October 2020

BGM

Barkerville Gold Mines Ltd.
Box 247, 3700 Ski Hill Road
Wells, BC, V0K 2R0

CARIBOO GOLD PROJECT

Detailed Project Description

EXECUTIVE SUMMARY

Introduction

Barkerville Gold Mines Ltd. (BGM) is proposing to develop and operate the Cariboo Gold Project (the Project), which includes the following major components:

- The Cariboo Gold Mine, an underground gold mine producing an average of 4,750 tonnes per day (1,735,000 tonnes per year [t/yr]) of ore located in the District of Wells and Cariboo Regional District, British Columbia (BC), including underground crushing, a Services Building containing a surface concentrator and paste backfill plant, a waste rock storage facility (WRSF) located at the Bonanza Ledge Mine near Wells, access roads, and associated mine infrastructure (Mine Site);
- BGM's existing Quesnel River Mill (QR Mill) and associated infrastructure, including upgrades to the existing QR Mill and construction of a filtered stack tailings storage facility (FSTSF);
- Transportation Routes:
  - Transportation of concentrate between the Mine Site and QR Mill along 56 kilometres (km) of Highway 26 and 59 km of the 500 Nyland Lake Forest Service Road, a forest service road maintained by West Fraser Mills Ltd.;
  - Transportation of workers, goods and service providers to Wells from Quesnel, BC along Highway 26. A new highway bypass will be built before Wells to enable traffic to exit the highway before entering the community;
  - Transportation of workers and goods to QR Mill from Quesnel along Highway 26 and the 500 Nyland Lake Road, and workers along the Quesnel Hydraulic Road to 2700 Road and the 500 Nyland Lake Road; and
- Transmission Line: a new 69 kilovolt (kV) transmission line, approximately 72 km in length, from Barlow Substation, near Quesnel to the Mine Site that follows a corridor north of Highway 26, along forest service roads or other disturbed areas where possible (Northern Transmission Line Route). This route will replace the previously identified 69 kV transmission line, described in the Initial Project Description (IPD), which was approximately 69 km in length and followed a corridor along Highway 26 from Barlow Substation to the Mine Site.

Total ore resources (indicated and inferred) are currently estimated to be approximately 24 million tonnes (t). The mine will have an approximate operational life of 16 years, operating 24 hours per day, 365 days per year. During the two-year construction period, it is estimated that a peak of 250 construction personnel will be present in Wells. During operations, the Project is anticipated to employ approximately 460 direct employees plus 50 contractors and consultants per year over the 16-year operational period.

The Project has been planned to avoid or minimize disturbance and impacts on the environment and stakeholders, where possible. Project infrastructure at the Mine Site will be located on brownfield sites that have been previously disturbed by historical mining operations. Infrastructure outside of the historical mine footprint will be located on previously disturbed areas or follow existing alignments where possible. The Project will also utilize the existing QR Mill and not require additional area outside the existing footprint.

The Project has a relatively low projected initial capital cost of approximately $400 to $450 million. Total capital cost, including sustaining capital, is estimated at just under $900 million which will provide meaningful economic partnerships, employment and training opportunities for Indigenous nations and local communities. The Project will provide an economic benefit to the Cariboo region, particularly in Wells, Quesnel, and surrounding areas, as well as the Province of BC. BGM is committed to developing the Project in a sustainable manner that respects environmental, social, heritage, and health l values while providing economic benefits for the region.

Purpose and Intent of the Detailed Project Description

The purpose and intent of the Detailed Project Description (DPD) is to clearly outline how information collected during the Early Engagement Phase has been used to inform project decisions and design. Information required by the BC Environmental Assessment Office (EAO's) Summary of Engagement is identified in Section 2.2. The DPD describes project components and activities and potential effects to inform the Readiness Decision along with the Process Planning Phase, should the project proceed to an environmental assessment (EA). The objectives of this DPD are to:

- Identify key issues and concerns, including identification of if and how some issues may have been resolved and others that will need to be addressed during the EA;
- Provide an overview of potential positive and negative effects of the project to inform Process Planning;
- Describe the outcomes of engagement undertaken to date; and
- Update and confirm information regarding the proposed project and identify how comments received on the IPD have been considered.

Project Updates and Changes

Planning, design and Project information has been amended and updated as necessary for various elements of the Project following receipt of information after the submission of the IPD in October 2019 and the Supplemental to the IPD, submitted in June 2020. The content in the sections below summarizes the current state of knowledge pertaining to all pertinent aspects of the Project; however, where updates and changes to Project design and/or Project information have occurred, these changes are encapsulated at the beginning of each section.

Existing Conditions

Baseline studies were initiated for the Project area in 2016 and will continue through 2021. Disciplines include the following:

- Air quality and climate
- Noise
- Light
- Hydrology
- Water quality and aquatic health
- Fish and fish habitat
- Soils
- Contaminated sites
- Geochemistry
- Vegetation
- Wildlife and wildlife habitat
- Hydrogeology
- Socio-community
- Land and resource use
- Use of lands and resources for traditional purposes
- Visual quality
- Economy
- Heritage
- Human health and ecological risk assessment

Potential Project Effects and Mitigation

An overview of the potential environmental, social, economic, heritage, and health effects of the Project, based on current knowledge of the Project and the existing environment, as well as examples of mitigation measures, are presented in Tables 41 and 42 (in the main body of this document). Example mitigation measures are also provided. Project effects, and linkages to Project components and activities, have been identified in Section 14.0 and will be further discussed in the Environmental Assessment Certificate (EAC) application.

Engagement and Consultation

BGM initiated engagement activities for the Project in 2016. BGM has engaged with the public and with the following Indigenous nations, regulatory agency representatives, and stakeholders through meetings, baseline study participation, teleconferences, e-mails, presentations and printed materials:

- Lhtako Dené Nation
- Soda Creek Indian Band (Xatśūll)
- Williams Lake First Nation (T'exelc)
- Tsilhqot'in National Government
- Neskonlith Indian Band
- Nazko First Nation
- District of Wells
- City of Quesnel
- Cariboo Regional District
- Barkerville Historic Town and Park
- Stakeholders
- BC EAO
- Ministry of Mines, Energy, and Petroleum Resources (BC)
- Ministry of Environment and Climate Change Strategy (BC)
- Forests, Lands, Natural Resource Operations and Rural Development
- BC Treaty Commission
- BC Hydro
- Ministry of Transportation and Infrastructure (BC)
- Impact Assessment Agency of Canada (the Agency)

BGM will work with the Indigenous nations throughout all stages of the EA to understand the extent to which Indigenous Interests may be affected by the Project.

The BC EAO-led component of the Early Engagement Phase of the Project occurred from May 14, 2020 to September 1, 2020. During this phase, BGM participated in two open houses with the BC EAO, and conducted other engagement activities with local communities, local and regional governments, Indigenous nations and other interested parties (Section 2.0). The Summary of Engagement, detailing public comments, Indigenous nations' interests in the Project area and concerns from technical advisors, was provided by the BC EAO to BGM on September 1, 2020. This document provides responses to these comments and describes how the issues raised will be addressed in either Project design, further studies or Project changes.

As engagement activities have been ongoing since 2016, BGM has been continuously refining the Project to address issues and concerns raised by the public, interested parties and Indigenous nations. Updates to Project components since the IPD and Supplemental to the IPD submission and how they have been informed by engagement activities are described in Section 2.0.

ABBREVIATIONS

The terminology used in this document has been defined where it is first used, while the following list has been presented to assist readers that choose to review only portions of the document.

Abbreviation	Description
ABA	acid-base accounting
AEC	areas of concern
the Agency	Impact Assessment Agency of Canada
APECs	areas of potential environmental concern
ARD	acid rock drainage
BC	British Columbia
BCEAA	British Columbia *Environmental Assessment Act*
BGM	Barkerville Gold Mines Ltd.
BMP	Best Management Practice
$CaCO_3$	calcium carbonate
°C	degrees Celsius
CCLUP	Cariboo Chilcotin Land Use Plan
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
COPC	contaminants of potential concern
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COVID-19	coronavirus disease of 2019
CRF	cemented rock fill
CRD	Cariboo Regional District
DPD	Detailed Project Description
DFO	Fisheries and Oceans Canada
DSI	Detailed Site Investigation
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office (BC)
EMP	Environmental Management Plan
EMPR	Ministry of Energy, Mines and Petroleum Resources (BC)
ENV	Ministry of Environment and Climate Change Strategy (BC)

ECCC	Environment and Climate Change Canada
ESA	Environmental Site Assessment
ESSFwk1	Engelmann Spruce-Subalpine Fir Cariboo Wet Cool variant
ESSFwc3	Engelmann Spruce-Subalpine Fir Cariboo Wet Cold variant
FLNRORD	Ministry of Forests, Lands, Natural Resources Operations and Rural Development (BC)
FSTSF	filtered stack tailings storage facility
GBA+	Gender-Based Analysis Plus
GHG	greenhouse gas
g/t	grams per metric tonne
ha	hectare
HCA	*Heritage Conservation Act* (BC)
HDS	high density sludge
HHERA	human health and ecological risk assessment
IAA	*Impact Assessment Act*
IPD	Initial Project Description
IWGM	International Wayside Gold Mines Ltd.
km	kilometre
km^2	square kilometre
kV	kilovolt
L	litre
L/s	litres per second
Ltd.	Limited
M	millions
m	metre
m^3	cubic metre
m^3/h	Cubic metre per hour
masl	metres above sea level
mg/g	milligrams per gram
ML	*metal leaching*
MZP	Main Zone Pit
MEM	Ministry of Energy and Mines (BC)
Mine Site	the underground mine and associated surface infrastructure
ML	metal leaching

mm	millimetre
Mm^3	million cubic metres
ENV	Ministry of Environment and Climate Change Strategy (British Columbia) – formerly Ministry of Environment
MOTI	Ministry of Transportation and Infrastructure (British Columbia)
MPM	Mineral processing material
MWh	megawatt hour
Mt	metric tonne
N	nitrogen
n/a	not applicable
NAG	net-acid generation
N_2O	nitrous oxide
NOx	oxides of nitrogen
NP	neutralization potential
NPAG	Non-Potentially Acid Generating
NRCan	Natural Resources Canada
oz	ounce
PAG	Potentially Acid Generating
PAHs	polycyclic aromatic hydrocarbons
PEA	Preliminary Economic Assessment
PEM	predictive ecosystem mapping
PM	particulate matter (PM_{10}, $PM_{2.5}$)
Project	Cariboo Gold Project (proposed)
Proponent	Barkerville Gold Mines Ltd. (BGM)
Q	quarter
QSRMP	Quesnel Sustainable Resource Management Plan
QR Mill	Quesnel River Mill
QR TSF	Quesnel River Tailings Storage Facility
RAAD	Remote Access to Archaeological Data
RCP	Reclamation and Closure Plan
RISC	Resources Information Standards Committee
ROM	run of mine
SAR	species at risk

SARA	*Species at Risk Act*
SBSmw	Sub-Boreal Spruce Moist Warm variant
SBSwk1	Sub-Boreal Spruce Willow Wet Cool variant
SFE	shake flask extraction
SO_2	sulphur dioxide
SO_4	sulfate
SSCP	South Seepage Collection Pond
t	tonne
t/m^3	tonnes per cubic metre
TBD	to be determined
TEK	Traditional Ecological Knowledge
TEM	Terrestrial Ecosystem Mapping
TFL	Tree Farm Licence
TNG	Tsilhqot'in National Government
tpd	tonnes per day
t/yr	tonne per year
TSF	tailings storage facility
tCO_2e	carbon dioxide equivalent tonnes
TSP	total suspended particles
URF	uncemented rock fill
VC	valued component
W/m^2	Watts per square metre
WHA	Wildlife Habitat Area
WTP	water treatment plant
WTS	water treatment system
WRSF	waste rock storage facility

Table of Contents

TABLES

FIGURES

APPENDICES

User Note: This Table of Contents section acts as a reference point for the Record of Issue, Executive Summary and Study Limitations sections as and when they might be required.

Therefore, the structure of this section must not be altered in any way.

1.0 GENERAL INFORMATION AND CONTACTS

1.1 Project Overview

Barkerville Gold Mines Ltd. (BGM) is proposing to develop and operate the Cariboo Gold Project (the Project), which includes the following major components (Figure 1):

- The Cariboo Gold Mine, an underground gold mine producing an average of 4,750 tonnes per day (tpd) (1,735,000 tonnes per year [t/yr]) of ore located in the District of Wells and Cariboo Regional District, British Columbia (BC), including underground crushing, a Services Building containing a surface concentrator and paste backfill plant, a waste rock storage facility (WRSF) located at the Bonanza Ledge Mine near Wells, access roads and associated mine infrastructure (Mine Site);
- BGM's existing Quesnel River Mill (QR Mill) and associated infrastructure, including upgrades to the existing QR Mill and construction of a filtered stack tailings storage facility (FSTSF).
- Transportation Routes:
  - Transportation of concentrate between the Mine Site and the QR Mill Site along 56 kilometres (km) of Highway 26 and 59 km of the 500 Nyland Lake Forest Service Road, a forest service road maintained by West Fraser Mills Ltd.;
  - Transportation of workers, goods and service providers to Wells from Quesnel, BC along Highway 26. A new highway bypass will be built before Wells to enable traffic to exit the highway before the community;
  - Transportation of workers and goods to the QR Mill from Quesnel along Highway 26 and the 500 Nyland Lake Road, and workers along the Quesnel Hydraulic Road to 2700 Road and the 500 Nyland Lake Road; and
- Transmission Line: a new 69 kilovolt (kV) transmission line, approximately 72 km in length, from Barlow Substation, near Quesnel to the Mine Site that follows a corridor north of Highway 26 along forest service roads or other disturbance areas where possible (Northern Transmission Line Route). This route will replace the previously identified 69 kV transmission line described in the Initial Project Description (IPD), which was approximately 69 km in length and followed a corridor along Highway 26 from Barlow Substation to the Mine Site.

The proposed infrastructure at the Mine Site and QR Mill are shown in Figure 2, Figure 3, Figure 4, Figure 5, and Figure 6. The proposed Transmission Line corridor is shown in Figures 7-1, 7-2, and 7-3. Further details on the Project and infrastructure are provided in Section 7.0.

Ore produced at the Mine Site will undergo crushing, ore sorting, milling, flotation, and dewatering before being trucked as a concentrate along the Transportation Route to QR Mill for processing. During the construction phase, the waste rock will be extracted and placed at the Bulk Fill Storage Facility. After the Construction Phase, the waste rock will be trucked from the Mine Site to the WRSF at the existing Bonanza Ledge Site or used as backfill material or the underground mine workings.

Construction will occur over a period of two years, once all permits and approvals have been received. Total ore resources (indicated and inferred) are currently estimated to be approximately 24 million tonnes (t). Based on these resources, the mine will have an approximate life of 16 years, operating 24 hours per day, 365 days per year. Reclamation and closure will occur over a period of 2 years after mining is completed.

Most of the Project infrastructure at the Mine Site will be located on brownfield sites that were previously disturbed by historical mining operations. The Project will also use brownfield sites at QR Mill and will not require any additional area outside the existing footprint. Use of the brownfield sites will reduce the potential environmental effects associated with ground disturbance and vegetation clearing at both sites.

New disturbance will be required for the Northern Transmission Line. Routing for the Northern Transmission Line has prioritized paralleling existing disturbance such as forest service roads and previously disturbed cut blocks where practical. The route also considers sensitive environmental features, land use and the visual quality near the District of Wells.

The information provided in this Detailed Project Description (DPD) reflects a preliminary engineering design basis and will be subject to ongoing studies and optimizations. The Environmental Assessment (EA) will be supported by studies currently underway for the technical, environmental and socio-economic components of the Project. Through ongoing consultation and engagement, BGM will inform Indigenous nations, federal and provincial government representatives and agencies, local and regional government representatives, community and economic organizations, adjacent permit/authorization holders, non-government organizations, local and regional businesses, and residents (Interested Parties) about the Project and consider their feedback as the Project progresses.

A summary of Indigenous engagement and consultation and other engagement undertaken is provided in Section 2.0 of this document.

The Project will:

- Not require federal approval under the *Impact Assessment Act* (Section 4.4.1);
- Implement reasonable practices and mitigation measures to avoid and limit potential adverse effects to environmental, economic, social, health, and heritage resources (Section 14.5); and
- Undergo all required permitting and statutory regulatory approval processes, including an environmental assessment (EA), prior to initiating construction (Section 4.0).

This DPD has been prepared in accordance with the BC Environmental Assessment Office (EAO) *Early Engagement Policy* (December 2019), *Human and Community Well-Being – Guidelines for Assessing Social, Economic, Cultural and Health Effects in Environmental Assessments in BC* (April 2020) and *Effects Assessment Policy* (April 2020). The BC EAO 2016 *Guidelines for Preparing a Project Description for an Environmental Assessment in British Columbia* were also consulted.

A table of concordance is provided in Appendix A.

1.2 Project Location and Options

Project infrastructure and locations are shown in Figures 1 to 7-3. The proposed Transmission Line corridor has been updated from the IPD and is shown in Figures 7-1, 7-2 and 7-3. Further details on the Project and infrastructure are provided in Section 7.0. Design details for all Project components are under development, and further details will be shared as they become available.

Most Mine Site infrastructure will be located on historical mine waste from the Cariboo Gold Quartz Mine which operated from 1933 to 1967, for which no remediation or reclamation has been completed. Infrastructure outside of the historical mine waste footprint will be located on previously disturbed areas (e.g. the existing Bonanza Ledge Mine) or follow existing alignments where possible. The final location, capacity, and layout of Project infrastructure will consider the results of current and planned geological, geotechnical, and environmental studies and inputs from consultation and engagement. It will be further defined as this information becomes available.

At this stage, exploration drilling has delineated a resource, and the approximate extents of the resource have been determined. A variety of mining and milling alternatives were assessed early in the planning stages of the Project, including open pit mining, underground mining, construction of a new mill near Wells, upgrading of the existing QR Mill, aboveground and underground ore concentration, new tailings ponds and/or dry stack tailings, and a variety of camp configurations and related infrastructure locations.

An underground mine complex will be established beneath Island Mountain, Cow Mountain, and the Valley Zone between the two mountains (Figure 3). Ore will be crushed underground. Concentration through ore sorting and flotation will occur at surface in the Services Building, which is fully enclosed. The combined sorted ore and flotation concentrates will be loaded into transport trucks in the Services Building and then hauled to QR Mill in ore trucks. Flotation tailings produced at the Mine Site will be returned underground in the form of paste backfill. Waste rock will be used as surface fill material during construction and as backfill material during operations. Surplus waste rock will be placed at BGM's existing Bonanza Ledge Mine, located 4 km from the Mine Site (Figure 5).

The QR Mill will be upgraded and used to process all ore generated from the Project. An additional footprint outside of the established disturbance at the QR Mill site is not required. A new filtered stack tailings storage facility will be constructed for managing tailings associated with Project operations (Figure 6). Technical studies are in progress to confirm and optimize the economic and technical merits of this current strategy. These studies, along with socio-environmental inputs and inputs from consultation and engagement, will guide the final shape and extent of the proposed Project activities and related infrastructure.

As described in the Supplemental to the IPD, three possible locations for filtered tailings storage at the QR Mill are under consideration (Figure 6). Option 3 is considered to be the preferred tailings storage option. Filtered tailings from the Project would be integrated into the "dry cover" closure strategy for the existing QR Mill TSF. The filtered tailings would be placed on the existing tailings and waste rock deposited in the QR Mill TSF and then covered with an engineered cover at the end of the operation. Option 3 has a design capacity for approximately 4.0 million tonnes (Mt) of tailings and a total area is 17.4 hectares (ha). Building the FSTSF will be completed in stages to integrate it into the existing water management system, of which the existing QR Mill Main Zone Pit is an active part. At later stages of operations, the water management system will be supplemented with a new freshwater pond. The freshwater pond will be located at the same location as the existing South Seepage Collection Pond within the QR Mill's existing boundaries.

Transportation Routes do not require upgrading as part of the Project. Concentrate trucks will travel between the Mine Site and QR Mill daily during operations. Workers and goods will be transported along the Transportation Routes between Quesnel, the Mine Site, and QR Mill daily during operations. The expected mode of daily worker transportation is a combination of personal use vehicles and bus transportation.

A new 69 kV transmission line, approximately 72 km in length, will be constructed from Barlow Substation to the Mine Site within a corridor north of Highway 26 (Figures 7-1, 7-2, 7-3).

The Project overlaps both private and public property, at the Mine Site (Figure 8).

1.3 Contact and Proponent Information

Barkerville Gold Mines Ltd. (BGM), wholly owned by Osisko Gold Royalties Ltd. (OGR), is a mining company focused on the development of over 2,000 km^2 of mineral tenures in the Cariboo Mining District in British Columbia, Canada. BGM is a Canadian company based in Wells, BC and headquartered in Toronto, Ontario.

Proponent:

BGM Corporate Office:

Barkerville Gold Mines Ltd.
Suite 1440 155 University Avenue
Toronto, Ontario, M5H 3B7
Website: https://osiskogr.com/en/bgm-cariboogoldproject-ea/
Email: feedback@barkervillegold.com

BGM Site Office:

Barkerville Gold Mines Ltd.
3700 Ski Hill Road
Wells, British Columbia, V0K 2R0

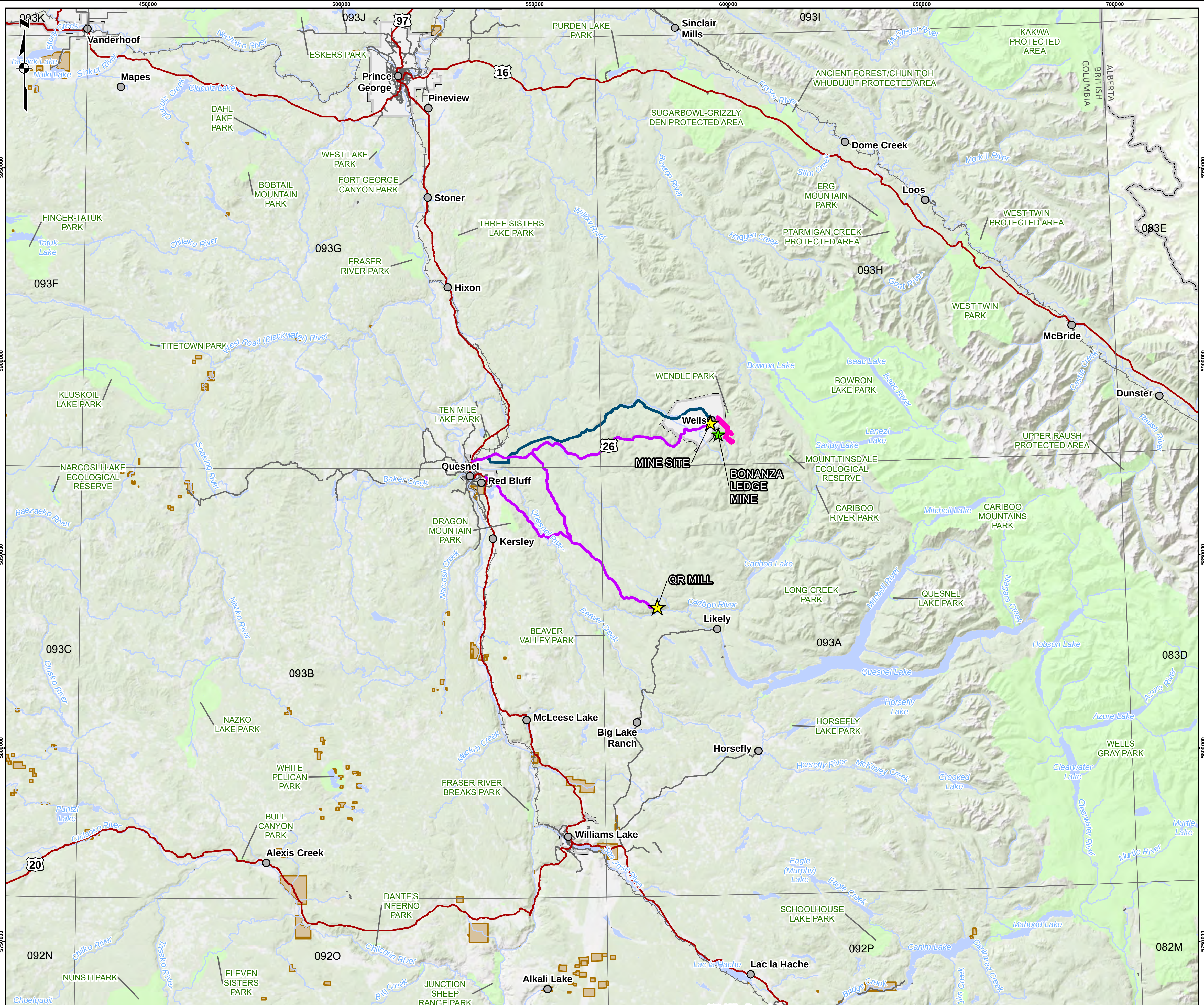
BGM's President and Chief Executive Officer:

Mr. Chris Lodder
President and Chief Executive Officer
Barkerville Gold Mines Ltd.
Cell Phone: (416) 388-1670
E-mail: clodder@barkervillegold.com

BGM's Environmental Assessment Representative:

Mr. Chris Pharness
Vice President, Sustainability & External Relations.
Barkerville Gold Mines Ltd.
Telephone: (236) 713-2018
Cell Phone: (250) 961-2778
Email: cpharness@barkervillegold.com

The DPD was prepared with the support of various consultants. Appendix B lists the consultants and their qualifications.



LEGEND

- POPULATED COMMUNITY
- MUNICIPALITY BOUNDARY
- HIGHWAY
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- FIRST NATION RESERVE
- BARKERVILLE HISTORIC TOWN AND PARK
- PROJECT INFRASTRUCTURE LOCATION
- BONANZA LEDGE MINE
- TRANSPORTATION ROUTE
- NORTHERN TRANSMISSION LINE ROUTE

REFERENCE(S)

1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
2. HILLSHADE DERIVED FROM LIDAR DATA FLOWN BY MCELHANNAY CONSULTANTS LTD. JUNE 27, 2016.
3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

NAD83 CSRS
UTM ZONE 10N

0 10 20 30 40 50
1:1,000,000 KILOMETRES

BGM

CARIBOO GOLD PROJECT

LOCATION OF THE PROPOSED PROJECT

REV.	DESCRIPTION	DATE	INITIALS
A		2020-09-14	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	1

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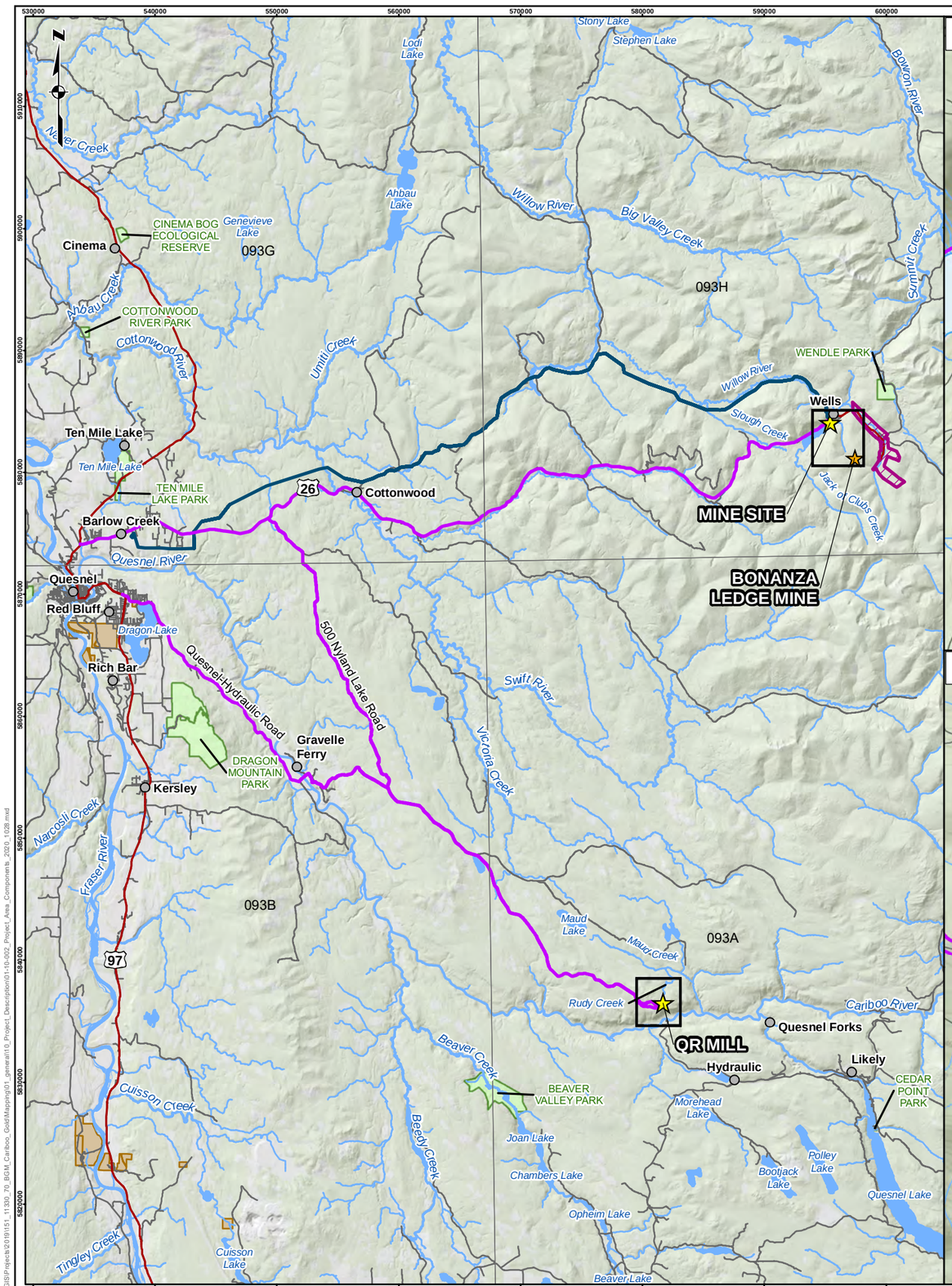
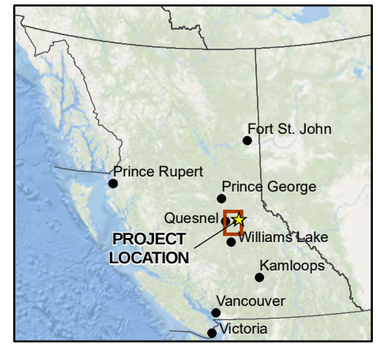


LEGEND

- POPULATED COMMUNITY
- ROAD
- HIGHWAY
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- FIRST NATION RESERVE
- BARKERVILLE HISTORIC TOWN AND PARK
- A ROAD
- B ROAD
- C ROAD
- TRANSPORTATION ROUTE
- NORTHERN TRANSMISSION LINE ROUTE
- SURFACE DISTURBANCE AREA



REFERENCE(S)

1.WATER FEATURES, TRANSPORTATION FEATURES OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. CITIES/TOWNS, INDIAN RESERVES, FEDERAL LANDS AND PARK/PROTECTED AREAS OBTAINED FROM BC MINISTRY OF FORESTS, LANDS NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

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NAD83 CSRS
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BGM

CARIBOO GOLD PROJECT

PROPOSED PROJECT COMPONENTS AND AREA

REV.	DESCRIPTION	DATE	INITIALS
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PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	2

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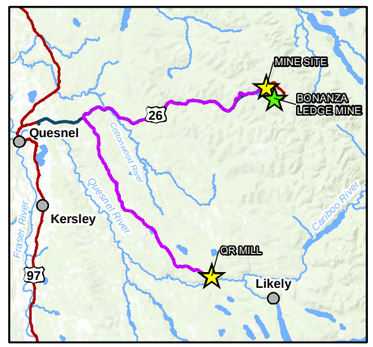
Mosquito Intake Ventilation Raise
Mosquito Creek
Mine Site Road To Surface Raise
Northern Transmission Line Route
Downey Creek
Pinus Creek
Williams Creek
Mailleue Creek
Island Mountain Portal
Willow River
Wells
Mosquito Exhaust Ventilation Raise
B Road
Valley Portal
Shaft Intake Ventilation Raise
Mine Site Complex
Jack of Clubs Lake
Valley Intake Ventilation Raise
Transportation Route
Cow Intake Ventilation Raise
Wilsons Creek
26
C Road
Lowhee Creek
A Road
District Of Wells Boundary
093H/04
Waste Rock Storage Facility
McLellan Gulch

593000 594000 595000 596000 597000 598000 599000
5885000 5884000 5883000 5882000 5881000

LEGEND

- MINE PORTAL LOCATION
- VENTILATION RAISE
- FLOW DIRECTION
- HIGHWAY
- WATERCOURSE
- EXISTING MINE SITE ROAD
- A ROAD
- B ROAD
- C ROAD
- TRANSPORTATION ROUTE
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE ROUTE ROW 36M
- BARKERVILLE HISTORIC TOWN AND PARK
- MINE SITE SURFACE SEDIMENT POND
- UNDERGROUND INFRASTRUCTURE
- SURFACE DISTURBANCE AREA
- UNDERGROUND MINE AREA
- FOOTPRINT
- DISTRICT OF WELLS BOUNDARY



REFERENCE(S)

1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
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4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

NAD83 CSRS
UTM ZONE 10N

0 500 1,000
1:21,000 METRES

BGM

CARIBOO GOLD PROJECT

MINE SITE - CURRENT AND PROPOSED INFRASTRUCTURE

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-28	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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595000 595250 595500 595750 596000

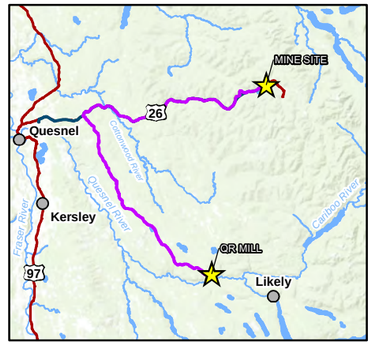
5884500 5884250 5884000 5883750

N

Northern Transmission Line Route
Island Mountain Portal
Island Mountain Portal Access Road
Willow River
Wells
Highway 26 Bypass
Bridge
093H/04
Access Road
Electrical Substation
Lowhee Creek
Transportation Route
Effluent Discharge into Willow River (Option)
Camp A and B
Parking
Main Entrance Gate
Accommodation
Water Treatment Plant
Bulk Fill Storage Facility
Septic Disposal Field
WTP Feed Pump
Sediment Pond
Service Building
BGM Office
B Road
Dike
26
Fuel Tank
Camp Road
Valley Portal
Emergency Spillway
Historic Mine Headframe
South non-contact Water Diversion Channel and Exit Channel for the Spillway
Valleyzone Ventilation Fan Heater and Propane Tank
Jack of Clubs Lake
South non-contact Water Diversion Berm
Effluent Discharge Point into Jack of Clubs Lake (Option)
C Road
Fire Water Pump Station

LEGEND

- MINE PORTAL LOCATION
- HIGHWAY
- B ROAD
- C ROAD
- FLOW DIRECTION
- WATERCOURSE
- TRANSPORTATION ROUTE
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE ROUTE ROW 36M
- MINE SITE SEDIMENT POND
- EXISTING MINE SITE ROAD
- MINE SITE SURFACE INFRASTRUCTURE
- FOOTPRINT



REFERENCE(S)

1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
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3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

NAD83 CSRS
UTM ZONE 10N

0 50 100 150
1:4,000 METRES

BGM

CARIBOO GOLD PROJECT

CARIBOO GOLD MINE COMPLEX EXISTING AND PROPOSED SURFACE INFRASTRUCTURE

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

25mm

0

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596500 596750 597000 597250 597500

5881750 5881500 5881250 5881000

N

Lowhee Creek

Watson Gulch

Sediment Pond

Existing Contact Ditch

East Diversion Ditch

Historic BC Vein Shaft

093H/04

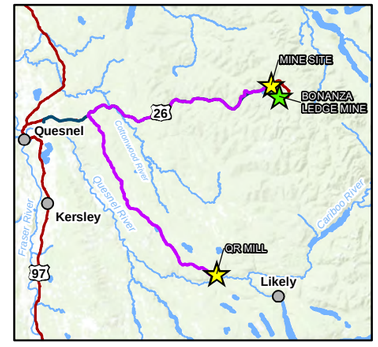
Existing Rainbow Road Ditch

Existing Non-Contact Water Ditch

Waste Rock Storage Facility

LEGEND

- A ROAD
- C ROAD
- EXISTING SURFACE CONTACT WATER CHANNEL
- EXISTING SURFACE NON-CONTACT WATER CHANNEL
- FLOW DIRECTION
- SEDIMENT POND
- WASTE ROCK STORAGE FACILITY
- FOOTPRINT



REFERENCE(S)

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NAD83 CSRS
UTM ZONE 10N

0 50 100 150
1:4,000 METRES

CARIBOO GOLD PROJECT

PROPOSED WASTE ROCK STORAGE FACILITY AT BONANZA LEDGE MINE

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-23	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

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579750 580000 580250 580500 580750 581000 581250 581500 581750 582000 582250 582500 582750

5837750 5837500 5837250 5837000 5836750 5836500 5836250 5836000 5835750 5835500

N

Option 2
Dry-Stack TSF

Rusty Creek

Potable
Water Well

Option 3
Dry-Stack TSF(Preferred)

TRANSPORTATION
ROUTE

NEW QR Camp

093A/12

QR Mill

Option 3 South Seepage
Collection Pond

Option 1
Dry-Stack TSF

New Tailings
Dewatering Plant

Water
Treatment Plant

QR Offices

New
Conveyor

New Ore
Feed Hopper

Main Zone Pit

Ore Storage

TRANSPORTATION
ROUTE

Unnamed Creek

Creek #2

Creek #2.5

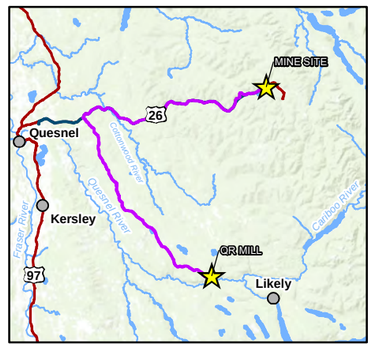
Creek #3

QUESNEL RIVER

579750 580000 580250 580500 580750 581000 581250 581500 581750 582000 582250 582500 582750

LEGEND

- POTABLE WATER WELL
- WATERCOURSE
- FLOW DIRECTION
- TRANSPORTATION ROUTE
- DISTURBANCE BOUNDARY
- OPTION 1 DRY-STACK TSF
- OPTION 2 DRY-STACK TSF
- OPTION 3 DRY-STACK TSF(PREFERRED)
- DRY-STACK TSF WATER MANAGEMENT STRUCTURE
- NEW INFRASTRUCTURE



REFERENCE(S)

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NAD83 CSRS
UTM ZONE 10N

0 100 200
1:10,000 METRES

BGM

CARIBOO GOLD PROJECT

QR MILL - CURRENT AND PROPOSED SURFACE INFRASTRUCTURE

REV.	DESCRIPTION	DATE	INITIALS
B		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	6

Y:\GIS\Projects\2019\151_11330_70_BGM_Cariboo_Gold\Mapping\01_general\10_Project_Description\01-10-004_QR_Mill_2020_1028.mxd

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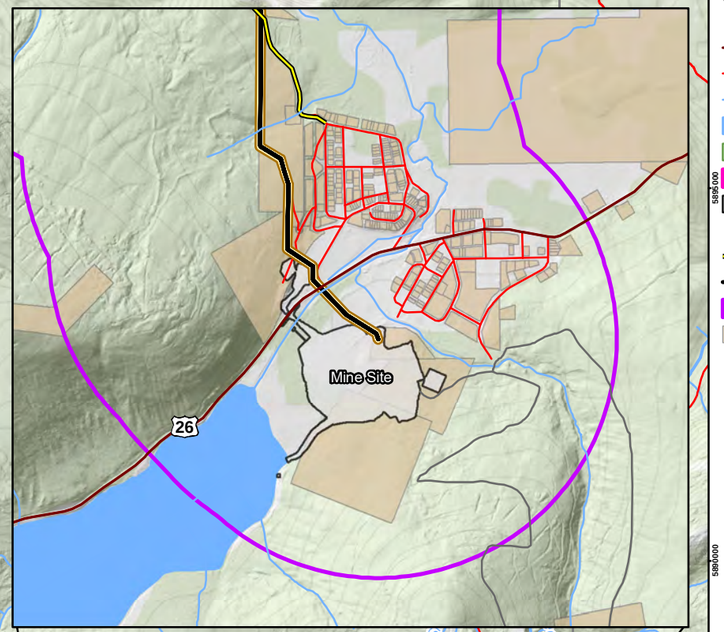
0 25mm

580000 585000 590000 595000 600000

5895000 5890000 5885000 5880000

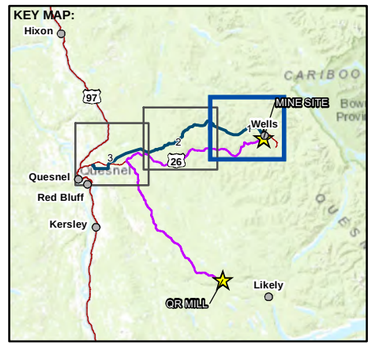
N

Cooper Creek
Sugar Creek
Hardscrabble Creek
Northern Transmission Line Route
093H/04
Willow River
Dragon Creek
Rucheon Creek
Lightning Creek
Jawbone Creek
Peters Creek
Chisholm Creek
Slough Creek
Mine Site
WRSF at Bonanza Ledge
Wells
Mosquito Creek
Downey Creek
WENDLE PARK
Jubilee Creek
Pleasant Valley Creek
Jack of Clubs Creek
26



LEGEND

- POPULATED COMMUNITY
- HIGHWAY
- EXISTING ACCESS ROADS
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- BARKERVILLE HISTORIC TOWN AND PARK
- DISTURBANCE AREA
- BARLOW SUBSTATION
- TRANSMISSION LINE ACCESS ROAD
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE CORRIDOR
- PRIVATE PARCEL



REFERENCE(S)

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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

NAD83 CSRS
UTM Zone 10N

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

BGM

CARIBOO GOLD PROJECT

NORTHERN TRANSMISSION LINE ROUTE
1 OF 3

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	7-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

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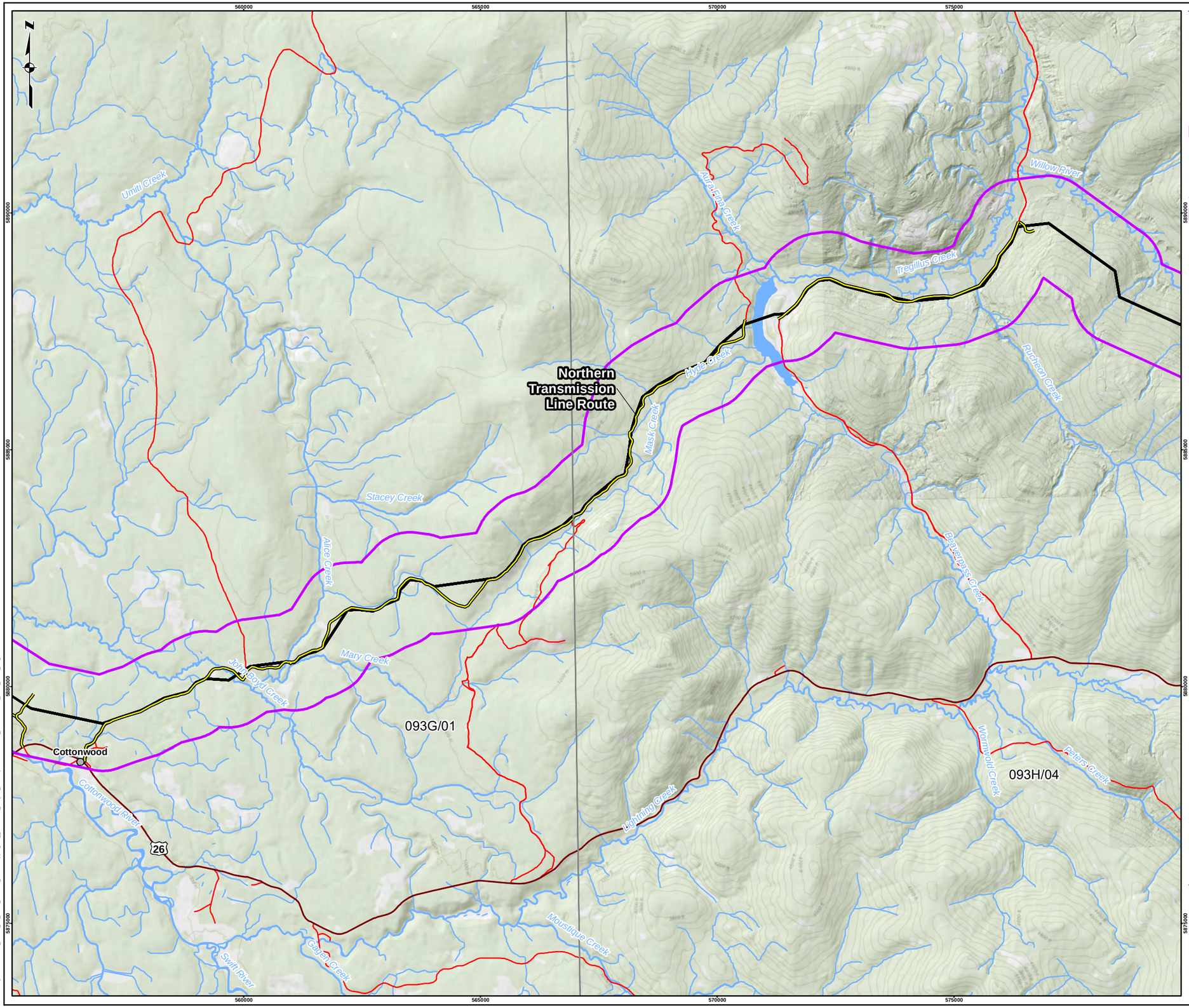
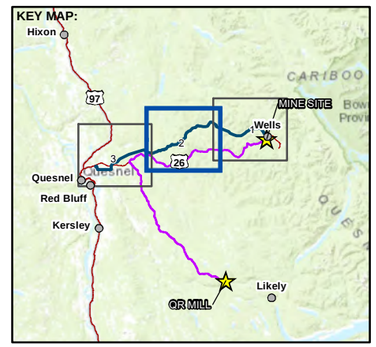


LEGEND

- POPULATED COMMUNITY
- HIGHWAY
- EXISTING ACCESS ROADS
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- BARKERVILLE HISTORIC TOWN AND PARK
- DISTURBANCE AREA
- BARLOW SUBSTATION
- TRANSMISSION LINE ACCESS ROAD
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE CORRIDOR
- PRIVATE PARCEL



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3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

NAD83 CSRS
UTM Zone 10N

0 1 2 3 4 5

1:80,000 KILOMETRES

BGM

CARIBOO GOLD PROJECT

NORTHERN TRANSMISSION LINE ROUTE
2 OF 3

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	7-2

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

535000 540000 545000 550000 555000

5885000 5880000 5875000 5870000

Northern Transmission Line Route

BLW

Barlow Creek

Quesnel

Red Bluff

Cottonwood

093G/01

093B/16

093B/15

Dragon Lake

Cottonwood River

Frye Creek

Umiti Creek

John Boyd Creek

Quesnel River

Deacon Creek

500 (Nyland Lake Road)

26

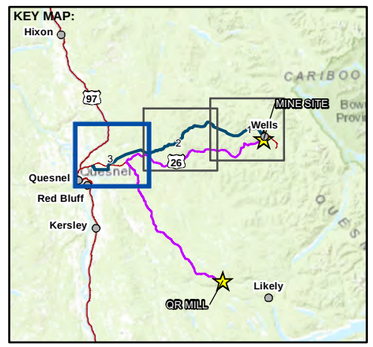
97

N

LEGEND

- POPULATED COMMUNITY
- HIGHWAY
- EXISTING ACCESS ROADS
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- BARKERVILLE HISTORIC TOWN AND PARK
- DISTURBANCE AREA
- BARLOW SUBSTATION
- TRANSMISSION LINE ACCESS ROAD
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE CORRIDOR
- PRIVATE PARCEL

KEY MAP:



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NAD83 CSRS
UTM Zone 10N

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

BGM

CARIBOO GOLD PROJECT

NORTHERN TRANSMISSION LINE ROUTE
3 OF 3

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	7-3

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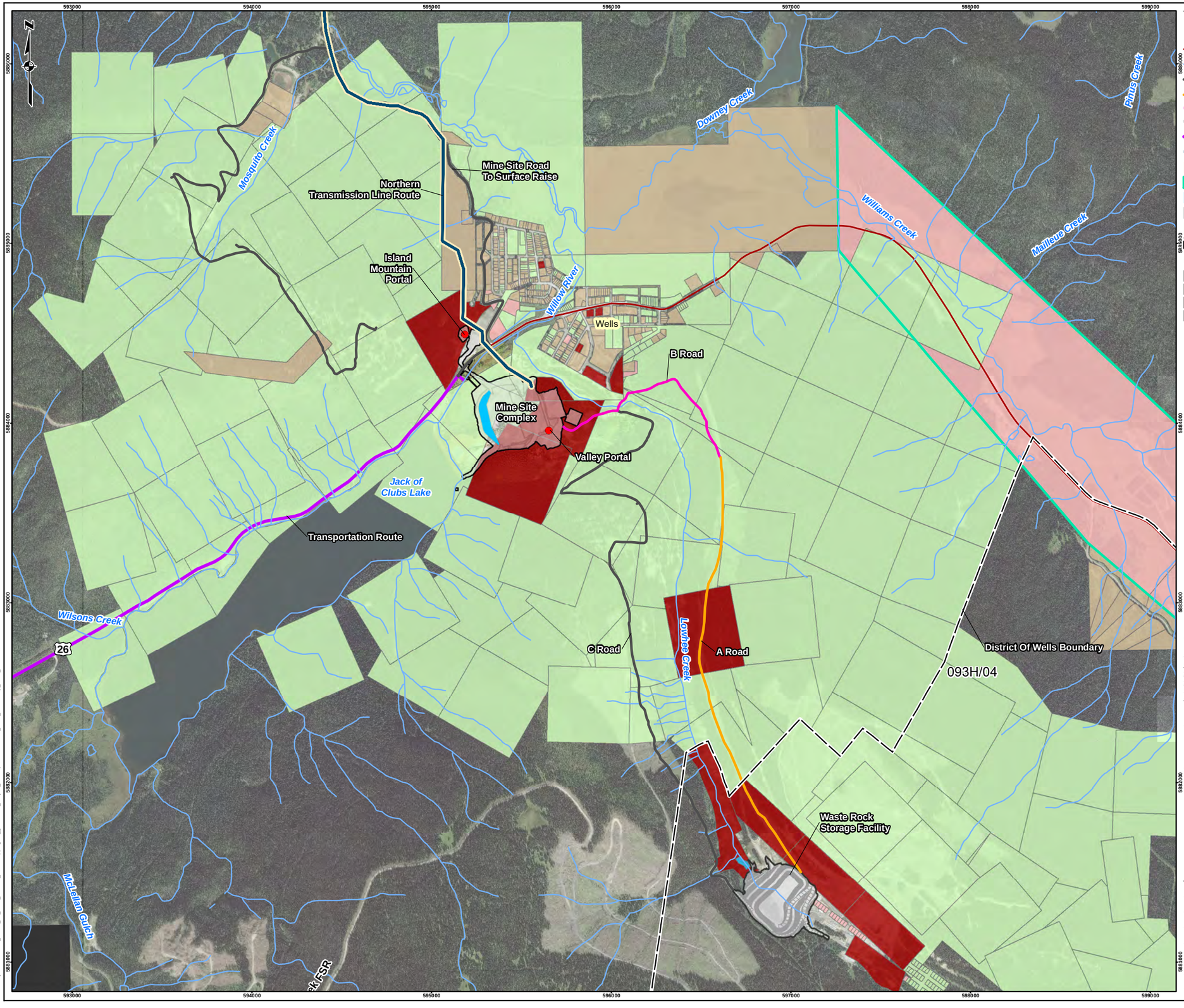
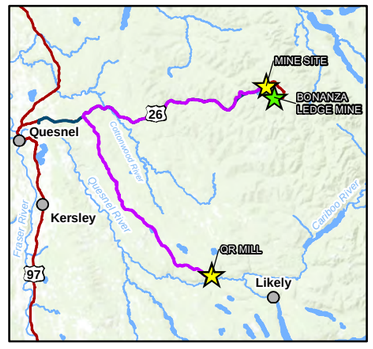


LEGEND

- MINE PORTAL LOCATION
- HIGHWAY
- WATERCOURSE
- EXISTING MINE SITE ROAD
- A ROAD
- B ROAD
- C ROAD
- TRANSPORTATION ROUTE
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE ROUTE ROW 36M
- BARKERVILLE HISTORIC TOWN AND PARK
- MINE SITE SURFACE SEDIMENT POND
- SURFACE DISTURBANCE AREA
- FOOTPRINT
- DISTRICT OF WELLS BOUNDARY

PARCEL OWNERSHIP

- CROWN
- PRIVATE
- PRIVATE BGM
- OTHER



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NAD83 CSRS
UTM ZONE 10N

0 500 1,000
1:21,000 METRES

CARIBOO GOLD PROJECT

MINE SITE AND LAND OWNERSHIP INFORMATION

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-28	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	8

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

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1.4 Corporate Policies

BGM is committed to a culture of honesty, integrity, and accountability and strives to operate in accordance with the highest ethical standards and applicable laws and regulations. BGM has implemented a Code of Business Conduct and Ethics, which outlines the ethical principles that should guide all representatives of BGM and any subsidiaries and/or controlled entities of BGM in their daily work.

BGM is subject to a number of laws, rules, and regulations with respect to the conduct of its business. Representatives are expected to maintain compliance with the letter and spirit of all laws governing the jurisdictions in which they perform their duties. The Code of Business Conduct and Ethics does not purport to address all areas of law that representatives might encounter in the day-to-day business of BGM. However, the following areas are worth specifically mentioning:

Human Rights Laws: BGM values the diversity of its representatives, customers, and suppliers and is committed to providing equal treatment in all aspects of the business. Abusive, harassing, or offensive conduct is unacceptable, whether verbal, physical, visual or otherwise. BGM will not tolerate any conduct that is discriminatory or harassing or otherwise compromises an individual's human rights.

Privacy Laws: BGM is committed to maintaining the accuracy, confidentiality, security, and privacy of the personal information of its customers, suppliers, and representatives. Representatives who have access to personal information are expected to support BGM's efforts to develop, implement, and maintain procedures and policies designed to manage personal information.

Health and Safety Laws: BGM complies with all applicable health and safety laws and regulations as part of its commitment to providing its representatives with a safe and healthy work environment. Representatives have a responsibility to maintain this work environment. In this regard, representatives are expected to work in a safe manner with due regard for their personal safety as well as that of their co-workers and to report accidents, injuries, hazardous equipment, and unsafe practices. Representatives are prohibited from engaging in the business of BGM while under the influence of alcohol or illegal drugs.

Environmental Laws: Cognizant of its responsibility to the environment, BGM strives to conform to all applicable environmental laws and regulations and to promote the respect of the environment in its activities. Representatives are expected to support BGM's efforts to develop, implement, and maintain procedures and programs designed to protect and preserve the environment.

Securities Laws: BGM is committed to protecting investments and expects all representatives to comply with the applicable reporting obligations and trading restrictions imposed by BGM, a securities commission, or stock exchange. Representatives who are in possession of material information about BGM must not trade in securities of BGM until such information is generally and publicly available. Providing inside information to others who then trade on it is also strictly prohibited.

Competition Laws: Competition laws are enacted to limit practices that are seen to impair the function of a free and open marketplace. A complete description of these laws is beyond the scope of this Code; however, they include price fixing, bid rigging, price discrimination, allocation of markets, and boycotting of certain suppliers or customers. Representatives having regular dealings with customers and suppliers should become familiar with the laws applying to these practices, as non-compliance can result in severe penalties being imposed on both BGM and the individuals involved.

1.5 Indigenous Nations

Based on a review of potential interests in the Project area, the Consultative Areas Database, and guidance from the BC EAO and the Impact Assessment Agency of Canada ('the Agency'), the Project was determined to be within, or in proximity to, the established or asserted traditional territories of the following Indigenous nations:

- Lhtako Dené Nation
- Soda Creek Indian Band
- Tsilhqot'in National Government
- Williams Lake First Nation
- Nazko First Nation

BGM is engaging with these Indigenous nations to understand their interests in the Project and the areas influenced by the Project. During the Early Engagement Period, Lhtako Dené Nation, Soda Creek Indian Band and Williams Lake First Nation provided the BC EAO notices of self-identification as participating Indigenous nations for the environmental assessment.

Prior to March 2020, BGM was also engaging with Neskonlith Indian Band. In March 2020, the BC EAO advised that BGM does not need to further engage with Neskonlith Indian Band based on their communicated interests in the area.

BGM will update this list, as required, as the Project moves forward, through consultation with Indigenous nations and as advised by the BC EAO. Additional information on Indigenous nations, including consultation and engagement activities, is provided in Sections 2.0 and 9.0.

1.6 Communities

Several communities are located near or adjacent to the Project. The Mine Site is located immediately adjacent to the community of Wells and is approximately 350 metres (m) west of the nearest residence which is currently unoccupied. Barkerville Historic Town and Park is located approximately 6 km from the community of Wells. A portion of the Mine Site and the other Project components are in Electoral Areas C and F of the Cariboo Regional District (CRD). There are several unincorporated communities in the CRD, including New Barkerville and others primarily along Highway 26. The Mine Site is located approximately 80 km east of Quesnel, BC.

The QR Mill is located approximately 111 km from the Mine Site, 58 km southeast of Quesnel, and 18 km northwest of Likely (direct distance; there are no roads providing direct access from Likely to the QR Mill).

Additional information on the communities and Barkerville Historic site is provided in Section 11.2.

2.0 ENGAGEMENT SUMMARY

Engagement with Indigenous nations, governments and government agencies, stakeholders and the public began in 2016 and is ongoing. In September of 2020, the BC EAO issued its Summary of Engagement report, which summarizes input received during the Early Engagement phase's (public comment and engagement period). Specifically, it summarizes public comments, outlines Indigenous interests in the Project area, and identifies key issues and concerns from technical advisors after reviewing the IPD and Supplemental to the IPD.

This section provides a summary of the engagement activities that have occurred to the issuance of the Summary of Engagement and discusses engagement that will be undertaken during the remainder of the Early Engagement phase. Descriptions of specific engagement activities and the materials used for engagement are provided. Engagement activities are distinguished as those occurring prior to the start of the Early Engagement Phase and those that occurred after. Responses to input received by the BC EAO and a description of the role that engagement has played on specific Project decisions and design are also provided.

2.1 Indigenous Nation Engagement

BGM has been engaging with Indigenous nations regarding the Project and activities in the Project area since 2016. BGM will continue to engage with Indigenous nations as the Project advances. Additional information regarding Indigenous interests is provided in Section 9.0.

2.1.1 Engagement Prior to the Early Engagement Phase

Discussion with Indigenous nations began in in 2016. The engagement activities conducted prior to the Early Engagement Phase are discussed in Table 1.

Table 1: Key Engagement Activities with Indigenous Nations Prior to the Early Engagement Phase

Date	Indigenous Nations	Activity and Additional Information
2016	■ Lhtako Dené Nation ■ Soda Creek Indian Band	Initial Meetings: In response to concerns expressed by Lhtako Dené Nation and Soda Creek Indian Band with respect to open pit mining, BGM changed the mine plan from open pit to an underground mine in early 2017. At the direction of the BC EAO, BGM expanded the scope of its engagement to include the Williams Lake First Nation, Nazko First Nation, Neskonlith Indian Band and Tsilhqot'in National Government.
December 21, 2018	■ Lhtako Dené Nation ■ Soda Creek Indian Band ■ Williams Lake First Nation ■ Nazko First Nation ■ Neskonlith Indian Band ■ Tsilhqot'in National Government	Indigenous nations were asked to provide comments on the draft Project Description by January 31, 2019. Lhtako Dené Nation and Soda Creek Indian Band provided comments to BGM. Neskonlith Indian Band requested spatial files for information in the Project Description but did not provide comments. BGM provided the spatial files. No comments were received from Williams Lake First Nation, Nazko First Nation, or the Tsilhqot'in National Government. BGM revised the Project Description based on the comments received from Lhtako Dené Nation and Soda Creek Indian Band.

Date	Indigenous Nations	Activity and Additional Information
April 18, 2019	■ Lhtako Dené Nation ■ Soda Creek Indian Band ■ Williams Lake First Nation ■ Nazko First Nation ■ Neskonlith Indian Band ■ Tsilhqot'in National Government	Indigenous nations were provided with a copy of the Project Description and asked to provide comments. Lhtako Dené Nation and Soda Creek Indian Band provided comments on the Project Description to BGM on May 16, 2019, and BGM revised the Project Description based on the comments received. No comments on the Project Description were received from Neskonlith Indian Band, Williams Lake First Nation, Nazko First Nation, or the Tsilhqot'in National Government.
July 26, 2019	■ Lhtako Dené Nation ■ Soda Creek Indian Band ■ Williams Lake First Nation ■ Nazko First Nation ■ Neskonlith Indian Band ■ Tsilhqot'in National Government	On July 29, 2019, Lhtako Dené Nation notified BGM that it supported the submission of the Project Description in its current form. Soda Creek Indian Band provided comments to BGM on August 22, 2019. BGM revised the Project Description based on the comments received from Soda Creek Indian Band. No comments on the Project Description were received from Neskonlith Indian Band, Williams Lake First Nation, Nazko First Nation, or the Tsilhqot'in National Government. BGM received additional comments from the BC EAO requesting additional detail and refinement of certain Project components on August 28, 2019.
September 5, 2019	■ Lhtako Dené Nation ■ Soda Creek Indian Band ■ Williams Lake First Nation ■ Nazko First Nation ■ Neskonlith Indian Band ■ Tsilhqot'in National Government	BGM revised the Project Description based on the BC EAO's comments and recirculated the document to Indigenous nations for review and comment. No additional comments on the Project Description were received from Lhtako Dené Nation, Soda Creek Indian Band, Neskonlith Indian Band, Williams Lake First Nation, Nazko First Nation, or the Tsilhqot'in National Government.
October 24, 2019	■ Lhtako Dené Nation ■ Soda Creek Indian Band ■ Williams Lake First Nation ■ Nazko First Nation ■ Neskonlith Indian Band ■ Tsilhqot'in National Government	Final Project Description submitted to Indigenous Nations and BC EAO. The Project Description was accepted by the BC EAO as the Initial Project Description on February 21, 2020.
March 30, 2020	■ Lhtako Dené Nation ■ Soda Creek Indian Band ■ Williams Lake First Nation ■ Nazko First Nation ■ Neskonlith Indian Band ■ Tsilhqot'in National Government	BGM sent the Engagement Plan to Indigenous nations for review. Indigenous nations were asked to provide comments on the Engagement Plan by April 21, 2020.

Date	Indigenous Nations	Activity and Additional Information
April 8, 2020	■ Soda Creek Indian Band ■ Williams Lake First Nation	BGM, Soda Creek Indian Band and Williams First Nation met to discuss the Engagement Plan, including each nation's preferred methods of engagement due to COVID-19. During the meeting, Soda Creek Indian Band requested that BGM revise the Engagement Plan to reflect the legal name "Soda Creek Indian Band" instead of "Xatśūll First Nation." BGM revised the Engagement Plan based on this comment. Williams Lake First Nation had no comments on the Engagement Plan.
April 21, 2020	■ Lhtako Dené Nation	BGM received comments on the Engagement Plan from Lhtako Dené Nation.
April 29, 2020	■ Lhtako Dené Nation	BGM met with Lhtako Dené Nation to discuss their comments on the Engagement Plan, BGM's proposed responses to the comments and the Lhtako Dené Nation's preferred methods of engagement due to COVID-19. BGM revised the Engagement Plan based on comments received.

In addition to the activities outlined above, BGM has provided regular Project updates to each of the Indigenous nations and organized site tours and field visits with elected leaders, technical staff and members of the Lhtako Dené Nation, Soda Creek Indian Band and Williams Lake First Nation. BGM invited representatives from Indigenous nations to participate in Project-specific baseline studies from 2016 to 2020 for wildlife, vegetation, water quality and aquatic health, fish habitat, terrain and soils, hydrology, heritage, human health and ecology risk assessment, and hydrogeology. BGM has also held discussions with Lhtako Dené Nation, Soda Creek Indian Band and Williams Lake First Nation regarding valued component (VC) selection since submitting the Initial Project Description.

2.1.2 Engagement Activities During the Early Engagement Phase

Activities pertaining to engagement with Indigenous nations to receipt of the Summary of Engagement are identified in Tables 2 to 6. Potential activities related to the remainder of the Early Engagement Phase are identified in Section 2.2.

2.1.2.1 Lhtako Dené Nation

A description of engagement activities with Lhtako Dené Nation is provided in Table 2.

Table 2: Engagement with Lhtako Dené Nation to Receipt of the Summary of Engagement

Date (2020)	Activity
May 8	High-level overview of baseline studies provided to Lhtako Dené Nation
May 21	Meeting to discuss engagement during Early Engagement
May 29	Hard copy of Final Engagement Plan provided to Lhtako Dené Nation
June 2	Communication regarding potential community investment
June 10	Meeting to discuss engagement during Early Engagement
June 12	Supplemental Project information provided to Lhtako Dené Nation
June 16	Copy of Open House ad provided to Lhtako Dené Nation

Date (2020)	Activity
June 23	Meeting to discuss what we have learned from Lhtako Dené Nation, how Lhtako Dené Nation input has been included in the Project, Lhtako Dené Nation input moving forward and next steps
June 24	BGM meeting with Lhtako Dené Nation staff
July 8	Check in regarding review of Project Description
July 13	Copy of Community meeting ad provided to Lhtako Dené Nation
July 28 - Aug 12	Various discussions regarding community interviews, Project information
July 30	Check in regarding review of Project Description
August 18/19	Request for proposal for potential business opportunities provided to Lhtako Dené Nation
August 20	Meeting to discuss community interviews, Project information, questionnaire
August 21	Discussion regarding the need to collect additional Traditional Use Information related to the Northern Transmission line, community interviews being undertaken by Lhtako Dené Nation and schedule for inputs regarding the review of the Project Description
August 24	Discussion regarding communication and communication channels
August 26	Meeting to discuss presentation materials, maps and any questions prior to Lhtako Dené Nation community interviews being undertaken
September 15	Draft Detailed Project Description submitted to Lhtako Dené Nation for review and comment
October 1	BGM met with Lhtako Dené Nation to discuss initial DPD comments and Transmission Line routing
October 14	Met with Lhtako Dené Nation to discuss comments on the DPD
October 19	BGM provided Lhtako Dené Nation with a memo regarding revisions to the Application Information Requirements, proposed candidate Valued Components and proposed assessment areas
October 26	Technical Workshop with Lhtako Dené Nation third party consultants to discuss comments about Project infrastructure described in the DPD

2.1.2.2 Soda Creek Indian Band

A description of engagement activities with Soda Creek Indian Band is provided in Table 3.

Table 3: Engagement with Soda Creek Indian Band to Receipt of the Summary of Engagement

Date (2020)	Activity
May 29	Hard copy of Final Engagement Plan provided to Soda Creek Indian Band
June 12	Supplemental Project information provided to Soda Creek Indian Band
June 16	Copy of Open House ad provided to Soda Creek Indian Band
June 24	BGM meeting with Soda Creek Indian Band staff regarding Project updates
June 26	BGM requests field program assistants
July 8	BGM checks in regarding meeting and provides newsletter copy for the Soda Creek Indian Band newsletter
July 13	Copy of Community meeting ad provided to Soda Creek Indian Band
August 12	BGM contacts Soda Creek Indian Band regarding a community meeting
August 17	Soda Creek Indian Band provides a copy of their newsletter
August 18/19	RFPs for potential business opportunities provided to Soda Creek Indian Band

Date (2020)	Activity
August 20	Informal meeting with Soda Creek Indian Band Councillor
August 26	Community Meeting
September 15	Draft Detailed Project Description submitted to Soda Creek Indian Band for review and comment
September 24	BGM provided Soda Creek Indian Band with a Project site tour
October 19	BGM provided Soda Creek Indian Band with a memo regarding revisions to the Application Information Requirements, proposed candidate Valued Components and proposed assessment areas

2.1.2.3 Williams Lake First Nation

A description of engagement activities with Williams Lake First Nation is provided in Table 4.

Table 4: Engagement with Williams Lake First Nation to Receipt of the Summary of Engagement

Date (2020)	Activity
May 29	Hard copy of Final Engagement Plan provided to Williams Lake First Nation
June 12	Supplemental Project information provided to Williams Lake First Nation
June 16	Copy of Open House ad provided to Williams Lake First Nation
June 24	Williams Lake First Nation provides BGM overview of contracting capabilities
June 24	Meeting with Chief and staff to discuss business opportunities and participating in baseline studies
June 25	Williams Lake First Nation inquires regarding contracting opportunities
June 26	BGM requests field program assistants
July 7	BGM requests community meeting/discussion reprocess of disseminating information
July 13	Copy of Community meeting ad provided to Williams Lake First Nation
July 14	Discussions regarding a site tour
July 21	Williams Lake First Nation confirms date for community meeting
July 24	BGM provides a site tour to Williams Lake First Nation of the underground workings at Bonanza Ledge Mine
August 18/19	RFPs for potential business opportunities provided to Williams Lake First Nation
August 20	Community Meeting
September 15	Draft Detailed Project Description submitted to Williams Lake First Nation for review and comment
October 13	BGM met with Williams Lake First Nation to discuss comments on the DPD
October 19	BGM provided Williams Lake First Nation with a memo regarding revisions to the Application Information Requirements, proposed candidate Valued Components and proposed assessment areas

2.1.2.4 Nazko First Nation

A description of engagement activities with Nazko First Nation is provided in Table 5.

Table 5: Engagement with Nazko First Nation to Receipt of the Summary of Engagement

Date (2020)	Activity
May 29	Hard copy of Final Engagement Plan provided to Nazko First Nation
June 12	Supplemental Project information provided to Nazko First Nation
June 16	Copy of Open House ad provided to Nazko First Nation
August 28	Letter was sent to Nazko First Nation with an invitation from BGM to host a meeting
September 15	Draft Detailed Project Description submitted to Nazko First Nation for review and comment
October 19	BGM provided Nazko First Nation with a memo regarding revisions to the Application Information Requirements, proposed candidate Valued Components and proposed assessment areas

2.1.2.5 Tsilhqot'in National Government

A description of engagement activities with Tsilhqot'in National Government to Receipt of the Summary of Engagement is provided in Table 6.

Table 6: Engagement with Tsilhqot'in National Government to Receipt of the Summary of Engagement

Date (2020)	Activity
May 29	Hard copy of Final Engagement Plan provided to Tsilhqot'in National Government
June 12	Supplemental Project information provided to Tsilhqot'in National Government
June 16	Copy of Open House ad provided to Tsilhqot'in National Government
August 28	Letter was sent to Tsilhqot'in National Government with an invitation from BGM to host a meeting
September 15	Draft Detailed Project Description submitted to Tsilhqot'in National Government for review and comment
October 19	BGM provided Tsilhqot'in National Government with a memo regarding revisions to the Application Information Requirements, proposed candidate Valued Components and proposed assessment areas
October 22	BGM provided a project overview presentation to Tsilhqot'in National Government

2.1.3 Engagement Following Receipt of the Summary of Engagement

BGM will continue to engage with Lhtako Dené Nation, Soda Creek Indian Band, Williams Lake First Nation, Nazko First Nation and Tsilhqot'in National Government to better understand how the Project may potentially impact their Indigenous interests and how measures may be incorporated into the Project to avoid, mitigate or otherwise address those potential impacts. BGM will continue to work with leadership, staff, community members and third parties as directed by each nation to identify appropriate methods of communication and engagement for their communities.

Potential engagement and consultation methods and communications materials are identified in Table 7.

Table 7: Potential Engagement and Consultation Methods and Communications Materials

Engagement and Consultation	Communications Materials
■ Face-to-face and phone meetings with elected leadership and nation representatives ■ Workshops on specific topics ■ Community Meetings ■ Presentations ■ Technical meetings ■ Tours and site visits ■ Written correspondence ■ Project website	■ Maps and figures ■ Poster boards ■ Information sheets ■ Question and Answer documents ■ Newsletters ■ Letters ■ Renderings/animations depicting the 3-dimensional layout of Project surface infrastructure

Other activities that are ongoing include:

- Indigenous participation in field and baseline studies;
- Implementation of existing agreements with Indigenous nations, including capacity funding; and
- Providing regulatory filings (e.g., Project Description, Application Information Requirements, Environmental Assessment Certification (EAC) Application, and the Indigenous Consultation Reports) to Indigenous nations for review and comment prior to submission to the BC EAO.

Records of engagement and consultation and a description of how comments received have been addressed and will be included in the EAC Application.

2.2 Government, Stakeholder and Public Engagement

A variety of potentially interested parties were identified, including members of the general public; local, regional, provincial and federal government elected officials and staff; community organizations; recreational groups; authorization holders; landowners; resource users; temporary residents of Wells, and others. These individuals, groups and organizations were identified based on their potential interests in, or potential interactions with, the Project, including their ability to contribute local knowledge and expertise. As the engagement program continues, additional stakeholders may be identified and will be included in information sharing and engagement activities. The participation of a broad range of interested parties in the engagement process provides BGM with the opportunity to learn about and incorporate local knowledge, issues of concern and potential opportunities and consider them in Project definition and planning.

2.2.1 Engagement Activities Prior to the Early Engagement Phase

Engagement with Governments and government agencies, stakeholders and the public began in 2016 and is ongoing. Engagement initially focused on the District of Wells and Wells residents to introduce the Project and expanded to the regional area as the Project advanced. Engagement during this period shaped the Project presented in the IPD and the Supplemental to the IPD.

A detailed description of engagement activities up to May 2020 is provided in the Engagement Plan available on the BC EAO website and is summarized below.

Engagement with local and regional governments prior to the Early Engagement Phase included the following activities:

- **Wells:** BGM met with the Mayor and Council regularly to keep them informed about the Project and to discuss infrastructure, housing, and taxes. BGM also met with individual council members and staff to discuss specific items or community concerns.
- **Quesnel:** BGM provided a presentation to City Council to discuss near-term objectives, the Project area, the Bonanza Ledge Mine plan, Indigenous Nations and community relations, and employment statistics. BGM also met with staff to discuss housing strategies and economic activity in the area.
- **Cariboo Regional District (CRD)**: BGM provided a corporate update to the CRD Board, met with the Electoral Area C Director to discuss activities in the Electoral Area and provide a Project update and met with the planner regarding information available about Electoral Areas C and F.

BGM engaged with provincial government Ministries, agencies, and Crown Corporations, including:

- **BC Environmental Assessment Office (BC EAO):** BGM initiated meetings with the BC EAO in 2016 to discuss engagement and consultation with Indigenous nations and initiation of baseline studies. BGM had ongoing dialogue with the BC EAO as the scope and extent of the Project evolved, seeking advice on Project components, regulatory and procedural changes, Indigenous nations engagement and consultation, and the DPD.
- **BC Ministry of Mines, Energy and Petroleum Resources (EMPR):** BGM sought advice and guidance regarding aspects of concurrent and synchronous permitting, as well as guidance on reclamation, bonding, Indigenous nations engagement, and the Crown's duty to consult.
- **BC Ministry of Environment and Climate Change Strategy (ENV):** BGM sought advice regarding aspects of permitting requirements and concurrent and synchronous permitting as part of the EA process.
- **BC Ministry of Forests, Lands, Natural Resources Operations and Rural Development (FLNRORD):** BGM sought direction regarding which Indigenous nations to notify and consult with regarding the 2016 Bonanza Ledge Mine *Mines Act Permit* Amendment. This information informed Project activities.
- **BC Treaty Commission:** BGM engaged the Commission to determine if any Indigenous Nations being engaged were in the treaty process, and if so, at what stage.
- **BC Hydro:** BGM had ongoing discussions related to the development of a 69 kV three-phase transmission line from Barlow substation near Quesnel to Wells.
- **BC Ministry of Transportation and Infrastructure (BC):** BGM discussed highway access for the proposed road.
- **Barkerville Historic Town and Park:** BGM had discussions on collaboration for three-phase power, accommodation in Barkerville, and access permit to authorize baseline work within the Park boundaries.

Engagement with stakeholders was primarily via public meetings and one-on-one meetings. BGM held public meetings on August 25, 2016, January 19 and October 19, 2017, and February 1, 2018, July 9, 2019, and September 18, 2019 in Wells, BC. BGM also held a public meeting on September 17, 2019 in Quesnel at the Barlow Community Hall.

In addition to the public meetings, meetings were held with a variety of stakeholders, service providers, adjacent landowners, land and resource users, local service providers, Community Forest representatives, and other interested parties that have potential environmental, economic, community or other interests pertaining to the Project.

A variety of communications materials were also employed to inform interested parties about the Project. A description of communication materials is provided in Appendix C.

2.2.2 Engagement Activities During Early Engagement Phase

This section discusses engagement undertaken to receipt of the Summary of Engagement and identifies planned activities during the remainder of the Early Engagement Phase to receipt of the Readiness Decision. Additional activities will be added and reported in the EAC Application. Throughout the Early Engagement phase, we have been, and continue to be, working in the COVID-19 pandemic environment and the uncertainty associated with this situation. We have adjusted activities as required to meet our objectives while at the same time meeting the health and safety requirements associated with COVID-19.

During this phase, we continued to use contact materials and activities used in prior engagement activities and adjusted them as required to address COVID-19 and the requirements of Interested Parties to help facilitate their involvement. Communications materials will continue to be tailored, as needed, to the needs of Interested Parties to facilitate their understanding of, and input to, the Project for the remainder of the Early Engagement Phase and through Project review and development, should the Project be approved. Descriptions of communication materials used in Early Engagement are provided in Appendix C.

From acceptance of the Engagement Plan to receipt of the Summary of Engagement, BGM has supported the BC EAO in engagement activities and engaged with local and regional governments, the provincial government and government agencies, and stakeholders and the public as described in the following sub-sections.

2.2.2.1 BC Environmental Assessment Office Activities

BGM supported BC EAO engagement activities during the Public Comment and Engagement Period of the Early Engagement Phase which ran from June 12 to July 27, 2020. BGM participated in BC EAO hosted events, supported event planning (e.g., advertising), and prepared presentation materials to facilitate public review and comment. BGM also prepared presentations for, and participated in, meetings with technical advisors (Table 8).

Table 8: BC EAO Activities During Early Engagement

Activity	Detail
Public Comment Period on Project Description	■ BGM arranged for advertising of the Public comment period in local and regional papers in Prince George, Quesnel and Williams Lake and on radio stations in Quesnel and Williams Lake. ■ Information was also sent to local and regional governments and community organizations. ■ Letters were sent to stakeholders with a copy of the Public Comment Period advertisement attached.

Activity	Detail
Open Houses	■ BGM participated in virtual open houses hosted by the BC EAO on June 17 and June 23 during the Public Comment Period. ■ BGM prepared a presentation and answered questions from attendees.
Technical Advisor Meetings	■ BGM participated in two meetings with technical advisors. ■ BGM prepared presentations for the meetings and answered questions from technical advisors.

2.2.2.2 Local and Regional Government

Engagement with local and regional governments focused on providing current Project information to the governments and staff and ensuring that they had an opportunity to provide feedback to BGM regarding the Project (Table 9).

Table 9: Engagement Activities with Local and Regional Government during Early Engagement

Activities	Detail

Meetings	■ District of Wells:
	  ■ BGM and BC EAO participated in a meeting with the District of Wells City Council in August.
	  ■ A second meeting was held with the District of Wells in September, focusing on clarifying the definition and purpose of the Technical Advisory Committee.
	■ City of Quesnel:
	  ■ BGM provided a presentation to Mayor and Council on September 14.
	■ City of Prince George:
	  ■ BGM provided a presentation to Mayor, Council and staff at an Information Session on September 1.
	■ City of Williams Lake:
	  ■ BGM provided a Project update letter to Mayor and Council.
	  ■ BGM provided a presentation to Mayor and Council on September 29.
	■ Cariboo Regional District:
	  ■ BGM met with the Director for Electoral Area C to discuss the Project.
	  ■ BGM contacted the CRD regarding a meeting and was asked to provide information on the Project for discussion at a Directors meeting, and this was done. A letter was provided.
	■ Regional District of Fraser Fort George:
	  ■ A letter providing a Project update was provided to the Board.
	  ■ BGM provided a presentation to the Chair and Directors at the Board meeting on October 15.

Community Meetings	■ District of Wells Mayor, Council and staff and the Cariboo Regional District Chair and Electoral Area C and F Directors were invited to attend the July, August and September Community meetings. ■ Quesnel, Prince George, and Williams Lake Mayor and staff and Fraser Fort George Regional District Chair and Electoral Areas Directors for areas south of Prince George were invited to attend the September Community meeting.

Activities	Detail
Workshops and Technical Meetings or Discussions	■ BGM arranged a meeting for the District of Wells Mayor and Council and the BC EAO to discuss participation in the Technical Advisory Committee and Community Advisory Committee. ■ Staff at District of Wells, Quesnel, Williams Lake, Cariboo Regional District and Fraser Fort George Regional District were contacted, and discussions are ongoing.
Site Visits	■ District of Wells Mayor and one Councillor participated in a site visit to view the underground workings at Bonanza Ledge Mine to give them an idea of what the Cariboo Gold Project underground would be like. ■ A site visit for local and regional government representatives is being planned for Fall 2020.
Public Displays	■ Advertisements and other materials are available at the District office, sent to the e-mail list or put on social media. Advertisements are also posted in key community locations.

2.2.2.3 Provincial Government

Information regarding engagement activities completed with Provincial Government agencies is provided in Table 10.

Table 10: Provincial Government Engagement Activities during Early Engagement

Activities	Description
Meetings	■ Meetings were held with the BC EAO and other permitting agencies (i.e., EMPR, ENV, FLNRORD) to ensure that requirements for the Project and other BGM activities are being met.
Workshops and Technical Meetings	■ BGM participated in meetings with technical advisors, as described in Table 11. ■ BGM participated in a meeting with FLNRORD to discuss the transmission line and statutory right-of-way application on October 7. ■ BGM participated in a meeting with FLNRORD to discuss wildlife concerns for the transmission line on October 21. ■ BGM met with ENV to provide a project overview to multi-disciplinary staff who were unable to attend earlier Technical Advisor presentations. ■ BGM met with ENV to discuss the Air Quality modelling for the Project.
Site Visit	■ A site visit for provincial government representatives is being planned for Fall 2020.
Phone/e-mail and meetings regarding Information Gathering	■ Contact regarding information gathering for the baseline studies was initiated and will continue through to the completion of the studies and assessment, as required.

2.2.2.4 Stakeholders and the Public

BGM continued to proactively engage with stakeholders to:

- Continue relationship building (existing and new);
- Raise awareness about the Project and EA process;
- Understand the priorities of stakeholders and the public;
- Expand knowledge of current conditions and priorities in the communities and broader area; and
- Understand their interests and concerns regarding the Project and the means through which those could be avoided through Project design or mitigated.

Engagement activities completed are described in Table 11. BGM is working to increase the involvement of those that may have been under-represented in engagement activities and will continue to expand this facet of engagement moving forward. This engagement will inform the baseline and effects assessment and socio-economic mitigation and management activities.

Table 11: Engagement Activities with Stakeholders and the Public during Early Engagement

Activities	Description
Community Meetings	■ Three community meetings have been held:July 13, 2020: Virtual meeting ■ August 25, 2020: Combined virtual and in-person meeting at the Wells Community Hall ■ September 22, 2020: Combined virtual and in-person meeting at the Sunset Theatre
Meetings/phone/e-mail contact	■ Senior BGM representatives are often in Wells and surrounding areas and interact with Interested Parties on an ongoing basis. Meetings were held at the BGM community office, and informal meetings were held in other locations. ■ Meetings were held by phone with a variety of interested parties, including both those involved prior to Early Engagement and those who became involved or were contacted directly by BGM during Early Engagement, and these meetings are ongoing. ■ BGM continued to reinforce that company representatives are available to meet at the resident's convenience while in the area, and this has become a common method of engagement.
Workshops and Technical Meetings	■ Items of specific interest to the community (e.g., transmission line, legacy projects, project changes, Services Building) were addressed at community meetings. BGM has committed to addressing certain items such as employment and legacy projects at future community meetings. ■ Wells community workshops are planned for November. ■ Workshops/meetings are being planned with various groups to continue to broaden the scope of those providing input to the Project and discuss barriers to participation and employment challenges.
Site Visits	■ Site tours were provided to representatives of interest groups and the public. The public tours were completed at the underground workings at Bonanza Ledge Mine to give attendees an understanding of underground workings that would be developed for the Cariboo Gold Project. Tours are ongoing.
Surveys	■ Surveys were used to gather information from Interested Parties about their priorities, interests and concerns relative to their community and the Project, and to gather feedback on the engagement program (e.g., satisfaction with the program and information presented) and preferences regarding engagement (e.g., type of information, topics). The surveys were available at community meetings. A general survey is available on the Project website. ■ An online survey was provided to stakeholders to gather information on timing and topics for upcoming community workshops.

In addition to the activities identified above, the information materials presented in Appendix C supported engagement during this phase.

2.2.3 Ongoing Engagement

The engagement activities identified in the Engagement Plan are ongoing and will continue through Early Engagement to the Readiness Decision.

2.3 Feedback and Response/Actions

Feedback on the Project was received by the BC EAO during the Public Engagement Comment Period, as well as by BGM during Community meetings, other meetings or discussions and site tours. The BC EAO summarized comments received from the general public into themes (Comment Categories) and provided summaries for each Comment Category. Table 12 provides responses and actions (completed or proposed) associated with the public comments received during the Public Engagement Comment Period.

Much of the feedback received directly by BGM was similar to that provided to the BC EAO; however, some additional items were raised with BGM. Questions were raised about the legacy that BGM would leave for the community, and BGM stated that planning for legacy projects is underway and requires community input to identify what residents would like to see in their community. Concern was also expressed that Project information provided during the early engagement phase differed from that presented prior to the submission of the IPD. BGM acknowledged that certain updates had been made to the Project and would continue to be made as the Project design is advanced. BGM committed to frequent and ongoing meetings as a mechanism for receiving continual public input into the Project as it evolves.

Technical advisors were identified from participating Indigenous nations, local governments, and provincial and federal agencies to provide feedback and comment on the IPD and supplemental information. Table 13 provides responses and actions (completed or proposed) associated with the Technical Advisor comments. A comprehensive list of all Technical Advisor comments and BGM responses is provided in Appendix D.

As a component of the Early Engagement Phase, the BC EAO notified Indigenous nations within the Project vicinity: Lhtako Dené Nation, Soda Creek Indian Band (alternatively known as Xatśūll First Nation), Williams Lake First Nation, Nazko First Nation and Tsilhqot'in National Government. A preliminary set of interests from each Indigenous nation was sought to inform a more complete understanding of interests and better understand how these preliminary interests may be related to potential effects specific to the Project on each Indigenous nation's rights or the Indigenous nation itself.

Table 14 provides a summary of each participating Indigenous nation's interest, as well as the associated response and actions (completed or proposed).

Table 12: Summary of Public Comments received during Early Engagement

Comment Category	Comment Summary	Response/Actions
Surface Concentrator Plant	Potential effects on access to recreational sites for use by residents and tourists. Concerns were focused on the location of the Surface Concentrator Plant, its proximity to residential homes, and the potential effects on the tourism industry and viewscape of the area.	■ BGM recognizes the concern regarding access to certain sites which are currently closed for safety reasons; however, safety is a key concern of BGM in considering which areas can be open to public access. BGM is reviewing the potential effects of the Project on access to sites and will describe any effects and potential mitigation in the EAC Application. ■ BGM appreciates the importance of tourism and arts to the Wells economy and wants to work with the community to help ensure that the mine and the tourism industry can coexist. A diversified economy will help attract people to Wells and make the local economy more resilient. ■ The location of the concentrator (now termed Services Building) was considered by the design team early in the Project development process. The service building location was determined using several criteria, including technical, environmental, and economic considerations. Detailed information regarding the location is provided in Section 7.1.2. ■ BGM recognizes the concerns regarding the visual effects of the Services Building. BGM has refined the design of components within the Services Building, allowing for a reduction in building height and change in profile. BGM is currently preparing updated visual renderings of the Mine Site to show proposed landscaping features to minimize visual impacts. Detailed information regarding changes to the surface building is provided in Section 7.1.2.
Northern Transmission Line Route Option	Potential effects of the Northern Transmission Line option on visual quality and potential environmental effects, including on caribou and caribou habitat. Additional concerns were raised on the legacy of the line that will supply power to the mine site and the ability (or lack of) for the community of Wells and others to benefit from, and use, the three-phased power at the end of the mine life.	■ BGM is currently refining the route alignment based on environmental constraints. ■ Routing options for the transmission line in the Wells area are being developed and will be discussed with the community. ■ BGM will continue to work with other interested parties to advocate for improved electricity service for the area. ■ BGM is undertaking legacy planning and is looking to the community for input regarding potential projects.

Comment Category	Comment Summary	Response/Actions
Noise, Light, and Visual Effects	Potential for the Project to cause noise and light pollution as well as affect visual quality in the community of Wells. Concerns that these effects may impact the quality of life for residents in the community of Wells and effects may be amplified due to the topography of the region (i.e., Wells being in a valley). Additional concerns were raised regarding data collection for baseline studies on noise and light at the proposed Mine Site.	■ BGM is undertaking noise, light and visual assessments, and the findings will be included in the EAC Application. ■ The community will continue to be involved in discussions regarding potential effects and in identifying possible mitigation measures. ■ BGM added data collection sites in the community after this issue was first raised by the community and has sufficient data to complete the effects assessment.
Second Portal at Island Mountain	Potential effects on dust, noise and traffic in the area from the second portal at Island Mountain. Concerns focused on the location and proximity of this portal to the community of Wells, increased mine traffic, the safety of residential traffic, and the portal's temporary nature.	■ Potential effects from dust, noise and traffic from the second portal at Island Mountain will be considered in the EAC Application. ■ BGM is currently developing design concepts for the Island Mountain Portal area after reclamation and landscaping activities have been completed. Further details on the Island Mountain Portal design changes are provided in Section 7.1.1
Worker Accommodation and Housing	Potential effect of the Project on the current housing shortages in the region, property values, and the ability for other businesses to recruit people to the area. Concerns with the loss of motels in the community of Wells that are now used to house mine workers, which reduces the availability of accommodations for tourists during peak seasons and festivals that occur within the Wells region. Potential effects from the number of transient workers living in work camps located in the community of Wells. on the community culture/atmosphere and municipal infrastructure (e.g., water supply, sewage).	■ The potential effects of the Project on housing, property values, and employment will be addressed in the EAC Application. ■ BGM has and will continue to work with the community to make blocks of rooms available for school groups, the ArtsWells Festival and other events as identified to BGM. BGM will evaluate this practice moving forward to determine what works best for the community and BGM. ■ BGM acknowledges the community's concerns related to community character and will work with the community to discuss worker interaction in the community. The worker accommodation will have a self-contained sewage system and a dedicated well and will not rely on municipal infrastructure.

Comment Category	Comment Summary	Response/Actions
Air Quality and Dust	Potential effects to air quality due to impacts from dust, vehicle emissions, vent raises, and emissions from facilities. Concerns that the community of Wells is downwind from the Project site and is situated in a valley which may amplify effects to air quality.	■ Potential effects on air quality will be considered in the EAC Application. ■ BGM continues to advance component and activity details to minimize effects on air quality through design.
Socio-Economic	Concerns were raised about ensuring the various sectors that support the Wells economy can coexist. These concerns focused on the need to balance the tourism, outdoor recreation, mining, and arts and culture sectors in Wells and avoid the mining industry from negatively impacting the others. Comments were raised about finding potential collaborative or cooperative opportunities between the various sectors of the community with this Project that could be mutually beneficial. Comments discussed the need to ensure lasting benefits to the community through legacy investments into infrastructure or programs.	■ BGM is committed to working with the community to balance mining and other economic activities in Wells. BGM believes that mining and other economic activities in Wells can co-exist. ■ BGM welcomes the opportunity to collaborate or cooperate with the community on proposed initiatives that would be beneficial to all parties. BGM will continue to evaluate proposed opportunities to determine the support that can be provided. ■ BGM stated that planning for legacy projects is underway and requires community input to identify what residents would like to see in their community.
Water Treatment and Water Quality	Potential effects to surface water, groundwater, and aquifers and the potential for the presence of potentially acid generating material. Concerns with the proximity of mine infrastructure to various waterways, including Jack of Clubs Lake, Willow River, and Quesnel River and the ability for the Project to capture and treat runoff and handle large precipitation events at the various Project sites. Concerns with the potential re-disturbance of historic mine waste and contamination in the Jack of Clubs Lake and how this would be treated as well as the treatment of water released through the dewatering of existing and new audits.	■ Potential effects to surface water, groundwater and aquifers and the potential for the presence of potentially acid generating material will be considered in the EAC Application. ■ Updates to water management infrastructure and a description of the water treatment system are provided in Sections 7.5.1.6 (Mine Site), 7.5.3.4 (QR Mill) and 7.6.4 (water treatment). ■ BGM recognizes the concerns with the historic mine waste and contamination in the Mine Site area. BGM has considered these concerns in the Mine Site design and is actively engaged with the FLNRORD Contaminated Sites Branch regarding the contaminated material at the east end of Jack of Clubs Lake. ■ Water from the historic mine underground workings will be used as process water, and any water will be treated at the Mine Site Water Treatment Plant prior to release. Details on the water treatment system are provided in Section 7.6.4.

Table 13: Summary of Technical Advisor Input during Early Engagement

Category	Technical Advisor Input	Response/Actions
Project design considerations for the Cariboo Gold Mine Site, Quesnel River (QR) Mill, and Bonanza Ledge Mine	Clarification is needed on overburden stockpiles, sedimentation ponds, discharge points into the receiving waters, the potential volume of tailings to be produced and stored in the tailings storage facility (TSF), TSF design, progressive reclamation, and how historical underground workings are being considered and incorporated into the mine design.	Updated information on Project components is provided in Section 7.5. Further design information on each of the noted items will be provided in the EAC Application.
	The Detailed Project Description will need to include a discussion of best practices and Best Available Technologies for waste management, including water treatment.	A discussion of best practices and Best Available Technologies for waste management, water treatment and tailings will be provided in the EAC Application. Updated information on the water treatment system is provided in Section 7.6.4.
	There will need to be an emphasis on best management and monitoring practices for tailings storage and water management, and a consideration of flood and freshet events in emergency response planning. Additionally, BGM is requested to include an alternative tailings assessment as part of their Detailed Project Description.	BGM acknowledges the importance of best management and monitoring practices associated with tailings and water management, both historically and for the proposed Cariboo Gold Project. BGM has considered flood events in the existing design at the QR Mill, as is the associated appropriate emergency response planning. BGM also confirms that consideration for these aspects will be included in the proposed design and planning for the Project, including the appropriate emergency notification processes. It should be further noted that BGM intends to move forward with a filtered tailings strategy to reduce the risk of dam failure and the amount of water that will need to be managed. This approach follows best practice guidelines and is in accordance with recommendations coming from the Mount Polley incident. Details on the tailings options currently under consideration are provided in Section 7.6.1.
	The waste rock storage facility (WRSF) designs will need to describe the foundation conditions of all proposed waste rock storage facilities, including where founded on historic mine rock and specify the type of liner (if any) proposed to be used.	Details on the waste rock storage facilities are provided in Section 7.5.1.5 and include details regarding the use and type of liners. Additional information regarding the WRSF foundation conditions, liner designs, and quantity divisions between WRSFs will be provided with the EAC Application.

Category	Technical Advisor Input	Response/Actions
	Climate change effects need to be considered and incorporated in the analysis of required water use and resources for the Project, water management measures related to larger precipitation events and extended periods of drought, and mine decommissioning and reclamation activities.	BGM confirms that the effects of climate change are considered in the analysis of water use, water management infrastructure and mine decommissioning and reclamation activities for the Project. Details on this will be provided in the EAC Application.
Project interactions with the biophysical environment	Further conceptual information will need to be included in the Detailed Project Description of the various water treatment concepts/approaches that BGM is considering for the Project and how precipitate from the water treatment plant will be managed during operation and closure.	Details on the proposed water treatment system for the Project is provided in Section 7.6.4.
	Consideration is needed regarding road dust and fugitive dust mitigation and its effects on air quality and country foods, as well as a consideration of how pre-existing management plans or technologies eliminate, control, or mitigate the effects of windblown dust associated with the various tailings handling options.	BGM confirms that road dust and fugitive dust mitigation attributable to the Project and its potential impacts on air quality and country foods will be considered in the EAC Application.
	Clarification is needed on how the various tailings storage options influence the volume requirements of overburden and soil materials to meet end land use and closure objectives.	BGM acknowledges that tailings storage options have the potential to influence material requirements to meet final land use and closure objectives for the Project. The current preferred tailings handling option for the Project is a new FSTSF. Should this option be selected, required subsoil and topsoil is already allocated to this location, and no changes are anticipated. Details associated with tailings storage options and associated potential closure implications are provided in Section 7.6.1.
	Concerns regarding Project activities that have the potential to effect bats and/or bat habitat.	Should project activities have the potential to effect bats and/or bat habitat, BGM will provide a bat management plan as part of the EAC Application.
	Concerns were raised related to building on a previously used industrial site and the potential for additional environmental hazards and compounding of potential biophysical risks.	Potential effects associated with utilizing historic mining areas will be considered through the EA process.

Category	Technical Advisor Input	Response/Actions
	Concerns were noted about how Project use of existing facilities/operations should best be considered in evaluating effects on wildlife and habitat resources.	Local and regional study areas are established for the assessment of potential project effects and cumulative effects. The spatial extent of these areas for each valued component considered in the effects assessment will be described in the EAC Application.
	Concerns were noted related to the effects of Cariboo Gold (including the Mine Site, Bonanza Ledge Mine site, and Northern Transmission Line route) on caribou and caribou habitat, specifically on the Barkerville herd.	Potential effects on caribou and caribou habitat will be considered in the EAC Application.
	Concerns were noted about Project effects to habitat areas managed by Land Use Orders (e.g., grizzly bear habitat, Old-Growth Management Areas, moose habitat) as well as proposed whitebark pine critical habitat, and areas managed as Mule Deer Winter Range.	Potential effects on wildlife, wildlife habitat and vegetation will be considered in the EAC Application.
Project interactions with the human environment	Request was made for further information on worker accommodations, including the intended capacity of QR mill camp and the proposed drinking water systems. Due to the proximity of the mine site camp to Wells, concerns were raised about the measures that will be taken around managing worker conduct and interactions within Wells.	Updated information on the worker accommodation and proposed potable water system is provided in Sections 7.5.1.1 (worker accommodations) and 7.6.3 (potable water supply). Mitigation measures will be outlined in the effects assessment presented in the EAC Application.
	A Human Health Risk Assessment approach should be used to assess health effects associated with biophysical exposures, in accordance with Health Canada's guidance, conducted by a professional with expertise and experience conducting human health risk assessments.	A Human Health and Environmental Risk Assessment (HHERA) will be completed for the Project, in accordance with Health Canada's guidelines and in consultation with the listed guidance documentation. This HHERA assessment and technical report, which will be conducted by an appropriately accredited professional, will be provided as a stand-alone section of the EAC Application.
	Reviewers emphasized the need to consider the current medical infrastructure of nearby communities (Wells, Quesnel) and identify any potential burdens on the local medical infrastructure and describe how it would be prevented or mitigated.	BGM will identify potential burdens placed on local medical infrastructure by the Project and will identify possible solutions to mitigate or prevent potential associated effects on nearby communities.

Category	Technical Advisor Input	Response/Actions
Permitting considerations	There may be several permits/approvals/certificates required that are not currently reflected in the Initial Project Description, including an effluent discharge permit, an emissions discharge permit, and a refuse permit. In addition, several regulations may apply, e.g., Municipal Waste Regulation, Hazardous Waste Regulation, etc.	Permits and approvals are listed in Section 4.5. This list has been updated to address any potential items that were not previously listed in the IPD.
	Requests were made seeking clarification on the expected timeline for completion of the transmission line and how that relates to the timeframe required for decisions on the Statutory Right of Way applications.	An updated project schedule is provided in Section 6.2. BGM will initiate discussions with FLNRORD to discuss timelines regarding the Statutory Right of Way application.
	A flag was raised that the proposed activities associated with Cariboo Gold are anticipated to require *Mines Act* permit amendments for the Bonanza Ledge Mine, QR Mill site, and Mosquito Creek Site.	BGM acknowledges that the *Mines Act* permit amendments are anticipated to be necessary for the Bonanza Ledge Mine and the QR Mill.
	Reviewers were seeking clarification on the effects of Cariboo Gold on legislated greenhouse gas targets, as described in the *Climate Change Accountability Act*. A request was made that BGM determine the likely greenhouse gas emissions from base case of the Project for all sources covered by the *Greenhouse Gas Industrial Reporting and Control Act*.	Details on greenhouse gas emissions are provided in Section 8.2.2.
Baseline Information	A request was made for BGM to discuss baseline study details with appropriate agencies early in the process to ensure the data collected is sufficient.	Baseline studies have been underway since 2016 and are described in Section 10.3.
	Concerns were raised related to air quality, given the proximity to Wells and the studies to represent baseline conditions.	In addition to the two periodic sampling events in 2016 and 2017, air quality data from stations operated by ENV were used to characterize existing conditions. The ENV data is continuous monitoring data. In continuous monitoring, air quality is constantly measured by drawing ambient air into a monitoring instrument that is connected to a datalogger. The resulting ENV data are provided as an hourly average, for each hour of a year. For fine particulates ($PM_{2.5}$) three years of hourly data from the ENV monitoring station in Quesnel were summarized and will therefore capture air quality conditions under a wide range of meteorological conditions.

Category	Technical Advisor Input	Response/Actions
Archaeology/Heritage	A request was made for a short summary of past archaeological/heritage work completed by BGM and seeking a commitment to future assessments once development plans are finalized.	BGM is providing a summary table of historic inspections conducted under the *Heritage Conservation Act* Permit 2016-0276 (See Appendix D). BGM reiterates their commitment to future assessments once development plans are finalized and have also included some information on these potential plans in the provided summary table. BGM confirms that a version of this summary table is provided in the DPD.
	A recommendation was made to contact FLNRORD's Heritage Branch for their input, considering the large number of Mining Era Heritage sites that could be impacted.	BGM confirms that Golder Associates Ltd., on behalf of BGM, reached out to the Heritage Branch following the initial 2018 assessment and was advised, at the time, to share spatial data and reports once the final HCA Permit 2016-0276 report is complete.

Table 14: Summary of Interests and Concerns identified by Participating Indigenous Nations in Early Engagement

Indigenous Nation	Potential effects to Indigenous Interests and Project Concerns	Response/Actions
Lhtako Dené Nation	Concerns with the social, cultural, and environmental effects of the proposed Northern Transmission Line route and its potential to cause a loss of resource use areas, disturbance and loss of wildlife and wildlife habitat, particularly caribou habitat and disturbance to valuable aquatic and terrestrial ecosystems.	BGM will support Lhtako Dené Nation in completing additional baseline data collection and field visits to identify the archeological and traditional use sites that the transmission line route overlaps. BGM will provide updated maps and revisions to the transmission line footprint to Lhtako Dené Nation for review and comment and will meet with Lhtako Dené Nation to discuss potential interactions between the route alignment and Lhtako Dené Nation interests. Potential effects from the Project are described in Section 14.0.
	Concerns with the disturbance to berry harvesting sites along the proposed transportation routes, particularly 500 Nyland Lake Road, through physical loss of the resource use area, restricted access to the resource area, and dust emissions rendering traditionally harvested berries inedible.	BGM will consider input from the Lhtako Dené Nation community members on these particular harvesting sites. BGM is collecting additional baseline information in this area to support the effects assessment. This area will be considered in the EAC Application. BGM does not anticipate that the Project or Project-related activities will result in restricted access to the resource use area or physical loss of the area as aside from new access or improvements to existing access to Highway 26 (for the Mine Site Surface Infrastructure, and Island Mountain Portal), upgrades to the Transportation Route are not required and mitigation measures to manage dust can be utilized.
	Concerns with tailings management, including the desire for more information on dry tailings storage and the potential effects on water quality and aquatic resources in Quesnel River.	BGM commits to providing additional information to Lhtako Dené Nation regarding filtered stack tailings, benefits and risks. Information on the tailings storage facility is provided in Section 7.6.3.

Indigenous Nation	Potential effects to Indigenous Interests and Project Concerns	Response/Actions
	Concerns with the effects on resource use areas through the reduced access and/or loss of fishing, hunting, trapping, gathering and harvesting sites/areas.	BGM commits to continued discussions with Lhtako Dené Nation regarding resource use, including available information on the location and seasonal use patterns where fishing, hunting, trapping, gathering, and harvesting occurs to inform Project planning with a view to mitigating potential effects. BGM will work with Lhtako Dené Nation to identify access to resource use areas and related opportunities for sustained fishing, hunting, trapping, gathering and camping activities and work to mitigate any impacts to these areas. BGM recognizes the importance of the berry picking and hunting area along 500 Nyland Lake Road and will endeavour to minimize any Project effects in that area. BGM will continue engagement to maximize the inclusion of traditional knowledge of the land use in and adjacent to the Project footprint in Project studies.
	Interest in conducting further archaeological monitoring to address concerns with loss or infringement of archaeological sites/areas from land alerting activities.	BGM will support archaeological monitoring by Indigenous nations in areas where new ground disturbance is occurring.
	Concerns with the potential disturbance of spiritual sites and culturally sensitive areas.	BGM will continue to work with Lhtako Dené Nation to identify potential spiritual sites and culturally sensitive areas and discuss measures to address any potential impacts of the Project on such Indigenous interests.
	Concern with the loss of both water and land transportation routes that overlap with the Cariboo Gold footprint.	Based on information contained in the Traditional Land Use and Occupancy Study (TLUOS) and discussions with Lhtako Dené Nation, BGM will identify transportation routes and trails that overlap the Project footprint and discuss potential means through which to mitigate potential effects.
	Concerns regarding effects to water quality and fish and fish habitat from water impairment, seepage of contamination into surface water and groundwater downstream of Project area, changes to stream hydrology, effects to potable water supply, and loss of riparian ecosystems and wetlands.	Each of these items identified will be considered in the effects assessment. Should potential effects to Lhtako Dené Nation interests be identified, BGM will discuss with Lhtako Dené Nation potential mitigation measures. BGM will discuss with Lhtako Dené Nation how water-based traditional practices may be impacted.

Indigenous Nation	Potential effects to Indigenous Interests and Project Concerns	Response/Actions
	Concerns with the effects on terrestrial and aquatic animal species through the disturbance or loss of critical habitat and wildlife corridors from land clearing, disturbance or loss of salmon from water impairment, and terrestrial wildlife mortality from increased traffic.	Each of these items identified will be considered in the effects assessment and documented in the EAC Application. Should potential effects to Lhtako Dené Nation's interests be identified, BGM will discuss with Lhtako Dené Nation potential mitigation measures. BGM has a Caribou Mitigation and Management Plan for its Bonanza Ledge Mine operations, and it will be updated as required for the Project.
	Concerns with the effects on plants from the loss of rare and culturally species and the loss of commonly harvested species.	Vegetation will be considered in the effects assessment. BGM will continue to engage with the Lhtako Dené Nation to learn about valued plant species and develop mitigation measures based on traditional knowledge.
	Concerns with the potential for impairment to air quality from pollution (i.e., contaminants and greenhouse gas emissions) and increased dust emissions.	Effects on air quality, including greenhouse gas emissions, will be considered in the EAC Application.
	Concerns with the effects of noise pollution through increased noise levels from construction and operations.	BGM will engage with the Lhtako Dené Nation to learn about their concerns with noise disturbance and incorporate it into the EAC Application.
	Concerns about water quality from discharge at QR Mill, including previous non-compliances and reporting at this site.	Water quality concerns at QR Mill are being addressed through the implementation of a water treatment system. This water treatment system has been designed to address and prevent non-compliance events. Details are provided in Section 7.6.4.
	Concerns with the loss of natural resources for future generations.	BGM will continue to discuss the use of Traditional Ecological Knowledge (TEK) and Traditional Land Use and Occupancy Study (TLUOS) information in the EA with Lhtako Dené Nation to understand the potential impacts of the Project on future generations. A cumulative effects assessment will be completed for the Project. BGM will work with Lhtako Dené Nation to reflect Lhtako Dené Nation's interests in the study.
	Interest in ensuring the appropriate use of Traditional Ecological Knowledge and Traditional Land Use and Occupancy Study information in all phases of the EA.	BGM will continue to discuss use of TK and the TLUOS information in the EA with Lhtako Dené Nation.

Indigenous Nation	Potential effects to Indigenous Interests and Project Concerns	Response/Actions
	Interests in woodland caribou, including impacts of Cariboo Gold on the local Barkerville caribou herd and cumulative impacts in the region from forestry and other industry, as well as the interactions with moose and moose hunting. Recovery of the caribou herd is a priority and Lhtako has future aspirations to be able to hunt caribou again in the future.	BGM recognizes the importance of caribou and moose to Lhtako Dené Nation. Studies related to wildlife and wildlife habitat, including caribou and moose, are being undertaken, and the findings will be discussed with Lhtako Dené Nation and included in the EAC Application.
	Interests in future aspirations for use of the land – Lhtako is attempting to revitalize the community and focus on fishing, ethnobotany and medicinal plant gathering in the area.	BGM will continue to work with Lhtako Dené Nation to understand their interests and future aspirations for use of the land in the Project area, including with respect to fishing, ethnobotany and medicinal plant gathering. Project studies will address a wide range of environmental topics, and BGM will work with Lhtako Dené Nation to identify ways to avoid or mitigate potential effects to Lhtako Dené Nation interests where possible.
	Interests in becoming partners with local governments and industry in managing the land base and providing Lhtako Dené Nation members with employment opportunities.	BGM will continue to work with Lhtako Dené Nation to understand their interests in the Project area, including with respect to potential land management frameworks. BGM will continue to provide employment opportunities for Lhtako Dené Nation members in accordance with the process and commitments contained in the Project Agreement, which was signed on October 2, 2020.
Soda Creek Indian Band	Interests in being involved in any archaeological studies being done in the Project area, including being involved in study design, preliminary field reconnaissance studies, and any archaeological finds.	BGM will continue to invite Soda Creek Indian Band members to participate in future archaeological studies for the Project.
	Interest in completing a traditional use study in the area of the Project and the local region.	BGM has offered to fund and will continue to work with Soda Creek Indian Band to complete a traditional use study for the Project.
	Concerns about any modifications to the access roads, including widening or lengthening the roads.	BGM intends to use existing roads and, although some roads may require maintenance, major upgrades are not anticipated to be required.
	Interest in being involved in any land stewardship initiatives.	BGM will engage with Soda Creek Indian Band regarding any land stewardship initiatives.

Indigenous Nation	Potential effects to Indigenous Interests and Project Concerns	Response/Actions
	Interested in developing experience and training for water technicians within Soda Creek Indian Band through working on this Project.	BGM will work with Soda Creek Indian Band to identify potential employment and training opportunities related to the Project, including those for technicians involved in water-related activities.
	Concerns about emergency procedures during shutdowns, in particular in the community due to the recent Mt. Polley disaster nearby.	BGM will share emergency response procedures with Soda Creek Indian Band.
	Interests in understanding closure and reclamation plans prior to Project operating.	BGM will discuss the development of reclamation and closure plans with Soda Creek Indian Band prior to the commencement of operations.
	Concerns about cumulative impacts in the region due to other industry activity, including placer mining.	BGM will complete a cumulative effects assessment as part of the Project studies.BGM will discuss items to be included in those studies with Soda Creek Indian Band. The cumulative effects assessment will be included in the EAC Application.
	Interests in understanding impacts to water quality from the Project.	Studies related to groundwater and surface water are being undertaken, and the findings will be discussed with Soda Creek Indian Band and included in the EAC Application.
Williams Lake First Nation	Interest in developing traditional use studies in the area of the QR Mill and access roads to the QR Mill.	BGM has offered to fund and will continue to work with Williams Lake First Nation to complete a traditional use study for the Project.
	Interests regarding understanding effects to water quality downstream of the QR Mill, including what are existing conditions on-site, storage of potentially-acid generating rock material stored at QR Mill site.	Studies related to groundwater and surface water are being undertaken, and the findings will be discussed with Williams Lake First Nation and included in the EAC Application. Waste rock will not be stored at the QR Mill site. Filtered stack tailings will be stored in a secure facility, and contact water will be treated, as required, before being released to the environment (See Section 7.5.3.3).
	Concerns regarding road use and cumulative effects of traffic on access roads to QR Mill.	A traffic and transportation study is being undertaken, and the findings will be discussed with Williams Lake First Nation and included in the EAC Application.
	Interest in being involved in archaeological studies in the area of the QR Mill and potential effects on cultural heritage.	BGM will continue to invite Williams Lake First Nation members to participate in future archaeological studies for the Project.

Indigenous Nation	Potential effects to Indigenous Interests and Project Concerns	Response/Actions
	Interest in effects on wildlife and wildlife habitat.	Studies related to wildlife and wildlife habitat are being undertaken, and the findings will be discussed with Williams Lake First Nation and included in the EAC Application.
	Interest in effects on vegetation.	Studies related to vegetation are being undertaken, and the findings will be discussed with Williams Lake First Nation and included in the EAC Application.
	Effects to fish and fish habitat downstream of the QR Mill, in particular on salmon populations	Studies related to fish and fish habitat are being undertaken, and the findings will be discussed with Williams Lake First Nation and included in the EAC Application.
	Interests in impacts and further study on the transmission line, archaeological impacts, traditional uses, wildlife, and potential impacts to any stream crossings that will be impacted by construction of the line.	Studies related to the transmission line are being undertaken, and the findings will be discussed with Williams Lake First Nation.

2.4 Role of Engagement in Project Definition and Planning

BGM approached Project planning with the intent of reducing potential environmental and social effects through Project design. BGM recognized that, for this approach to be most successful, environmental and social studies and engagement with Interested Parties would have to start early in the Project planning process and be reviewed and updated as the Project advanced.

BGM began engagement with Indigenous nations and other Interested Parties in 2016 to identify potential interests, issues and concerns. This early engagement enabled the input received to inform engineering design and Project studies. Table 15 identifies key changes to the Project and Project studies resulting from input prior to the Early Engagement Phase.

Items related to BGM's existing activities in the area were raised during Project-related engagement. BGM addressed these items through their ongoing community relations activities and, those with potential applicability to the Project (e.g., light, noise, traffic) have been considered in Project design.

Following the start of the Early Engagement Phase, BGM continued to approach Project planning with the intent of reducing potential environmental and social effects through Project design. Table 16 identifies key changes to the Project and Project studies resulting from input received during the Early Engagement Phase.

The Project refinements that resulted from Engagement activities both prior to and during the Early Engagement Phase display BGM's commitment to working with the communities, stakeholders and Indigenous Nations to eliminate, minimize and mitigate Project effects and enhance benefits.

Table 15: Role of Engagement in Project Definition and Planning Prior to the Early Engagement Phase

Project Component or Activity	Input	Project Refinement/Discussions
Mining Method	■ Concerns were expressed about plans by previous management to develop an open pit mine in the area.	■ BGM revised its Project design and is proceeding with an underground mine.
Mine Site Facility Locations	■ Minimizing new disturbance is a priority.	■ Existing disturbed sites will be used for most facilities. ■ Progressive reclamation will be undertaken.
Employee Housing	■ Minimizing new disturbance is a priority. ■ Building housing in Wells is preferable to camps for mine employees and families. ■ The Project will increase demand on infrastructure (i.e., sewer, water, power) that is already at or near capacity.	■ Camp location is in a previously disturbed area to minimize new disturbance. ■ Given the life of the Project, location of operations, constraints on infrastructure in Wells and the number of workers required for the operation, a worker camp is a more practical solution to attract labour from the region. ■ BGM is open to discussing housing alternatives for a certain portion of its' workforce in Wells.
Waste Rock Storage	■ Minimizing new disturbance is a priority. ■ Water quality is important.	■ Waste rock will be stored at disturbed locations at the Mine Site and Bonanza Ledge Mine. ■ Waste rock will be used as backfill material for the underground mine workings or will be stored at the Bonanza Ledge Mine. ■ Water treatment will be part of the plan from the outset. ■ Progressive reclamation will be undertaken.
Processing - BGM initially considered processing ore at a new facility at the mine site.	■ Concern about processing at the Mine Site.	■ Processing will be done at the QR Mill.
Tailings - sites near Wells were considered to support processing at the Mine Site.	■ Concern about tailings storage in the Wells/Barkerville area.	■ The processed ore in the Services Building will generate tailings that will be mixed with binder and used as paste backfill for filling the voids generated by the extraction of ore underground. Concentrate produced in Wells will be processed, and tailings stored at the existing QR Mill site.

Project Component or Activity	Input	Project Refinement/Discussions
Tailings Storage - BGM initially considered storing tailings at the existing or a new, sub-aqueous storage facility at the QR Mill site.	■ Concern about the potential for a tailings dam breach associated with the Project.	■ BGM will use filtered stack tailings. ■ The FSTSF is proposed to be built on the site of the existing tailings pond at QR Mill. ■ Filtered tailings have very low water content and do not require a dam to retain water. The new tailings facility will consist of a berm design to retain solids, and a collection ditch will recover the water run-off coming from the tailings, which will be sent to the water treatment plant.
Transmission line – routing - two routes were considered: a route along Highway 26 and a northern route.	■ Preference for the existing right-of-way along Highway 26 rather than opening a new right-of-way. ■ Concern about impacts on tourism from a wider right-of-way affecting visual quality along Highway 26. ■ There is a desire for 3-phase power in Barkerville, Wells, and at locations along Highway 26 to support or encourage economic development.	■ A transmission line along the existing route was BGM's preferred option; however, technical challenges arose regarding the Highway 26 route, and ultimately it was determined that one 69 kV line could not serve the mine and the community and building along Highway 26 would result in a second right-of-way required alongside the existing right-of-way. ■ An additional option (the Northern Transmission Line Route) from the Highway 26 route was presented. ■ BGM commits to continue to work with other local organizations to advocate for improved electricity service for the area.
Road Use	■ Concern about mine-related traffic travelling through Wells.	■ Minimizing traffic entering into Wells was a consideration in selecting the site for the Mine Site facilities. ■ A bypass will be developed before the community of Wells so that mine-related traffic can enter and exit the highway without travelling through the community.
Water Treatment	■ Concern with discharge from current sites exceeding permitted discharge limits.	■ Water treatment will be included from the design stage based on the results of on-going water quality and water balance models.
Use of District of Wells water and sewer infrastructure	■ Concern about increased demand from BGM as District of Wells' services are at or near capacity.	■ A water well will be developed at the Mine Site for Project use. ■ The worker camp will have a self-contained sewage system.

Project Component or Activity	Input	Project Refinement/Discussions
Mine Site lighting	■ Concern regarding light escaping into the community from the Mine Site.	■ BGM completed a baseline light assessment for the Project. ■ BGM is designing the landscape of the Mine Site to reduce the impact of light escaping into the community. ■ BGM is also adjusting existing lighting to reduce light escaping into the community and will use directional lighting for the Project.
Noise	■ Concern that not enough monitoring locations were included in baseline studies. ■ Concern regarding low-frequency noise. ■ Concern regarding consistent noise from operations being like exploration noise.	■ BGM added baseline monitoring locations. ■ Low-frequency noise is being addressed in the studies. ■ Acoustical enclosures, insulation and other reduction technology, as well as physical barriers such as berms, will be used to reduce noise. ■ Development of Island Mountain Portal to reduce the duration of the construction period when noise is most likely to be generated.
Air Quality	■ GHG emissions from the facility.	■ BGM is examining ways to supply electricity to the site when the mine becomes operational to eliminate the need to use generators for the first year of operations.

Table 16: Role of Engagement in Project Definition and Planning as a result of comments received on the IPD and Supplemental to the IPD during the Early Engagement Phase

Project Component or Activity	Input	Project Refinement/Discussions
Concentrator building and other mine site facilities	■ Minimizing visual effects is a priority.	■ A number of Project-related activities are housed in the Services Building to reduce visual effects at the site. ■ The Services Building and water treatment plant were repositioned on the Mine Site to reduce visual effects. ■ Adjustments were made to the Services Building height and configuration height to reduce visual effects (See Section 7.1.2).
Island Mountain Portal	■ Minimizing visual effects. ■ Dust and noise from activities associated with the portal.	■ BGM advanced a design concept showing landscaping and site contouring (as part of a reclamation plan for the Island Mountain Portal, to be implemented in Year 2 of the Project operations phase) to reduce visual, dust generation and noise impacts (See Section 7.1.1).
Noise and Dust	■ Concern regarding noise and dust in the community and the impact that increased levels will have on the quality of life and tourism.	■ The Services Building combines all surface activities into one building, thus limiting the sources for noise and dust at the Mine Site.
Tailings Storage	■ Concern about the potential for a tailings dam breach associated with the Project.	■ Filtered tailings have very low water content and do not require a dam to retain water. The new tailings facility will consist of a berm design to retain solids, and a collection ditch will recover the water run-off coming from the tailings, which will be sent to the water treatment plant. ■ BGM's preferred site for the filtered stack tailing storage facility is the existing tailings pond at the QR Mill site. Use of this location will rehabilitate the tailings pond and remove the risk of a dam breach as water from the pond will be removed.

Project Component or Activity	Input	Project Refinement/Discussions
Transmission line	■ Concern regarding visual effects along Highway 26. ■ Concern about opening a new corridor. ■ Concern regarding caribou habitat. ■ There is a desire for 3-phase power in Barkerville, Wells, and at locations along Highway 26 to support or encourage economic development.	■ The Northern Transmission Line is now BGM's preferred route given technical, scheduling, air quality, noise, and visual quality advantages. This option also impacts fewer private properties and less critical caribou habitat than the Highway 26 route. ■ The line routing is being further evaluated in consideration of all environmental constraints, including caribou habitat. ■ Where trade-offs between values are required, options will be developed for discussion with community stakeholders and Indigenous nations. ■ BGM will continue to work with other local organizations to advocate for improved electricity service for the area.

3.0 PURPOSE AND RATIONALE

3.1 Project Purpose and Rationale

BGM's vision is to establish a safe, sustainable long-life mining operation in BC's historic Cariboo region that has a low environmental impact and positive socio-economic return for our Indigenous partners and local stakeholders. The Cariboo region has a history of mining that dates back to the 1860s. The Project continues the legacy of mining in the region, with the construction and operation of a modern underground mine which follows sustainable development values. With resources containing approximately 5 million ounces of gold and the high exploration potential over the 2,071 km² of mineral rights in the Cariboo district, BGM is convinced that the Cariboo Gold Project will establish the foundation of an emerging world-class mining operation. The company is committed to conducting its' activities with respect for environmental factors, social considerations and an appreciation of our Indigenous partner's knowledge and connection to these lands.

3.2 Potential Project Benefits

The 16-year operational phase of the Project will result in approximately 460 direct employment positions in addition to 50 contractors and consultants per year, given currently delineated resources. The Project will provide meaningful economic partnerships, employment, and training opportunities for Indigenous nations and people from the Cariboo region. With an initial investment of $400 to $450 million, and spending another $450 million over the life of the mine in sustaining capital, the Project will provide an economic benefit to the Cariboo region, particularly in Wells, Quesnel and the surrounding areas, as well as to the Province of BC. For the town of Wells, potential mutual infrastructure or services may be envisioned with the Cariboo Gold Mine benefitting both parties. BGM has always invited and welcomed partnerships.

The Cariboo Gold Mine will be at the forefront of the latest technology and will require the talents and expertise of a highly qualified labour force. BGM will facilitate the training of personnel and give opportunities to local community members and Indigenous nations to obtain training and gain expertise in the different skilled areas the mining operation will require. This is also true for potential business partnerships that will be required to upgrade, expand, or create new services for the mining operation. We anticipate that the creation of steady, well paying professions in the region will reduce population drift from the Cariboo region and will bring new professionals attracted to the opportunities created by the mine.

The historical mining that has taken place in the region has left negative environmental impacts which BGM has started to address. One of the key criteria in the site location for the major component of the Project is to use previously disturbed "brownfield sites" for the Mine Site and avoid impacting previously undisturbed lands or environmentally sensitive areas. In using these brownfield sites, BGM has the opportunity "to leave it better than we found it" and ensure that these historic and legacy sites be reclaimed and closed as part of our reclamation and closure plan commitments. .BGM has designed its operation and selected technology to minimize the footprint required for the Project. By selecting an underground operation and using technology like ore sorting, paste backfill, filtered tailings and electrical equipment, the Cariboo Gold Mine will minimize its' environmental footprint and will be an example to follow in the mining industry.

4.0 LEGISLATIVE AND REGULATORY CONTEXT

The required permitting and statutory regulatory approval processes prior to initiating construction are summarized below.

4.1 Project Updates and Changes

The Project was initially submitted to the BC EAO under the 2002 BC *Environmental Assessment Act* (EAA) on October 24, 2019. As the 2018 EAA came into force on December 16, 2019, BGM requested that the Project be considered under the new 2018 EAA (See Section 4.3.1).

The Project was updated to a production rate of 4,750 tpd from 4,000 tpd, as described in Supplemental to the IPD. The updated production rate is below the threshold for review under the federal *Impact Assessment Act* (See Section 4.4.1).

4.2 Engagement Activities

During the Early Engagement Phase, BGM presented Project details to the technical advisors which included members from various provincial regulatory agencies and local governments. Comments received from the technical advisors during the Early Engagement Phase noted requirements for various permits and approvals that would be obtained for the Project after the EAC was received. Table 17 has been updated as appropriate in consideration of these comments.

4.3 Provincial Considerations

4.3.1 British Columbia Environmental Assessment Act

The provincial EA process was initiated with the submission of the Project Description to the BC EAO under the 2002 EAA on October 24, 2019. A Section 10(1)(c) Order under the *EAA* S.B.C 2002 (former Act) was received on October 29, 2019. On December 16, 2019, the 2018 EAA (Government of BC, 2018a) and associated regulations came into force. As the Project had not received an Order under Section 11 as per the 2002 EAA (now called a Process Order under the 2018 EAA), BGM requested on January 17, 2020 that the Project be considered under the 2018 EAA.

The Project is expected to require a provincial EA certificate because it exceeds the following threshold under Part 3 (Table 6 – Mine Projects) of the *Reviewable Projects Regulation* (Government of BC, 2019a):

- Project Category (2): Mineral Mines - “A new mine facility that, during operations, will have a production capacity of >75,000 tonnes/year (t/yr) of mineral ore.”

The Project Description submitted to the BC EAO on October 24, 2019 was accepted as fulfilling the requirements of the IPD, as required under the new 2018 EAA, on February 21, 2020. The Engagement Plan was submitted to the BC EAO on May 4, 2020 for review. The IPD and Engagement Plan were approved, pursuant to Section 13(3)(a) of the 2018 EAA, on May 14, 2020.

A Supplemental to the IPD was submitted on June 11, 2020.

4.3.2 Climate Action Legislation

Two pieces of Provincial climate action legislation have direct impacts on the BC EAO review of the Project, as well as ongoing operations of the Project, should it be approved. The *Climate Change Accountability Act, 2019* (Government of BC, 2019b) sets legislated targets for reducing provincial greenhouse gas (GHG) emissions by at least 40% below 2007 levels by 2030, 60% by 2040, and 80% by 2050. The Act also requires that separate 2030 sectoral targets be established by the Province through engagement with industry, Indigenous nations and other stakeholders. Reflecting the requirements of the Act, the BC EAO now requires that the DPD include:

- An estimate of direct and indirect Project GHG emissions by phase; and
- A description of the potential effects on the Province being able to meet its targets under the *Climate Change Accountability Act* (Government of BC, 2019b).

These requirements are addressed in Section 8.2's discussion of Project air, dust and GHG emissions.

The *Greenhouse Gas Industrial Reporting and Control Act, 2016* (Government of BC, 2014) and associated *Greenhouse Gas Emission Reporting Regulation, 2016* (Government of BC, 2015) require that industrial operations that emit over 10,000 carbon dioxide equivalent t/yr (tCO_2e) report their GHG emissions each year, following calculation and reporting methodologies established by the province. Operations emitting over 25,000 tCO_2e are required to have their emission reports independently verified, following the ISO 14064-3:2006 verification standard. As discussed in Section 8.3, the Project is expected to have annual direct GHG emissions exceeding 25,000 tCO_2e, meaning that it would be subject to both the emissions reporting and verification requirements.

4.3.3 Applicable Indigenous Nations Agreements

The Project is within, or in proximity to, the traditional territories of the Lhtako Dené Nation, Soda Creek Indian Band, Williams Lake First Nation, Nazko First Nation and Tsilhqot'in National Government. As part of the Northern Shuswap Tribal Council, Soda Creek Indian Band and Williams Lake First Nation are currently in final agreement negotiations with the BC Treaty Commission (BC Treaty Commission, 2020). Nazko First Nation is also in active negotiations with the BC Treaty Commission (BC Treaty Commission, 2020).

4.4 Federal Considerations

4.4.1 Impact Assessment Act

The Project is not expected to require federal review pursuant to the *Impact Assessment Act* (IAA) because it does not exceed the applicable thresholds prescribed in the *Physical Activities Regulations* (SOR/2019-285) (Government of Canada, 2018d), including:

- **Section 18(c):** "The construction, operation, decommissioning and abandonment of a new metal mine, other than a rare earth element mine, placer mine or uranium mine, with an ore production capacity of 5,000 tpd or more."
- **Section 18(d):** "The construction, operation, decommissioning and abandonment of a new metal mill, other than a uranium mill, with an ore input capacity of 5,000 tpd or more."
- **Section 19(d):** "The expansion of…an existing metal mill, if the expansion would result in an increase in the area of mining operations of 50% or more and the total ore input capacity would be 5,000 tpd or more after the expansion."

In addition, Project activities are not planned within a wildlife area or migratory bird sanctuary, or protected marine area, as defined by the *Physical Activities Regulations* (Government of Canada, 2019b).

4.4.2 Substitution

A substitution agreement is not required as the Project is not subject to federal review.

4.4.3 Federal Land and Federal Funding

There is no proposed or anticipated federal financial support being provided to carry out the Project. In addition, there are also no federal lands that will be used for undertaking the Project. The nearest federal property consists of three buildings owned by the Royal Canadian Mounted Police in Wells. However, it is understood that the regulation of these properties is deferred to the municipality and province.

4.5 Permits and Approvals

4.5.1 Provincial Permits, Approvals, and Licences

Provincial permits, approvals, authorizations, and licences that could potentially be applicable to the proposed Project are summarized in Table 17. As the Project proceeds, specific permit requirements will be determined based on discussions with provincial agencies.

Table 17: Provincial Permits and Approvals Potentially Applicable to the Proposed Project

Permit/Approval	Responsible Agency	Provincial Statute	Regulatory Context
Mines Act Permit	BC Ministry of Mines, Energy, and Petroleum Resources	*Mines Act*	■ Approval of the Mine plan, construction, and the reclamation and closure plan. ■ Amendments to existing permits.
Effluent Discharge Permit, Emissions Discharge Permit, Refuse Permit and Waste Storage Approvals	BC Ministry of Environment and Climate Change Strategy (ENV; formerly BC Ministry of Environment)	*Environmental Management Act*	■ Permitting system to enable authorized discharge of effluent to water, storage/treatment of wastes, disposal of solid waste to the land, and discharge of emissions to the atmosphere. ■ Amendments to existing permits.
Heritage Conservation Act Permit	BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD; formerly BC Ministry of Forests, Lands and Natural Resource Operations), Archaeology Branch	*Heritage Conservation Act*	■ Heritage inspection, investigation, or site alteration of lands potentially affected by the Project.

Permit/Approval	Responsible Agency	Provincial Statute	Regulatory Context
Heritage Conservation Act Concurrence Letters	FLNRORD, Archaeology Branch	*Heritage Conservation Act*	■ Heritage resources must be assessed in relation to the mandates, objectives, and intents of the *Heritage Conservation Act* for lands potentially affected by the Project. ■ The Archaeology Branch issues letters to the BC EAO, stating that appropriate assessment under the *Heritage Conservation Act* is complete.
License of Occupation	FLNRORD	*Land Act*	■ Authorize entry, occupation and construction on Crown Lands of the Transmission Line and associated access roads as an interim tenure pending completion of survey requirements and issuance of statutory right-of-way.
Statutory Right of Way	FLNRORD	*Land Act*	■ Standard tenure for electrical transmission lines on Crown Lands.
Wildlife Act Permit	ENV, Environmental Stewardship Division	*Wildlife Act*	■ Wildlife and fish salvages and surveys of wildlife and their habitat. ■ Bird nest removal or relocation.
Sewer System Regulation Approval	BC Ministry of Health, Interior Health Authority, Northern Health Authority	*BC Public Health Act*	■ Approval for change in design flow or intended use.
Construction Permit for a Potable Water Well	BC Ministry of Health, Northern Health Authority, Interior Health Authority	*Drinking Water Protection Act*	■ Exploration of a groundwater well for domestic water use.
Water System Construction Permit	BC Ministry of Health, Northern Health Authority, Interior Health Authority	*Drinking Water Protection Act*	■ Construction of a potable water system.
Drinking Water System Operations Permit	BC Ministry of Health, Northern Health Authority, Interior Health Authority	*Drinking Water Protection Act*	■ Operation of a potable water system.
Short Term Use of Water Permit	ENV, Water Stewardship Branch	*Water Sustainability Act*	■ Approval for short-term use of water approval from freshwater streams and lakes for construction purposes.
Water Sustainability Act Approval	ENV, Water Stewardship Branch	*Water Sustainability Act*	■ For changes in and about a stream, including diversions, storage, and use of water.

Permit/Approval	Responsible Agency	Provincial Statute	Regulatory Context
Water Licence	ENV, Water Stewardship Branch	*Water Sustainability Act*	■ For construction and operation of Project activities requiring diversion of surface waters or groundwater sources for potable or process water.
Licenses to Cut and Special Use Permit	FLNRORD, Forest Tenures Branch	*Forest Act*	■ License to Cut Permit to harvest in a specific area over a relatively short time period. ■ Special Use Permit to gain non-exclusive authority to use Crown Land, within Provincial Forest.
Industrial Access Permit	BC Ministry of Transportation and Infrastructure (MOTI)	*Transportation Act*	■ Required for any new roads that join onto public roads controlled by the MOTI.
Permit for regulated activities	Ministry of Health	*Public Health Act*	■ Regulated activities may, if prescribed standards are not met, endanger health or cause injury or illness, or are not regulated under an enactment (or if regulated do not sufficiently prevent, mitigate or respond to the risk to health or risk of injury or illness). Such activities could be the construction of industrial camps, providing potable water, processing wastewater, or managing septic systems.
Explosives Magazine Storage and Use Permit	Ministry of Energy, Mines and Petroleum Resources	*Mines Act*	■ Storage and use of explosives.

4.5.2 Federal Permits, Approvals, Licences, and Authorizations

Federal permits, approvals, and authorizations that could potentially be applicable to the proposed Project are summarized in Table 18. As the Project proceeds, specific permit requirements will be determined based on discussions with federal agencies.

Table 18: Federal Permits and Approvals Potentially Applicable to the Proposed Project

Permit/Approval	Responsible Agency	Federal Statute	Regulatory Context
Fisheries Act Authorization	Fisheries and Oceans Canada (DFO)	*Fisheries Act*	■ No person shall carry on any work, undertaking or activity other than fishing that results in the death of fish. ■ No person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction (HADD) of fish habitat. ■ If the death of fish or a HADD cannot be avoided during any part of the Project, an Authorization under Section 35 may be required.
Migratory Birds Convention Act Authorization	Environment and Climate Change Canada (ECCC)	*Migratory Birds Convention Act*	■ Permits may be issued to eliminate dangerous conditions or damage to property caused by migratory birds or their nests.
Navigation Protection Program Notification and/ or approval	Transport Canada	*Canadian Navigable Waters Act*	■ Notification and information to the Minister for works that are in, on, over, under, through or across any navigable water. ■ Application for approval from the Minister is required for works (other than minor works) that are in, on, over, under, through or across any navigable water and may interfere with navigation.
Species at Risk Act Authorizations	Environment and Climate Change Canada, DFO, and Parks Canada	*Species at Risk Act* (SARA)	■ The Competent Minister may issue a SARA permit authorizing activity that will affect a listed wildlife species, any part of its critical habitat, or the residences of its individuals.
Explosive Licences and Permits	Natural Resources Canada	*Explosives Act*	■ Explosive License required for factories and magazines. ■ Explosive Permit required for vehicles used for the transportation of explosives.
Transportation of Dangerous Goods	Transport Canada	*Transportation of Dangerous Goods Act*	■ Addresses the classification, documentation, marking, means of containment, required training, emergency response, accidental release, protective measures, and permits required for the transportation of dangerous goods by road, rail, or air.

4.5.3 Local Government Permits

The Project facilities are located in areas within the jurisdictions of the CRD and District of Wells. Both jurisdictions have passed Bylaws which may pertain to Project activities/operations and Property ownership or business operations, including:

- CRD Bylaw No. 4949, regarding the management of invasive plants;
- CRD Bylaw No. 4628, regarding the management of untidy/unsightly properties;
- Wells Bylaw No. 93, Noise Control, limiting hours of noise during operations/construction; and
- Wells Bylaw No. 68, Traffic and Streets, providing for load and size restrictions.

Other Wells Bylaws are applicable to utility connections and municipal service fees related to property development (water, sewer, garbage). These will be addressed through direct applications with the District of Wells.

5.0 PROJECT STATUS AND HISTORY

The history of mining in the Project area, Cariboo Gold Project history and a summary of current permits and tenures are provided in the section below.

5.1 History of Mining in the Project Area

The District of Wells has a history of mining and anthropogenic disturbance dating back to the 1860s. Large scale lode gold exploration began in the 1930s. The Project area contains several historical mines, including Cariboo Gold Quartz, Aurum and Mosquito Creek.

The Cariboo Gold Quartz Mine in Wells went into production in 1933. There has been substantial work completed over the last 90 years on the overall claim holdings, with work programs having been completed by various companies. The historic Cariboo Gold Quartz portal location for the 1,500 level is located immediately adjacent to the Valley Portal location for the Project (Figure 3) at the Mine Site. Project underground development and ore extraction will take place adjacent to the extensive historical underground developments associated with these mining operations. During the operation of the Cariboo Gold Quartz Mine, approximately 2.65 million t of flotation mill tailings were deposited into the northeastern end of Jack of Clubs Lake near its outlet into the Willow River, filling approximately 30 ha of the original lake area (SNC Lavalin, 2011).

In addition to the mill tailings, hydraulic placer mining operations in Lowhee Creek also deposited an unknown quantity of placer outwash to the northeastern end of Jack of Clubs Lake. Historical waste rock associated with the 1,500 Level adit is also located on the northeast end of Jack of Clubs Lake, adjacent to the proposed Mine Site portal. The Cariboo Gold Quartz Mine closed on August 31, 1959. The Cariboo Gold Quartz Mill continued operating using feed from the Aurum Mine until March 1967. During the period between 1933 and 1967, a total of 1,951,944 t of ore was mined, and 863,307 oz of gold and 91,652 oz of silver were recovered. The average recovery during that period was 95.3%.

Milling at the Aurum Mine, located on the north side of Jack of Clubs Lake, across from the Cariboo Gold Quartz Mine, commenced in 1934 by Newmont Mining Corporation. After 1945, no further exploration or development was carried out west of the Aurum Fault, and in 1952 the Aurum mine suspended active exploration and development. Underground workings extending northwest from the Island Mountain Mine into the Mosquito Group are formally known as the Aurum Mine. The Cariboo Gold Quartz Mine and Island Mountain Mine do not connect below Jack of Clubs Lake.

New exploration of the ground above the Aurum Mine and underground development, associated with the Mosquito Creek Mine, occurred from 1971 to 1975, and 27,384 oz of gold was recovered during the main production period (1980 to 1983). During the period between 1980 and 1987, a total of 92,826 t of ore was mined, from which 35,054 oz of gold and 9,750 oz of silver was recovered. In addition to the exploration and mining activities described above, numerous surface and underground exploration activities have occurred in the Project area dating from approximately 1968.

International Wayside Gold Mines Ltd. (IWGM) conducted exploration drilling on the Island Mountain Project between 1999 and 2014 and the Cariboo Gold Quartz Project between 1995 and 2009. In April 2000, IWGM submitted an Application to the BC EAO that included a conceptual plan for a 3,000 tpd open pit and underground gold mining operation. Due to amendments to the Project and regulatory changes, it was determined that additional information was required for the Application. In April 2003, the BC EAO issued a Section 11 order that outlined the scope, procedures and methods required for the EA. In April 2009, the Project was terminated by the BC EAO as supplementary information for their Application was not submitted by the deadline outlined in the Section 11 order.

The QR Mill is located on the Quesnel River Mine property, which has historically produced gold. The Quesnel River Mine began pre-production development and site construction under Kinross Gold in 1994, and production started from the Main Zone Pit in 1995. BGM acquired the property in 2010 and focused on mining a small remaining deposit over a 12-month period, after which the mine was put into care and maintenance.

5.2 Project History

BGM's predecessor, IWGM, began acquiring land in the Barkerville area in 1994. Under an option agreement dated October 4, 1994 (the "Cariboo Option Agreement"), IWGM could acquire a 50% interest in the Cariboo Gold Quartz Property in the Cariboo Gold District from Mosquito Consolidated Gold Mines Ltd., which consisted of 65 Crown-granted mineral claims. On May 12, 1999, Island Mountain Gold Mines Ltd. optioned a 50% interest in the Island Mountain – Aurum gold mine and the Cariboo Gold Quartz Property from IWGM. The property consisted of 68 Crown-granted mineral claims. From 2006 to 2011, IWGM consolidated its land package by acquiring additional predominately contiguous properties and Crown-granted mineral claims. IWGM changed its name to Barkerville Gold Mines on January 20, 2010.

Since 1994, BGM has staked additional mineral titles and acquired other mineral titles (mineral claims and Crown-granted parcels) through purchase agreements with other title owners within the Cariboo Gold District. A total of 17 titles outside of the mineral resource area are subject to Net Smelter Royalties.

BGM intermittently processed Bonanza Ledge Mine ore from June 2014 to March 2015 at its wholly-owned QR Mill until management stopped production and placed the Bonanza Ledge Mine under care and maintenance. During the second quarter of 2017, after receiving a permit amendment to change the mine plan from open pit to underground, BGM began portal and underground development at the Bonanza Ledge Mine to prepare for the processing of in-situ Bonanza Ledge Mine material resulting in the processing of both low- and high-grade development material at the QR Mill for commissioning and training purposes.

The proposed Cariboo Gold Project is a new project located in an area known for its rich mining history. The Project footprint has been significantly reduced by utilizing existing infrastructure associated with the Bonanza Ledge Mine located 4 km southeast of the historic Cariboo Gold Quartz Mine as well as transporting and processing ore at the existing QR Mill.

5.3 Existing Permits and Tenures

BGM currently operates the Bonanza Ledge Mine located 4 km southeast of the historic Cariboo Gold Quartz Mine. In 2012, BGM received *Mines Act* permit M-238 to develop an open pit mine at the Bonanza Ledge Mine. The Bonanza Ledge Mine also has an *Environmental Management Act* Permit PE-17876, which authorizes the discharge of effluent to Lowhee Creek during operations and Stouts Gulch at closure. In 2017, the Bonanza Ledge Mine permits were amended to increase ore production and operate underground.

Current operations at the QR Mill are managed under *Mines Act* Permit M-198 and *Environmental Management Act* Permit, PE-12601. In July 2012, BGM received an amendment to *Mines Act* Permit M-198 to allow the custom milling of up to 300,000 t of ore from the Bonanza Ledge Mine, as well as the disposal of associated mine tailings in the QR Main Zone Pit. In December 2012, BGM received an amended *Environmental Management Act* Permit, PE-12601, to allow effluent discharge associated with active mining at Bonanza Ledge Mine.

BGM submitted two Joint Permit Amendment Applications (JPAAs) in July 2020 for Bonanza Ledge Phase II (BL Phase II) (two amendment applications were submitted, one for the Bonanza Ledge mine site and one for QR Mill); an expansion of the existing Bonanza Ledge Underground Mine with an increase in production from

150,000 t/yr to 215,000 t/yr. The ore will be trucked from Bonanza Ledge to the QR Mill for processing and tailings storage. A Departure from Approval in association with the current *Mines Act* permit M-238, was granted by EMPR in May 2020 for ongoing drift development, ventilation raise, and emergency egress in association with BL Phase II. A separate *Mines Act* permit amendment application, under M-238, was submitted for the water treatment plant (WTP) at Bonanza Ledge in April 2020 and approval to operate the plant as a pilot (until September 2021) was granted. BGM is seeking approval for BL Phase II ore production through the Bonanza Ledge JPAA, as well as transitioning the Bonanza Ledge WTP from the piloting to the operational stage. Approval for the ore processing, tailings storage, and the construction and operation of a second WTP is sought through the QR JPAA. The WTP proposed for the QR Mill site (for low volume, high-efficiency sulphate removal), is intended to facilitate compliance under the current EMA permit.

The anticipated mine life of BL Phase II is approximately two years (2021 to 2022). There is no overlap in timing of the operation phases for BL Phase II and the Cariboo Gold Project (CGP).

The linkage between CGP and permitting processes for BL Phase II (Bonanza Ledge Mine and QR Mine JPAAs) relate mainly to water management / treatment at both of these sites. For CGP, the WTP at Bonanza Ledge will be relocated to the Mine Site. CGP WRSF contact water from the Bonanza Ledge site requiring treatment will be piped to the Mine Site. No other treatment of contact water from the Bonanza Ledge Site (beyond WRSF contact water) is anticipated to be required. The QR WTP proposed in the JPAA currently under review is anticipated to require upgrading for CGP, for neutralizing acid of tailings water, to add an ammonia treatment system for the process water, and for handling the additional flow anticipated with CGP. Confirmation of treatment upgrade requirements for the Mine Site and QR Mill will be provided in the CGP EAC Application.

BGM anticipates moving from Application Screening to Review for both JPAAs in early November, 2020. Target dates for the completion of the Application Review and issuance of required *Environmental Management Act* and *Mines Act* permit amendments is Q1 2021.

6.0 PROJECT TIMING

The preliminary project execution plan and schedule are currently conceptual and will be further developed and detailed during the next phase of Project development in support of the EAC Application submission. Seasonal timing constraints such as the least risk periods will be identified as the Project progresses and incorporated into the Project schedule. A preliminary Project phasing schedule and a general Project timeline are provided below. Project timing has been amended since the submission of the IPD, with increased estimates for both the site preparation and construction phase as well as the Project operation and ongoing mining phase. To date, BGM has not received comments pertaining specifically to the duration of Project phases, that have led to changes in the estimated or proposed timing.

6.1 Project Phases

The Project will consist of three distinct phases: construction, operation and decommissioning/reclamation. Preliminary durations for each phase of the Project is presented in Table 19.

Table 19: Preliminary Project Phase Durations

Project Phase	Duration
Site Preparation and Construction of Surface and Underground infrastructures	2 years
Project Operation and Ongoing Mining	16 years
Reclamation and closure	2 years

6.2 Project Schedule

Primary activities and major milestones are listed in Table 20. Construction start dates are subject to receipt of the EAC and are presented as estimates based on current schedule assumptions. The pre-production schedule has been developed to minimize the period between completing mining at the Bonanza Ledge Mine and commencing production on the Cariboo Gold Project.

Table 20: Cariboo Gold Project Milestones

Activity	Start Date	Completion Date
Complete design work on Project components to feasibility level to support the EA	-	Q4 2020
Development and Submission of Project EAC application	Q4 2020	Q1/Q2 2021
EAC Application Review and Receipt of Certificate	Q1/Q2 2021	Q2 2022
Transmission line preparation construction	Q3 2022	Q4 2023
Services Building and Mine Site infrastructure preparation and construction	Q3 2022	Q4 2024
QR Mill Upgrade and site preparation and construction	Q4 2022	Q3 2023
Pre-production mine preparation and development	Q3 2022	Q3 2023
Initial production at 1,500 tpd	Q3 2023	Q4 2024
End of Services Building construction/concentrator commissioning	Q4 2023	Q4 2024

Activity	Start Date	Completion Date
Full production achieved at the Mine	-	Q1 2025
Services Building fully operational (commercial production)	-	Q1 2025

6.3 Project Permitting Timeline

The proposed timeline for the submission of key EA and permitting applications is provided below in Table 21.

Table 21: Cariboo Gold Project Permitting Timelines

Activity	Start Date	Completion Date
Early Engagement	May 2020	September 2020
EA Readiness Decision	November 2020	December 2020
Process Planning	January 2021	April 2021
Application Development and Review	November 2020	May 2021
Effects Assessment and Recommendations	June 2021	June 2022
Decision	June 2022	July 2022
Post Certificate Permit Applications*	July 2022	Q1 2023

Note: * During the EA process, BGM intends to move forward with the permit application for obtaining a License of Occupation related to the Transmission Line. This has been discussed with FLNRORD, who has agreed to review the permit application and EAC application in parallel.

6.4 Known Seasonal Timing Constraints

The proposed Project schedule may overlap the seasonal timing constraints listed below in Table 22. Confirmation of, if, or how these timing constraints may impact the Project schedule will be provided in the EAC Application.

Table 22: Known Seasonal Timing Constraints

Activity	Start Date	Completion Date
Fish timing window for the Quesnel Forest District (Quesnel River watershed)[1]	July 15	July 31
Fish timing window for the Quesnel Forest District (Willow River watershed)[1]	July 15	July 25
Migratory Breeding Bird Window[2]	April 15	August 31
Non-Migratory Breeding Bird Window*[2]	March 15	July 31
Caribou (peak calving)[3]	May 15	June 15
Caribou (post-parturition)**	June 15	July 6
Caribou (late winter)	February	April
Bats (maternity, parturition)***[5]	April	August
Amphibians Breeding Window[6]	February	July

Notes: * Not including Golden Eagle which is from the beginning of March to Mid-August.
** Timing refers to three weeks in maternity pens timing after calving before release.
*** General timing window for bats. Bat timing windows are region specific and may be further refined.

References:
1. Fish Timing Window from Cariboo Regional Timing (MWLAP 2004)
2. Bird Breeding Window from Birds Canada Nesting Calendar Tool (2020)
3. Cichowski, et al. (2004)
4. BC MELP (1999)
5. BC MOE (2016)
6. Based on the longest breeding window (Northern Pacific Treefrog) BC MOE 2014

7.0 PROJECT LOCATION, ACTIVITIES AND COMPONENTS

Updates and changes to the Project, land and water use, a summary of Project components, alternative means of carrying out the Project, Project development and engagement activities are described below.

7.1 Project Updates and Changes

Since the submission of the IPD and Supplemental to the IPD, BGM has continued to progress Project design elements and update and identify alternative options for certain Project components.

Updated information for this DPD includes:

- Increase in the operational mine life from 12 - 15 years to 16 years;
- Update to the total capital cost, including sustaining capital, from $750 - $800 million to just under $900 million;
- Update to the operation's employees from an estimated 350 to 460 direct employees;
- A preferred option for the 69-kV transmission line route has been selected. BGM has selected the Northern Transmission Line Route for the Project. Further details are discussed in Section 7.5.4;
- Increase in the Mine Site operational camp size from 139-persons to 200-persons;
- A new water well for potable water will be drilled and water transported from that well by waterline to the Mine Site camp. This water is for domestic use, designed for a daily volume of 450 L/person, and will be locally stored at the Mine Site for use as potable water;
- Additional fuel storage has been considered as part of the DPD, including the following:
  - Four 80,000 L propane storage tanks, located near each of the four ventilation raise intakes;
  - One additional propane storage tank, located near the camp kitchen; and
  - One additional 50,000 L diesel fuel reservoir located at the mine laydown area.
- Communication infrastructure at Mine Site, including telecom tower and fibre line along the transmission line;
- Establishment of two water treatment systems; one at the Mine Site near Wells, and a second at QR Mill. Both systems will build off of or expand upon existing water treatment systems at the Bonanza Ledge Mine and QR Mill, respectively. Contact water from the WRSF at Bonanza Ledge Mine will be transported to the Mine Site Water Treatment Plant (WTP) for treatment via a 4-km water pipeline that will follow either A-Road or C-Road;
- Early design concept of the Island Mountain Portal showing reclamation strategy; and
- Redesign of the Services Building to reduce the height by approximately 20 m.

A summary of alternatives and options that have been considered to date for key Project components is presented in Section 7.6 Alternative Means of Carrying out the Project.

7.1.1 Island Mountain Portal Visual

As part of the engineering process, BGM has advanced the design of the Island Mountain Portal entrance by developing a landscape concept to improve the visual aspect of the underground access. Figure 9 provides a view of the current conditions of the portal entrance location. Figure 10 provides a view of the portal showing the proposed landscape concept. This proposed landscape concept for the Island Mountain Portal was designed in order to address concerns raised in the public comments.

Figure 9: Current Conditions of the Island Mountain Portal Location

Figure 10: Proposed Landscape Concept for the Island Mountain Portal Entrance after Year 1 of Planting

The proposed design concept shows the reclamation of the historical waste piles from the Aurum Mine. The reclamation of the existing waste piles will be advanced for this site as part of the development and operation of the Island Mountain Portal. The concept also includes planting young trees instead of seedings to expedite the time required to achieve reclamation objectives. The addition of mature vegetation and contouring of the landscape minimizes the visual aspect of the underground access. The addition of vegetative cover will also minimize dust generation by reducing the exposure of rock surface, along with reducing noise propagation. The addition of trees and contouring the landscape will also reduce noise effects.

7.1.2 Mine Site Location and Services Building

A key concern raised during the public comment period related to the location of the concentrator (now termed Services Building) and the size of the building. In relation to the site location, BGM evaluated several different locations for the Service Building. This site was selected for multiple reasons but mainly:

- Central position on the strike length of the deposits (3.8 km) substantially reducing the transport of ore, waste, and concentrate (Figure 13). Less transport and shorter distances result in less carbon footprint and lower vehicle requirements for material transport. The centralized position of the Services Building allows for the use of paste backfill and the ability to return waste rock underground to fill voids from ore extraction without having pipelines on surface or the use of trucks.
- This location permits mine traffic to bypass Wells, not only for the concentrate transport but also for material supply and employees at the start and end of shift. This results in less noise, dust and safety concerns related to traffic for the mine operations

- The Services Building is located on a brownfield site already impacted by historical mining that has not been reclaimed. Locating the Mine Site surface infrastructure at this previously impacted area will avoid impacting undisturbed areas and permit rehabilitation of the historical mining site once the Cariboo Gold Project is complete. This will help resolve the negative environmental impacts from past mining operations.
- Avoids additional impacts in undisturbed areas near Wells by utilizing a historically impacted site, which also allows the Project the ability to address previously identified environmental issues like metal leaching from the historical waste dump.
- Topography and location allow for the grouping of buildings and activities for a smaller footprint.

BGM is reducing the height of the service building to improve the visual aspects. By converting the round ore silos to square silos and rearranging conveyors and the transfer point within the Service Building, the engineering team was able to reduce the height of the highest part of the building by approximately 20 m. This results in a new maximum height of 36.5 m in comparison to the previous iteration of the building, which was 54.5 m high (Figure 11 and Figure 12). A new rendering of the Mine Site showing the changes to the service building and the proposed revegetation concept is shown in Figure 13.

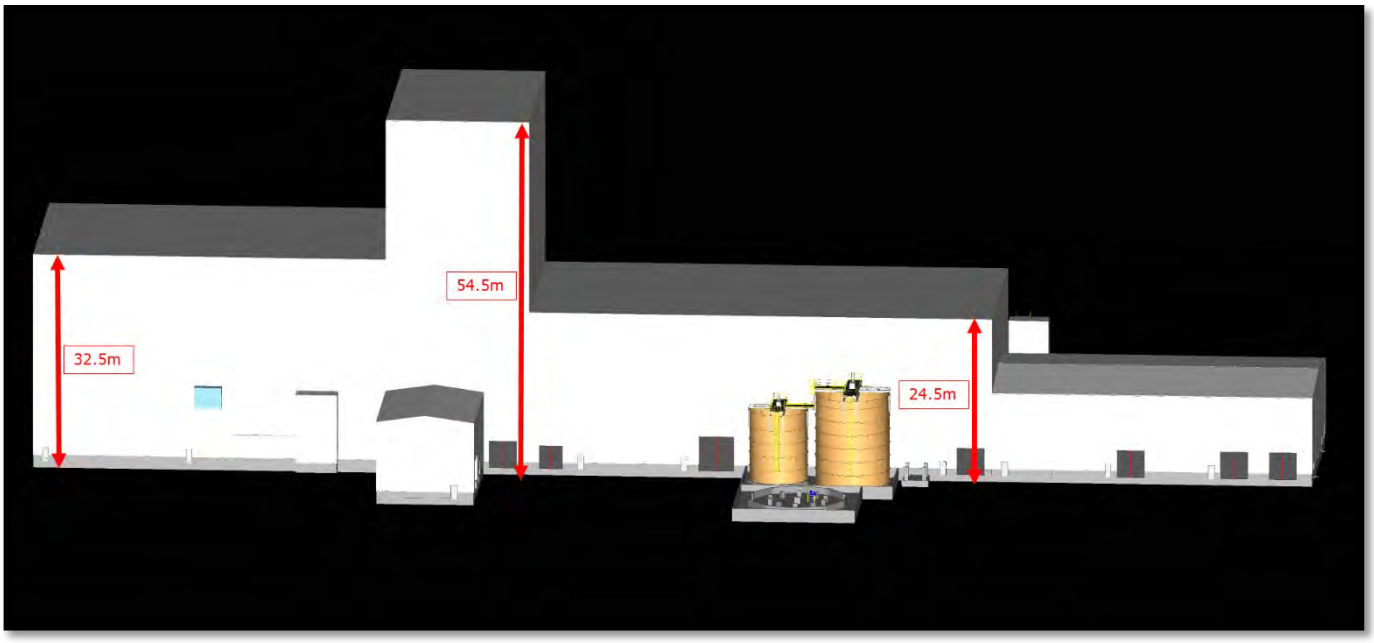


Figure 11: Previous Design Concept for the Services Building

Figure 12: Revised Design Concept for the Services Building

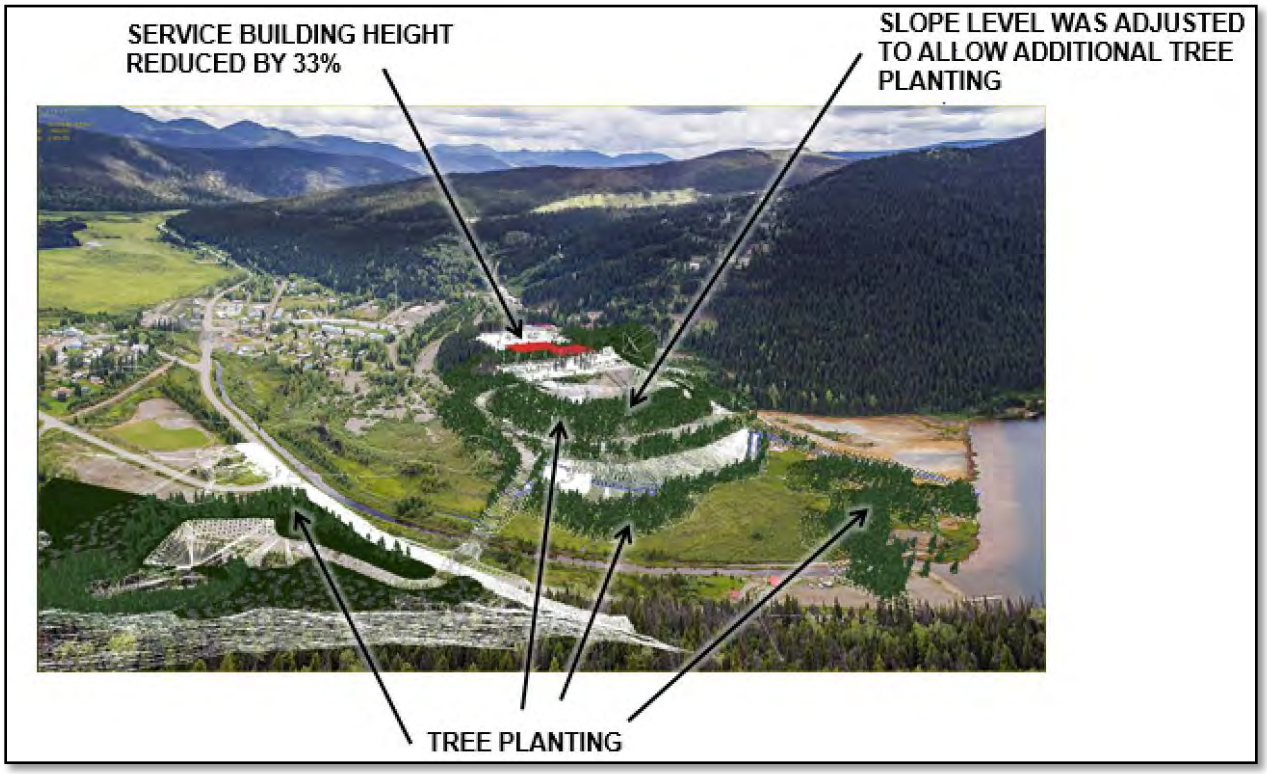


Figure 13: Preliminary Visualization of the Mine Site showing the Redesigned Service Building

7.2 Engagement Activities

Engagement activities for the Project have been underway since 2016. These discussions, along with feedback received from Indigenous nations and the community, have actively shaped the Project as it has been refined over time. Primary concerns with the Mine Site project components near Wells include visual impact, noise, light, dust and traffic concerns. BGM continues to refine the Project through mitigation by design and is continuing to look at alternatives to minimize effects to the community and environment (See Sections 7.1.1, 7.1.2 and 14.5).

The original design of the Mine Site layout (August 2019) showed multiple buildings for various components. In the IPD, the Project had been refined to show one building housing multiple components, including the concentrator, offices, warehouses and other surface infrastructure. This update came as a response to public concern regarding noise, light and dust generation, as the use of one building would centralize the lighting requirements, along with containing the noise and dust generation to one location. As noted in Section 7.1.2, further refinements to surface infrastructure were made following submission of the IPD and associated Supplemental, in consideration of community concerns regarding infrastructure near Wells.

To address concerns regarding mine traffic through Wells, BGM included a bypass to the Mine Site from Highway 26. All large truck traffic will be contained within the Mine Site, A-Road, B-Road and C-Road with no truck traffic through Wells.

As presented in the Supplemental to the IPD, the Island Mountain Portal was added to allow BGM to complete the initial underground workings at a faster rate, which would limit surface construction works to a shorter duration (reduction of 1 year for the construction period). By reducing the duration of surface construction works, this would also help to minimize noise and dust generation at the Mine Site.

Also, as presented in the IPD Supplemental, the WRSF at Bonanza Ledge Mine was increased in size to minimize the amount of waste rock that would need to be stored at the Mine Site. This also minimizes the noise and dust generation at the Mine Site as waste rock would be transported to and handled at Bonanza Ledge Mine.

The accommodation at the Mine Site was increased in size to a 200-person camp to address concerns regarding accommodation use in the Wells area. BGM will continue to engage with the community regarding concerns related to the camp.

Changes to the Project have resulted in an increase in the number of jobs that the Project will provide. Additional mitigation will be identified in the EAC Application related to the commitment for in-community training and capacity building for maximizing the job opportunities for local community members and Indigenous nations.

7.3 Project Location

The Project is located in the Quesnel Highlands, which is west of the Cariboo Mountains and east of the Fraser Plateau. The highlands extend from Bowron Lake on the north to Mahood Lake on the south, encompassing an area of approximately 8,100 km^2. Within the Quesnel Highlands, there are upland areas that are remnants of a highly dissected plateau of moderate relief. These remnants rise gradually from approximately 1,500 m above sea level (masl) on the west to over 1,900 masl on the east and become progressively more dissected.

The Mine Site is located approximately 80 km east of Quesnel, and approximately 350 m west of the nearest permanent residence in Wells (121° 34.37’ W, 53° 5.82’ N; Figure 1) BGM’s current field offices and related facilities are also located near Wells adjacent to the Mine Site. A community relations office is located in downtown Wells. Gravel roads established during historic placer and lode gold mining activities provide access throughout the area.

Jack of Clubs Lake is located immediately southwest of the Mine Site. The lake is encompassed by Island Mountain to the northwest, and Cow Mountain and Richfield Mountain to the south-southwest. Jack of Clubs Creek and Wilson's Creek flows into Jack of Clubs Lake, and the Willow River is the outlet from the lake, which flows to the northwest to join the Fraser River. Lowhee Creek, a historically mined stream channel, is a tributary to the Willow River and flows northwest from the Bonanza Ledge Mine between Cow Mountain and Barkerville Mountain past the BGM offices and related facilities. Other nearby rivers and creeks include Mosquito Creek and Peep O'Day Creek to the northwest, Promise Creek and Slough Creek to the west, and Williams Creek to the east (including tributaries called Walker Gulch, Black Jack Gulch, and Stouts Gulch). Tributaries to Upper Jack of Clubs Creek (situated upstream of Jack of Clubs Lake) include Victoire Creek and Stoney Creek to the south.

The QR Mill is a site located approximately 115 km from the Mine Site, 58 km southeast of Quesnel, and 18 km west-northwest of Likely (direct distance; no road access) (121° 47.49' W, 52° 40.28' N; see Figure 1). Approximately 1 km south of the QR Mill is the Quesnel River. The headwaters of Rudy Creek are located near the QR Mill. Rudy Creek flows into Maud Creek.

BGM has been active in the Cariboo Mining District of BC since 1994 and has assembled a large package of land, covering many historic gold mining properties that occur along the Cariboo Gold Belt near Wells. The BGM property is comprised of staked mineral tenures and Crown-granted mineral claims covering an area of approximately 1,346 km^2 along a strike length of 77 km, and with an approximate width varying from 22 km to 35 km. Within the BGM property, there are several legacy claims belonging to other persons or companies which have first right to the minerals contained within those boundaries. Should those legacy claims lapse, then the mineral rights will immediately belong to BGM as per the *Mineral Tenure Act*.

7.4 Land and Water Use

Multiple levels of government manage contemporary land and resource use at the federal, provincial, regional and community levels, a summary for which is provided in Section 11.4.2 - Non-traditional Land and Resource Use. This section provides a description of the land and water use requirements for each Project component.

7.4.1 Project Area Requirements

Area requirements for the Project are provided in Table 23 based on existing, new, and total disturbance. Descriptions of the Project area requirements by component are outlined below.

Table 23: Cariboo Gold Project Components and Area Requirements

Component	Infrastructure	Existing Disturbance (ha)	New Disturbance (ha)	Total Disturbance (ha)
Mine Site	Mine Site Surface Infrastructure	15.4	3.2	18.6
	Ventilation Raises	0	1.0	1.0
	Island Mountain Portal	1.2	0.2	1.4
	Ventilation Raise Access Roads	5.2	0.3	5.5
	WRSF at Bonanza Ledge Mine	8.0	5.4	13.4
	WRSF Access Road	8.9	0.6	9.5
Mine Site Total		38.7	10.7	49.4

Component	Infrastructure	Existing Disturbance (ha)	New Disturbance (ha)	Total Disturbance (ha)
QR Mill	Total area at QR Mill	133.7	0	133.7
	Filtered Stack TSF (Option 3)	19.0	0	19.0
Transmission Line	Transmission Line Right of Way	TBD	TBD	72 km x 36 m right-of-way
	Access Roads	TBD	TBD	TBD

7.4.1.1 Mine Site

The total area for Mine Site surface infrastructure is approximately 18 ha. The Mine Site is located on property owned by BGM and on Crown land. Both the private and Crown parcels have been previously disturbed by historical mining activities. The Valley Portal is located within the Mine Site, and will be the main access portal to access the underground mine in operation. The Island Mountain portal and associated infrastructure is located across Highway 26 and is approximately 1.4 ha in size

Outside of the Mine Site surface infrastructure, the only additional disturbance for the underground mine will be ventilation raises installed for each of the four underground zones (total of five raises). The total area for each ventilation raise and associated infrastructure is approximately 0.2 ha, for a total of 1.0 ha. These raises will be located on previously disturbed lands and will be fenced for safety purposes. Existing exploration roads will be used to access the ventilation raises for the Mosquito, Shaft and Cow zones. The Valley zone ventilation raise will be located within the Mine Site, and additional access is not required. Total length of the existing access roads is 9.7 km. Upgrades to the existing exploration roads will be evaluated during Project development.

The waste rock at Bonanza Ledge Mine will be placed on areas previously disturbed by the Bonanza Ledge Mine. The total area for the proposed WRSF at Bonanza Ledge is 13.3 ha. Approximately 1.6 ha of the proposed footprint will be outside of the current authorized mine footprint area for the Bonanza Ledge Mine as per *Mines Act* permit M-238. The access route to the WRSF at the Bonanza Ledge Mine will be upgraded to allow for transport of waste rock from the Mine Site. Waste rock from the Project will be transported from the Mine Site using the existing B-Road (2.2 km) and the A-Road (2.0 km) to the Bonanza Ledge Mine. The existing C-Road will be maintained as an alternative route should the existing A-Road or B-Road be closed for maintenance or other reasons.

The Mine Site footprint is shown on Figure 3 and includes all infrastructure plus an additional area to delineate the maximum potential area that may be disturbed as part of the Project. For the purpose of the DPD, the additional area (shown in green) outside the infrastructure (shown in grey) is an area that may be required to facilitate construction activities related to project components. Mine Site surface infrastructure has been buffered by 50 m. The footprint also includes the underground mining zones projected to surface and buffered by 50 m. Existing access roads are buffered by 10 m from centreline. The access routes to the WRSF at Bonanza Ledge Mine are buffered by 25 m from centreline. The road right-of-way occurs within this buffer. This additional area required to support construction activities will be further delineated in the EAC Application.

7.4.1.2 Transportation Route

Concentrate generated at the Mine Site will be hauled along the Transportation Route to the QR Mill. The Transportation Route between the Mine Site and QR Mill comprises of Highway 26 and the 500 Nyland Lake Road. Workers, goods and service providers will access the Mine Site via Highway 26 from Quesnel.

Access to the QR Mill is through two routes. The first route to QR Mill is from Quesnel is along Highway 26, and then south onto the 500 Nyland Lake Road from Highway 26, near Cottonwood. 500 Nyland Lake Road is a gravel forest service road that is maintained by West Fraser Mills Ltd. The second route is south from Quesnel along the Quesnel Hydraulic Road to 2700 Road, where it meets with 500 Nyland Lake Road. Currently, this road is washed out with no anticipated repair date. Workers will primarily access QR Mill via 500 Nyland Lake Road and, if available, the Quesnel Hydraulic Road. Material and equipment deliveries will access the QR Mill via 500 Nyland Lake Road only.

Aside from new access or improvements to the existing access to Highway 26 (for the Mine Site Surface Infrastructure, and Island Mountain Portal), upgrades to the Transportation Route are not required as part of the Project. A new 24 m clear-span bridge structure over the Willow River will be installed at the entrance of the new Mine Site access road to Highway 26.

7.4.1.3 QR Mill

The total area of the QR Mill is 133.7 ha, and Project-related infrastructure is contained within the existing footprint. The mill upgrades will be completed within the existing mill area, and the Filtered Stack Tailings Storage Facility (FSTSF) (preferred option) will require 19.0 ha of area.

With the preferred tailings management option (further discussion of tailings storage options are presented in Section 7.6.1), tailings from the QR Mill will be thickened and filtered prior to disposal on top of the existing QR Tailings Storage Facility (TSF) at the QR Mill, which will significantly reduce, the size of the tailings footprint versus conventional slurry placement methods.

Surface runoff collected in the existing QR TSF pond would be managed by pumping to another pond, such as the Main Zone Pit (MZP). A liner will not be required to collect and manage seepage from the FSTSF, which would combine with that of the existing tailings and be collected in the seepage collection ponds located at the toes of the TSF dams.

The FSTSF (preferred option) has a design capacity of 2.1 million cubic metres (Mm^3) of compacted dry stack tailings, corresponding to a total dry mass of 3.6 Mt.

No additional expansion of the QR Mill outside of the existing disturbed footprint is required with the current mine plan. The remainder of the historic QR Mine site (old pits, borrow areas) will undergo reclamation and closure in alignment with the reclamation and closure plan included in the Bonanza Ledge Mine Phase II Joint Permit Amendment Application (under review). The Cariboo Gold Project reclamation plan will build upon existing plans both accepted and under review.

7.4.1.4 Transmission Line

The new Transmission Line corridor commences from the Barlow Substation near Quesnel, BC, to the Mine Site at Wells, BC (Figure 2). After crossing Highway 26, the route would be located north of Highway 26 and would parallel existing forest service roads and existing disturbance areas located on crown land, where possible.

The Northern Transmission Line Route would be a new 69 kV transmission line with a right-of-way width of approximately 36 m. The Northern Transmission Line Route is approximately 72 km in length. The transmission line would consist of single wood pole structures with an approximate height of 15 m. Access roads will be required for construction, and these may include existing, new and/or upgraded roads. Detailed routing is currently underway, and the location of the Transmission Line right-of-way will be determined based on environmental and terrain constraints, and in consultation with Indigenous nations and stakeholders. Routing options are currently being considered and will be shared with Indigenous nations, stakeholders and regulators for comment. Disturbance areas will be presented in the EAC Application.

As shown in Figures 7-1, 7-2, 7-3, the location of the transmission line right-of-way is currently being considered within a 2 km wide corridor (1 km from centerline). This corridor is used in the routing process to evaluate environmental and terrain constraints. The actual construction right-of-way will be smaller to accommodate the 36 m wide transmission line right-of-way. In the EAC Application, a refined corridor (for example, 100 m wide) will be presented based on the results of the routing evaluation. This corridor would be carried forward to the permitting process after the EAC is received.

A new substation will be located within the Mine Site, transforming the 69 kV power to a lower voltage to meet the Project's needs.

7.4.2 Water Use

Water will be required at the Mine Site for domestic (e.g., camp and offices) and industrial uses (e.g., mining operations and dust suppression). A new water well for potable water will be drilled and water transported via pipeline from that well to the camp. Location options for this well are still under consideration (refer to Section 7.6.3 for further details on these options). This water well will be for domestic use purposes, designed for a daily volume of 450 L/person, and will be locally stored at the Mine Site for use as potable water.

Industrial make-up water for use at the Services Building at the Mine Site is anticipated to be minimal (1.8 m^3/day) and will be sourced from dewatered historic underground mine workings at the Project construction throughout the operational period; if required, water will be treated at the Mine Site Water Treatment Plant.

Domestic water at the QR Mill will continue to be supplied from an existing well, located approximately 500 m north of the existing camp pad within the QR Mill footprint.

In the QR Mill, industrial water is required throughout the ore processing circuit, from grinding to leaching. The main water source for this purpose will be reclaimed water from the proposed South Seepage Collection Pond (SSCP). Some water will be reclaimed and reused within the QR Mill as part of the thickening process, and any remaining makeup water will be sourced from the mined-out, flooded North Lobe Pit.

BGM has existing water licences for the Willow River (Licence #501198 and #500871), Lowhee Creek (License #C121278), and other small streams (License # 501863) to support both exploration and the former processing operation at the Mosquito Creek Mine. BGM also has a water license for use at the QR Mill (License #C109119).

7.5 Project Components

Project infrastructure will be located at two main sites, the Mine Site and QR Mill, with a transportation route connecting them. A new transmission line will be built to deliver power to the Mine Site, while an existing transmission line will continue to deliver power to the QR Mill. The Project is being developed as an underground mine, with underground crushing as well as ore sorting, milling and flotation beneficiation processes completed in

a Services Building at surface at the Mine Site prior to ore transport to the QR Mill for further milling, gold recovery, and tailings management. Waste rock will be permanently stored at the Bonanza Ledge Mine (Bonanza Ledge WRSF). A temporary storage facility for rock to be used as fill at the Mine Site (Bulk Fill Storage Facility) will be located adjacent to the Services Building of the Mine Site.

7.5.1 Mine Site

The Mine Site will consist of the components listed in Table 24.

Table 24: Mine Site Project Components

Purpose	Components	
Surface Infrastructure	■ Fuel storage and handling facilities ■ Worker accommodation ■ Sewage and septic works ■ Mine dry and mine rescue services ■ Maintenance shop and laydown area ■ Warehouse facilities ■ Offices ■ Main Mine Site access and site roads ■ Main ventilation and mine heating infrastructure	■ Security facilities and main entrance gate ■ Firewater pumping station on Jack of Clubs Lake and firewater distribution piping system ■ Willow River bridge ■ Telecom tower ■ Fibre optic network interconnecting the main areas of the Project ■ New water well
Mining	■ Island Mountain Portal, Valley Portal ■ Mine development ■ Underground workings and ore passes ■ Ventilation raises (including emergency egresses) ■ Underground infrastructure	■ Underground ore storage silos ■ Portable batch plant for cemented rock fill ■ Paste backfill
Mineral Processing	■ Underground crushing	■ Services Building for surface concentrator, including screening, ore sorting, grinding and flotation process equipment, thickener, paste backfill plant, binder silo and concentrate and waste storage silos
Mine Waste Management Facilities	■ Overburden and soil stockpile	■ Temporary Bulk Fill Storage Facility next to the Services Building at the Mine Site and Waste Rock Storage Facility at Bonanza Ledge Mine (4 km away)
Water Management Facilities:	■ Potable water storage and supply ■ Freshwater supply ■ Non-contact water diversions ■ Contact water management structures	■ Pumps, pipelines, and collection systems for the water management systems at the Mine Site ■ 4-km water pipeline from Bonanza Ledge WRSF to the Mine Site Water Treatment facilities ■ Water discharge

Purpose	Components	
Power supply	■ Connection of the Mine to the Transmission Line via a substation on the Mine Site ■ Generators will be used during pre-production mine development and until a transmission line with three-phase power becomes available ■ Emergency generators to maintain minimal site and underground services during a power outage	■ Site electrical distribution including a 13.8 kV switchgear, located inside Services Building main electrical room ■ Internet access, phone services will be provided via a fibre optic cable over the transmission line

7.5.1.1 Surface Infrastructure

Site surface infrastructure includes all of the buildings required to support the mine portal areas, and ore transport to QR Mill, as well as offices and accommodations. The Mine Site near Wells will be fenced for public safety and security of the site. Site surface infrastructure currently planned for the Project is discussed in the following subsections.

All new surface infrastructure at the Mine Site, except for the excavations for the Services Building, Camp Access Road and portals, will be built on top of the existing material present on-site. As currently planned, no excavations into the old tailings material will be required. Where possible, excavated material from the Services Building, Valley Portal and Camp Access Road will be placed as backfill for civil works, including the main access road, water management infrastructure, and to raise the grade of the Mine Site laydown area. Excess excavated material will be used as fill for the Mine Site construction.

The mine is accessed by two portals at surface: the Island Mountain Portal and the Valley Portal. A series of internal ramps connected to the main ramps provide access to all mining zones.

Camp Access Road

The Project includes a new Camp Access Road, which will connect the mine laydown area with the new camp area. The Camp Access Road will have a minimum width of 7 m, with a maximum 10% grade. The Mine Site has a number of other existing roads that will be used for the development and operation of the Project.

Security Gate

Access to the Mine Site will be by a controlled access gate entrance to the main surface infrastructure area at Wells and near the substation to the Transmission Line.

Mine Office and Dry, Maintenance Shop, and Warehouse and Laydown Area

A Services Building comprising the surface concentrator, mine offices, a maintenance shop, and a warehouse will be constructed in a central location at the Mine Site, near the proposed Valley Portal entrance. This complex will also be used for mine rescue training and general training of personnel.

A laydown area for additional storage will be located near the Services Building.

Worker Accommodation

A new 200-person operation camp will be constructed at the Mine Site, located at the site of the existing core storage facility. This camp will be in use for the 16-year duration of Mine operation. The camp will also include office space for the camp administration, laundry room, storage room, conference/training room, full kitchen facility, common area living rooms.

BGM also has an existing camp (Camp A and Camp B) close to the current BGM office (Figure 4) and plans to use this camp during Project construction. Camp A can house up to 48 people for day/night shift. Camp B has 24 rooms with one bed in each room.

Sewage and Septic Works

A sewage and septic handling system will be constructed near the new operation camp at the Mine Site with the capacity to support a 200-person camp and will be independent of the Wells sewage system.

The treatment system will be located east of the camp pad and will consist of three large fibre-reinforced polymer tanks – a trash tank, an equalization chamber, and a mix bed bioreactor (MBBR). Wastewater from the kitchen/dining/recreation facility will pass through a 1,500 gallon grease trap prior to entering the trash tank. Effluent will be treated by the MBBR system. Following treatment, effluent will flow into a pump chamber where 2-HP effluent pumps will distribute the flow throughout the disposal fields. Each of the two drainage fields will have 700 linear metres of drainage pipe as per the Municipal Wastewater Regulation for a percolation rate of 15 minutes /25 millimetre (mm).

Fuel Storage

Fuel storage reservoirs will be installed at the Mine Site close to the laydown area. They will be constructed and maintained in accordance with applicable law. Equipment refuelling and lubrication will be conducted on the surface and underground. A fuel truck will distribute fuel underground to mobile stations. The Mine Site fuel storage and handling facilities include:

- Three 40,000 L diesel storage reservoirs for the generators during the pre-production period. Only one reservoir will be required after the Transmission Line is in service;
- Four 80,000 L propane storage tanks, one located near each of the four ventilation intake raises;
- One propane storage tank, located near the camp kitchen;
- Two 50,000 L diesel fuel reservoir located at the mine laydown area; and
- One 20,000 L gasoline reservoir for small service equipment and pick-up trucks located at the mine laydown area.

Explosives Storage and Handling Facility (Magazine)

The proposed explosive storage location during the construction of the starter ramp is on the surface at the existing explosives storage magazine used for the Bonanza Ledge Mine operation. Explosives will be transported via utility vehicles with clearly marked signage when required.

Upon completing approximately 1 km of development on the Valley Portal ramp, the main explosives storage and handling facility will be constructed underground.

7.5.1.2 Mining

Mine Development

The Project is planned to achieve an average production rate of 4,750 tpd over a 16-year life of mine beneath Island Mountain, Cow Mountain, and the valley between the two mountains with four distinct zones:

- Mosquito,
- Shaft,
- Valley, and
- Cow.

The mining zones are accessed via two main portals (Valley and Island Mountain) and are connected by an internal ramp system. During the construction period (approximately two years), access to the underground will be provided by the Island Mountain Portal to accelerate the development of the underground infrastructures. This will reduce the surface construction period and enable underground connection between the mine extraction zones of Shaft, Valley and Cow and thus reducing surface disturbance and eliminating impact of noise, dust and traffic for waste handling on surface.

Infrastructure associated with the Island Mountain Portal will include: a generator, sound barrier, ventilation heater, water management infrastructure, a temporary mine waste pile, and sound-proofed fans employed during the decline development stage. The Island Mountain Portal will be the main underground access in Year 1 and 2 during initial decline development. Once the Valley Portal is connected to the Island Mountain Portal via the underground ramp, the Valley Portal will be the main access portal for production. Use of the Island Mountain Portal during this period will be for emergency egress only.

Figure 14 shows the Mine Design in reference to the Mine Site surface infrastructure and the District of Wells.

Ore mined underground will feed an underground crushing facility, while the waste rock from the development will remain underground, except during construction, where the development waste rock will be transported to the Mine Site for backfill adjacent to the Valley Portal. A portion of the development waste rock will be used as cemented rock fill or uncemented rock fill. Cemented rockfill and uncemented rockfill are both used to backfill underground mine workings to progress mine development. Paste backfill will also be used in the mine development and backfill strategy.

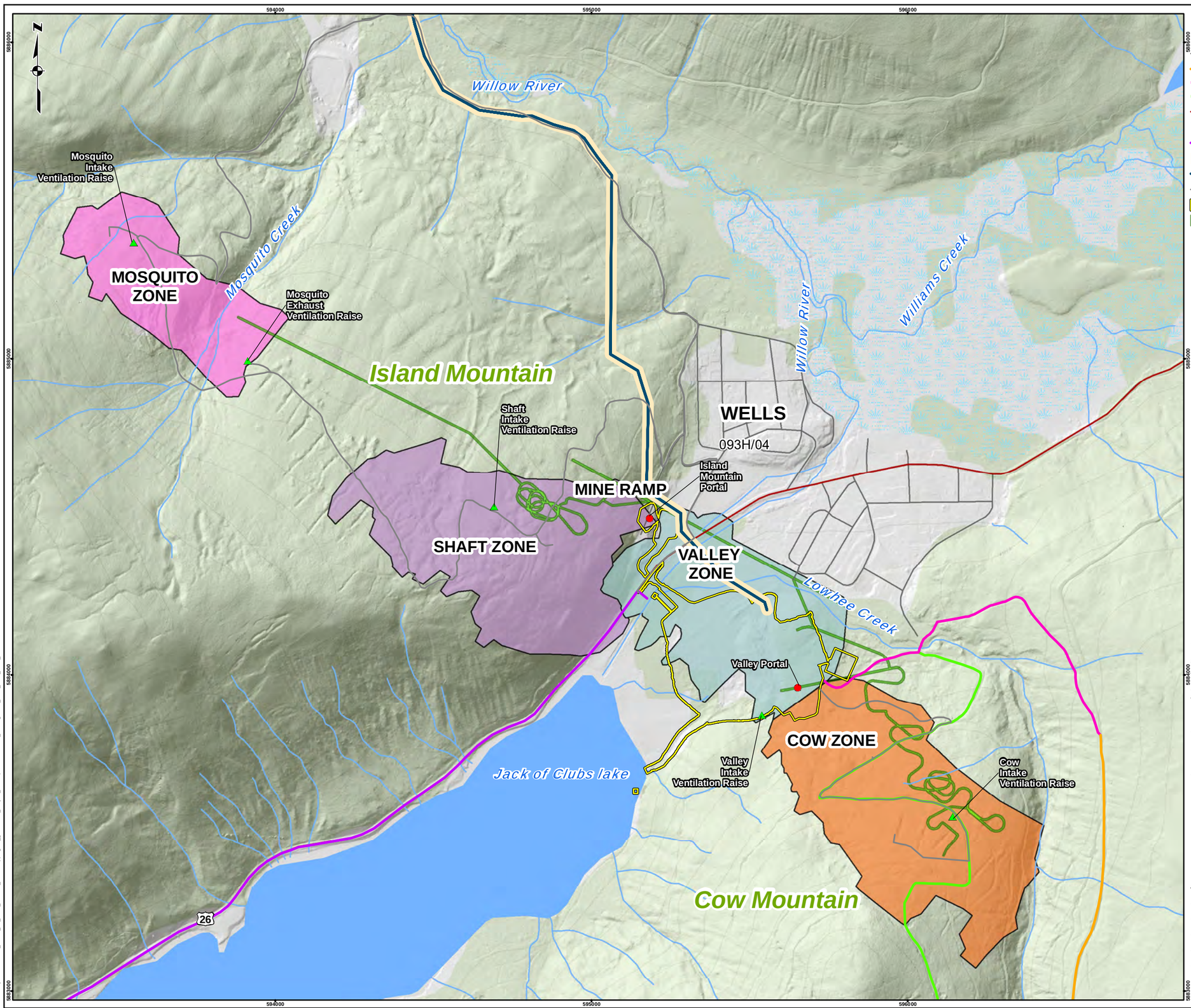
Underground Workings

There will be two portals, with dimensions of approximately 5.3 m by 5.3 m, used to access underground ramps, the Island Mountain Portal and the Valley Portal. The Valley Portal will be used as the main services access. The zones are accessed by main ramps connecting to haulage drifts and each individual zone has an internal ramp system. The Mosquito Zone is further west, connected to the Shaft Zone by a 1,000 m-long haulage drift. The underground workings for the Project will not interact with historical underground workings from previous mining activities.

Each zone is planned to be mined with the longitudinal retreat long hole method. Sublevels for all zones are 30 m sill to sill, and a combination of Paste Backfill, Cemented Rock Fill (CRF) and Uncemented Rock Fill (URF) are planned to backfill mined stopes. Stope strike lengths vary by zone based on geotechnical assessments of each zone. All zones are capped by a crown pillar (15 m for Cow and Valley, 20 m for Shaft and Mosquito) and vary in depth.

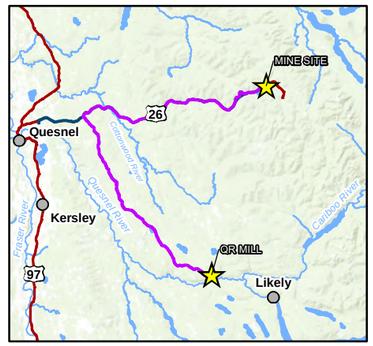
Development dimensions for the main ramp will be 5.3 m × 5.3 m, providing the space required to access all areas safely, as per BC mining regulations.

The development will be carried out using either a continuous miner (Roadheader machine) or conventional drill and blast techniques.



LEGEND

- VENTILATION RAISE
- ROAD
- A ROAD
- B ROAD
- C ROAD
- HIGHWAY
- WETLAND
- TRANSPORTATION ROUTE
- TRANSMISSION LINE ROUTE ROW 36M
- TRANSMISSION LINE ROUTE
- EXISTING MINE SITE ROAD
- MINE SITE SURFACE BOUNDARY
- UNDERGROUND INFRASTRUCTURE



REFERENCE(S)

1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
2. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY
3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

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CARIBOO GOLD PROJECT

SIMPLIFIED ORE DEPOSITS AND UNDERGROUND INFRASTRUCTURES

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Ventilation

During construction of the starting ramp, ventilation will be installed using ducting originating from the portal. Ventilation raises will be developed for each mining zone with minimal associated surface infrastructure; these raises are vertical, circular access holes bored into the ground and are covered at surface. They will serve as emergency egresses as well as providing fresh air intakes by linking fans and heaters to the underground for each mining zone to maintain proper mine ventilation. The order in which they are developed will be based on the detailed mining sequence, which is currently being developed. During the development of the Project, additional underground ventilation raises may be required, or the currently planned raises may be extended to reach the lower levels of the underground mine zones.

Underground Infrastructure

In addition to the ventilation raises, the following underground infrastructure will be developed and implemented to follow applicable regulations, to maintain a safe workplace and to optimize mining operations. Underground infrastructure is listed below:

- Crushing station excavation, including excavation for a vertical conveyor to the surface,
- A Rail-Veyor© system between Shaft zone and the crushing station,
- Safety bays,
- Garage,
- Explosive magazine,
- Sumps and pumps,
- Lunchrooms and refuges,
- Warehouse storage,
- Raw and clean water reservoirs,
- Communication network, and
- Electrical distribution and sub-stations.

Ancillary excavations are required to accommodate the above infrastructure. Additional excavations for production are also required, including haulage drifts, ore passes, draw points, and other service bays.

Cemented Rock Fill Batch Plant

A combination of CRF and URF will be used for stope backfilling complementary to the paste network. In order to minimize the amount of cement required for backfilling, only a CRF wedge will be backfilled against the subsequent stope on the retreat sequence. The remainder of the stope will be backfilled with a combination of development waste and mineral sorter rejects.

A small mixing bay will be excavated on each underground level access in which a scoop will mix a predetermined amount of waste material with 3.5% of cement slurry. Waste for CRF or URF will be delivered to each level using the truck dump arrangement. The mixing process will sufficiently coat the waste material with CRF, which will be delivered to the stopes via a load, haul, dump machine.

Ore Silos

Mineralized material will be stored underground in stopes and in underground silos prior to underground crushing and conveying to surface for processing. Coarse mined mineralized material will feed the mineral sorter while the finer mineralized material will be directly sent to the flotation circuits in the Services Building at the Mine Site. A final concentrate product will be stored in a silo in the Services Building, awaiting transportation to QR Mill.

Mineralized material arriving at QR Mill via the transportation route will either dumped by truck onto a new feed system to fed the mill, or it will be offloaded into a mineralized material storage covered structure, to be fed into the mill feed system when required.

7.5.1.3 Mineral Processing

The Project includes underground crushing as well as a Services Building at surface comprised of ore sorting, milling, flotation and dewatering circuits, a paste backfill plant, waste storage prior to final placement in the WRSF at the Bonanza Ledge Mine and concentrate storage prior to transportation to the QR Mill. Figure 15 and Figure 16 present simplified schematics of the Project mineral processing at the Mine Site for years 0 to 2, and 2+, respectively.

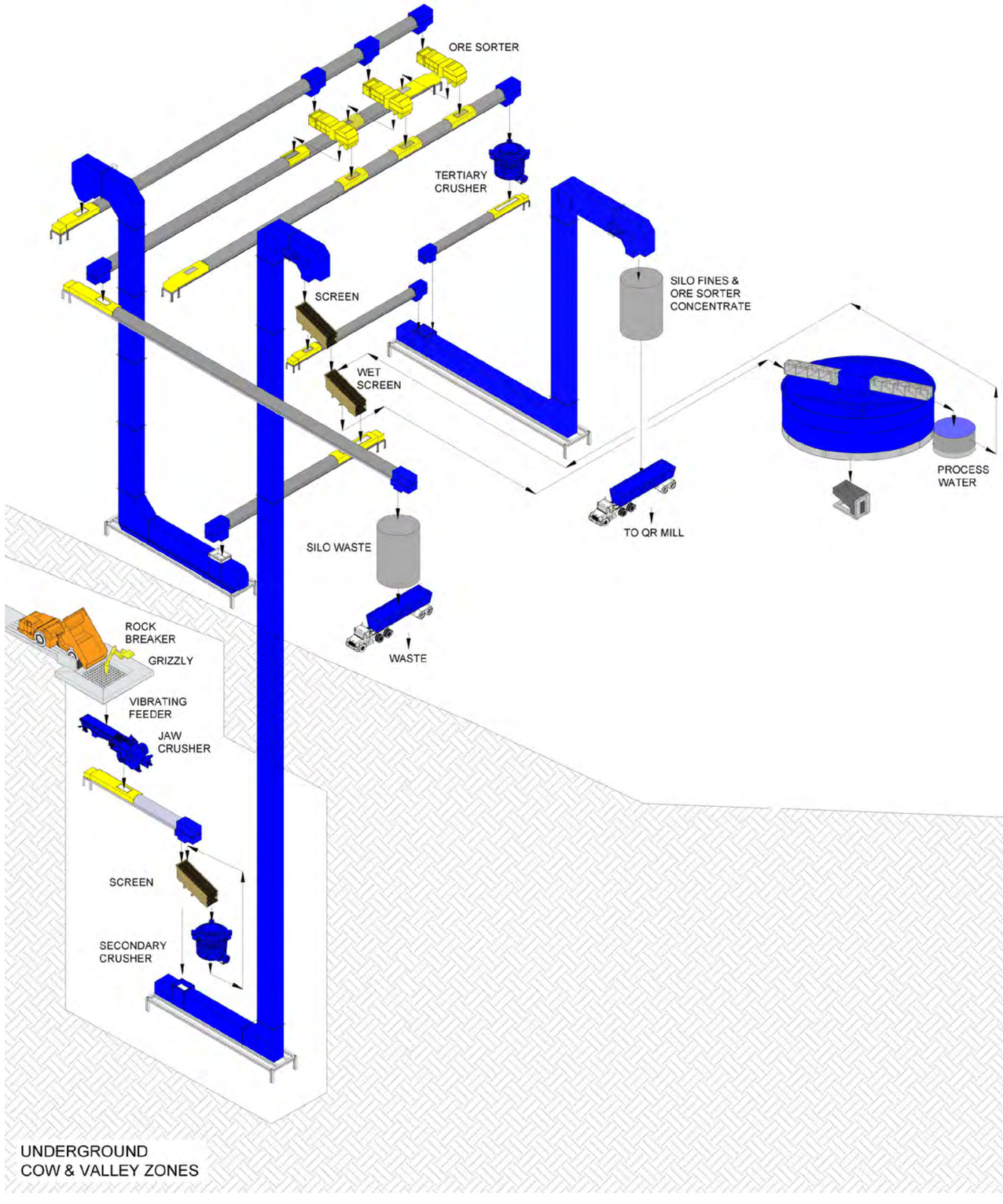
Underground Crushing

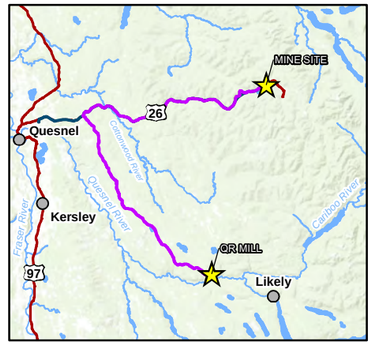
The mined ore material will feed into an underground primary jaw crusher, where the crushed ore product will be transported to surface by a vertical conveyor and stored in a silo at the Services Building. The primary crushing equipment will be installed underground to reduce surface disturbances, increase operational efficiency, and reduce noise and dust at the surface.

Services Building

The primary crushed ore from the underground mine is stored in a silo inside the Services Building at the surface. The first concentration step will be completed using minerals sorters. The surface silo feeds a screen where coarser particles (greater than 10 mm) are separated, washed and fed to the minerals sorters. Mineral sorter product (sulphur and gold-bearing material) is further crushed using a secondary cone crusher, for which the secondary crusher product will feed either the milling and flotation circuit for further concentration or the final concentrate silo for transport to QR Mill. Ore sorter waste is sent to a waste silo for placement in the WRSF.

The second concentration step is by flotation. A portion of the mineral sorter concentrate, as well as particles finer than 12 mm passing through the screens, will feed the flotation concentration circuit. The ore material will feed a ball mill closed by a cyclone cluster where the ball mill product will feed a pyrite flotation circuit. The ore will be further separated into a pyrite flotation concentrate and flotation tailings. Both the flotation concentrate and the flotation tailings will be thickened and filtered. The flotation concentrate will then be combined with a portion of the mineral sorter product in the final ore bin and stored for transport to the QR Mill.





REFERENCE(S)
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2. HILLSHADE DERIVED FROM LIDAR DATA FLOWN BY MCELHANNAY CONSULTANTS LTD. JUNE 27, 2016.
3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

CARIBOO GOLD PROJECT

MINE SITE
MINERAL PROCESSING SCHEMATIC
YEAR 0 TO 2

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	15

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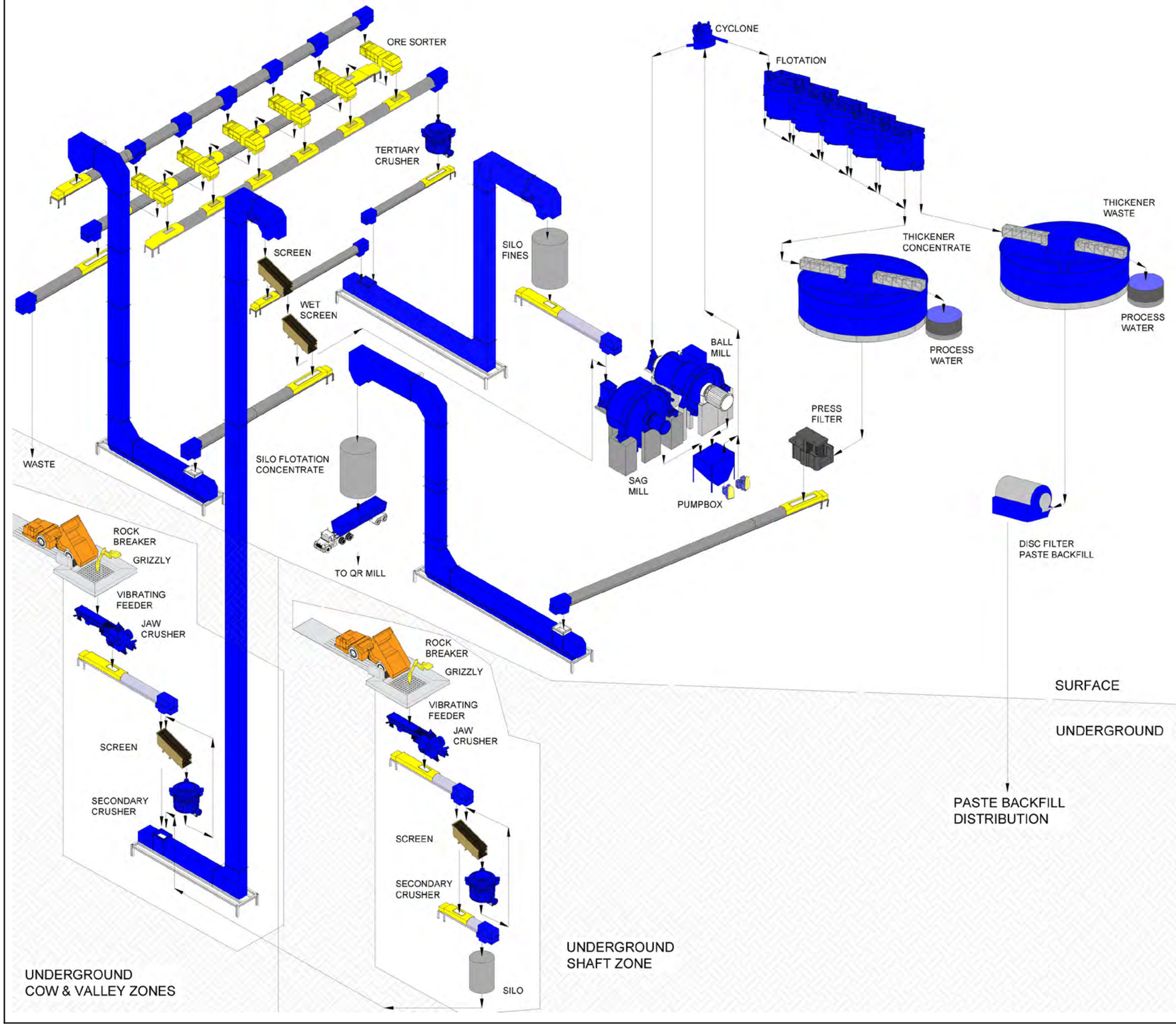

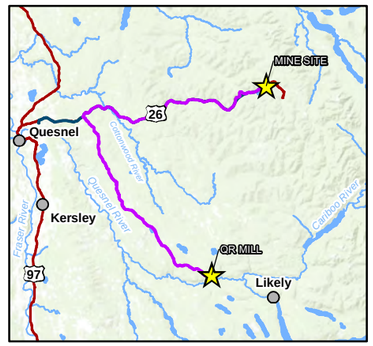

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4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

CARIBOO GOLD PROJECT

MINE SITE
MINERAL PROCESSING SCHEMATIC
YEAR 2 TO +

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	16

Paste Backfill Plant

Tailings from the flotation circuit will be dewatered, mixed with a binder, and returned underground from a paste backfill plant located within the Services Building. Paste backfill will leave the Services Building and use an underground piping distribution network to transport the paste to the different stopes to be filled.

The paste primary network consists of cascading boreholes between levels and lateral level pipelines and will connect the surface paste backfill plant to the secondary network of Valley, Cow, and Shaft zones. Paste backfill will not be available in the Mosquito zone due to its distance from the paste backfill plant. The primary network will have a total length of approximately 9.4 km and will allow the paste backfill to be delivered to mine levels then to the mined-out stopes through the secondary and tertiary network. First, the primary network comprises a main fill line from the surface paste backfill plant to the Valley zone. The internal reticulation distribution is built with pipes inclined at about 60 degrees and connected from level to level. This arrangement will also reduce the hammering effects while transporting paste backfill in vertically. Then, from the Valley Zone, piping will be installed in the connection ramps to send fill to the Shaft and Cow zones.

Paste backfill will be used as a priority in the backfill schedule. Outstanding quantities of backfill, beyond that supplied by paste backfill required for mining operations will use both cemented and uncemented rock fill made from ore sorter waste and development waste rock.

7.5.1.4 Overburden Material

Excavation of overburden will be required at the Mine Site to support construction of surface infrastructure, including three primary areas: Services Building, Valley Portal, and Camp Access Road. A temporary overburden stockpile of approximately 300,000 m^3 is planned as part of the site layout to store the overburden generated from the Valley Portal, the Services Building, and camp construction at the Mine. In addition, excavation at the Island Mountain Portal will require an overburden and topsoil stockpile of approximately 11,000 m^3. This Island Mountain Portal stockpile, which will be approximately 40 m long and 20 m high, will be temporarily staged beside the portal and along the historic waste pile, and used for Project reclamation activities. Additional details regarding the temporary storage and intended uses of overburden stockpiles will be provided with the EAC Application.

7.5.1.5 Mine Waste Management Facilities

Waste Rock Storage Facilities

Waste rock from the Valley Portal and Island Mountain Portal mine development during construction, and during initial years of operation, will be placed as a bulk fill material to grade the mine laydown area, and construct portions of the access road. Approximately 1.8 million tonnes (Mt) of waste rock will placed in the location labelled as the Bulk Fill Storage Facility, to establish a barrier between the historic tailings and the mine laydown area (to be located on top of the Bulk Fill Storage Facility). The mine laydown area, the Bulk Fill Storage Facility and the retention basin will be constructed on a liner, keyed-in up to the surface of the existing waste rock pile to ensure separation from the historic waste rock and tailings below.

After the construction period, waste rock will be transported to the Bonanza Ledge Mine located approximately 3.5 km southeast of the Mine Site via the B-Road and A-Road. The Bonanza Ledge WRSF, which has a total capacity of approximately 9.5 Mt, will be constructed during the operational period, prior to reaching the maximum capacity of the Bulk Fill Storage Facility at the Mine Site. A low permeability liner of clean, coarse, and segregated material will be placed under the WRSF where practical.

Both the WRSF and Bulk Fill Storage Facility will include non-contact water diversion structures, liner beneath the facilities, and collection of contact water in sedimentation ponds (one new pond at the Mine Site and an existing sediment control pond at Bonanza Ledge) prior to treatment and discharge.

Tailings Storage Facility

A dedicated Tailings Storage Facility is not required at the Mine Site or in the Wells area as part of the Project. The sorting of the mined ore prior to milling and flotation, as well as the use of flotation tailings for paste backfill, will eliminate the requirement for a TSF at or near the Mine Site. A new Filtered Stack TSF will be constructed at QR Mill; see Section 7.5.3.3 for additional details.

7.5.1.6 Water Management Facilities

The water management facilities required at the Mine Site will include the following:

- Two sediment ponds, one located at the Mine Site and the other at the Bonanza Ledge Site, which will serve as central collection ponds for contact water at each site;
- Contact and non-contact water conveyance infrastructure including diversion berms, collection channels, pumps and pipelines to separately manage these volumes;
- Culverts where the access roads cross natural channels or streams;
- A mine dewatering system for the historic underground mining areas; and
- Water treatment system: a new water treatment system is proposed at the Mine Site near Wells. Design of this system is in progress and is anticipated to include a conventional high-density sludge (HDS) lime neutralization and ferric coprecipitation system, combined with the water treatment system at the Bonanza Ledge Site, which will be relocated to the Mine Site near Wells.

The surface water management systems at the Mine Site will contain diversion channels to deflect upslope non-contact water from entering the site and collection channels to direct contact water within the site either to the proposed Mine Site sediment pond or other sumps. Contact surface water at the Mine Site will drain naturally through the Bulk Fill Storage Facility to the bottom of the waste pad into the lined sediment pond.

The underground mine dewatering system will be operational during pre-production, and will include sumps, pumps, pipelines, and collection systems. The historic flooded underground workings, which are estimated to have approximately 685,000 m^3 of water, will be dewatered using a system designed to handle 10,800 m^3/day. Excess water from the underground mine dewatering system will be pumped to surface and connect to the Services Building and to the Mine Site WTP where it will be treated prior to discharge.

The surface water management system at the Bonanza Ledge Mine contains existing and proposed diversion channels to deflect upslope non-contact water from entering the site and channels to direct contact water within the site either to the proposed Bonanza Ledge Mine sediment control pond or to the southern sump. Surface water runoff will be collected and directed towards the Bonanza Ledge Mine sediment control pond before being treated in the Mine Site WTP.

The Bonanza Ledge WRSF will include water management infrastructure to collect water from the facility. At the Bonanza Ledge WRSF, an underdrain may be utilized to help control the water level within the facility and to direct water from the south sump to the Bonanza Ledge Mine sediment pond. The proposed underdrain would consist of clean, coarse and segregated material or perforated pipes and be located above the liner at the lowest elevation of the facility area (along the existing natural valley), with all water draining to the Bonanza Ledge Mine sediment control pond.

Two water treatment systems will be combined and utilized at the Mine Site through the life of mine. The new proposed contact water treatment infrastructure for the Mine Site consists of a conventional high-density sludge (HDS) system (600 m^3/h) that will be combined, at a centralized location, with the former Bonanza Ledge Mine modular water treatment system (Bonanza Ledge WTS). The former Bonanza Ledge WTS (180 m^3/h), which uses chemical-physical treatment processes, will be relocated to a central location at the Mine Site and will treat the residual drainage from the Bonanza Ledge Mine via a 4-km long water pipeline. The Bonanza Ledge WTS will also provide additional treatment capacity to better manage surface water collected at the Mine Site at the toe of the Bulk Fill Storage Facility. BGM notes that additional upgrades to include biological treatment in the Bonanza Ledge WTS may be required during the life of mine; the potential requirements for these upgrades will be examined further once the updated water balance and water quality model is developed. The Mine Site WTP will predominantly treat the slightly acidic underground water (both pre-operational and operational mine dewatering), as well as the remainder of the surface contact water from the Mine Site area, including historical and new waste rock storage facilities and excess process water from the Services Building at the Mine Site. Treated effluent meeting permit requirements will be pumped either into the Willow River on the west side of the new Mine Site access bridge or into Jack of Clubs Lake. The precipitates from the Mine Site WTP will be combined with a binder and backfilled.

Potable water for domestic use at the Mine Site will be sourced from a newly drilled well and water transported from that well to the camp via a waterline. The proposed well will have sufficient capacity to meet the domestic Maximum Day Demand of the camp (90 m^3/day) and the Services Building. The water for domestic use will be locally stored at the Mine Site. Process water used at the Services Building will be recirculated and re-used to the extent possible using thickeners and filters. If additional make-up water is required, excess water from underground will be prioritized and directed to the Services Building instead or to the water treatment plant.

Industrial water for use at the Services Building at the Mine Site is anticipated to be minimal (1.8 m^3/day) and will be sourced from dewatered historic underground mine workings at the Project throughout the operational period; if required, water will be treated at the Wells WTP.

Additional details regarding the water management facilities at the Mine Site will be described in the EAC Application. A mine water management plan will be developed for the Mine Site prior to commencing operations that will provide details of mine water management strategies and guidance on protecting natural waterways surrounding the Project to follow applicable Best Management Practices (BMPs), including references to water treatment, effluent discharge permits, and legislation.

7.5.2 Transportation Route

Concentrate generated at the Mine Site will be hauled along the Transportation Route to the QR Mill. The Transportation Route between the Mine Site and QR Mill is comprised of Highway 26 and 500 Nyland Lake Road. Haul truck capacity will be approximately 50 t. Approximately 20 to 25 transport truckloads per day will be hauled along the Transportation Route, 365 days a year. Further studies are underway to determine if hauling will be completed on a 12 hour or 24 hour day, and information will be provided in the EAC Application.

Access to the Mine Site will be from Quesnel on Highway 26. BGM will build a new mine access bypass from Highway 26 near Wells to the Mine Site that will cross the Willow River on a bridge and then cross the historical tailings deposit on the northeast side of Jack of Clubs Lake (Figure 4). A new 24-m clear-span bridge structure over the Willow River will be installed at the entrance of the Mine Site access road to Highway 26. Access to the Island Mountain Portal will also be along Highway 26.

Access to the QR Mill is through two routes. The first route to QR Mill is from Quesnel is along Highway 26, and then south onto the 500 Nyland Lake Road from Highway 26, near Cottonwood. 500 Nyland Lake Road is a gravel forest service road that is maintained by West Fraser Mills Ltd. The second route is south from Quesnel along the Quesnel Hydraulic Road to 2700 Road, where it meets with 500 Nyland Lake Road. Workers will access QR Mill via both routes; however, material and equipment deliveries will access the QR Mill via 500 Nyland Lake Road only.

Upgrades to the existing Transportation Routes are not required as part of the Project.

Project-related vehicle traffic to the Mine Site and QR Mill will include the following deliveries along the Transportation Route and beyond to each item's point of origin:

- Fuel,
- Emulsion (the Mine Site only),
- Drill bits (the Mine Site only),
- Grinding media,
- Reagents,
- Equipment maintenance spare parts,
- Operational consumables, and
- Food and cleaning products for the camps.

7.5.3 QR Mill

The QR Mill is an existing plant with a daily capacity to process 850 t of mineralized material. The QR Mill was used to process Bonanza Ledge Mine ore, with these tailings deposited into the Main Zone Pit. The QR Mill site is currently not operating; however, it is anticipated that it will resume operations while the EAC Application is under review. Once mining is finished at the Bonanza Ledge Mine, the QR Mill will shut down for several months in order to perform the upgrades required to process concentrate trucked from the Mine Site. Also, upon receiving applicable permits for the Cariboo Gold Project, and while Bonanza Ledge Mine ore processing is drawing to an end, a tailings dewatering plant (thickening and filtration), as well as the site preparation and water management infrastructure for the FSTSF, will be built (Table 25). This is also when, if required, the site water management infrastructure will be upgraded, and a water treatment plant will be built to meet the needs of the Cariboo Gold Project. These new systems will tie into the QR Mill processing circuit during a planned shut down upon at the end of mining at the Bonanza Ledge Mine.

Table 25: QR Mill Project Components

Purpose	Components	
Site Infrastructure	■ Existing fuel and propane storage and handling facilities ■ New worker accommodation	■ Sewage and septic works ■ Existing offices
Mineral Processing	■ Grinding, leaching, gold recovery, and cyanide destruction in an upgraded QR Mill	■ Tailings dewatering plant ■ Covered mineralized material stockpile
Tailings and Waste Management Facilities	■ FSTSF	■ Overburden stockpile (should additional surface disturbance within the existing QR Mill footprint be required)
Water Management Facilities	■ Water storage and supply (potable and non-potable) ■ Integration of new contact and non-contact water management infrastructure from the Project to the existing water management infrastructure at QR mill and upgrades as required	■ Water treatment system and discharge
Power supply	■ An existing powerline currently supplies power to the QR Mill. No upgrades are required to this powerline; therefore, it is not part of the Cariboo Gold Project.	■ Electrical equipment upgrades within the QR Mill

7.5.3.1 Site Infrastructure

Site surface infrastructure includes all of the buildings required to support the activities at QR Mill, including offices and accommodations. Site surface infrastructure currently planned at the QR Mill is discussed in the following subsections.

Fuel Storage

There is currently one diesel storage reservoir and one gasoline storage reservoir installed at the QR Mill, as well as another reservoir for the mill emergency generator. The existing reservoirs will be inspected and re-used for the Project if they meet current fuel storage standards and regulations.

Accommodations for Workers

The existing camp can accommodate 40 workers and will be used during the pre-production period. The existing camp will be replaced with a new 40-person camp and kitchen for the Project.

Sewage and Septic Works

The existing septic system at the QR Mill is under review. If required, upgrades to the sewage and septic handling system will be constructed near the QR Mill camp.

7.5.3.2 Mineral Processing - QR Mill Upgrade

The QR Mill is currently used to process Bonanza Ledge Mine mineralized material, with these tailings currently being stored in the MZP. Once mining is finished at the Bonanza Ledge Mine, the QR Mill will shut down for several months in order to perform the upgrades required to process concentrate from the Mine Site.

The combined mineral sorter and flotation concentrates will be transported by haul trucks from the Mine Site to the QR Mill. The following modifications to the existing QR Mill will be made, as required, to meet the Project's needs:

- Addition of a covered 5,500 t mineralized material stockpile;
- Addition of a haul truck dump, hopper, and conveyor to by-pass the existing crushing circuit;
- Addition of a pre-aeration tank to the existing leach circuit;
- Replacement of the existing carbon elution and electrowinning circuits;
- Replacement of existing cyanide destruction tanks;
- Addition of a tailings dewatering circuit; and
- Upgrades as required within the existing QR Mill.

Figure 17 presents a simplified schematic of the Project mineral processing at the QR Mill.

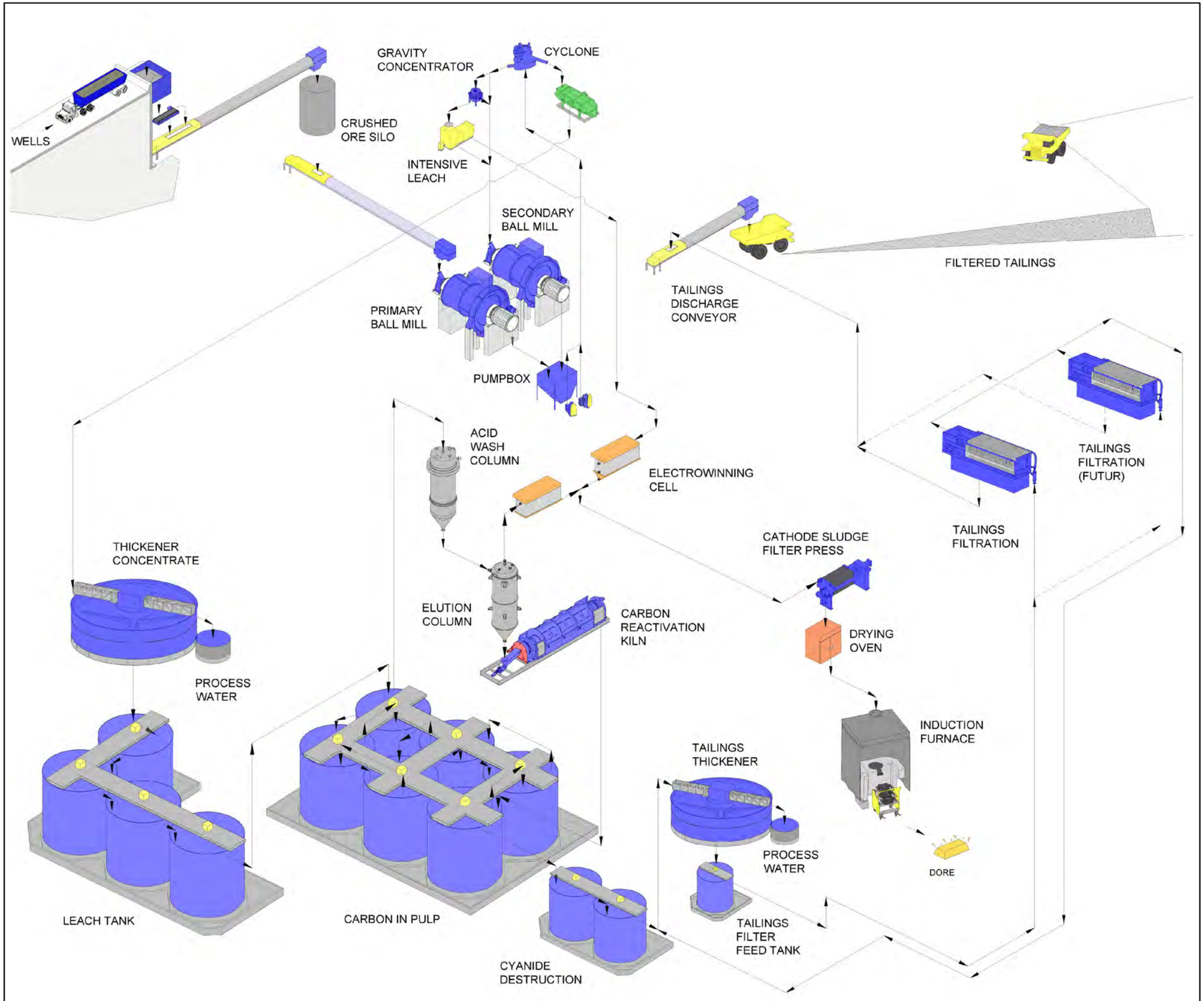
7.5.3.3 Tailings and Mine Waste Management Facilities

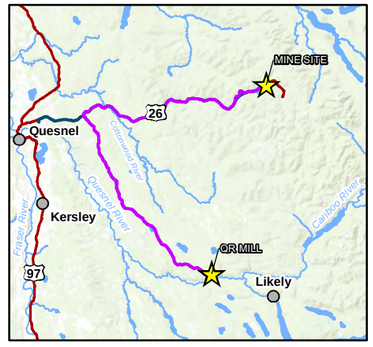
Two tailings management facilities currently exist at the QR Mill: the QR Tailings Storage Facility (QR TSF) and the Main Zone Pit (MZP).

Filtered tailings technology has been chosen for the QR Mill, which will reduce the size of the tailings footprint versus conventional slurry placement methods. Tailings will be pressure filtered to achieve optimum water content for compaction of approximately 18% to 20% (mass water: mass solids). Tailings will then be deposited in lifts and compacted. Current options under consideration involve the development of a new filtered tailings storage facility site, or the storage of new filtered tailings in the existing QR TSF over the existing tailings and waste rock, forming a mound. A FSTSF in the existing QR TSF is currently considered to be the preferred option, with a design capacity of 2.1 Mm^3 of compacted tailings (3.57 Mt, considering a dry density of 1.7 t/m^3). Discussion regarding alternative options considered for tailings storage is provided in Section 7.6.1.

Should the currently preferred tailings storage option be selected, construction of the FSTSF would begin by partially or completely drawing down the existing QR TSF pond such that an initial lift of filtered tailings would be placed over the existing tailings to create a graded surface. This construction would be sequenced in a manner that allows surface runoff to flow to the east of the stack and report to the existing QR TSF pond. Surface runoff collected in the existing QR TSF pond would be managed by pumping to another pond, such as the MZP. A liner would not be required to collect and manage seepage from the FSTSF, which would combine with that of the existing tailings and be collected in the seepage collection ponds located at the toes of the TSF dams.

Details on water management infrastructure associated with FSTSF (preferred option) can be found in Section 7.5.3.3.





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1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
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CARIBOO GOLD PROJECT

QR MILL
MINERAL PROCESSING SCHEMATIC

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	17

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Waste Rock Storage Facilities

A dedicated WRSF will not be required at the QR Mill or surrounding area as part of the Project. The sorting of the mined ore prior to milling and flotation at the Mine Site Services Building will eliminate the requirement for a WRSF at or near the QR Mill. See Section 7.5.1.4 for details on the WRSFs located at the Mine Site.

7.5.3.4 Water Management Facilities

- The water management facilities required at the QR Mill will include the following:
  - Two existing tailings facilities: QR TSF, and the mined-out MZP;
  - Two inactive pits: Northwest Zone Pit and North Lobe Pit;
  - Contact and non-contact water conveyance infrastructure including diversions, spillways, pumps, and pipelines to separately manage these volumes; and
  - A Water Treatment System (WTS).

In addition, water management infrastructure associated with the FSTSF (preferred option) will include the existing surface water diversion ditch upslope of the FSTSF to route non-contact natural runoff around the FSTSF to the natural downstream watercourse and an internal perimeter drainage ditch to convey runoff from the filtered tailings to the TSF Pond. Surface runoff collected in the TSF pond would be managed by pumping to another pond, such as the MZP.

This FSTSF water management infrastructure will include the following key components:

- The existing North Seepage Collection Pond that will continue to collect seepage from the existing QR TSF containment dam;
- The proposed South Seepage Collection Pond (SSCP) that will collect seepage from the existing QR TSF Cross Dyke which will be refurbished for the Project;
- The existing MZP, proposed SSCP and existing WR TSF Pond would provide flood storage; and
- The existing MZP, and proposed SSCP would provide operational water storage.

Potable water for domestic use is currently supplied from an existing shallow groundwater well, located approximately 230 m southeast of the camp. A new well is not required for this site.

Water supply for the QR Mill is primarily reclaimed water from the MZP, which is continually pumped to the Fire Water Tank; excess water from this tank gravity drains back to the MZP via a mill bypass. The potential receiving water bodies at the QR Mill include the Quesnel River and the Rudy Creek watershed.

The QR Mill will be equipped with a WTS by the time Project approvals in place. The WTS uses chemical-physical processes to remove trace metals, sulphate, and other trace constituents from contact water from the existing QR TSF and MZP. During Project operations, BGM will look at potential enhancements to the QR Mill WTS which will increase the ability to continuously discharge a low volume of water to manage water levels at the site. The nature of these upgrades and timing for implementation will be confirmed through updated water quality modelling to verify any water meets all discharge criteria before release.

Additional details regarding the water management facilities at the QR Mill will be described in the EAC Application. A site water management plan will be developed for the QR Mill prior to commencing operations that will provide details of water management strategies and guidance on protecting natural waterways surrounding the Project to follow applicable BMPs, including references to water treatment, effluent discharge permits, and legislation.

7.5.4 Power Supply

BC Hydro currently operates a 25/14.4 kV (single-phase) powerline to provide power to the District of Wells. This existing powerline does not meet the requirements of the Mine Site for three-phase power. BGM will build a new 69 kV, three-phase Transmission Line (the Northern Transmission Line) from the Barlow Substation near Quesnel to the District of Wells (Figure 2). After crossing Highway 26, the route would be located north of Highway 26 and would parallel existing forest service roads and previously disturbed areas, where possible. The Northern Transmission Line Route would be require a right-of-way approximately 36 m wide and approximately 72 km in length. Access roads will be required for construction, and these may include existing, new and/or upgraded roads.

A new substation will be located near the Mine Site, transforming the 69 kV power to a lower voltage to meet the Project's needs.

Diesel generators currently supply power to the Bonanza Ledge Site. Generators will be installed near the Mine portal areas for use during Mine Site construction and until the Transmission Line is operational. Diesel generators will remain on-site and will be used as an emergency backup power source during power outages.

The current power supply to the QR Mill is sufficient to meet Project needs. The process upgrades specified during the upcoming technical study will dictate what electrical upgrades are required within the QR Mill.

7.5.5 Reclamation

BGM maintains multiple Reclamation and Closure Plans (RCPs) for the Bonanza Ledge Mine, QR Mill and Mosquito Creek, which detail how these sites will be closed. These RCPs provide the basis to develop an integrated reclamation and closure plan for the Project, including costing that is based on the most current assumptions regarding reclamation and closure of Project facilities and landforms. Soil and overburden inventories for disturbances associated with Project sites will be provided in the EAC Application. Potential measures to meet end land use objectives if there is an anticipated shortfall will also be provided. Soil and overburden material suitable for reclamation will not be used as fill.

During the reclamation period, and until the sites have been restored and reclaimed to a safe and stable condition suitable for release by regulators, contact water will continue to be managed (and treated if required) to be compliant with all permits and regulations. If water treatment facilities are required beyond the reclamation and closure phase, then maintenance and monitoring of the water treatment facilities and monitoring of effluent and receiving environments will continue until such time as treatment is no longer required. The objective is to design and reclaim the sites to not require human intervention in managing the water once the site has been restored.

Post-closure monitoring and maintenance activities will be carried out for five years beyond reclamation decommissioning activities. Post-closure monitoring will include geotechnical and hydro-geotechnical monitoring and reporting, surface and groundwater monitoring, revegetation, and invasive plant surveys. Water treatment units will be maintained, as required. Only the infrastructure related to water treatment, such as access roads, contact water ditches, and sediment ponds, will be maintained beyond the reclamation decommissioning activities, if necessary.

An updated RCP for the Project will be provided as part of the EAC Application. This will include details on progressive reclamation and any previous research completed in support of the reclamation approach. A description of the anticipated metals uptake for vegetation used to reclaim the tailings storage facility will be included.

7.6 Alternative Means of Carrying Out the Project

In addition to the Project updates and changes that have occurred since the completion of the IPD, this section summarizes the key components of the Project for which alternatives and options were reviewed. The below alternatives in design and methodology were considered and evaluated for the Project components, including:

- Tailings technology;
- Transmission line route;
- Potable water supply; and
- Water treatment.

As part of the EA process, additional information will be provided where available on the below alternatives. This information will consider the inclusion of feedback provided through ongoing engagement activities as well as other technical, environmental (including GHG emissions), economic, and socio-economic aspects.

A brief summary of alternatives is outlined below; additional details describing all alternatives analyses that were undertaken and of the alternative assessment methodology will be provided within the EAC Application.

7.6.1 Tailings Technology

BGM investigated several tailings technology alternatives and locations, including (Table 26):

- Option 1: Conventional tailings;
- Option 2: Filtered tailings in a new facility; and
- Option 3: Filtered tailings on top of the existing QR TSF.

Table 26: Tailings Technology Alternatives Assessed

Option	Description	Passed Screening	Selected for Continued Evaluation	Comments
1	Conventional tailings	No	No	Screened out due to an increase in Project footprint and requirement for either a raise to existing QR TSF or new TSF and associated dam.
2	Filtered tailings in a new facility	Yes	Yes	Option still under consideration by BGM.
3	Filtered tailings on top of the existing QR TSF	Yes	Yes	Option still under consideration by BGM.

It is noted that Option 1, conventional tailings, was considered during the Initial Project Description phase and ruled out from further consideration. This option would require an increase in Project footprint for and requirements for either a raise to the existing QR TSF or a new TSF and associated dam. Options 2 and 3 are still under consideration by BGM; however, Option 3 is currently considered to be the preferred option due to the decrease in overall potential Project footprint and increase in water recycling within the QR Mill. Option 3 will also not require any additional overburden and soil stockpiling. Further details on the preliminary options analysis approach is provided in a brief technical memo in Appendix E.

As part of the EAC Application, additional details will be provided within a Tailings Alternative Assessment Report, considering the Best Achievable Technology in alignment with ENV guidelines (ENV, 2015). 2015) and the Government of Canada guidelines: *Guidelines for the Assessment of Alternatives for Mine Waste Disposal.*

7.6.2 Transmission Line Route

BGM investigated several transmission line routes associated with the Project, including:

- Option 1: Upgrade existing 25/14.4 kV BC Hydro powerline to a 69 kV transmission line in partnership with BC Hydro;
- Option 2: New 69 kV transmission line paralleling the existing BC Hydro right-of-way (Highway 26 Route). This included two alternatives: 2A – BC Hydro Partnership and 2B – Private Line; and
- Option 3: New 69 kV transmission north of the existing BC Hydro right-of-way (the Northern Transmission Line Route).

It is noted that Option 1, upgrading the existing 25/14.4 kV powerline, was previously considered during the IPD and ruled out from further consideration. It was determined that one 69 kV transmission line would not be sufficient to power both the Mine Site and existing users. The Mine Site requires 22 mega watts (MW), and the new 69 kV transmission line has a capacity to carry up to 30 MW based on the present line length and configuration.

During the Early Engagement Phase, BGM considered Option 2 Highway 26 Route and Option 3 Northern Transmission Line Route. For Option 2, BGM evaluated both partnering with BC Hydro to construct the Highway 26 Route within the existing BC Hydro right-of-way (Option 2A – BC Hydro Partnerhsip), which includes the MOTI right-of-way, or building a private transmission line parallel to the existing BC Hydro right-of-way (Option 2B – Private Line. BGM compared these two alternates with the Northern Transmission Line. A summary of the assessment aspects considered for Option 2 and Option 3 is outlined in Table 27.

Table 27: Transmission Line DPD Alternatives Assessed

Criteria	Highway 26 Route – BC Hydro Partnership (Option 2A)	Highway 26 Route – Private Line (Option 2B)	Northern Transmission Line Route (Option 3)
Technical	■ Ministry of Transportation and Infrastructure does not allow any proponent besides BC Hydro to build in their right-of-way. ■ Upgrading this line or building a new transmission line to Wells has not been identified as a priority by BC Hydro.	■ Transmission line would be located outside of BC Hydro and MOTI right-of-ways. ■ The new 36 m right-of-way would be required adjacent to the existing BC Hydro right-of-way. This would result in a much larger cleared area to accommodate the existing and new transmission lines.	■ New 36-m right-of-way would be constructed parallel to existing forest service roads and cutblocks, where possible, to minimize new disturbance.
Clearing	■ Additional clearing along Highway 26 required to meet vegetation clearance requirements. ■ Constrained by existing right-of-way and private properties thus limiting flexibility in routing to minimize clearing.	■ Additional clearing along Highway 26 required to meet vegetation clearance requirements. ■ Constrained by existing right-of-way and private properties thus limiting flexibility in routing to minimize clearing.	■ Additional clearing required. ■ Flexibility to route through previously cleared areas to minimize new disturbance.
Access Roads	■ Construction access would be via Highway 26. ■ May result in temporary one-way highway closures or diversions during construction.	■ Construction access would be via Highway 26. ■ May result in temporary highway diversions during construction (material delivery).	■ Construction access would be via existing forest service roads. ■ Additional access would be via the construction right-of-way thus limiting the need for new access roads.
Caribou Habitat	■ Route intersects high and low elevation core caribou habitat and matrix habitat.	■ Route intersects high and low elevation core caribou habitat and matrix habitat.	■ Route avoids high and low elevation core caribou habitat. ■ Route crosses caribou matrix habitat.
Private Properties (current route)	■ 77 properties directly affected by transmission line footprint.	■ 77 properties directly affected by transmission line footprint.	■ 25 properties directly affected by transmission line footprint.
Crown Land	■ Route intersects Crown Lands located along the highway.	■ Route intersects Crown Lands located along the highway.	■ Route intersects Crown Lands along forest service roads.

Criteria	Highway 26 Route – BC Hydro Partnership (Option 2A)	Highway 26 Route – Private Line (Option 2B)	Northern Transmission Line Route (Option 3)
Visual Effects	■ Concerns regarding visual effects along the highway on tourism. ■ Clearing would remove established buffers exposing clear cut areas along Highway 26.	■ Concerns regarding visual effects along the highway on tourism. ■ Clearing would remove established buffers exposing clear cut areas along Highway 26.	■ Concerns regarding visual effects near Wells and visibility of the transmission line from the community.
Schedule	■ BC Hydro project schedule (study design, procurement and construction) of approximately 5 years. ■ In-service date of transmission line would not meet start of mine production.	■ BGM project schedule of approximately 3 years. ■ In-service date of transmission line coincides with start of mine production.	■ BGM project schedule of approximately 3 years. ■ In-service date of transmission line coincides with start of mine production.
Cost	■ Approximately $70-90 million.	■ Approximately $22 million.	■ Approximately $19 million.
Noise and Air Quality	■ Longer construction time for the BC Hydro partnered line thus, mine is reliant on diesel generators (noise, air quality concerns) for a longer period. ■ Larger greenhouse gas contribution due to reliance on diesel generators.	■ Private transmission line can be constructed more quickly, thereby reducing the use of diesel generator and, in turn: ■ Reducing noise ■ Reducting fuel deliveries ■ Reducing GHG generation ■ Improving air quality.	■ Private transmission line can be constructed more quickly, thereby reducing the use of diesel generator and, in turn: ■ Reducing noise ■ Reducting fuel deliveries ■ Reducing GHG generation ■ Improving air quality.

Of the three options carried forward, BGM selected Option 3, the Northern Transmission Line Route for further advancement and study. As compared in the table above, this option affects fewer private properties, avoids high and low elevation caribou habitat, avoids exposing cleared areas along Highway 26 to tourism traffic and has greater flexibility in developing routing options. A shorter construction schedule would reduce fuel deliveries, reduce noise, improve air quality, as well as reducing overall GHG generation. BGM continues to explore minor route adjustments in the Wells area to reduce the visibility of the proposed line as well as to minimize new disturbance by utilizing forest service roads and previously disturbed areas where possible; these additional route adjustments continue in consideration of public feedback that was raised during community engagement activities associated with the Project. BGM has and will continue to discuss route options with Lhtako Dené Nation based on community feedback on current use along the proposed Northern Transmission Line Route. BGM is also discussing route options with FLNRORD to address wildlife issues and concerns about caribou along the proposed transmission line route. Additional details associated with the Northern Transmission Line route will be provided as part of the EAC Application.

7.6.3 Potable Water Supply

BGM is evaluating a groundwater source to provide potable water to the new camp at the Mine Site. A small amount of potable water is also required at the Services Building. A groundwater supply options assessment is underway to identify potential locations of groundwater supply wells. The options analysis is being undertaken assuming a peak demand of 1.45 L/s.

An options analysis is being performed considering the following selection criteria:

- Proximity to demand;
- Available groundwater source;
- Potential groundwater quality;
- Well interference (i.e., potential impact to groundwater levels in other wells);
- Permitting considerations; and
- Social acceptance (i.e., less acceptable locations by local residents including sites near municipal well, near certain public spaces, close to specific environmental areas).

Five groundwater supply options were initially under consideration. However, two options were considered unfavourable and therefore dropped:

- Historic tailings deposit– considered unfavourable due to the potential for poor groundwater quality; and
- Northeast District of Wells – considered unfavourable due to long distance from demand points.

Three groundwater supply options are, therefore, being carried forward for further consideration; these options are shown in Figure 18, and a summary of the assessment aspects considered is outlined in Table 28:

- Valley Zone central;
- Former Island Mountain mill; and
- Existing BGM office well.

Table 28: Potable Water Supply Alternatives Assessed

Option	Description	Options Analysis Preliminary Results	Strengths	Drawbacks
1	Valley Zone Central	Favourable	■ Good hydraulic conductivity. ■ Reasonably close to the demand points. ■ Initial groundwater quality results are favourable. ■ Monitoring well is already present.	■ Would require a road and watercourse crossing. ■ Somewhat close to District of Wells municipal supply well – would need to monitor for effects to the aquifer over time. ■ Aquifer has relatively higher silt content.
2	Former Island Mountain Mill	Potentially Favourable	■ Well yield measured to be much higher than requirements. ■ Close proximity to demand points ■ Not likely to interfere with District of Wells municipal well. ■ Out of site on BGM controlled land.	■ Would require a road and watercourse crossing. ■ Proximity to the valley walls results in uncertainty in the likelihood of aquifer intersection. ■ Closer to lower quality groundwater seepage area.. ■ Location near BGM's proposed Island Mountain portal requires careful integration into proposed infrastructure
3	Existing BGM Office Well	More Information Needed	■ Option to repurpose existing groundwater well at this site. ■ Could also install a new well (according to supply well standards). ■ Very close proximity to demand points. ■ BGM controlled land and out of site ■ Well interference with municipal well is unlikely.	■ Well log information for the existing well is unavailable. ■ Existing well may not be constructed to regulatory standards. ■ Well may in an unconfirmed aquifer and more difficult to license. ■ Unconfirmed groundwater yield and quality.

The three sites being evaluated for the potable water supply options are located predominately on crown land with several private parcels only marginally overlapped.

Further analysis and engagement are proposed to support the selection of a preferred potable water supply option for the Project. BGM would welcome the opportunity to explore these options further with the community of Wells, to optimize community input, minimize adverse effects associated with the construction of the well and waterline, and maximize any potential community benefits. Further information on the selected site will be provided in the EAC Application.

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Location 5

Willow River

Location 2

Location 3

Wells

093H/04

Location 1

Lowhee Creek

Location 4

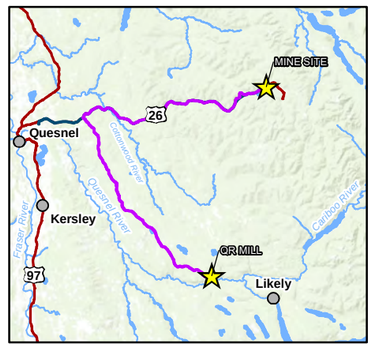
26

Jack of Clubs Lake

LEGEND

- MUNICIPAL WELL
- HIGHWAY
- WATERCOURSE
- MINE SITE SURFACE BOUNDARY
- POTABLE WATER SUPPLY LOCATION OPTIONS

LOCATION 1 – HISTORIC TAILINGS DEPOSIT
LOCATION 2 – VALLEY ZONE CENTRAL
LOCATION 3 – FORMER ISLAND MOUNTAIN MILL
LOCATION 4 – EXISTING BGM OFFICE WELL
LOCATION 5 – NORTHEAST DISTRICT OF WELLS



REFERENCE(S)
1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
2. HILLSHADE DERIVED FROM LIDAR DATA FLOWN BY MCELHANNAY CONSULTANTS LTD. JUNE 27, 2016.
3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

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BGM

CARIBOO GOLD PROJECT

POTABLE WATER SUPPLY LOCATION OPTIONS

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	18

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7.6.4 Water Treatment

At the Bonanza Ledge Mine, two options were considered to manage effluent from the waste rock associated with the Project; namely (Table 29):

- Option 1: Upgrade the Bonanza Ledge Mine water treatment system (WTS) to include a nutrient removal stage; and
- Option 2: Install a 4-km water pipeline to deliver the waste rock seepage to the central water treatment location in the Wells site.

Table 29: Water Treatment Alternatives Assessed

Option	Description	Passed Screening	Selected for Continued Evaluation	Comments
1	Upgrade the Bonanza Ledge Mine water treatment system	Yes	No	Not selected due to economic factors
2	Install a 4-km water pipeline	Yes	Yes	Preferred alternative due to economic, environmental factors

- BGM selected Option 2 as it is a more economically favourable option than Option 1 as the proposed pipeline is more cost effective with respect to capital and operating expenditures.
- The pipeline installation viability will be assessed; in addition, BGM will review the permitting considerations and potential pathway for the pipeline. Current options have the pipeline installed along either the A-Road or C-Road.
- Additional information regarding the alternatives analyses completed in the selection of water treatment technology for both the Mine Site and QR Mill will be provided in the EAC Application. This will include information on treatment types / concepts that could be used and have been shown to achieve target concentrations in similar settings.

7.7 Project Development

7.7.1 Project Capital Costs

The operational life of the Project is currently projected to be 16 years based on the currently delineated resources. The total pre-production capital cost for the Cariboo Gold Project is estimated to be $432.8 million (M) (including contingencies and indirect costs) as dated Q2 2020 and expressed in Canadian dollars. The cumulative life of mine capital expenditures, including costs for construction, sustaining operations, site reclamation and closure, is estimated to be $899.5M. Table 30 provides an overview of the capital costs (construction and operations phases) on an annual and cumulative basis for the life of the Project. Table 31 provides an overview of the annual operating costs for the life of the Project.

Table 30: Cariboo Gold Project Capital Cost Summary

Area Description	Construction (Pre-production) Capital Cost ($M)	Total Capital Cost during Operations[1] ($M)	Total Cost ($M)
General and Administrative	39.0	0	39.0
Underground Mine	78.8	320.3	399.1
Mine Surface Infrastructure	17.8	4.5	22.3
Electrical and Communications	33.6	0.6	34.2
Site Infrastructure	38.0	7.5	45.5
Processing Wells	69.1	80.3	149.5
Processing QR Mill	31.2	0.0	31.2
Tailings, Waste and Water Management	19.2	12.2	31.4
Indirects	57.1	5.9	63.0
Contingency	48.8	18.1	66.9
Total	432.6	449.4	882.1
Decommisioning (Site Reclamation and Closure)	-	17.4	17.4
Total Forecast to Spend	**432.6**	**466.7**	**899.5**

Note: [1] Excluding direct operational costs.

Table 31: Cariboo Gold Project Annual Operating Cost Summary

Area Description	LOM ($M)	Annual Average Cost ($M)	Average LOM ($/tonne mined)	Average LOM ($/oz)	OPEX (%)
General and Administration	269.7	16.9	11.06	101.1	12.4%
Mineralized Material Transport	89.5	5.6	3.67	33.5	4.1%
Underground Mining	1,129.9	70.6	46.32	423.6	52.0%
Processing Wells	409.0	25.6	16.76	153.3	18.8%
Processing QR Mill	183.0	11.4	7.50	68.6	8.4%
Tailings, Water Treatment and Environment	92.8	5.8	3.81	34.8	4.3%
Total	**2,173.9**	**135.9**	**89.12**	**815.0**	**100%**

7.7.2 Workforce Estimates

The Cariboo Gold Project workforce has been estimated by Project phase, for the pre-production period and operational period as outlined below.

7.7.2.1 Construction Period

The preliminary on-site workforce requirement for pre-production, including infrastructure, Services Building, and development of the underground mine is expected to average 200 construction personnel, peaking at approximately 250 individuals.

BGM will hire a variety of contractors for construction. Contractors generally have a core group of workers (e.g., trades people, labourers, operators) and hire locally as required to support their existing workforce. Some contractors will provide specialized services (e.g., underground development). Most construction jobs will not be full-time permanent; contractors will come to site, complete their work and leave. Many of the contractors required for Project construction will be specialized in underground mining and may come from outside the local area.

BGM will hire construction managers, engineers, geologists and environmental, office and support staff for construction. Some of these positions may transition to operations.

7.7.2.2 Operation Period

A total facility workforce of approximately 460 employees is estimated for the Cariboo Gold Project. A summary of labour in all areas is shown in Table 32 below. The Project will create operations jobs in the skilled trades as well as in the professional, technical, environmental, regulatory/permitting, support and administrative fields.

The new camp at the Mine Site and new camp at the QR Mill will be adequate to accommodate BGM operations employees. A detailed logistics plan will be developed to ensure adequate accommodations are available during the Cariboo Gold Project Operational Period.

Table 32: Cariboo Gold Project Summary of Operations Workforce

Facility Area	Role	Total
General and Administration	Management	2
	Administration	9
	Human Resources and Community Relations	2
	Health and Safety	8
	Surface Operations	11
	Technical Services (mine and geology)	23
	Subtotal	**55**
Underground Mine	Staff and Supervision	28
	Operations	178
	Maintenance and Services	82
	Subtotal	**288**
Processing	Mine Site Services Building	53
	QR Mill	53
	Subtotal	**106**
Tailings, Waste and Water Management	Staff and Supervision	10
	Subtotal	**10**
	Total	**459**

Specific requirements will include underground and surface-based jobs in a variety of fields, including:

- Heavy equipment operators
- Mechanics
- Electricians
- Miners
- Mill operators
- Truck drivers
- Blasters
- Engineers
- Managers
- Geologists
- Environmental scientists
- Accountants
- Purchasers
- Catering/Camp staff
- Human Resources
- Warehouse
- Communications
- Health and Safety

The mine will operate on two 12-hour shifts/day for automated operations and one 10-hr shift/day for other underground activities. Operations will be carried out 7 days a week, 365 days per year. The mine will be operated using three different rosters. A combination of a 4/3 and 5/2 (days working/days off) will be used for salaried personnel. Hourly employees are scheduled on 14 days on, 14 days off roster on a fly-in fly-out schedule.

Contractors are expected to undertake many of the operational activities for the Project, and may provide employment through several full-time equivalent positions, including heavy vehicle operators, local transportation services, audit and monitoring services, and catering. The contractor workforce is expected to work 12-hour shifts on 14 days on/14 days off roster.

The QR Mill will share staff with Mine Site Services Building. The superintendent, general foreman, metallurgist, and project engineers will be located at the QR Mill and will supervise the Mine Site team in their respective fields of expertise.

In addition to the direct employment and contractor employment, the Project will also create indirect employment opportunities in businesses that manufacture, process, or market goods and services that support the construction, operation, and maintenance activities for the Project. Construction and operation of the Project will provide an increase in employment and household income and may promote extra spending in the local and regional economy. This additional spending could lead to higher employment in a range of sectors.

7.7.2.3 Workforce Sourcing

BGM is interested in employing local people during construction, and information on contracting and employment opportunities will be provided as it becomes available. BGM is also cognizant of the fact that many local businesses struggle to find employees and wants to ensure that hiring for the mine does not negatively impact these businesses.

As with the construction phase, BGM is interested in employing local people during operations and will work with the community to discuss local hire policies. However, given that the workforce requirements are approximately twice the population of the District of Wells, many workers will initially come from outside the local area and, likely, from outside the regional area.

7.7.2.4 Workforce Accommodation

Employees who are not local to the area (for example Wells or Quesnel) will be provided with accommodation in camp. The existing camp and the various accommodations that BGM currently own in the District of Wells are sufficient to meet the labour requirements for the Project during the pre-production period. The current Camp A and Camp B will be used while the site earthworks, water management structures and the new camp are being constructed. Once the new camp is complete and operational, and along with Camp A and Camp B, there will be

sufficient capacity to accommodate the peak pre-production on-site workforce of approximately 250 workers. Workers will be able to leave camp when off-shift.

The capacity and condition of the existing QR Camp is adequate for construction personnel during the pre-production period, at which time the QR Mill operations personnel will transfer to the new camp. During short periods of increased construction activity, any minor shortfalls in accommodation is planned to be addressed through accommodation available in Wells and Quesnel. A detailed logistics plan will be developed to ensure adequate accommodations are available during the QR Mill upgrade work for the Project.

The new camp at the Mine Site and new camp at the QR Mill will be adequate to accommodate BGM operations employees.

7.7.2.5 Workforce Diversity and Wellbeing

BGM recognizes that there are certain segments of the population that are under-represented in the current socio-demographic characteristics of its workforce and also recognizes the challenges in diversifying the workforce given the nature and location of the work (e.g., living at a camp, shift work, limited opportunities in Wells for partners, relatively remote location, childcare barriers associated with shift-work, etc.). BGM is currently working to develop hiring and employment policies and is considering ways to reduce the barriers to employment. A component of this planning is engaging with members of under-represented groups to discuss the barriers they experience and means through which they could be addressed. These discussions are ongoing.

7.8 Possible Future Project Refinements

BGM will continue to optimize the Cariboo Gold Project based on advanced engineering efforts and ongoing engagement activities. Project components that may undergo further refinement as a result of these efforts include, but are not necessarily limited to, the following:

- Underground mine plan;
- Final routing of the Northern Transmission Line Route and associated access roads;
- Land use objectives and reclamation and closure strategies;
- Water treatment strategy for the Mine Site based on peak flows;
- Water treatment strategy for the QR Mill based on potential contaminants associated with the new tailings design strategy; and
- Final location of the ventilation raises.

Any Project refinements will be fully described in the Project Description to be submitted with the EAC Application.

8.0 EMISSION, DISCHARGE AND WASTE

The emissions, discharges and wastes anticipated for the Project, associated with air, noise, mining wastes, light emissions, potential accidents and malfunctions and decommissioning, are described in the sections below.

8.1 Project Updates and Changes

This section has been refined based on updates to the water management infrastructure and components described in Sections 7.1, 7.5 and 7.6.

8.2 Air Contaminant and Greenhouse Gas Emissions

8.2.1 Air Contaminant Emissions

Air contaminant emissions will be generated by the Project from construction and mining activities and may include:

- Fugitive dust or particulate matter including total suspended particles (TSP), PM_{10} and $PM_{2.5}$ associated with the construction of the Mine Site, ancillary facilities, and the FSTSF at QR Mill, along with mining activities such as material handling, material processing operations, vehicle travel along unpaved roads, and windblown emissions from exposed areas such as material stockpiles;
- Criteria air contaminants including oxides of nitrogen (NO_x), PM_{10}, $PM_{2.5}$, sulphur dioxide (SO_2) and carbon monoxide (CO) due to the combustion of diesel, gasoline and propane fuels by vehicles, non-road equipment, power supply (diesel generators) and heating units; and
- Particulate matter, including TSP, PM_{10} and $PM_{2.5}$ associated with point source discharges from ventilation and dust collections systems at the Mine Site Services Building and QR Mill sites.

An Air Quality and Dust Control Management Plan will be implemented prior to the start of construction to ensure that measures are in place to minimize air contaminant emissions. BGM will consider approaches for reducing emissions of air contaminants, with a focus on dust emissions from surface activities at the mine as well as road dust and fugitive dust mitigation and its impacts on air quality and country foods. Implementation of permanent air quality monitoring stations near the mine or in the community of Wells will be investigated as a means to provide feedback on the efficacy of air quality and dust control measures.

8.2.2 Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions will be generated directly by the Project from construction and mining activities and may include:

- Carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) due to the combustion of diesel, gasoline and propane fuels by vehicles, non-road equipment, power supply (diesel generators) and heating units.

The Project will also utilize electricity from BC Hydro's integrated grid, which results in indirect GHG emissions associated with the third-party generation of the Project's incremental electrical energy requirement.

Based on the current construction and mine operations plan, summarized in this DPD, total direct Project GHG emissions are estimated to be 145,000 tCO_2e during the Construction phase, and 375,500 tCO_2e during the Operational phase. Maximum annual direct GHG emissions during Construction are estimated to be 54,100 tCO_2e/year in 2022, and maximum annual direct GHG emissions during Operations are expected to be 26,100 tCO_2e/year in 2024. Indirect GHG emissions associated with consumption of BC Hydro grid electricity are estimated to be 5,500 tCO_2e/year during Project Operations.

Under the *Climate Change Accountability Act* (CCAA), the Province has committed to reduce total provincial GHG emissions to 40% below 2007 levels by 2030 (38,800,000 tCO_2e/year) and 60% below 2007 levels by 2040 (25,900,000 tCO_2e/year). Direct emissions from the Project in 2030 are estimated to be 25,500 tCO_2e/year, which represents 0.066% of the CCAA 2030 target. Including both direct and indirect GHG emissions, the Project represents 0.08% of the CCAA 2030 target. Depending on the timeline for achieving full operation of the Project, and assuming a 16-year operating period, the Project may still be operating in 2040, at which time its direct emissions would be 0.098% of the CCAA 2040 target, and direct and indirect emissions would be 0.12% of the CCAA 2020 target. At either 2030 or 2040, these are modest emissions impacts at the provincial scale and should not significantly impact the ability of the Province to meet the CCAA 2030 or 2040 targets. Project Operations are expected to be completed well before 2050, so the Project would have no impact on the CCAA 2050 target.

As part of the advancement of the Project, BGM will consider opportunities to reduce GHG emissions. Some of the traditional ways to reduce GHG include increasing energy efficiency, fuel switching, constructing more energy-efficient buildings, combining heat and power sources, and increasing renewable energy uses where feasible. The proposed Transmission Line is considered to be a Project element that would reduce GHG emissions, given the reduction in the requirement for local diesel-power generators through construction and operations phases. As part of the EAC Application, BGM will explore other opportunities to reduce GHG emissions, including the development of a formal Energy and Greenhouse Gas Management Plan for the Project that would act as a companion to the Air Quality and Dust Control Management Plan.

8.3 Noise and Vibration Emissions

Potential noise and vibration emissions at the Mine Site will be related to mine ventilation equipment, underground drilling and blasting at the Mine Site, Services Building operations, equipment maintenance, vehicle use and ore and waste rock hauling, and generators, when in use. The Mine Site is located approximately 350 m from residential receptors in Wells. Potential noise emissions along the Transportation Route and Transmission Line are related to vehicle and machinery use, and ore hauling. Noise sources at QR Mill are expected to be similar to the current operations.

Acoustical enclosures, blankets and other measures will be utilized, as necessary, to ensure that noise-generating machinery and equipment operate within regulatory limits.

8.4 Mining, Waste, Tailings and Water Management Activities

During operations, Project activities such as ore extraction, waste rock management, tailings management, and water management have the potential to generate emissions, discharges and wastes within the Project area. Operating procedures will prescribe the performance of these activities in accordance with design, permit, and regulatory requirements. The EAC Application will include a discussion of best practices and Best Available Technologies for tailings design and storage, water treatment and waste rock management.

The Project includes underground crushing as well as a Services Building at surface comprising ore sorting, milling, flotation and dewatering circuits, a paste backfill plant, waste storage prior to final placement in the WRSF at Bonanza Ledge Mine and ore storage prior to transportation to the QR Mill. Tailings from the flotation circuit will be dewatered, mixed with a binder, and returned underground from a paste backfill plant located within the Services Building. Paste backfill will be used as a priority in the backfill schedule.

At the Mine Site, surface contact water will be collected in the sediment pond and directed to the Mine Site WTP discharged after treatment. This pond will be established during the site preparation activities. Underground water in excess of the Mine Site process requirements will be pumped directly to the water treatment plant and

discharged after treatment to meet permit limits. At Bonanza Ledge Mine, contact water draining from the proposed WRSF will report to an existing sediment control pond and then be transported to the Mine Site WTP. A description of Mine Site water management facilities is provided in Section 7.5.1.6.

The QR Mill, which is currently used to process Bonanza Ledge Mine mineralized material, will shut down for several months in order to perform the upgrades required to process concentrate from the Mine Site once mining is finished at Bonanza Ledge Mine. Filtered tailings technology has been chosen for the QR Mill, which will reduce the size of the tailings footprint versus conventional slurry placement methods. The preferred option is to store new filtered tailings in the existing QR TSF over the existing tailings and waste rock, forming a mound. Contact water at the QR Mill will be collected in existing water management infrastructure. Surface runoff collected in the existing QR TSF pond would be managed by pumping to another pond, such as the MZP. A liner would not be required to collect and manage seepage from the FSTSF, which would combine with that of the existing tailings and be collected in the seepage collection ponds located at the toes of the QR TSF dams. Water will be treated prior to discharge. A description of QR Mill water management facilities is provided in Section 7.5.3.4.

At both sites, non-contact water will be diverted around the Project area. Sediment and erosion control measures will be implemented, as required, to divert stormwater away from exposed soils. Specific management plans will be developed that outline strategies and operational guidelines for Project activities that have the potential to generate emissions, discharges and wastes.

8.5 Solid, Hazardous, and Sanitary Wastes

Potential solid, hazardous, and sanitary wastes that may be generated by the Project include:

- Debris from the removal of any site surfacing;
- Rock material from excavation activities to reach the ore body;
- Existing abandoned infrastructure removal associated with historic mining activities at the Mine Site;
- Contaminated in-situ soils from the historic operations at the Mine Site;
- Waste such as construction trash, food trash, and other wastes;
- Hazardous waste such as unserviceable batteries, used motor and hydraulic oils, contaminated filters, used chemical cleaning fluids, paints, and other waste items considered as hazardous by regulatory authorities; and
- Solid and sanitary wastes from worker accommodations (Mine and QR Mill camps), facilities at the Mine Site, and the QR Mill.

Wastes will be collected on-site, segregated, secured, contained in a designated area, and disposed of at a suitably licensed facility. A Construction Environmental Management Plan will be developed that presents procedures to reduce, segregate, safely store, and recycle or dispose of solid wastes. During operations of the Mine Site and QR Mill, solid, hazardous and sanitary wastes will be appropriately disposed of according to BMPs and applicable regulations. An Operational Waste Management Plan will be developed for the Project that presents protocols to reduce, segregate, safely store, and dispose of solid, sanitary, and hazardous wastes. Sanitary wastes from on-site worker amenities will be disposed of at permitted on-site facilities or suitably licensed offsite facilities.

8.6 Light Emissions

Construction activities will primarily be undertaken during daylight hours. The Mine Site will be in operation 24-hours per day. Light emissions at the Mine Site during nighttime construction and operational activities will be from mobile and fixed on-site lighting established for health and safety purposes, along with vehicular traffic. Light emissions at the QR Mill will also be from mobile and fixed on-site lighting. Light emissions will be controlled appropriately using various methods that may include directional lighting, the height of lighting, and low lumen fixtures.

8.7 Decommissioning and Reclamation

It is expected that emissions associated with the progressive decommissioning activities will relate to air emissions from combustion engines, noise emissions from machinery to be used as portions of the Mine Site are closed and reclaimed following extraction of the ore, sources of liquid discharge, and wastes generated. The control measures identified are expected to be the same as those outlined in previous sections.

9.0 INDIGENOUS NATION INTERESTS

In addition to identifying the Project updates and changes that have been considered in ensuring Indigenous interests are addressed, this section summarizes BGMs consultation and engagement principles and objectives, Indigenous nations potentially affected, key interests and concerns, and consideration of Indigenous interests in Project design.

9.1 Project Updates and Changes

The following key updates and changes have occurred since the submission of the IPD:

- Lhtako Dené Nation, Soda Creek Indian Band and Williams Lake First Nation have advised the BC EAO that they will be Participating Indigenous Nations in the BC EAA process;
- In March 2020, the BC EAO advised that BGM does not need to engage further with Neskonlith Indian Band based on their communicated interests in the Project area; and
- On October 2, 2020, BGM signed a life-of-project Agreement with Lhtako Dené Nation ("Project Agreement"), which establishes a framework for BGM and Lhtako Dené Nation to work together during all stages of the Project, including the terms under which the Project will be developed and operated with the consent and support of the Lhtako Dené Nation.

BGM will continue to share Project information and engage with Nazko First Nation and Tsilhqot'in National Government in relation to the Project.

9.2 BGM's Consultation and Engagement Principles and Objectives

BGM strives to engage with Indigenous nations and other Interested Parties in a respectful and appropriate manner. The engagement activities for the Project are framed by the following principles:

- **Shared Process** – BGM's engagement program is developed based on a shared process that seeks and considers input from potentially affected parties.
- **Respect** – BGM is committed to working to establish positive, productive, and lasting relationships based on mutual respect and understanding and supported by appropriate engagement opportunities. Specifically related to Indigenous nations, BGM recognizes their unique cultural, legal and historical identity and will work with each Indigenous nation to engage with their communities in a respectful and appropriate manner.
- **Timeliness** – BGM is committed to undertaking early engagement and to providing the timely and accurate exchange of information about the Project and about opportunities to participate in consultation activities.
- **Relationships** – BGM seeks to establish and maintain long-term relationships with those with an interest in the proposed Project. These relationships will evolve through ongoing engagement.
- **Inclusiveness** – BGM strives to be inclusive in its engagement activities and will pro-actively work to identify those potentially affected by the Project in a manner consistent with the principles of Gender-Based Analysis Plus (GBA+). BGM will work with Indigenous nations and Interested Parties to identify means through which they feel comfortable being engaged and having their input reflected.
- **Responsiveness** – BGM strives to be open and transparent in its operations. BGM will consider and respond to input and demonstrate how input has been considered in Project designs, including management and mitigation plans.

- **Open communication** – BGM openly listens to feedback and works with Indigenous nations and Interested Parties to address Project-related concerns. Input received is transparently reported.

Building on the engagement principles identified above, BGM's objectives specific to Indigenous nation engagement are to:

- Identify Indigenous nations who may be impacted by the Project and, through ongoing engagement, determine how they wish to be consulted;
- Provide timely and reasonable levels of capacity resources, in addition to potential BC EAO funding, in order to assist potentially impacted Indigenous nations to participate in Project consultation;
- Provide timely and relevant Project information and seek feedback from Indigenous nations on Project-related impacts, interests and concerns;
- Understand Indigenous nations governance and community interests and priorities;
- Determine what practices, traditions or customs have been or are currently being engaged in by Indigenous nations near the proposed Project and determine how these practices, traditions or customs may potentially be impacted by the Project;
- Collaboratively explore appropriate measures to avoid, mitigate or otherwise address potential Project impacts on rights recognized and affirmed by section 35 of the *Constitution Act*, 1982;
- Ensure that issues raised by Indigenous nations related to the proposed Project are considered in the development and implementation of the Project and that such issues are addressed to the extent that they are not resolved or otherwise accommodated, as appropriate; and
- Develop positive, long-term relationships with Indigenous nations.

BGM engaged, and will continue to engage, with each Indigenous nation based on the preference of each Indigenous nation, as directed by Chief and Council or the nation's authorized representative. The scope and extent of engagement with each of the Indigenous nations varied based on the response BGM received from the nations. It is anticipated that this will continue as the Project advances.

9.3 Potentially Affected Indigenous Nations

As stated in Section 1.5, based on a review of potential interests in the Project area, the Consultative Areas Database, and guidance from the BC EAO and the Impact Assessment Agency of Canada, the Project was determined to be within, or in proximity to, the established or asserted traditional territories of the following Indigenous nations:

- Lhtako Dené Nation
- Soda Creek Indian Band
- Tsilhqot'in National Government
- Williams Lake First Nation
- Nazko First Nation

BGM also engaged with Neskonlith Indian Band; however, in March 2020, the BC EAO advised that BGM does not need to engage further with Neskonlith Indian Band based on their communicated interests in the Project area.

An overview of each of the five Indigenous nations currently included in Project activities is provided below. BGM is engaging with these Indigenous nations to understand their Indigenous interests in the Project and the areas influenced by the Project and to determine how the Project aligns with Indigenous nation's laws, customs and policies.

- Lhtako Dené Nation has four reserves located near Quesnel and the Lhtako Dené Nation community at Quesnel 1, just south of Quesnel, is the closest Indigenous nation community to the Mine Site near Wells. As of September 2020, Lhtako Dené Nation has 184 registered members, with 85 living on Lhtako Dené Nation reserves (INAC, 2020a).
- Soda Creek Indian Band has two reserves near Williams Lake, BC, located just over one-hour driving time from the QR Mill. As of September 2020, Soda Creek Indian Band had 442 registered members, of whom 137 live on Soda Creek Indian Band reserves (INAC, 2020b).
- Williams Lake First Nation has nine reserves located near Williams Lake, BC. As of September 2020, Williams Lake First Nation had 848 registered members with 234 members living on reserves (INAC, 2020c).
- The Tsilhqot'in National Government represents six-member communities (TNG, 2018), including?Esdilagh, which had 258 registered members as of September 2020, with 53 members living on ?Esdilagh reserves located between Williams Lake and Quesnel (INAC, 2020e).
- Nazko First Nation has 22 reserves located near Quesnel and Prince George, BC. As of September 2020, Nazko First Nation has 408 registered members, 114 of whom live on Nazko reserves (INAC, 2020f).

BGM is not aware of any understandings regarding governance responsibilities among multiple Indigenous nations or between the Indigenous nations and the Province in relation to the proposed Project area.

9.4 Indigenous Interests

BGM respects the rights, cultures and interests of Indigenous nations ("Indigenous interests") and is committed to meaningful consultation and engagement with Indigenous nations and their involvement in informing the development of regulatory applications related to the Project. BGM understands that identifying and recommending measures to address potential adverse impacts of the Project on Indigenous nations and their interests will be an essential element of the EAC Application and the fulfillment of the Crown's duty to consult.

A review of available information, including traditional use information provided relative to the Project as well as documentation submitted to the Crown for other EAs, indicates that Indigenous nations identified in Section 9.3 may have Indigenous interests proximity to the Project that may be associated with:

- Aboriginal title to the lands, waters, and resources within their territories, including economic interests in those lands, waters, and resources;
- Aboriginal rights related to the use of terrestrial, freshwater, heritage, visual, and other resources within these territories, which may include harvesting activities, such as fishing, hunting, trapping and gathering, and other traditional and cultural activities (e.g., travel routes, cultural expression, and spiritual practices); and
- Current and potential future use of the land.

Based on this information, discussions with Indigenous nations and information provided in Sections 11.4 and 14.4, BGM understands that the Project may affect Indigenous interests linked to past, present, and desired future use of lands and resources. Through consultation and engagement, BGM is seeking to confirm and expand upon the current understanding of the following:

- Past, current, and desired future use in the Project area;
- TK with respect to lands and resources in the vicinity of the Project;
- The potential for adverse or beneficial Project effects on Indigenous interests; and
- The appropriate measures to avoid or mitigate identified adverse effects.

BGM is working to understand whether, and to what extent, the Indigenous interests of the nations identified in Section 9.3 may be affected by the Project and how measures may be incorporated into the Project to avoid, mitigate or otherwise address potential effects. In discussions with Indigenous nations, BGM has inquired regarding information that the Indigenous nation may have regarding its interests (e.g., Indigenous stewardship plans, reports on Indigenous history or culture, territorial plans or other Indigenous initiatives) that could provide information on, or supplement available information, regarding interests relative to the Project and that should be considered in the EA. Discussions are ongoing and, as new information is made available, it will be considered by BGM.

Interests, potential interactions with the Project and potential mitigation and enhancement measures are discussed in more detail in Sections 9.6 and 9.7.

9.5 Engagement and Consultation Activities

BGM initiated discussions with Indigenous nations in 2016. Engagement and consultation are ongoing and will continue to inform project planning and design as well as mitigation pertaining to impacts on identified VCs. Details pertaining to engagement and consultation activities with Indigenous nations are discussed in Section 2.1.

9.6 Key Interests and Concerns

A summary of the key interests and concerns raised by each Indigenous nation for the period from 2016 to the beginning of the Early Engagement Phase, May 2020, as well as BGMs responses, are provided in this section. It is recognized that the information in this section is a summary and is not intended to be exhaustive or a comprehensive representation of all the interests of the Indigenous nations. Input specific to the Early Engagement Phase is provided in Section 2.1.

9.6.1 Interests and Concerns Identified Prior to Early Engagement

9.6.1.1 Lhtako Dené Nation

Key areas of interest and concern identified by Lhtako Dené Nation during engagement from 2016 to mid-May 2020, and BGM's response are identified in Table 33.

Table 33: Lhtako Dené Nation: Key Areas of Interest and Concern to May 2020 and BGM Responses

Topic	BGM Response
Employment and Training Opportunities	
■ Types of jobs available. ■ Support for education and training, on the job training. ■ Indigenous hiring practices.	■ BGM will provide employment and training opportunities for qualified Lhtako members. ■ BGM has and will continue to arrange meetings with contractors to discuss opportunities. ■ BGM's intention is to hire as many individuals as are qualified and/or provide training opportunities to interested individuals.
Business Opportunities	
■ Opportunities for Indigenous-owned businesses. ■ Contracting/joint-venture opportunities.	■ BGM will provide opportunities for qualified Lhtako Dené Nation businesses. ■ BGM and Lhtako Dené Nation have identified joint venture opportunities.
Community Initiatives	
■ Support for community-based projects, initiatives, and events.	■ BGM support community identified projects, initiatives and events activities and will continue to work with Lhtako Dené Nation representatives to identify opportunities.
Project-related Agreements	
■ Engagement protocols and agreements. ■ Benefit Agreements/Capacity Funding.	■ The Project Agreement signed by BGM and Lhtako on October 2, 2020 builds upon our initial Engagement Protocol (2016) and subsequent Relationship Agreement (2016). BGM is committed to engaging with Lhtako Dené Nation in accordance with the Project Agreement, including with respect to the provision of capacity funding.
Traditional Use and Knowledge	
■ Must be considered in Project studies. ■ Existing TLUOS was not sufficient to support the EA. ■ Linkages between environmental effects and use must be considered.	■ BGM recognizes that the Project-specific TLUOS funded by BGM in 2019 was completed prior to finalizing routing options for the Northern Transmission Line. BGM is committed to addressing any informational gaps which may exist in accordance with the process set out in the Project Agreement and by continuing to facilitate the participation of the Lhatko Dené Nation in baseline studies related to the Northern Transmission Line. Information provided by Lhatko Dené Nation is being considered in Project studies related to the Transmission Line and will be discussed with Lhtako Dené Nation to ensure that it is reflected accurately. ■ Linkages between environmental effects of the Project and Lhatko Dené Nation use will be considered. ■ Linkages will be considered.

Topic	BGM Response
Current Use	
■ Concern regarding the focus on current use – potential future use must be considered. ■ Concern raised regarding dust near current berry harvesting areas. ■ Will BGM road use restrict use by the nation?	■ BGM has and will continue to discuss interests with Lhtako Dené Nation to enable them to be reflected in the EAC Application. ■ Potential effects from dust will be discussed in the EAC Application. ■ The ability to use the roads will not change.
Project Study and Review	
■ Discuss study methodologies prior to assessments being completed. ■ Ensure baseline scope and data collection is sufficient to support effects assessment. ■ Involvement in VC identification. ■ Involvement in developing mitigation/management strategies. ■ Provide a variety of participation options – meetings, site tours, one-on-ones.	■ BGM has and will continue to meet regularly with Lhtako Dené Nation to discuss the Project. ■ BGM is funding third party consultants to support Lhtako Dené Nation review and participation in the EA process. ■ Lhtako Dené Nation members have participated in baseline program field studies. ■ A Community Meeting was held to discuss the Project and Project studies. ■ A VC workshop was held along with a site visit with Lhtako Dené Nation elders to inform VC selection and studies undertaken; additional discussions regarding VCs will be undertaken with Lhtako Dené Nation. ■ Baseline scope, data collection, findings and effects assessment methodology, including mitigation/management will be discussed with Lhtako Dené Nation. ■ A variety of engagement options are being used.
Cumulative Effects	
■ Cumulative effects study areas should be VC focused.	■ VC focused study areas will be developed.
Project Description	
■ Ensure sufficient detail is available to enable a complete Project assessment.	■ BGM is working to advance Project design and believes that the Project is EA ready.
Water treatment and management through Project life	
■ Concern regarding water treatment at Mine Site and QR Mill. ■ Concern regarding post-closure water management.	■ BGM has developed water treatment methods that would be implemented at each site during operations and following closure.
Caribou	
■ Caribou recovery in the area.	■ BGM has developed a Caribou Mitigation and Management Plan for current operations and will update the plan to include the Project.
Minimizing new disturbance	
■ Concern regarding opening a new corridor for the transmission line. ■ Concern regarding new disturbance for the Project overall.	■ BGM's preferred transmission line route is a route north of the Highway 26 route. This route will follow existing disturbance to the extent possible. ■ Most project facilities will be located on previously disturbed sites.

9.6.1.2 Soda Creek Indian Band

Key areas of interest and concern identified by Soda Creek Indian Band during engagement to mid-May 2020 and BGM's response are identified in Table 34.

Table 34: Soda Creek Indian Band: Key Areas of Interest and Concern and BGM Responses

Topic	BGM Response
Employment and Training Opportunities	
■ Types of jobs available; noted that some members have mining experience with other mines in the area. ■ Support for education and training, on the job training. ■ Indigenous hiring practices. ■ Soda Creek Indian Band involvement in the characterization of employment and economic baseline.	■ BGM's intention is to hire as many individuals as are qualified and/or provide training opportunities to interested individuals. ■ BGM will work with Soda Creek Indian Band to characterize the nation's employment and economic baselines.
Business Opportunities	
■ Opportunities for Indigenous-owned businesses to be suppliers need to be defined. ■ Contracting/joint venture opportunities.	■ BGM will work with the Xat'sull Development Corporation to facilitate involvement in the Project, including through contracting and joint venture opportunities.
Traffic	
■ Traffic travelling past the Soda Creek Indian Band community. ■ Details of traffic movements, vehicle types, changes to traffic patterns, etc.	■ Project related traffic travelling past the community is expected to be minimal. ■ Available information regarding traffic patterns has been provided and additional information will be shared as it becomes available.
Project-related Agreements	
■ Engagement protocols and agreements. ■ Impact Benefit Agreements/Capacity Funding.	■ BGM has entered into agreements to fund Soda Creek Indian Band's participation in the EA process, including third-party review of the Initial Project Description, Detailed Project Description and EA materials. ■ BGM is open to discussing further Project-related agreements with Soda Creek Indian Band.
Traditional Land Use and Knowledge	
■ Must be considered in Project studies. ■ How will indicators and thresholds for Indigenous traditional use and sensate measures be incorporated in the assessment?	■ Information provided by Soda Creek Indian Band is being considered in Project studies, including information regarding traditional use and sensate measures. ■ Use of such information in the EA will be discussed with Soda Creek Indian Band to ensure that it is reflected accurately. ■ BGM has entered into an agreement to fund Soda Creek's participation in the EA process, including third-party review of the Initial Project Description, Detailed Project Description and EA materials, in order to facilitate the incorporation of information regarding traditional knowledge and use into Project planning.

Topic	BGM Response
Regulatory Review	
■ BGM should meet the requirements of applicable EA processes.	■ BGM has been working with Soda Creek Indian Band to identify engagement opportunities in accordance with the 2018 EAA.
Involvement in Alternatives Assessments	
■ Soda Creek Indian Band must be involved in alternatives assessment.	■ BGM plans to engage Soda Creek Indian Band regarding Project components as we advance Project design.
Project Study and Review	
■ Soda Creek Indian Band members must be involved in field studies. ■ Discussion of study methodologies before assessments are completed. ■ Ensuring environmental and socio-economic baseline scope is sufficient to support effects assessment. ■ Involvement in developing mitigation/management strategies. ■ Studies must recognize that the interests of Indigenous and non-Indigenous people may differ. ■ Positive and negative effects must be considered.	■ Soda Creek Indian Band members were invited to participate in a variety of studies during 2017, 2018 and 2019 field seasons. ■ BGM has and will continue to meet regularly with Soda Creek Indian Band to discuss the Project and studies. ■ Baseline findings and assessment methodology, including involvement in the identification of mitigation and management strategies, will be discussed with Soda Creek Indian Band. ■ BGM recognizes that potential interests may differ between Indigenous and non-Indigenous people. ■ The assessment will consider positive and negative effects.
Valued Components	
■ Soda Creek Indian Band must be involved in VC identification.	■ BGM has discussed VCs with Soda Creek Indian Band staff and Chief and Council. Additional community meetings are being planned. ■ Discussions to date and feedback on the Project Description have informed potential VCs.
Cumulative Effects	
■ Existing condition does not represent pre-mine condition. ■ Scoping of cumulative effects assessment.	■ Cumulative effects methodology will be discussed with Soda Creek Indian Band before the assessment is complete.
Indigenous Specific Assessment	
■ Indigenous data should be presented separately, and separate assessments should be completed for each nation.	■ BGM will present Indigenous data separately where available and will discuss potential effects on each Indigenous nation included in the assessment separately.
Project Description and Definition	
■ Ensure sufficient detail on the Project and environment is available to enable a complete assessment.	■ BGM is working to advance Project design and believes that the Project is EA ready.
Water Quality and Quantity Monitoring	
■ Monitoring systems must be in place.	■ A water quantity and quality monitoring program will be developed as part of Project EA and permitting.

Topic	BGM Response
Caribou	
■ All critical habitat for southern mountain caribou should be considered.	■ Information presented about caribou in the EAC Application will be confirmed as planning advances and, if the Project is approved, as part of BGM's updated Caribou Mitigation and Management Plan.
Climate Change	
■ How will climate change be incorporated?	■ Climate change will be considered in the EAC Application.
Health Assessment	
■ Community wellbeing and food security as well as other Indigenous considerations, must be included.	■ BGM will discuss the health assessment with Soda Creek Indian Band.
Minimizing new disturbance	
■ Concern regarding new disturbance for the Project overall.	■ Most project facilities will be located on long-standing, brownfield sites owned or optioned by BGM or lands previously used for industrial purposes.

9.6.1.3 Williams Lake First Nation

Key areas of interest and concern identified by Williams Lake First Nation during engagement to mid-May 2020 and BGM's response are identified in Table 35.

Table 35: Williams Lake First Nation: Key Areas of Interest and Concern and BGM Responses

Issue	Response
Traditional Knowledge and Use	
■ Must be considered in Project studies. ■ How will indicators and thresholds for Indigenous traditional use and sensate measures be incorporated in the assessment?	■ Information provided by Williams Lake First Nation (including in respect of traditional use and sensate measures) will be considered in Project studies and will be discussed with Williams Lake First Nation to ensure that it is reflected accurately in the EA. ■ BGM has entered into an agreement to fund William Lake First Nation's participation in the EA process, including third-party review of the Initial Project Description, Detailed Project Description and EA materials, in order to facilitate the incorporation of information regarding traditional knowledge and use into Project planning.
Employment and Training Opportunities	
■ Williams Lake First Nation expressed interest in employment and training opportunities	■ BGM's intention is to hire as many individuals as are qualified and/or provide training opportunities to interested individuals. ■ BGM will work with Williams Lake First Nation to characterize the nation's employment baselines.

Issue	Response
Business Opportunities	
■ Williams Lake First Nation expressed interest in business opportunities with existing operations and the Project.	■ BGM has offered contracting opportunities to Williams Lake First Nation and will continue to do so. ■ BGM will continue discussions to understand the scope of services available through Williams Lake First Nation and associated companies.

9.6.1.4 Tsilhqot'in National Government

BGM did not receive any responses or input from the Tsilhqot'in National Government on the Project Description or the Engagement Plan.

9.6.1.5 Nazko First Nation

BGM did not receive any responses or input from Nazko First Nation on the Project Description, the Engagement Plan, or otherwise.

9.6.2 Interests and Concerns Identified during Early Engagement

Interests and concerns identified by the Lhtako Dené Nation, Soda Creek Indian Band and the Williams Lake First Nation as provided in the Summary of Engagement and BGMs responses are discussed in Section 2.3.

9.6.2.1 Tsilhqot'in National Government

BGM met with Tsilhqot'in National Government on October 22, 2020. BGM presented an overview of the project which included information on project components and employment opportunities. Tsilhqot'in National Government asked general questions regarding current studies, wildlife, water treatment, current economic partnerships, and training.

9.6.2.2 Nazko First Nation

BGM did not receive any responses or input from Nazko First Nation during Early Engagement.

9.7 Consideration of Indigenous Interests in Project Design

This section discusses the potential for the Project to interact with Indigenous interests and how BGM has worked to develop the Project components to avoid or mitigate effects on Indigenous interests. Additional information pertaining to the role of engagement in Project definition and planning can be found in Section 2.4.

BGM acknowledges that the interests identified to date have been identified by Indigenous nations based on information available at the time the comments were made. BGM will continue to work with Indigenous nations through the regulatory review process, and as more detailed Project information becomes available, to further mitigate potential interactions where possible.

The Project has the potential to interact with a number of Indigenous interests, including:

- Water quality;
- Plants and berries and their gathering/harvesting areas;
- Medicinal plants and their gathering/harvesting areas;

- Wildlife and wildlife habitat, particularly caribou and moose;
- Fish and aquatic habitat;
- Fishing, hunting and trapping sites;
- Non-consumptive materials gathering areas;
- Habitation sites;
- Archaeological sites; and
- Ceremonial sites.

BGM has worked with Indigenous nations from early in the Project planning process to ensure that their input was considered in Project design in the IPD. Design has been refined during early engagement to reflect input received from Indigenous nations.

The following actions were taken to minimize potential effects and interactions in general:

- Mitigation through Project design (avoid potential effects),
- Approach to water management (reuse, treatment),
- Use of previously disturbed sites,
- Minimizing size of the footprint,
- Reclamation of existing disturbance,
- Planning for closure before development,
- Participation by Indigenous nations members in baseline studies, and
- Discussion of interests and potential interactions as Project planning advanced.

As Project planning employed the mitigation measures identified above, many updates to Project components occurred prior to the submission of the IPD. Input during the Early Engagement Phase helped further refine components and activities as summarized in Table 36.

Table 36: Project Refinements due to Indigenous Nations Input during Early Engagement Phase

Project Component	Project Refinements
Mine Site	■ Development of Island Mountain Portal conceptual landscaping to reduce the effects associated with noise, dust and light. ■ Establishment of a water treatment facility at the Mine Site that will combine with the existing treatment facility at Bonanza Ledge Mine.
Bonanza Ledge WRSF	■ Water from the Bonanza Ledge Mine will be moved via pipeline to the Mine Site for treatment.
Transmission Line	■ Having transmission line available during the construction phase to reduce use of diesel generators.
Transportation Route	■ Additional studies along the 500 Nyland Road in order to address concerns regarding dust and harvesting areas.
QR Mill Site	■ Use of existing TSF as the site for the filtered stack tailings. ■ Establishment of a water treatment system at QR Mill that will build off of the existing system.

10.0 BIOPHYSICAL ENVIRONMENT

Baseline studies were initiated for the Project area in 2016 and will continue through 2021 (Table 37). Historical studies within the Project area were also referenced for baseline information. Photographs of the Project area are presented in Appendix F.

Baseline studies include air quality and climate, noise, light, hydrology, water quality and aquatic health, hydrogeology, fish and fish habitat, soils, terrain and terrain stability, geochemistry, vegetation, wildlife and wildlife habitat, contaminated sites, socio-community, land and resource use, use of lands and resources for traditional purposes, visual quality, economy, heritage, and human health and ecological risk assessment (HHERA). Detailed survey methodology and results will be provided in the EAC Application and supporting technical documents.

A summary of the historical information review and baseline studies are provided in the sections below. As part of the EAC application, technical data reports describing the methodology, study area and results of the baseline studies will be provided. Where available, the technical data reports will include TK, traditional use information and other information reflecting the social, economic, environmental, heritage and health values of Indigenous nations as provided by Indigenous nations.

Table 37: Project Baseline Studies

Discipline	2016	2017	2018	2019	2020
Air Quality and Climate	■ Regional Air Quality data ■ Discrete sampling for PM10 and metals near Mine Site ■ Dustfall monitoring at Bonanza Ledge Mine ■ Barkerville Mountain Met Station	■ Regional Air Quality Data ■ Discrete sampling for PM10 and metals at Wells and Barkerville ■ Dustfall monitoring at Bonanza Ledge Mine ■ Barkerville Mountain Met Station	■ Regional Air Quality Data ■ Dustfall monitoring at Bonanza Ledge Mine and QR Mill ■ Barkerville Mountain Met Station ■ QR Mill Met Station	■ Dustfall monitoring at Bonanza Ledge Mine and QR Mill ■ Barkerville Mountain Met Station ■ QR Mill Met Station	n/a
Noise	n/a	n/a	■ Noise measurements and audible sound at receptor locations	■ Noise measurements and audible sound at receptor locations	n/a
Light	n/a	n/a	■ Light trespass and sky glow measurements at receptor locations	n/a	n/a
Hydrology	■ Streamflow and water depth monitoring in watersheds at and near the Mine Site	■ Streamflow and water depth monitoring in watersheds at and near the Mine Site	■ Streamflow and water depth monitoring in watersheds at and near the Mine Site ■ Streamflow and water depth monitoring in watersheds at and near QR Mill	■ Streamflow and water depth monitoring in watersheds at and near QR Mill	n/a
Water Quality	■ Water quality and sediment quality sampling near Mine Site ■ Water Quality sampling at and near QR Mill	■ Water quality and sediment quality sampling near Mine Site ■ Water Quality sampling at and near QR Mill	■ Water quality and sediment quality sampling near Mine Site ■ Water Quality sampling at and near QR Mill	■ Water Quality sampling at and near QR Mill	n/a
Aquatic Health	■ Aquatic sampling at and near Mine Site	■ NA	■ Aquatic sampling at and near Mine Site	■ Aquatic sampling at and near QR Mill	n/a

Discipline	2016	2017	2018	2019	2020
Hydrogeology	■ Field investigations and well installations	■ Groundwater well monitoring	■ Groundwater well monitoring	■ Groundwater well monitoring	■ Groundwater well monitoring
Fish and Fish Habitat	■ Spawning survey, presence/absence survey, fish habitat surveys, and fish community at Mine Site	n/a	■ Spawning survey, fish habitat surveys, and fish community and end of fish use surveys at Mine Site	■ Presence/absence survey, fish habitat surveys, fish community and end of fish use surveys at QR Mill	■ Presence/absence survey and fish habitat survey along the Northern Transmission Line Route
Soils and Terrain	■ Bioterrain, surficial geology and soil field surveys at the Mine Site	n/a	■ Bioterrain, surficial geology and soil field surveys at the Mine Site and QR Mill	■ Bioterrain, surficial geology and soil field surveys at the Mine Site and QR Mill	■ Bioterrain, surficial geology and soil field surveys at the Northern Transmission Line Route
Geochemistry	n/a	■ Waste rock and ore sample collection for ARD/ML characteristics	■ Waste rock and ore sample collection for acid rock drainage/metal leaching (ARD/ML) characteristics	■ Waste rock and ore sample collection for ARD/ML characteristics	n/a
Vegetation	■ Terrain Ecosystem Mapping (TEM) at the Mine Site ■ Species at risk and invasive plants surveys at the Mine Site and QR Mill	n/a	■ TEM at the Mine Site. ■ Species at risk and invasive plants surveys at the Mine Site and QR Mill	n/a	■ TEM, species at risk and invasive plant surveys along the Northern Transmission Line

Discipline	2016	2017	2018	2019	2020
Wildlife and Wildlife Habitat	■ Amphibian surveys at the Mine Site ■ Breeding bird surveys at the Mine Site ■ Winter track surveys at the Mine Site ■ Bat summer foraging and winter hibernacula acoustic monitoring at Mine Site ■ Wildlife cameras at Mine Site	■ Winter track surveys at the Mine Site ■ Bat summer foraging and winter hibernacula acoustic monitoring at Mine Site and QR Mill (winter hibernacula)	■ Winter track surveys at the Mine Site ■ Bat winter hibernacula acoustic monitoring at Mine Site	■ Amphibian surveys at the QR Mill ■ Breeding bird surveys at the QR Mill ■ Northern Goshawk surveys ■ Summer hibernacula along Highway 26 ■ Wildlife cameras along Highway 26	■ Amphibian surveys along the Northern Transmission Line Route ■ Breeding bird surveys along the Northern Transmission Line Route ■ Winter track surveys at the Northern Transmission Line (continues to 2021) ■ Wildlife cameras along Northern Transmission Line (continues to 2021)
Contaminated Sites	■ Mine Site Phase I Environmental Site Assessment (ESA) ■ Mine Site Phase II ESA	n/a	n/a	■ QR Mill Phase I ESA ■ QR Mill Phase II ESA ■ Highway 26 Phase I ESA	■ Northern Transmission Line Phase I ESA
Visual	■ n/a	n/a	■ Photographic field survey from viewpoints	■ Photographic field survey from viewpoints	n/a
Heritage	■ Heritage Resources Overview Assessment for the Mine Site	■ Heritage Resources Impact Assessment at the Mine Site	n/a	■ Heritage Resource Impact Assessment for the QR Mill, Mine Site Workers Accommodation and Highway 26	■ Preliminary Field Reconnaissance for the Northern Transmission Line
Human Health and Environmental Risk Assessment	■ Data collection and baseline sampling	n/a	■ Data collection and baseline sampling	■ Data collection and baseline sampling	■ Data collection and baseline sampling

10.1 Project Updates and Changes

Baseline studies in 2020 were completed to address the updates to the Project, including the Northern Transmission Line and Island Mountain Portal, along with footprint changes for the WRSF at Bonanza Ledge Mine.

10.2 Engagement Activities

In September 2019, prior to submission of the IPD, BGM hosted a community workshop in Wells to provide information on Project baseline studies and results. Based on the community feedback, BGM conducted additional Noise monitoring within Wells in October 2019.

BGM presented a high-level summary of baseline studies conducted to date to technical advisors for the Project on September 3, 2020. This also included a brief summary of VC feedback to date.

10.3 Biophysical Environment

10.3.1 Air Quality and Climate

The Project is located within the Central Interior Air Zone. The existing air quality conditions in the Project area are influenced by the various industrial, commercial, residential, and recreational activities that occur in the region. Active logging and mining occur near Wells; these activities are sources of particulate emissions ($PM_{2.5}$, PM_{10}) from material and ground handling, and combustion emissions from mobile sources. In addition, local residential areas such as Wells, New Barkerville, Likely and recreational cabins/campsites may be sources of combustion emissions, including fine particulate matter ($PM_{2.5}$), from wood and pellet stoves, heaters, generators, and recreational vehicles.

Air quality and climate baseline investigations included:

- Reviewing air quality data representative of the conditions in Wells and at the QR Mill (regional air quality) located in BC, consistent with BC Ministry of Environment and Climate Change Strategy (ENV) guidance;
- Collecting and analyzing four discrete particulate matter samples near the Mine Site;
- Measuring existing dustfall (deposition) conditions at Bonanza Ledge Mine and QR Mill to characterize existing regional conditions;
- Collecting and documenting site-specific meteorological data from BGM's continuous weather recording stations at Barkerville Mountain and QR Mill; and
- Summarizing available climate normal data from Barkerville and Quesnel A (located at Quesnel Airport) Environment and Climate Change Canada (ECCC) meteorological stations.

ENV operates several regional air quality monitoring stations across the province, with the closest active ENV station to the Project being at Correlieu Senior Secondary (in Quesnel), located approximately 65 km west – southwest of Wells. The Kelowna College air quality monitoring station, located 385 km south south-east of Wells, was also used to establish representative regional air quality concentrations

The air quality monitoring stations would be influenced by urban emission sources, including vehicle and heating emissions, along with road dust and regional forest fires in the summer.

The Cariboo region experiences a dry continental climate due to the coastal mountains influencing the westerly flow of winds and moisture coming from the Pacific Ocean. Meteorological data is relevant to the air quality discipline since meteorology affects how the air emissions are transported, dispersed, and deposited.

The climate at the site is characterized by relatively cold winters and mild summers with average December temperatures at around -7.8 degrees Celsius (°C) and average July temperatures at around 12.3°C (ECCC, 2010). The annual precipitation amount is moderate at 1,022 mm and no distinct dry or wet season. Average monthly precipitation varies between a low of 60 mm in February and a high of 110 mm in November. Relatively long periods of sub-zero temperatures, which last on average from October to April, lead to large snow accumulation with snowmelt generally taking place in May.

Potential sensitive receptors with respect to air quality include Wells, residences at New Barkerville, and recreational cabins and campgrounds. The Project completed the following monitoring to establish existing local and regional baseline conditions (Figure 18):

- Dustfall monitoring:
  - The existing Bonanza Ledge Mine is monitored at eight stations in four locations, including two stations adjacent to the Bonanza Ledge Mine (one directly north and one directly south), along with one station near New Barkerville and one station near Wells immediately adjacent to the Valley portal at the Mine Site.
  - QR Mill is monitored quarterly (over a one-month monitoring period per quarter) at three locations within the site, including: above the west portal; main office; and north field.
- Two (24-hour) discrete sampling events for PM_{10} and metals using MiniVols near the Mine Site including (1 September 2016 to 31 August 2017):
  - 2016 - August / September near the Bonanza Ledge Mine office (PM_{10}), and in late August near the historic town of Barkerville cottages (PM_{10} and metals);
  - 2017 – near the historic town of Barkerville cottages and Wells in early April (PM_{10} and metals);
- Installation and data monitoring of the Barkerville Mountain meteorological station to collect weather data (September 2016 to present and is ongoing); and
- Monitoring at the QR Mill meteorological station to collect weather data (July 2018 to present and is ongoing).

For the Mine Site study area, three climate stations were installed in the study area, with the objective of assessing the spatial variability of climate variables in the area:

- Two stations (R1 and R4) were rainfall gauges, using a tipping bucket installation, and were installed close to the top of Cow Mountain and Island Mountain, respectively.
- One station monitored a wider range of variables, including total precipitation, air temperature, relative humidity, and solar radiation, and was installed close to the top of Barkerville Mountain.

The collected data from these three stations were compared with records from ECCC's Barkerville station, which is located in the town of Barkerville. Also, a snowpack survey was undertaken between March 27 and 29, 2017. Snow depth and snowpack water equivalent were measured at 13 locations throughout the study area. The objective of the survey was to assess the potential spatial variability in snowpack properties across the study

area. The values were compared with records at the BC Barkerville Automated Snow Weather Station. A climate station was installed at the QR Mill in February 2018; however, the station was found to be out of level and corrected in July 2018. Only data measured after this date were analyzed. The station monitored a wide range of variables, including total precipitation, air temperature, relative humidity, and solar radiation. The data collected from this climate station were compared with records from ECCC regional stations, where applicable. No snow survey data were available for the QR Mill.

10.3.1.1 Baseline Studies Recently Completed and Proposed / Planned

The air quality baseline will be revised to include the 2019 calendar year regional data up to December 31, 2019, and federal and provincial air quality criteria will be updated to reflect any changes. Particulate and metal deposition data measured by the Bonanza Ledge Mine and QR Mill dustfall programs will be updated to include December 31, 2019.

Meteorological data summarized in the 2019 air quality baseline report includes Barkerville Mountain station data from September 1, 2016 to August 31, 2017 and the QR Mill station data from July 20, 2018 to July 19, 2019 and background meteorological conditions will be updated to include data up to December 31, 2019.

- Additional baseline studies in support of the Northern Transmission Line Route include:
  - Review suitability of regional climate stations along the transmission line right-of-way and identify additional regional stations (if any) that should be considered; and
  - Evaluate climate data from additional regional stations and update climate parameters as required.

10.3.2 Noise

Ambient noise near the Project is influenced by existing mining and forestry operations, highway traffic, recreational vehicle use (i.e., all-terrain vehicles, snowmobiles), periodic road maintenance, and tourism-related activities, including campgrounds and an annual local music festival.

Limited historical quantitative information is available regarding existing noise levels in the Project Area. A baseline monitoring program was performed from 1 October to 5 October 2018 and 15 October to 16 October 2019 to quantify baseline noise levels at eleven noise-sensitive receptors near the Mine Site, along the Transportation Route, and near the QR Mill (Figure 18), including:

- Mine Site – BGM Wells Camp, Wells residence south of Highway 26, BGM Wells office on Sanders Avenue, Barkerville Provincial Park Lowhee Campground, New Barkerville and Barkerville Historic Town.
- Transportation Route – Town of Cottonwood, Residences located north and northeast of Barlow Substation and Nyland Lake Campground.
- BGM QR Mill Camp.

At each monitoring location, a Model 2250 Bruel and Kjaer Type I integrating sound level meter was used to collect noise measurements and to record audible sound for 24 hours. During the noise survey, weather data were collected using Kestrel or 5500 pocket weather meters from Nielsen Kellermen, set up near the noise monitoring sites. Noise from sources not representative of normal conditions at the noise monitoring sites were deemed invalid and filtered out. Data from the weather meters, audio recordings, and site notes were used for the interpretation and filtration of the logged noise data.

No additional noise baseline surveys were completed for the Northern Transmission Line.

10.3.3 Light

Existing light conditions near the Mine Site are influenced by existing mining and forestry operations along with light sources from Wells. There is no historical quantitative information regarding existing light levels for the Mine Site or QR Mill.

Baseline light monitoring was conducted in 2018 to quantify existing conditions at various locations, including Wells, New Barkerville, Barkerville Historic Town and Park, communities along Highway 26, and campgrounds located east of the Mine Site on Highway 26 (Figure 19). Baseline light measurements were undertaken at seven sites during a new moon to determine the baseline conditions for values of light trespass (light output from the Project perimeter on vertical surface receptors) and levels of sky glow (ratio of upward-directed light of total lighting) within the Project area. Measurements using a photometer were carried out to establish existing levels of light trespass. Light measurements at each measurement location were collected on October 2, 2018. The measurements were taken during a period of clear skies, after astronomical twilight and before the moon rise between 8:40 PM and 11:30 PM. A sky quality meter and night-time photographs of the local night sky were used to help establish the existing sky glow levels in the direction of the Project area.

No additional light baseline surveys were completed for the Northern Transmission Line Route.

10.3.4 Hydrology

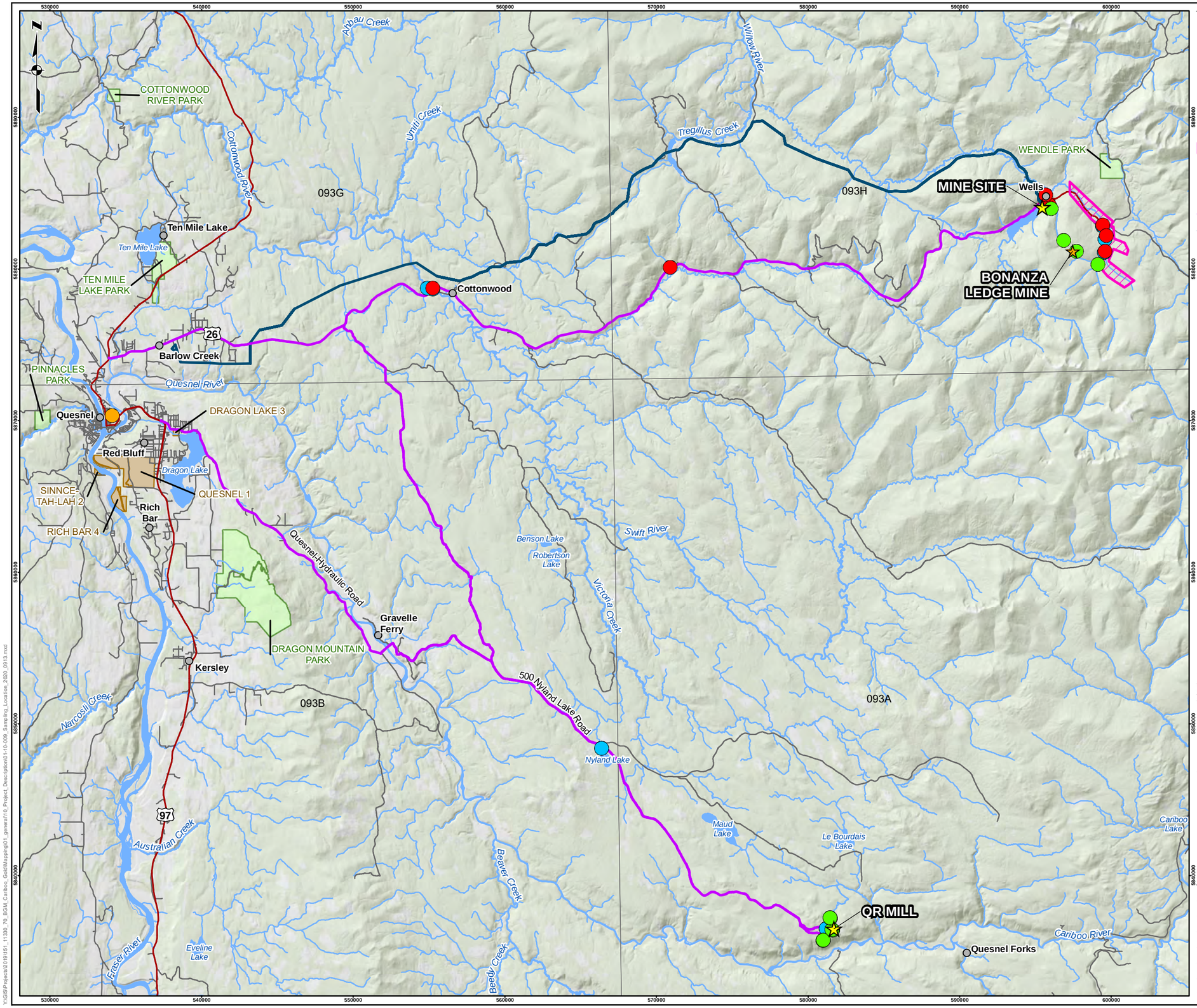
The Mine Site is located in the headwaters of the Willow River watershed, a major tributary to the Fraser River. The Mine Site is bordered by Lowhee Creek to the northeast, the Willow River to the northwest and Jack of Clubs Lake to the southwest. The QR Mill is located in the Quesnel River watershed, and the Quesnel River is downslope of the QR Mill. The Transportation Route and Northern Transmission Line Route are located within the Willow River, Cottonwood River and Quesnel River watersheds.

Regional hydrometric data has been collected at various ECCC flow monitoring stations within both the Mine Site and QR Mill areas. ECCC monitoring historically conducted in the Mine Site area included:

- Three flow monitoring stations on the Willow River;
- One station close to Wells (between 1938 and 1975); and
- Two stations located further downstream with one above Hay Creek operating between 1976 and 2010, and one located much further downstream near the confluence with the Fraser River between 1953 and 1975.

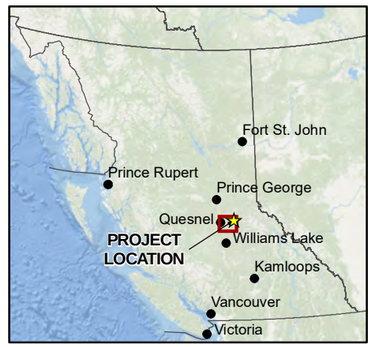
The 30 years (within the interval 1976 to 2011) of complete records at the ECCC Willow River above Hay Creek station were used as the basis for estimating streamflow statistics for the outlet point on the Willow River. A total of 15 other hydrometric stations (most of which are no longer in operation) are in proximity to the Project area, and those still in operation could be used to support estimating regional river flow characteristics.

Historic data in the region has also been collected. Water level measurements (three times weekly) and flow measurements (three to eight measurements depending on the stations) were collected from March 2000 to September 2000 for seven different stations along Lowhee Creek, the Willow River (two stations), Stouts Gulch, Williams Creek, Jack of Clubs Lake, and Slough Creek (IWGM., 2002). Measurements allowed a preliminary assessment of flow characteristics at the station locations, though additional flow measurements would have been required to establish reliable rating curves.



LEGEND

- POPULATED COMMUNITY
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- FIRST NATION RESERVE
- BARKERVILLE HISTORIC TOWN AND PARK
- PROJECT INFRASTRUCTURE LOCATION
- BONANZA LEDGE MINE
- TRANSPORTATION ROUTE
- NORTHERN TRANSMISSION LINE ROUTE
- LIGHT ASSESSMENT MONITORING LOCATIONS
- NOISE ASSESSMENT MONITORING LOCATIONS
- AIR QUALITY MONITORING STATIONS
- DUSTFALL STATIONS



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CARIBOO GOLD PROJECT

AIR QUALITY, NOISE AND LIGHT ASSESSMENT MONITORING / SAMPLING LOCATIONS

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
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Water level measurements (continuous) and flow measurements (5 to 20 measurements depending on the station) were collected from May 2006 to March 2010 for four different stations along Lowhee Creek, the Willow River, Stouts Gulch, and Williams Creek (Knight Piésold Ltd., 2010). Measurements allowed a preliminary assessment of flow characteristics at the station locations, though additional flow measurements would have been required to establish reliable rating curves, especially in consideration of the unstable streambed.

In addition, annual streamflow monitoring reports for existing operations are available for 2011, 2012, 2014, 2015, and 2016 (Triton, 2014; BGM 2015, 2016b, 2017a, 2017b; Lorax Environmental 2012, 2014).

BGM operates seven hydrometric stations located near the Mine Site to collect data for existing operations. Data supplied for the Project are from 2017 to 2018. These stations include:

- Lowhee Creek approximately 1.5 km upstream from the confluence with the Willow River;
- Lowhee Creek approximately 3.9 km upstream of the confluence with the Willow River;
- Emory Gulch approximately 250 m upstream of the confluence with Stouts Gulch;
- Stouts Gulch approximately 250 m upstream from the confluence with Williams Creek;
- Stouts Gulch approximately 1.4 km upstream from the confluence with Williams Creek;
- Williams Creek approximately 8.0 km upstream from the confluence with the Willow River; and
- Willow River approximately 150 m downstream from the outlet of Jack of Clubs Lake.

As part of the baseline studies for the Project, the following hydrometric stations were established from 2016 to 2018 at five additional locations near the Mine Site (Figure 20):

- Black Jack Gulch upstream of Barkerville;
- Mosquito Creek close to the confluence with the Willow River;
- Willow River downstream of the confluence with Mosquito Creek;
- Slough Creek downstream of the confluence with Coulter Creek and Slough Creek; and
- Jack of Clubs Creek upstream of Jack of Clubs Lake.

A hydrometric station was also installed at the Willow River upstream of Stephanie Creek.

Between 2016 and 2019, BGM collected a variety of data from the following seven hydrometric monitoring locations at the QR Mill:

- E2 – North Seepage collection pond at Weir #2 downstream of the QR TSF;
- E12 – West Zone South Lobe Point discharge;
- NP – North Portal Seepage;
- SW1 - Geoff Creek immediately downstream of the northwest boundary of the QR TSF;
- SW2 – Rudy Creek 300 m upstream from Sandy Lake and 2.6 km upstream from the confluence with Maud Creek;

- SW3 – Rudy Creek 120 m downstream of Sandy Lake and 1.8 km upstream from the confluence with Maud Creek; and
- SW5 – Creek #2 downstream West Zone Road.

Continuous streamflow monitoring was installed at four stations in May 2018 (E2, E12, SW2 and SW3). In addition to visiting five of BGM's seven established hydrometric monitoring stations, the following six new locations were visited in May and June of 2019 to collect supporting local hydrometric data from streams flowing directly into the Quesnel River:

- Weir #7 – 60 m downstream of the Freshwater Pond;
- Creek #2 – immediately downstream of the intersection with West Zone Road and 200 m upstream from the confluence with Quesnel River;
- Creek #2.5 – 800 m upstream from the confluence with the Quesnel River;
- Creek #3-1 – Creek #3 at Weir #8 250 m downstream of Weir #7 and 1.3 km upstream of the confluence with Quesnel River;
- Creek #3-2 – Creek #3 at the North Portal 700 m upstream from the confluence with Quesnel River; and
- Creek #3-3 – Creek #3 immediately upstream of unnamed lake and 300 m upstream of the confluence with Quesnel River.

Monitoring (2016-present) has been conducted to further characterize hydrological properties within the Project area with respect to runoff production during normal, wet, and dry climates. Baseline monitoring includes sampling stations that are considered to be outside of the main area outside of the historic mining activities. The general hydrological regime of watercourses within the Project area, in terms of average flows, low summer and winter flows, and high flows, have also been characterized. Snowpack surveying was also conducted in addition to hydrometric monitoring (water level and watercourse flow). Climate variables, which are a key input to the hydrological baseline, have been monitored as part of Air Quality baseline data collection program (refer to Section 10.3.1) and as part of the surface water hydrology baseline data collection program. Regional climate stations, the closest of which is the ECCC Barkerville station (refer to Section 10.3.1), provides records for the Project and baseline climate assessment.

Field collection methods were consistent with standard ECCC (Water Survey of Canada) methods (Environment Canada, 1999) and, where appropriate, with previous monitoring at the site. The monitoring program followed Technical Guidance 6 on *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators* (ENV, 2012b). The results of the monitoring program will contribute to the EAC Application to support verifications corresponding to hydrological regime changes as per provisions of the *Fisheries Act* (Government of Canada, 1985b) and the *Water Sustainability Act* (Government of BC, 2016b). This information will also be used in operational monitoring pursuant to provincial waste discharge permit and federal metal mining effluent regulations requirements to evaluate how mine-related activities may result in changes in the receiving environment.

10.3.4.1 Baseline Studies Recently Completed and Proposed / Planned

Streamflow monitoring is on-going for Project streams, and the hydrological assessment will be updated with additional information ensuring that key locations are addressed.

Additional baseline studies in support of the Northern Transmission Line Route include:

- Identify key stream crossings along the transmission line corridor;
- Review and compile flow data at gauged key stream crossings (if any); and
- Estimate flow characteristics (mean, flood and low flows) at key stream crossings.

10.3.5 Water Quality and Aquatic Health

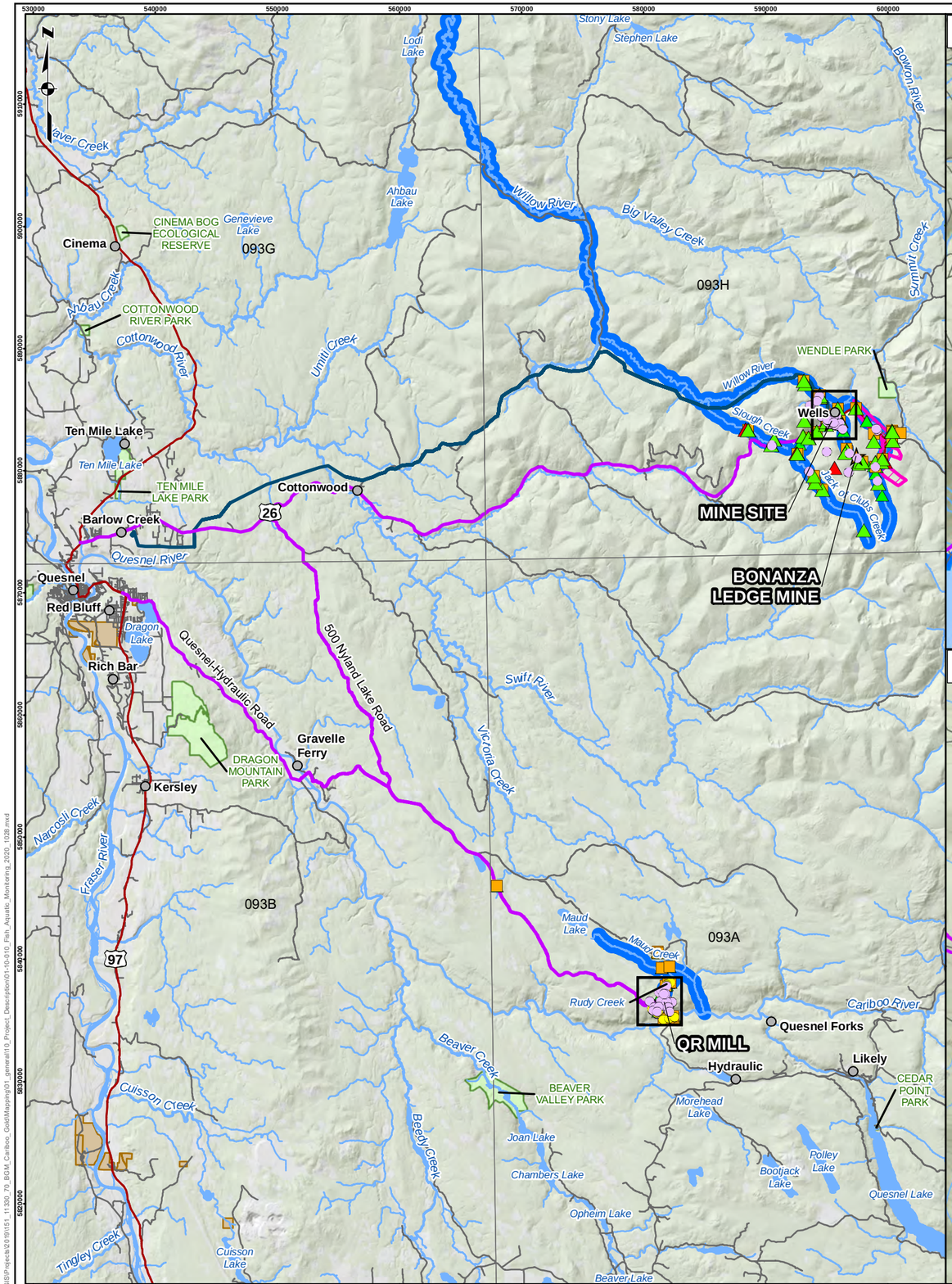
The Project study area is divided into two parts for the water quality and aquatic health disciplines: the Mine Site area and the QR Mill area. The same spatial boundaries are used for hydrogeology, surface water hydrology, surface water quality, aquatic health, and fish and fish habitat studies due to the linkages that exist among these disciplines.

Historical water quality and aquatic health sampling focused primarily on Lowhee Creek, Williams Creek, and Jack of Clubs Lake, with the emphasis on surface water quality. Surface water quality data was collected between 2000 and 2018 through the following baseline and ongoing monitoring programs related to pre-construction or operations at Bonanza Ledge Mine (Figure 20):

- February 2000 to January 2001 – Monthly water quality sampling in creeks and weekly sampling in March (winter low flow) and May (freshet), with Jack of Clubs Lake sampled once in August (IWGM, 2002);
- April 2004 to February 2005 – Weekly water quality sampling from April 2004 to August 2004, and monthly during most other months until February 2005 (AMEC unpublished data); and
- Routine operational monitoring since 2011 within the Project area.

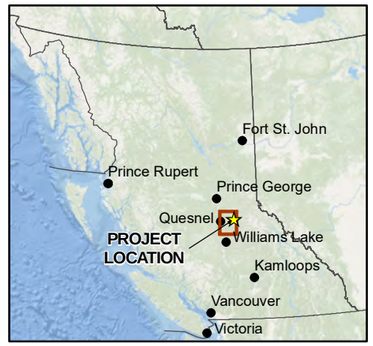
Historical data for sediment chemistry and lower trophic aquatic life (i.e., benthic invertebrates, periphyton, and plankton) are more limited, as described below. Lower trophic aquatic resource information is available from the following studies:

- Jack of Clubs Lake was sampled in August 2000 to describe the trophic status of the lake and levels of contamination in sediment and aquatic biota resulting from historical mining activities (Knight Piésold Ltd L, 2002). Plankton and benthic invertebrate community structures were also characterized.
- Sampling of biological communities was conducted in 2009 for an ecological risk assessment of Jack of Clubs Lake and the Willow River (Azimuth Consulting Group Inc, 2010). The sampling involved the collection of sediment chemistry and benthic invertebrate community data with the objective of assessing ecological risks associated with historically deposited mine wastes.
- Environmental effects monitoring programs have been undertaken for the operational monitoring of the Bonanza Ledge Mine. This monitoring has involved sampling of benthic invertebrate communities (BBA, 2016).
- Bonanza Ledge Mine Underground Project - *Mines Act* Permit Amendment Application (BGM, 2016a).
- Jack of Clubs Lake sampling as a part of the Risk Based Detailed Site Investigation of the Wells Tailings Deposit between 2009 and 2011 (SNC Lavalin, 2011).



LEGEND

- POPULATED COMMUNITY
- ROAD
- HIGHWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- FIRST NATION RESERVE
- PARKS/PROTECTED AREA
- BARKERVILLE HISTORIC TOWN AND PARK
- PROJECT INFRASTRUCTURE LOCATION
- BONANZA LEDGE MINE
- DISTURBANCE AREA
- TRANSPORTATION ROUTE
- NORTHERN TRANSMISSION LINE ROUTE
- (HYDROLOGY)
- (WATER QUALITY AND SEDIMENT QUALITY STATIONS)
- GROUNDWATER MONITORING
- SURFACE WATER MONITORING
- AQUATIC HEALTH MONITORING STATIONS
- WATER SAMPLING LOCATION
- WELLS AQUIFER - ID# 0829



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BGM

CARIBOO GOLD PROJECT

WATERSHEDS AND AQUATIC ENVIRONMENT MONITORING / SAMPLING LOCATIONS

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	MY

PROJECT NO.	PHASE	REV.	FIGURE
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Contemporary baseline sampling in support of the Project was conducted from November 2015 to August 2019 to further characterize water chemistry, sediment chemistry, and biotic communities (benthic invertebrates and plankton) in waterbodies where there is potential for mine-related activities to cause changes in water quality (Figure 19). Of the 35 water quality stations selected for the Mine Site, 20 sites were sampled to characterize baseline conditions over the course of a year. The remaining 15 sites were sampled as part of BGM's ongoing routine monitoring program. Seven water quality stations, sampled as part of BGM's routine monitoring program, were selected to characterize conditions in the QR Mill study area. Sampling stations were selected in consideration of the Project footprint and planned activities that could affect surface water quality. The water quality baseline program in the Wells area included monthly sampling, except for one month of high instream flow (e.g., May) and low instream flow (e.g., August) during which water quality sampling was conducted weekly for five weeks following guidance from the BC ENV (2012). In the QR Mill study area, surface water samples were collected quarterly or semi-annually. The sediment quality program was conducted at existing water quality monitoring stations.

Field collection, sampling handling methods, and laboratory analyses (including quality assurance and quality control procedures) were consistent, where appropriate, with:

- BC Field Sampling Manual (ENV, 2013);
- Environment Canada (2012a, 2012b) protocols for collecting and interpreting benthic invertebrate community data ("CABIN"); and
- Previous monitoring.

The purpose of the baseline sampling was to characterize how parameters of potential concern may vary with location and through the hydrological cycle. The data collected will contribute to the EA and the waste discharge permitting pursuant to the *Environmental Management Act* (Government of BC, 2003) and verify that the pollution prevention provisions of the *Fisheries Act* (Government of Canada, 1985b) are also being met. This information will also be used in operational monitoring pursuant to provincial waste discharge permit and federal *Metal and Diamond Mining Effluent Regulations* (DFO, 2002) requirements to evaluate how mine-related activities may result in changes in the receiving environment.

No baseline surveys for the Northern Transmission Line are anticipated. Water quality effects would be managed through construction environmental management planning.

10.3.6 Hydrogeology

The Project is located in the Quesnel Highlands, an area west of the Cariboo Mountains and east of the Fraser Plateau. The extent of the groundwater aquifer near the Mine Site is shown in Figure 19. The Quesnel Highlands are characterized as a complex of upland hill and plateau areas that become progressively more dissected as they rise to the west. Regionally, groundwater table elevations are expected to follow the topography with a more subdued expression. Recharge to groundwater within the area occurs predominantly via precipitation in highland areas. Groundwater flows through bedrock and overburden in the same direction as local topographic relief, eventually discharging locally at lower elevations within the valleys.

Locally, the area surrounding the Mine Site is composed of defined mountain and valley systems, with local drainage across most of the Valley zone to the Willow River. Mountainous and highland areas are generally covered by thin or discontinuous unconsolidated deposits overlying bedrock. Both the historic and recent underground mines are expected to affect the local hydrogeological conditions. Fluvial/glaciofluvial deposits are

typically observed in the valleys, with reworked sediments from hydraulic and placer mining present in areas of historic mining activities. Areas of historical tailings deposits and waste rock associated with previous mining activities are present at the Mine Site.

Due to the extensive mining history of the area near Wells, numerous hydrogeological studies have been carried out in the vicinity of the Mine Site. Relevant historic environmental and hydrogeological studies and monitoring are associated with the following:

- Studies associated with previous plans for the Cow Mountain deposit (Knight Piésold Ltd., 2002);
- Studies associated with the permitting and ongoing monitoring of the Bonanza Ledge Mine (BGM, 2010) (BGM, 2016a);
- Environmental and risk assessment investigations associated with historical mine waste in proximity to Wells (Rescan Environmental Services Ltd., 1990) (SNC Lavalin, 2011);
- Post-closure monitoring of the Mosquito Creek Gold Mine; and
- Post-closure monitoring of the Island Mountain Gold Mine.

Baseline data collection for the Project is ongoing with primary data collection commencing in 2016 in the Wells area and then expanding to other regions in response to changes in the Project definition. The baseline data collection includes a compilation of past hydrogeological data and reporting in the Study Area, new investigations and monitoring, as well as hydrogeological information collected during investigations to support engineering design.

As part of the hydrogeological baseline study, subsurface investigations were initiated at the Wells area in 2016, with an active collection of groundwater quality and groundwater hydraulic head data beginning at available locations in 2017. As the Project was further defined, the groundwater monitoring network in the Wells area was expanded with hydrogeological drilling investigations in 2018 and 2019, and with the rehabilitation and redevelopment of previously installed monitoring wells on the Wells historic tailings deposit in 2020. Currently, active groundwater monitoring associated with the Project is conducted at 46 monitoring wells, 5 mine seepage locations, and 1 groundwater seepage area in the Wells area. When the QR Mill area was incorporated into the Project in 2019, an active baseline collection of groundwater quality and groundwater hydraulic head data was initiated at previously installed environmental and geotechnical monitoring wells in the QR Mill area. Based on an assessment of potential data gaps, the groundwater monitoring network was subsequently expanded with a hydrogeological drilling investigation in 2019. Currently, active groundwater monitoring associated with the Project is conducted at 26 monitoring wells in the QR Mill area.

Findings from the data compilation, field investigations, and groundwater monitoring programs at both locations were utilized to construct two 3D hydrostratigraphic models of the subsurface in the Wells and QR Mill areas using Leapfrog Works, a commercially available geological modelling and visualization software package. The definition of hydrostratigraphic units and their properties was supported by the compilation and/or analysis of over 100 hydraulic tests (i.e., slug tests, packer tests, pumping tests) to characterize the hydraulic conductivity of the various soil and bedrock units.

10.3.7 Fish and Fish Habitat

Fish and fish habitat are found throughout the Project area. Fish distribution is typically only limited by gradient, flows, and habitat quality. Several tributaries of the Willow River are located near the Mine Site, including Slough Creek, Mosquito Creek, Lowhee Creek, Williams Creek, and Jack of Clubs Creek. At the QR Mill, fish and fish habitat are found in Rudy Creek, Maud Creek, and the nearby Quesnel River. The Transportation Route crosses over Slough Creek, Chisholm Creek, Beaverpass Creek, Lightning Creek, Cottonwood River, Frye Creek and Gerimi Creek. The Northern Transmission Line Route crosses over the Cottonwood River, Willow River and Quesnel River watersheds.

Several historical fish and fish habitat studies have been conducted near the Mine Site. These include:

- Fish and fish habitat studies were initiated in 1995 as part of the EAC Application submitted by International Wayside Gold Mines Ltd. (Knight Piésold Ltd., 2000).
- Fish and fish habitat baseline data was collected in June and August of 2000 by Cariboo Envirotech Limited with data analyzed and reported by Knight Piésold Ltd. in 2002 (IWGM, 2002).
- Baseline data was collected in Jack of Clubs Lake in the summer of 2001.
- In August 2004, a fisheries study was conducted to meet the requirements outlined in the Health, Safety and Reclamation Code for mines in BC (MEM, 2003) and the *Metal and Diamond Mining Effluent Regulations*.
- An additional survey was completed by AMEC (2005) in September 2004 designed using procedures detailed in the *Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring* (Environment Canada, 2002).

Freshwater fish and fish habitat baseline surveys for the Project were conducted in July 2016, August 2016, June 2018, and August 2018 within the upper Willow River Watershed, within the Willow River Mainstem, and within the Williams Creek, Lowhee Creek, and Jack of Clubs Lake watersheds (Figure 13). Freshwater fish and fish habitat baseline surveys were also conducted in the Jack of Clubs Creek and Slough Creek watersheds in July 2016 and August 2016 but were determined to be outside of the study area prior to the 2018 field programs. In June 2019, freshwater fish and fish habitat baseline surveys were conducted in the vicinity of the QR Mill site in tributaries to the Quesnel River (Rudy Creek, Maud Creek, Sandy Lake, and Creeks 2, 2.5, and 3). Fish and fish habitat information was collected along Highway 26 in 2019, and along the Northern Transmission Line Route in 2020.

Critical habitat for bull trout has been identified in the Cariboo region under the CCLUP (Government of BC, 2007). This includes Jack of Clubs Creek upstream of Jack of Clubs Lake, and sections of Lightning Creek, along Highway 26 near Beaver Pass House. The Quesnel River near QR Mill is also identified as critical fish habitat.

The ENV's Technical Guidance 6 *Environmental Management Act Applications, Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators* (ENV, 2012a) defines the baseline study requirements and information considerations for a mineral development project in BC.

Therefore, the fish and fish habitat baseline program was designed to meet the requirements and information needs of the ENV Technical Guidance 6 (ENV, 2012a). The results of this baseline study will be used to inform mine planning and to assess potential Project effects to fish and fish habitat, and if required, support an application for Authorization under Section 35(2) of the *Fisheries Act*.

For regulatory agencies to evaluate the effects of mine development on fish and fish habitat, baseline data collection must capture detailed information on fish populations and the habitats they use to complete their life history (ENV, 2012a). The fish and fish habitat baseline sampling program was designed to assess fish abundance, distribution and community structure and to provide an understanding of the fish and fish habitat values potentially affected by the Project. Specific tasks associated with fish and fish habitat data collection included:

- Spring spawning surveys,
- Reconnaissance-level fish and fish habitat assessments,
- Detailed habitat assessments,
- Fish abundance estimates, and
- Fall spawning surveys.

10.3.8 Soils, Terrain and Terrain Stability

The majority of the Project area consists of morainal till blankets and veneers, where brunisolic and podzolic soil horizons have developed on sandy loam and loam textured materials (Lord and Green, 1985). To a lesser extent, colluvial brunisolic soils with angular coarse fragments are found on steep slopes, and sandy brunisolic soils are found on fluvial plains and terraces (Lord and Green, 1985). Organic materials have developed mesic and gleysolic soils located along valley floors and in depressions (Lord and Green, 1985). The Project area is underlain by Barkerville Terrane, a Hadrynian and/or early Paleozoic sequence of siliciclastic rocks, which were deposited as continental shelf to slope marine clastic rocks along with lesser amounts of marine carbonate rocks and volcanic rocks adjacent to the craton of ancestral North America (Schiarizza and Fillippo, 2002).

The Quaternary history of the Project area is dominated by glacial erosion and meltwater scour during the retreat of the Fraser Glaciation approximately 10,000 years ago. Upland areas within the Quesnel Highlands are remnants of a highly dissected plateau of moderate relief (Holland, 1976). The majority of the area consists of thick silt clay to sand silt textured morainal material (till) that typically masks the underlying bedrock. Colluvial materials (material transported by gravity) are found on slope gradients greater than 70% (Lord and Green, 1985). Glaciofluvial and fluvial material are located along the lower valley bottoms. Lacustrine and organic materials are also located along wider valley floors and in discrete depressions but are less common. Anthropogenic deposits, including talus and processed deposits from historic placer mining, are common throughout narrow valleys in the area. Geomorphological processes in the area are associated with mass movement events along steep slopes and gullies, active fluvial processes in valleys, and areas with possible inundation and seepage (Lord and Green, 1985).

Existing soil conditions are described using information garnered from a combination of a desktop review of existing information, a field terrain inventory mapping and terrain stability mapping program, in conjunction with soils mapping and Terrestrial Ecosystem Mapping (TEM). Information and data sources accessed during the desktop review included:

- TEM with Wildlife Habitat Interpretations for Tree Farm License 52 (GEOWEST [Geowest Environmental Consultants Ltd.], 2000);
- Soil of the Barkerville area, BC (Lord and Green, 1985);
- Agriculture Capability Maps of the Barkerville area (ENV, 2018);

- The Soil Landscapes of British Columbia (Valentine, Sprout, Baker, and Lawkulich, 1978);
- Applicable CanSIS National Soil Database (Agriculture and Agri Food Canada, 2017) for soil survey reports and maps for the area;
- CANVEC (Natural Resources Canada, 2017) and iMapBC (Government of BC, 2018b) for geographic locations and topographic features;
- Digital information from DataBC (Government of BC, 2018b) for Biogeoclimatic Ecosystem Classification boundaries;
- Bonanza Ledge *Mines Act* Permit Amendment Application 2010 - Section 3.6 Terrain and Soils (BGM, 2010); and
- Bonanza Ledge Underground Project - *Mines Act* Permit Amendment Application 2016, Section 3.6 Terrain and Soils (BGM, 2016).

Terrain data were collected to fulfill the requirements for terrain and terrain stability and soil erosion potential listed in provincial guidance documents (Government of BC, BC ENV and Forest Service BC, 1999; Howes & Kenk, 1997; RIC, 1995). To meet these standards and requirements, a terrain and terrain stability field program was initiated in 2016 and completed in 2019 for the Project. In 2016 and 2018, information was collected for the Mine Site. In 2019, surveys were completed for the Mine Site, QR Mill and Transportation Route.

Appendix 1 of the *Application Requirements for a Permit Approving the Mine Plan and Reclamation Program Pursuant to the Mines Act* requires a soil survey of the mine footprint at a scale of 1:5,000 following methods and soil survey procedures outlined in the *Field Manual for Describing Terrestrial Ecosystems, 2nd Edition* (BC Ministry of Forests and Range and BC Ministry of Environment, 2010). To meet these standards and requirements, a soils field program was initiated in 2016 and completed in 2019 and included the following parameters:

- Soil chemical and physical characteristics,
- Soil suitability for reclamation and soil salvage operational limitations,
- Soil erosion potential, and
- Rutting and compaction.

10.3.8.1 Baseline Studies Recently Completed and Proposed / Planned

Additional baseline studies, data interpretation and mapping will be completed for the Northern Transmission Line route in 2020. A desktop review will be completed including compiling available background data and terrain/bioterrain mapping for the proposed transmission line right-of-way. A combined field program with vegetation will be completed focusing on representatively sampling the terrestrial ecosystems found within the proposed transmission line right-of-way. Plot data will adhere to protocols outlined in the Terrain Classification System of British Columbia (Howes and Kenk, 1997) and the Canadian System of Soil Classification, 3rd Edition (Soil Classification Working Group [SCWG], 1998). The field plot data will be incorporated into preliminary mapping, and bioterrain polygons will be reviewed and attributes revised where new field data is identified.

10.3.9 Geochemistry

The geochemical baseline study is used to determine the acid rock drainage (ARD) and metal leaching (ML) potential of the materials that will be produced during mining, including ore, waste rock and mill process material (MPM). The *Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators* (ENV, 2012b) outlines the recommended scope of geochemical testing programs for mining projects in the province of BC, based on the following guidance documents:

- *Policy for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia* (Price & Errington, 1998);
- *Guidelines for Metal Leaching and Acid Rock Drainage at Minesites in British Columbia* (MEM and ENV, 1998);
- *Prediction Manual for Drainage Chemistry from Suphidic Geologic Materials* (Mine Environment Neutral Drainage 2009); and
- *Global Acid Rock Drainage (GARD) Guide* (International Network for Acid Prevention 2012)

The baseline geochemistry program collected samples in 2017, 2018 and 2019. Assessment of the ARD and ML potential included the collection of 24 ore samples, 176 waste rock samples and 37 MPM samples. All samples were submitted for select static testing, including acid-base accounting (ABA), whole rock analysis and bulk metal analysis. Subsequent to these analyses and based on their results, shake flask extraction (SFE) testing was performed on a sub-set of 12 ore samples, 68 waste rock samples all 37 MPM samples. Net acid generation (NAG) testing and NAG leachate analysis was also conducted as part of the second stage of testing on six ore samples, 39 waste rock samples and 23 mineral process material samples. Lastly, humidity cell tests were conducted on a further subset of samples based on NAG and SFE results; tests were run on six waste rock and one MPM sample.

The results of the ARD assessment indicate that 92% of the ore, 6% of the waste rock and 62% of the MPM samples are classified as potentially acid generating (PAG). Additionally, 13% of the waste rock, and 5% of the MPM samples are classified as uncertain in their acid generating potential. Finally, the remaining 8% of ore samples, 81% of waste rock samples and 32% of MPM samples are classified as non-potentially acid generating (NPAG). The results of the sulphide-sulphur and NP depletion calculations performed using HCT data was consistent with the ABA results with the exception of one sample which was classified as NPAG based on ABA but classified as PAG based on depletion calculations.

Metal leaching potential was determined using the results of short-term leach testing, including NAG leachate testing, SFE and humidity cell testing. Metal leaching has the potential to occur under acidic and near-neutral to alkaline pH conditions. Kinetic testing, currently being completed on select samples of waste rock, will better determine mineral reaction rates and potential for long term ML potential. Based on the results of the leach testing completed to date, parameters that are capable of leaching in either acidic or near-neutral to alkaline pH conditions include sulphate, arsenic, iron, lead, and zine in ore and MPM; and arsenic and zinc in the waste rock. Further kinetic testing of MPM is underway.

Baseline assessment of the acid rock drainage and metal leaching potential along the Northern Transmission Line Route will be completed in 2020, including a desktop review and field assessment of bedrock outcrops along the route. Samples for laboratory testing will be collected in areas of high and moderate potential.

10.3.10 Vegetation

Existing conditions will be described in the EAC Application using information and data collected from a combination of a desktop review of existing information, a field sampling program, and TEM. Example information and data sources accessed during the desktop review include:

- A Field Guide to Site Identification and Interpretation for the Cariboo Forest Region (Steen and Coupé, 1997);
- Ecosystems of British Columbia (Meidinger and Pojar, 1991);
- Wetlands of British Columbia: A Guide to Identification (Mackenzie and Moran, 2004);
- Rare Native Vascular Plants of BC (Douglas et al,. 2002);
- British Columbia Vegetation Resource Inventory (VRI) (DataBC, 2019a);
- BC Conservation Data Centre Species and Ecosystems Explorer (BC CDC) (2019a; 2019b) (iterative search criteria: Groups = Plants, Fungi, Ecological Communities; BC List = red, blue; Area Bases, Ministry of Environment Regions = 5- Cariboo; Biogeoclimatic Units = ESSFwc, ESSFwk1, SBSdw1, SBSmh, SBSmw, SBSwk1, completed on 10 July 2019);
- Specimen label information (Consortium of North American Lichen Herbaria 2019; Consortium of North American Bryophyte Herbaria 2019; UBC, 2019);
- BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD) Invasive Alien Plant Program On-Line Mapping Program (BC MFLNR, 2018a) and Invasive Alien Plant Site Data (BC MFLNR, 2014);
- Species at Risk Public Registry (Government of Canada, 2019);
- COSEWIC Status Reports (ECCC, 2019);
- Traditional use plant information (Palmer 1975; Walker 1998; Kuhnlein and Turner 1991; Ritch-Krc 1992; Ignace 1998; Archaeo Research Limited 2002; Shaw and Young, 2012);
- Terrestrial Ecosystem Mapping (TEM) (TEI Project 135) conducted by Geowest Environmental Consultants Ltd. (Geowest) for Tree Farm Licence 52, West Fraser Mills Ltd. (Geowest, 2000);
- TEM (TEI Project 233 and 244) conducted by Keystone Wildlife Research (Keystone) for Gerimi/Nyland and Le Bourdais Study Areas, Weldwood (Keystone 2000a; 2000b);
- TEM (TEI Project 027 and 079) conducted by Keystone for Cunningham, Willow River, Kimball Creek, Big Valley North, Lighting Creek, and Little Swift Study Areas, Weldwood (Keystone, 1999);
- Cariboo Predictive Ecosystem Mapping (PEM) (Business Area Project ID 5512) conducted by Moon et al., (2008);
- Bonanza Ledge Project, Wells, BC. Joint Application for a Permit Pursuant to Section 10(1) of the British Columbia Mines Act and Amendment to Existing Effluent Discharge Permit PE-17876 under the *Environmental Management Act* for the Proposed Development of an Open Pit Gold Mine at Bonanza Ledge, Wells, BC (BGM, 2010); and

Data collection for the vegetation baseline program was initiated in 2016 and continued in 2018 and 2019 to identify provincially and federally listed plant species at risk (SAR) and provincially listed ecological communities at risk. Existing TEM (GEOWEST, 2000) was field verified and updated in accordance with the Resources Information Standards Committee (RISC) standards. Additional data for the vegetation baseline program is being collected for the Northern Transmission Line route option in 2020.

The Project lies within the Cariboo Forest Region and, based on the BC provincial BEC system, spans five BEC variants (Steen & Coupé, 1997). The Sub-Boreal Spruce Willow Wet Cool variant (SBSwk1), Engelmann Spruce-Subalpine Fir Cariboo Wet Cool variant (ESSFwk1), and Engelmann Spruce-Subalpine Fir Cariboo Wet Cold (ESSFwc3) together make up over 90% of the Mine Site area. The Transportation Route, Northern Transmission Line route option and QR Mill occur within the Sub-Boreal Spruce Moist Warm variant (SBSmw).

PEM was used to describe and classify ecosystems and candidate ecosystem-based subcomponents within the regional study area. PEM is an inventory-based approach that uses available spatial data and knowledge of the ecological-landscape relationships to automate computer-generated ecosystem maps. Mapped themes, using a formalized knowledge base researched from various sources (RISC, 1999b), included existing TEM, PEM, legal objectives, forest fire and riparian ecosystem information and anthropogenic disturbance layers.

TEM was used to describe and classify ecosystems and candidate ecosystem-based subcomponents within the study area. TEM is a process of manually delineating distinct ecosystem units (i.e., BEC site series) within a study area according to characteristics defined by climate, physiography, geology, surficial materials, soils, and vegetation (i.e., species composition, canopy composition, structural stage, and stand age). Digitization of the TEM polygons was used to map the study area at a scale of 1:5,000.

Field surveys identified 81 traditional use plants, including subalpine fir, bunchberry, black twinberry, and black huckleberry being the five most frequently detected. A desktop review of ecosystem-based subcomponents was completed and included:

- Ecological communities at risk,
- Wetlands,
- Old-growth forests, and
- Riparian ecosystems.

Twenty-five ecological communities at risk were mapped with three red listed, and the remaining 22 blue listed. Twenty-six wetland ecosystem units were mapped. Mapping also identified old-growth forests and riparian ecosystems.

The *SARA* and the associated bilateral Canada-BC agreement on SAR (Government of Canada, 2002, 2005) protect plant species in BC that are listed federally as threatened or endangered (Government of Canada, 2002, 2005). A search of the *BC Species and Ecosystems Explorer* indicates 17 provincially designated plant SAR has the potential to occur in the Project area (CDC, 2018). Eight SAR were detected in during field studies. Intermediate hook-moss (*Scorpidium cossonii*) occur at five sites, but the remaining seven SAR occur at a single site each. Two SAR are red listed: barbula moss (*Barbula amplexifolia*) and Jensen's sphagnum (*Sphagnum jensenii*). The six remaining SAR are blue listed.

Twenty-seven invasive plant species occur in the Project area; 11 are provincially regulated noxious species under the Weed Control Regulation (Government of BC 2011), and 13 are listed as invasive under the Forest and Range Practices Act (Government of BC, 2002b). The most significant invasive plant species are common comfrey (*Symphytum officinale*), Japanese knotweed (*Fallopia japonica*), mountain bluet (*Centaurea montana),* marsh plume thistle (*Cirsium palustre*), wild parsnip (*Pastinaca sativa*), and sulphur cinquefoil (*Potentilla recta*) (Cariboo Chilcotin Coast Invasive Plant Committee [CCCIPC], 2018).

10.3.10.1 Baseline Studies Recently Completed and Proposed / Planned

Baseline surveys for the Northern Transmission Line Route will be completed in 2020. Existing

data on species and ecosystems, was used to describe potential distribution and status based on known distribution and availability of suitable habitat. Two independent field programs were completed to meet new provincial standards (RISC, 2018):

- TEM field verification program, and
- Plant species at risk program.

Field data for the TEM field verification program was collected following standards outlined in BC Ministry of Forests and Range [MOFR] and BC ENV (2010), for full ecosystem plots, ground inspections, and visual checks and included collecting species information and tree mensuration. Targeted surveys for SAR followed standards outlined in RISC (2018); these were conducted outside the overall TEM field sampling program. Survey blocks delineated during desktop review were surveyed using the random meander technique, and observed plants were recorded.

Invasive plant species surveys targeted historic (BC MFLNRORD 2020), disturbed, and anthropogenic sites in the study area.

10.3.11 Wildlife and Wildlife Habitat

Existing conditions for wildlife and wildlife habitat will be described in detail as part of the EAC Application using a combination of available information and data collected from wildlife surveys specifically for the Project. Background information regarding existing conditions for wildlife in areas that may be affected by the Project has been be derived from the following information sources:

- TEK, as obtained through agreed-upon methods from Indigenous nations, relating to culturally important species in the Project area;
- Studies available from the BC EAO e-PIC website related to adjacent projects with relevant data (BC EAO, 2018);
- CDC, BC Species and Ecosystems Explorer to develop a list of SAR that has the potential to occur in the Project area, based on known distribution and habitat needs (CDC, 2018);
- Provincial geographical and spatial databases, such as iMapBC (Government of BC, 2018b), Bird Studies Canada (Bird Studies Canada, 2017), and E-Fauna BC (Klinkenberg, 2018a), with reference to wildlife occurrence records, designated wildlife habitat areas and ranges, resource management zones, ungulate winter ranges, and parks and protected areas;

- BC Cross-Linked Information Resources and associated databases such as the Ecological Reports Catalogue (Government of BC, 2018c), and the Species Inventory Web Explorer for wildlife reports and publications (Government of BC, 2016a);
- Species at Risk Public Registry for information and designations of wildlife SAR (Government of Canada, 2016b);
- Relevant provincial and federal species status reports, management plans, recovery plans, and implementation plans;
- Information from the CCLUP, including mapping and available databases;
- Relevant peer-reviewed scientific literature, grey literature (e.g., government documents, technical reports, industry reports, theses, conference proceedings), and existing wildlife data (e.g., harvest records, telemetry data) relevant to the Project; and
- Government agency biologists with local and/or regional expertise, as relevant;

Terrestrial wildlife and wildlife habitat surveys were completed for the Project between 2016 and 2019. The survey methods implemented were selected to capture a variety of wildlife species within the study area and were based on relevant Resources Information Standards Committee Inventory Standards where standards exist. The field studies included:

- Pond breeding amphibian surveys,
- Breeding Bird Surveys,
- Acoustic bat detector data collection (spring/summer to assess foraging habitat and fall/winter to assess swarming and hibernacula use),
- Winter tracking surveys for large and medium-sized mammals,
- Remote camera data, and
- Northern goshawk surveys.

Surveys were conducted during seasonal periods when focal species were most easily detected (i.e., bird breeding season) and when sensitive life phases may be present (i.e., amphibian breeding). Sampling effort targeted expected areas of new disturbance within the Project footprint, where possible. Candidate survey locations for each field program were selected using satellite imagery, orthophotographs, available wildlife habitat mapping, and/or preliminary TEM to target habitats for the species group being surveyed. Some candidate survey locations were discarded upon field inspection because they lacked suitable habitat, or they posed health and safety risks to surveyors. In these circumstances, substitute survey locations were identified opportunistically in the field.

Caribou critical habitat and ungulate winter range in the Project area is shown in Figures 21-1, 21-2 and 21-3. The caribou herd present in the Project area is the Barkerville subpopulation, a part of the Quesnel Highlands Local Population Unit which is within the Southern Group of the larger Woodland, Southern Mountain Population Caribou (*Rangifer tarandus pop. 1*) in Canada. The Southern Mountain Population is considered endangered by COSEWIC, threatened by SARA and red-listed by the Province.

There are two variants of caribou critical habitat in the Project area. The Mine Site is located within the matrix variant of critical habitat. The eastern portion of the Northern Transmission Line route is also within matrix habitat. The Transportation Route is within both matrix and high/low elevation critical habitat at the eastern portion.

The Bonanza Ledge Mine is located within the high or low elevation range variant of critical habitat. Part of the high and low elevation critical habitat has been included within a Mountain Caribou Wildlife Habitat Area. The current and long-term trends for this population identified in the 2014 Recovery Strategy (ECCC, 2014) are both increasing.

The QR Mill is not within critical caribou habitat but is within ungulate winter range. The ungulate winter range follows the northern side of the Quesnel River.

Based on a desktop review of provincial databases, 42 wildlife species occur in the Project area that are currently designated as Endangered, Threatened, or Special Concern under Schedule 1 of the federal SARA, and/or are provincially Red- or Blue-listed (BC CDC 2019): one amphibians, 22 birds, seven mammals, and 12 invertebrates.

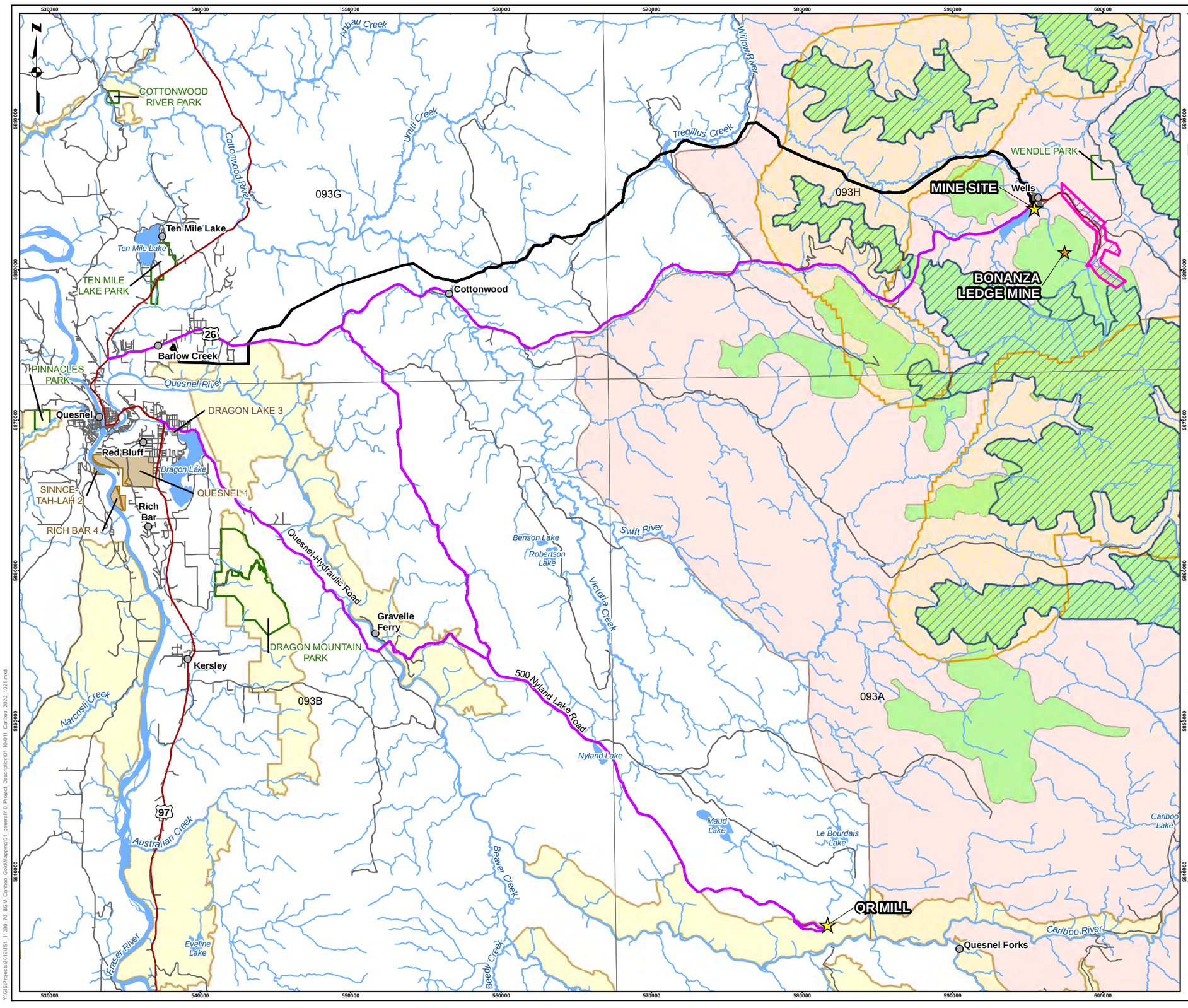
10.3.11.1 Baseline Studies Recently Completed and Proposed / Planned

Baseline wildlife studies will be completed for the Northern Transmission Line in 2020 and will continue into 2021. Wildlife cameras were installed along the proposed transmission line route in Winter 2019/2020 and will be removed in December 2020. Winter tracking surveys were completed in winter 2020, and additional tracking surveys will be completed in winter 2021. Visual amphibian surveys were completed to assess the presence and distribution of pond-breeding amphibians in a representative subset of suitable habitat. Two rounds of amphibian surveys were completed. Breeding bird and northern goshawk surveys along the proposed transmission line route were also completed. Bat acoustic surveys were completed to determine the presence and habitat associations of bat species present along the proposed transmission line route. Six bat detectors were deployed in June 2020 for the summer foraging survey. These detectors were redeployed in September 2020 for use in the winter hibernacula survey. Removal of the detectors will occur in May 2021.

10.3.12 Contaminated Sites

Mining activities have been within the Project area since the 1860s and have included underground and open pit mines, waste rock and tailings disposal areas, former mill areas, offices, and mechanical shops. The historical Cariboo Gold Quartz mine property extends southeasterly from the town of Wells, covering the north spur of Cow Mountain, Lowhee Creek, and the westerly slopes of Barkerville Mountain. The Cariboo Gold Quartz mine workings extend southeasterly from the north end of Jack of Clubs Lake through Cow Mountain to the Cariboo claim at the head of Lowhee Creek, a distance of 3 km. The Aurum or Island Mountain mine was located on the southeast slope of Island Mountain, extending from the town of Wells southwesterly along the west shore of Jack of Clubs Lake. The property is adjoined to the northwest and southeast by the Mosquito Creek Mine (active in the 1980s) and Cariboo Gold Quartz mines, respectively.

The former Island Mountain and Cariboo Gold Quartz mine sites have been under ongoing contaminated sites investigation. Tailings contaminated with arsenic and other metals from historical mine waste produced by previous owners and operators extend over 65 ha, including around and in Jack of Clubs Lake and the Willow River (FLNRORD, 2018f). Water quality in the lake and river generally meets provincial water quality guidelines for the protection of freshwater aquatic life despite the extensive mine waste.

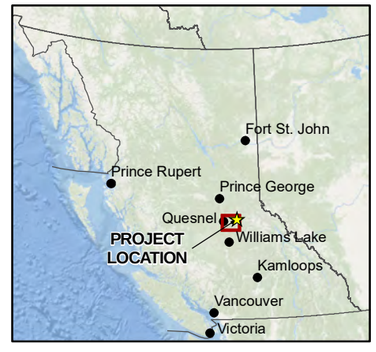


LEGEND

- POPULATED COMMUNITY
- HIGHWAY
- ROAD
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- FIRST NATION RESERVE
- BARKERVILLE HISTORIC TOWN AND PARK
- PROJECT INFRASTRUCTURE LOCATION
- BONANZA LEDGE MINE
- TRANSPORTATION ROUTE
- NORTHERN TRANSMISSION LINE ROUTE
- BARKERVILLE HERD LOCATION
- MOUNTAIN CARIBOU WILDLIFE HABITAT AREA
- UNGULATE WINTER RANGE (MULE DEER)

CARIBOU CRITICAL HABITAT

- High or Low Elevation Range
- Matrix Range



REFERENCE(S)

1.WATER FEATURES, TRANSPORTATION FEATURES OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. CITIES/TOWNS, INDIAN RESERVES, FEDERAL LANDS AND PARK/PROTECTED AREAS OBTAINED FROM BC MINISTRY OF FORESTS, LANDS NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
3. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

NAD83 CSRS
UTM Zone 10N

0 5 10 15
1:250,000 KILOMETRES

BGM

CARIBOO GOLD PROJECT

CARIBOU CRITICAL HABITAT AND UNGULATE WINTER RANGE NEAR THE PROJECT

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	21-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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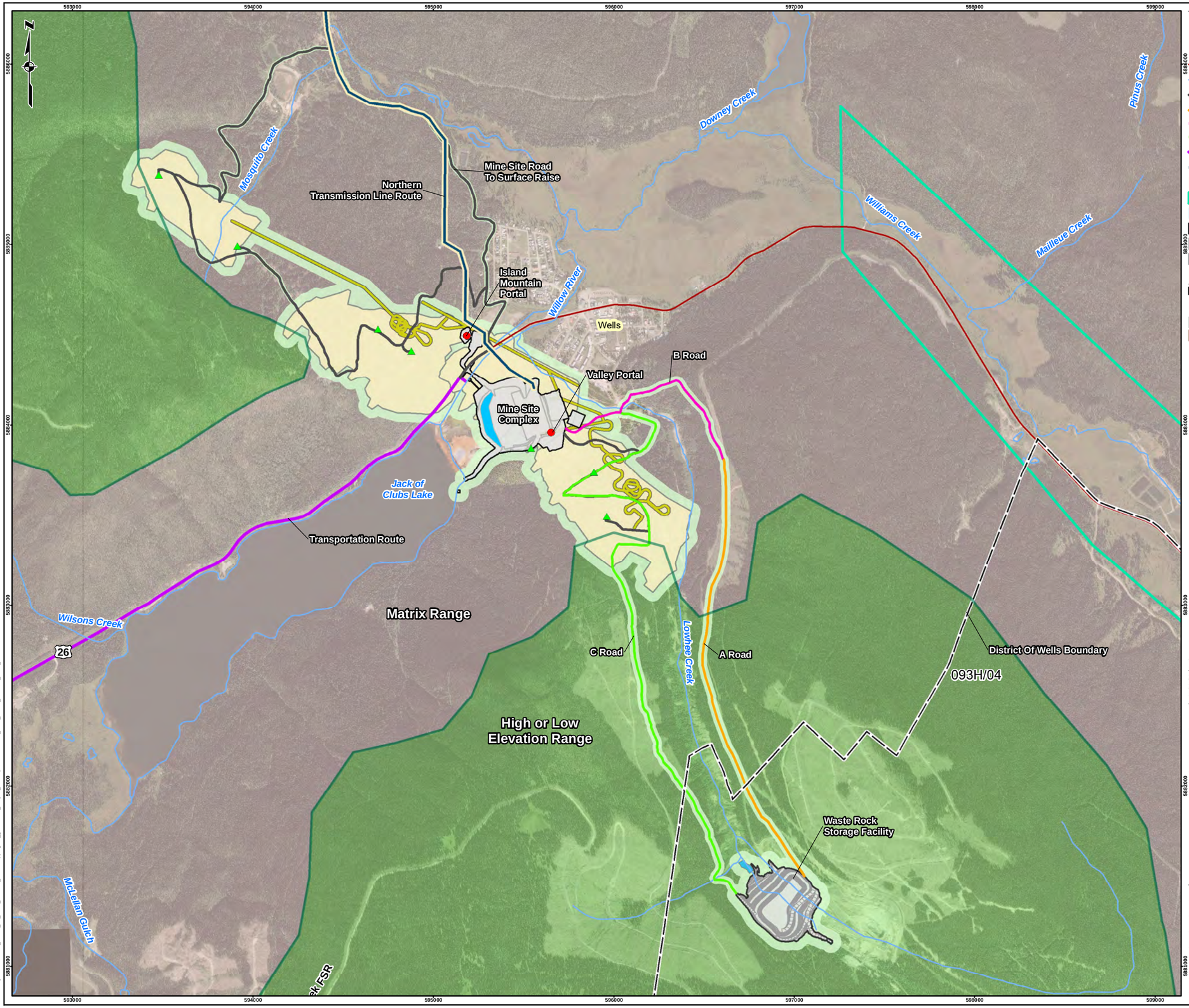
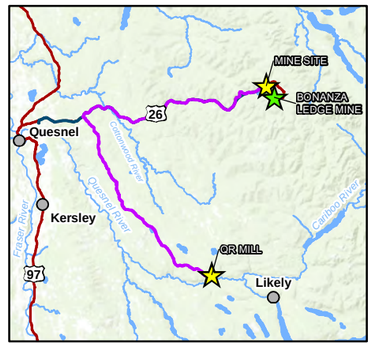


LEGEND

- MINE PORTAL LOCATION
- VENTILATION RAISE
- HIGHWAY
- WATERCOURSE
- EXISTING MINE SITE ROAD
- A ROAD
- B ROAD
- C ROAD
- TRANSPORTATION ROUTE
- TRANSMISSION LINE ROUTE
- TRANSMISSION LINE ROUTE ROW 36M
- BARKERVILLE HISTORIC TOWN AND PARK
- MINE SITE SURFACE SEDIMENT POND
- UNDERGROUND INFRASTRUCTURE
- SURFACE DISTURBANCE AREA
- UNDERGROUND MINE AREA
- FOOTPRINT
- DISTRICT OF WELLS BOUNDARY

CARIBOU CRITICAL HABITAT

- High or Low Elevation Range
- Matrix Range



REFERENCE(S)

1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
2. HILLSHADE DERIVED FROM LIDAR DATA FLOWN BY MCELHANNAY CONSULTANTS LTD. JUNE 27, 2016.
3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

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CARIBOO GOLD PROJECT

MINE SITE - CURRENT AND PROPOSED INFRASTRUCTURE AND CARIBOU CRITICAL HABITAT

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	21-2

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Option 2
Dry-Stack TSF

Option 3
Dry-Stack TSF(Preferred)

TRANSPORTATION
ROUTE

NEW QR Camp

093A/12

QR Mill

Option 3 South Seepage
Collection Pond

Option 1
Dry-Stack TSF

New Tailings
Dewatering Plant

Water
Treatment Plant

QR Offices

New
Conveyor

New Ore
Feed Hopper

Main Zone Pit

Ore Storage

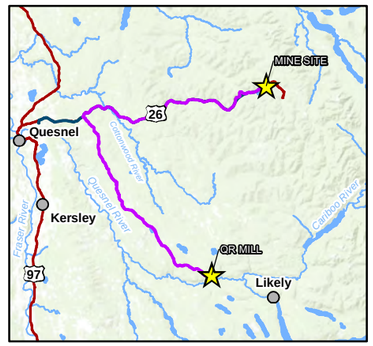
TRANSPORTATION
ROUTE

579750 580000 580250 580500 580750 581000 581250 581500 581750 582000 582250 582500 582750

5837750 5837500 5837250 5837000 5836750 5836500 5836250 5836000 5835750 5835500

LEGEND

- WATERCOURSE
- TRANSPORTATION ROUTE
- DISTURBANCE BOUNDARY
- OPTION 1 DRY-STACK TSF
- OPTION 2 DRY-STACK TSF
- OPTION 3 DRY-STACK TSF(PREFERRED)
- DRY-STACK TSF WATER MANAGEMENT STRUCTURE
- NEW INFRASTRUCTURE
- UNGULATE WINTER RANGE (MULE DEER)



REFERENCE(S)

1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
2. HILLSHADE DERIVED FROM LIDAR DATA FLOWN BY MCELHANNAY CONSULTANTS LTD. JUNE 27, 2016.
3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

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CARIBOO GOLD PROJECT

QR MILL - CURRENT AND PROPOSED SURFACE INFRASTRUCTURE AND UNGULATE WINTER RANGE

REV.	DESCRIPTION	DATE	INITIALS
B		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	21-3

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Areas of potential environmental concern (APECs) and constituents of potential concern were identified based on readily available information. Readily available records were reviewed on past and present activities in the Project area and immediately adjacent properties. Historical contaminated sites information sources for the Mine Site included historical land title searches, aerial photographs, fire insurance records, EcoLog Environmental Risk Information Service searches, companies historically operating at the site, PAG and NPAG mine wastes, sawmill operations, the ENV Contaminated Site Registry, BC Government Mineral Titles Online database, Federal Contaminated Sites Inventory, historical records and archives, environmental reports, and regulatory information applicable to contaminated sites.

A contaminated sites assessment completed in 2016 focused on environmental conditions within the following areas:

- Cow Mountain Mining Area – located along the northern slopes of Cow Mountain in the former area of the Cariboo Gold Quartz Mine;
- Bonanza Ledge Mine Area – located along the southwest slope of Barkerville Mountain; and
- Area consisting largely of private properties to the northeast of the junction of Highway 26 and Bowron Lake Park Road and Matthew Valley Road (Cunningham Forest Service Road).

The Phase I Environmental Site Assessment (ESA) completed for the above-listed areas was conducted in general accordance with the Canadian Standards Association Standard Z768-01, Phase I ESA (reaffirmed 2012) and with reference to ENV reporting requirements for a Stage 1 Preliminary Site Investigation, as outlined in the Checklist for Reviewing a Preliminary Site Investigation (ENV, 2016c). The Phase I ESA involved reviewing readily available records to collect data on past and present activities within the Project area, conducting a site reconnaissance to select areas, interviewing individuals knowledgeable about the past and current activities within the Project area, and evaluating the information collected to identify APECs.

Based on the results of the Phase I ESA, 23 APECs were identified, and a limited scope Phase II ESA was conducted to evaluate whether or not soil contamination was present in the APECs. A total of 43 test pits were excavated, and soil samples were collected from various depths and submitted for chemical analyses of selected constituents of potential concern.

A Phase I and II ESA was completed for QR Mill in 2019. Site visits to the QR Mill location were conducted in May and September 2019. During both field programs, the Site Assessors observed accessible areas of the Site and neighbouring properties, conducted interviews, and photographed representative Site features. For the QR Mill Study area, the Phase II ESA scope of work involved a test pit excavation and soil sampling program. A total of 33 test pits were excavated (25 using a backhoe, and eight hand excavated with a shovel), and soil samples were collected from various depths.

10.3.12.1 Baseline Studies Recently Completed and Proposed / Planned

A Phase I ESA will be completed for the Northern Transmission Line Route in 2020. The Phase I ESA will assess whether the past or present generation, use, storage, or disposal of hazardous substances may have occurred on the subject Site or on adjacent properties.

11.0 HUMAN AND COMMUNITY WELLBEING

This section provides an overview of human and community wellbeing and the associated baseline studies being undertaking including social, economic, land use, visual, heritage and human health and ecological risk assessment. Information regarding potential project effects and mitigations measures is also discussed.

11.1 Project Updates and Changes

Key updates and changes since submission of the IPD include:

- Engagement activities included discussion of information provided in the IPD, Supplemental and information developed during the Early Engagement Phase.
- Baseline data gathering relative to the socio-economic, land and resource use and current use studies has continued.
- The scope of the socio-economic studies changed to include GBA+ analysis as required under the 2018 EAA.
- Additional baseline data gathering was also undertaken along the Northern Transmission Line Route as this route has been confirmed as the preferred transmission line route.

11.2 Socio-community Overview

As shown in Figure 1, and discussed in Section 1.2, the Mine Site is located approximately 80 km east of Quesnel adjacent to the community of Wells. The Mine Site is approximately 350 m west of the nearest residence which is currently unoccupied. A portion of the Mine Site and the other Project components are in Electoral Areas C and F of the CRD. Bonanza Ledge Mine is located approximately 4 km from the Mine Site. The QR Mill site is located approximately 111 km from the Mine Site, 58 km southeast of Quesnel, and 17.5 km northwest of Likely. There are no roads joining Likely directly to the QR Mill site. The Quesnel River is located approximately 1 km south of the QR Mill site.

The Mine Site is located approximately 6 km from Barkerville Historic Town and Park, and there are a variety of recreation trails in proximity to, and on, BGM property and surrounding Crown land. There are heritage/cultural sites along Highway 26 as well as opportunities for recreation activities. Trails and Indigenous nation areas of interest have been identified along the forestry roads leading to the QR Mill site. There are also potential Indigenous interests in other areas around the Project components that will be identified as the Project advances.

11.2.1 Social Baseline

A social baseline program is being carried out to:

- Develop community profiles, including past trends, current status, and projections in population and age demographics;
- Characterize trends and current status of housing availability and affordability;
- Characterize demand, supply, capacity, and development planning of local and regional public infrastructure and services; and
- Identify perceptions of local and regional communities and Indigenous nations representatives and service providers on potential effects of the Project on socio-community matters.

As part of baseline development, BGM is working to identify the interests and needs of diverse sub-sets of the community to facilitate discussion of the potential social impacts of the Project as per GBA+ requirements as well as to develop more comprehensive mitigation and enhancement strategies.

To date, the baseline program has included a review of secondary data from key sources, including the following:

- Barkerville Gold Mines' 2010 *Mines Act* Permit Application for the Bonanza Ledge Mine (BGM, 2010);
- Barkerville Gold Mines' 2016 *Mines Act* Permit Application for the Bonanza Ledge Mine (BGM, 2016);
- Barkerville Gold Mines' 2020 Joint Permit Amendment Application for the Bonanza Ledge Mine and QR Mill site (BGM,2020);
- Other BGM permit and regulatory documents;
- Mining industry reports and EAs for similar Projects;
- Local and regional government information, planning, policies, studies, and reports including a recently completed housing assessment for Quesnel;
- Government and service provider websites;
- Statistics Canada and BC Stats data on population and demographics, housing characteristics, community well-being, and other relevant indicators; and
- Reports prepared for other ongoing activities in the area around the Project (e.g., Tree Farm License [TFL] 52 related studies [West Fraser Mills,2018] etc.).

Primary data is being collected via a field program consisting of interviews with local and regional municipal representatives; health, protective, infrastructure, and service providers; others active in the local economy and local residents to verify data and information obtained through secondary sources, address identified data gaps, and obtain views on Project effects. BGM is working with Indigenous nations to identify opportunities to implement collaborative baseline data collection and EA processes addressing their specific interests.

11.2.2 Community Context

An overview of the non-Indigenous communities in the Project area is provided below.

11.2.2.1 District of Wells

The District of Wells, which covers approximately 158 square kilometres (km^2), is located in the Cariboo Regional District approximately 80 km east of Quesnel along Highway 26. The community of Wells (Wells) is located within the District and adjacent to the Mine Site.

Wells was named after Fred Wells, the prospector who discovered the deposit that led to the development of the Cariboo Gold Quartz Mine in 1932. Originally developed as a company town, Wells grew to a thriving community of 4,500 people during the 1940s; however, the population of Wells declined to about 300 people following the closure of the Cariboo Gold Quartz Mine in 1967 (District of Wells, 2010) and has decreased further since that time. The 2016 Census population of Wells was 217 (Statistics Canada, 2017a). Total population change between 2001 and 2016 was -7.7% compared to the total provincial growth rate of 16.6% for the same period (BC Stats, 2015, 2016).

Wells was incorporated as a district municipality in 1998. The current Mayor and Council were elected to a four-year term in 2018. Their priorities are to improve the District's sewer and water infrastructure and to develop an Official Community Plan and a zoning bylaw.

The local economy is based on tourism, including visits to the Barkerville Historic Town and Park (Barkerville) and Bowron Lake Provincial Park, timber harvesting, mineral exploration and development (including placer mining), arts and crafts production and sales, and outdoor recreation. The main employer in the Wells/Barkerville area are BGM and Barkerville.

The community has a lively arts community and features art galleries and artists' studios, cultural events including concerts, courses in the arts, live theatre, and an arts curriculum in the elementary school.

Highway 26, a two-lane paved highway linking Wells to Quesnel, serves as the main transportation route in the area. Users of this road are primarily Wells residents, suppliers to Wells area businesses, and visitors to Barkerville and other tourist destinations, as well as industrial traffic from the logging industry and mining.

As of 2016, Wells had 158 private dwellings, 112 of which were occupied by "usual residents" (Statistics Canada, 2017a). Wells also has many seasonal summer residents, including non-local placer miners, seasonal workers employed at Barkerville and local accommodations, restaurants, and retail businesses, and seasonal resource industry employees. Community services in Wells include paramedics, nurse practitioner visits, and a Royal Canadian Mounted Police detachment.

11.2.2.2 Barkerville Historic Town and Park

Barkerville is located approximately 6 km southeast of the Mine Site along Highway 26. Barkerville is a Province of BC owned Heritage property and designated historic park, and a Government of Canada National Historic Site. In addition, two other National Historic Sites of Canada are located within Barkerville: the Cariboo Wagon Road, built to transport supplies during the gold rush, and the Chee Kung Tong building, an important community building for Chinese workers living in Barkerville during the gold rush.

A non-profit organization, the Barkerville Heritage Trust, operates and manages Barkerville on behalf of the BC Government. The board of the Barkerville Heritage Trust has members that represent communities and/or interests from across the Province.

Barkerville has over 100 historic buildings and is open year-round. Various visitation, interpretation, and live enactment programs are staged during the summer months, and Barkerville is working on expanding the scope of activities available during the winter months to develop a year-round destination. While the park offers visitors accommodations (three bed and breakfasts and four cottages within Barkerville, as well as three campgrounds), no one lives year-round in Barkerville.

11.2.2.3 City of Quesnel

Quesnel is located at the confluence of the Quesnel and Fraser Rivers, approximately 80 km west of the Mine Site and 58 km northwest of the QR Mill site. Quesnel is the service center for the surrounding area.

Quesnel had a 2016 Census population of 12,064, a decrease of 1.2% from the 2011 Census population compared to an increase of 11.6% for the province as a whole over the same time period (Statistics Canada, 2017b). At the time of the 2016 Census, the population of Quesnel was older than that of the province as a whole; however, younger families are now being attracted to the area as a result of favourable house prices and other quality of life factors (Tanya Turner, pers. comm.) It is not uncommon for people working at Barkerville, in Wells or at the QR Mill to live in Quesnel.

Quesnel is part of School District 28 and contains several elementary schools, as well as a Junior and a Senior Secondary School. Quesnel is also home to satellite campuses of the College of New Caledonia and the University of Northern British Columbia, which offer several tertiary education programs (City of Quesnel, 2017). Quesnel is also home to the closest hospital to Wells as well as to the closest commercial airport to the Project with regularly scheduled air service.

Quesnel is considered the gateway to the north Cariboo area, which offers considerable recreational opportunities, including fly-fishing, canoeing, golfing, horseback riding, river rafting, hiking, biking, downhill and cross-country skiing and snowshoeing, among other activities.

11.2.2.4 Likely

Likely, a rural community located approximately 18 km southeast of the QR Mill site (straight line distance), has a population of approximately 350 people (Likely BC, 2018). Businesses in Likely include the Valley General Store, Likely Restaurant and Services, Likely Lodge, and licenced mechanic (Likely BC, 2018). There is no direct road connection from Likely to the QR Mill site.

11.2.2.5 Other Settlements

New Barkerville, located approximately 1 km from Barkerville and 7 km from the Mine Site, is a small unincorporated settlement consisting of eight homes. It was formed when Barkerville was taken over by the BC Government, and the residents were relocated to an area along Reduction Road Hill.

Stanley, Beaver Pass House, Pinegrove, Wingdam, Coldspring House, and Cottonwood House are unincorporated rural areas in CRD Electoral Area C that are located off Highway 26 along the Transportation Route.

The original settlement at Cottonwood House is a provincially and federally recognized historic site. There are a few other unnamed settlement areas that are located along Highway 26 close to the Cottonwood River Forest Service Road as well as east and west of Cottonwood House.

Troll Resort is a small ski and snowboard resort located approximately 30 km west of the Mine along Highway 26, on the north side of the highway.

11.2.3 Potential Interactions with the Community

Potential Project interactions with the community, based on the Project as currently defined and our current understanding of the community are as follows:

- Changes in community character;
- Increased pressure on infrastructure, traffic and roads, medical and community services, due to Project demand or Project-driven population change;
- Potential issues with the community being able to sustain increased infrastructure, etc. once the mine closes should population and tax base decrease;
- Changes to local and regional population and demographics;
- Changes to community health and well-being with a focus on vulnerable sub-populations including low-income families, children and seniors;
- Changes to availability of local housing and temporary accommodation; and

- Changes to health and safety of workers and public, including those associated with noise and light.

Potential mitigation measures include:

- Continuing to work with the community to understand their interests and issues to ensure that proposed mitigation reflects community needs;
- Implementing a mechanism that facilitates community feedback throughout the Project life in an open and transparent manner;
- Working cooperatively with the community in the development of local initiatives that contribute to community health and well-being and maintenance of community character;
- Initiating development of a hiring plan, training plan, skills inventory and other employment planning; and
- Implementing BMPs and Environmental Management Plans (EMPs) that address specific socio-community concerns (i.e., traffic management plan, occupational health and safety plan).

Other potential interactions may be identified as Project studies continue. Through the baseline and assessment, BGM will work to identify potential effects on subsets of the population. Anticipated Project effects and mitigation will be identified and discussed in the EAC Application.

11.3 Economic Overview

An overview of the local and regional economy, economic baseline, and potential effects and mitigation measures is provided in this section.

11.3.1 Local and Regional Economy

The economy of the Wells area is based on tourism and mining with timber harvesting, arts and crafts production and sales, and outdoor recreation also contributing. Businesses in Wells include locally owned restaurants, hotels, gas station, general stores, arts stores, a theatre, and gift shops. BGM and Barkerville Historic Site are the main employers in the area. Businesses in Barkerville include souvenir shops, food vendors and restaurants, accommodations and a theatre. Although historically, Barkerville was only open in the summer months, it is working towards becoming a year-round destination.

The economy of Quesnel is much more diverse, and Quesnel serves as a regional centre for goods and services serving the Wells and Barkerville area.

An economy baseline program is being carried out to:

- Develop community economic profiles, including information on the labour force, employment levels, income, and industry characteristics;
- Characterize economic development initiatives and priorities in the region; and
- Characterize government revenues and expenditures.

Secondary data from relevant, publicly available sources, including the following will be reviewed:

- Mining industry reports and environmental assessments for similar Projects;
- Local government studies and reports; and

- Statistics Canada data on population and demographics, employment and income, and other relevant indicators available through the Census Program of Canada and other available statistical information.

Primary data will be collected via interviews with local and regional municipal representatives, representatives of the tourism industry, and economic development organizations, employers in the region and Interested Parties to fill information gaps and verify secondary research findings. BGM is also working with Indigenous nations to identify opportunities to implement collaborative baseline data collection and reporting into the EA process.

11.3.2 Local and Regional Economic Effect

The Project's procurement requirements for materials, goods, and services would have economic implications for the existing industry and business profile in the Project area. Consumer-oriented spending derived from the wages and salaries of Project employees and employees of Project contractors and suppliers would also support business opportunities and economic development.

The Project is expected to contribute to the local and regional economy by:

- Contributing to tax revenues for local government and revenues for the BC government from personal income and corporate income taxes and various property, consumption, and mineral taxes;
- Providing opportunities for contractors and others during construction;
- Providing well-paying, full-time jobs during operations (all levels);
- Purchasing goods and services from area businesses;
- Helping diversify the local and regional economy;
- Replacing jobs lost in other sectors;
- Enabling people to stay in, or move to, local communities; and
- Supporting businesses through the spending of wages.

It is also recognized that there will be some challenges, including:

- Lack of employees in Wells and, potentially, in the regional area;
- Identifying ways to involve subsets of the community who do not normally participate in mining projects and involving those who do participate in lower-skilled positions with lower wages in higher-skilled and paying traders or other positions;
- Potential price inflation for goods and services in the local area;
- Potential reduction in the availability of goods and services for local residents, at least in the short-term; and
- Increased demand for local government expenditures.

Potential mitigation measures include:

- Continue to engage with the community and encourage feedback.
- Work with the community to identify mitigation measures that will be effective in the community, and
- Work to understand the local labour market and implement employment and training plans, as needed.

BGM recognizes that the success of the Project depends on working with local and regional communities to develop projects that strengthen the social, economic and environmental fabric of the area.

11.4 Land and Resource Use, Recreation, and Tourism

A summary of traditional and non-traditional land and resources uses near to the Project area is provided below.

11.4.1 Use of Lands and Resources for Traditional Purposes

Project components and activities have the potential to adversely affect the use of lands and resources for traditional purposes that support traditional diets, economies, social and spiritual life, governance, and cultural transmission (e.g., transfer of traditional language, laws, stories, and beliefs associated with places and sites on the landscape, harvesting of resources, and formation and maintenance of cultural identity). Potential Project-related effects may also extend to the exercise of rights that may be associated with that use.

Information on Indigenous interests in the Project is being identified through consultation with Indigenous nations. This information will be supplemented where needed by information from publicly available sources, including published reports and studies and regulatory submissions for other projects in the area.

Potential interactions between the Project and use of land and resources for traditional purposes include:

- Change in the ability to access preferred locations used for traditional purposes;
- Change to the safe and productive use of the land for traditional purposes by Indigenous nations;
- Changes in presence, absence, abundance, quality or spatial distribution of freshwater, terrestrial, or other resources that are currently used for traditional purposes;
- Changes in the quality of experience associated with the current use of lands and resources for traditional purposes as a result of items such as increased activity in the area, noise, dust, light, etc.; and
- Changes to Indigenous interests, including socio-economic status, community well being and cultural sustainability (e.g., the ability to transfer Indigenous knowledge).

Potential mitigation measures include:

- Continuing to work cooperatively with Indigenous nations to identify concerns and develop specific mitigation plans that address their use of lands and resources;
- Incorporating traditional knowledge and traditional land use in Project planning;
- Maintaining an ongoing dialogue with Indigenous nations to ensure that their specific interests and concerns are understood and that they have the information required to contribute to the discussion of potential effects and mitigation;
- Mitigation as discussed earlier for noise, dust, light, water quality, traffic, etc.; and
- Developing strong working relationships with the Indigenous nations based on trust and transparency.

11.4.2 Non-traditional Land and Resource Use

The Project area falls entirely within the 2,077,233 ha Quesnel River Sustainable Resource Management Plan (SRMP), one of seven management areas defined within the CCPUP area, which coincides with the Quesnel Forest District and the Quesnel Timber Supply Area (FLNRO 2007). The SRMP does not apply to private land or protected areas.

The Mine Site overlaps the District of Wells Official Community Plan area and any required zoning changes will be addressed in consultation with the District of Wells as required by local zoning bylaws.

The Project area supports a diverse range of commercial and non-commercial land uses including mining and mineral exploration, forestry, hunting and trapping, guide outfitting, outdoor recreation, livestock range, and residential settlement. Mining and exploration date back to the 1860s during the Cariboo Gold Rush period when miners and prospectors frequented the area for exploration of the Cariboo goldfields. Commercial timber harvesting occurs in the Project area in West Fraser's TFL 52 tenure. The Wells Barkerville Community Forest, which covers approximately 4,300 ha north of Wells, is managed by the District of Wells and provides recreation trails, forms part of the town's viewscape, is a popular non-timber forest product harvesting area and contains one local home (District of Wells Website, 2019). A review of available ParcelMap BC information (DataBC, 2017) indicates the property types that may potentially be overlapped by the Mine Site surface infrastructure and associated access roads include privately owned, crown provincial, municipal and inactive crown subdivision. Current crown tenure types overlapped by Mine Site surface infrastructure and associated access routes include commercial, community, institutional (application accepted), and miscellaneous land uses (planning/marketing/development projects) and rural residential (DataBC, 2019b). The QR Mill and Transportation Route will not require any additional land acquisition. The Transmission Line route is in the process of being finalized and predominately follows forest service roads or other disturbed areas located on crown land, along with crossing private properties near Barlow substation and Wells.

Heritage tourism is an important activity with the Barkerville Historic Town and Park, located 6 km east of Wells, being internationally recognized as a tourist destination (Barkerville Historic Town and Park, 2018). Outdoor recreation is a regional tourist attraction, particularly snowmobiling in the winter that uses an extensive system of groomed trails near Wells and Barkerville.

Hunting, trapping and guide outfitting occurs throughout the Project area for a variety of species. Recreational activities such as angling, canoeing, boating, and swimming occur on Jack of Clubs Lake.

Highway 26 links the Wells-Barkerville area to Quesnel to the west and Bowron Lake Provincial Park to the northeast. Numerous forest service roads support access to resource development locations and outdoor recreation and tourism activities in the area.

Baseline data was collected from secondary and primary information sources. Secondary data was accessed from a variety of sources, including:

- Barkerville Gold Mine 2010 *Mines Act* Permit Application for the Bonanza Ledge Mine (BGM, 2010);
- Barkerville Gold Mine 2016 *Mines Act* Permit Amendment Application for the Bonanza Ledge Mine (BGM, 2016);
- Local, regional, and provincial land use plans, studies, and reports (e.g., CCLUP and Quesnel Sustainable Resource Management Plan);

- Tenure and ownership information and mapping from the Integrated Land and Resource Registry and DataBC databases;
- Information on parks and protected areas and their use from Parks Canada and B.C. Parks publications and websites;
- Information about forestry tenure and harvesting activity from the FLNRORD;
- Information about mining tenure and mining activity from the EMPR;
- Wildlife harvesting regulations and data provided by the FLNRORD; and
- Tourism and outdoor recreational use information collected from available tourism, recreational club, and service provider reports and websites.

Based on the results of the desktop analysis of secondary data, primary source information is being gathered through a field program of interviews and/or mapping sessions to confirm findings as well as address gaps. Interviewees include representatives of local, regional and provincial governments, outdoor recreation user groups, tourism operations, resource interests, authorization holders, and the BC Conservation Officer Service, among others.

11.5 Visual Quality

Visual quality of the landscape is highly valued by both residents and visitors within BC and is particularly important for an area where the landscape supports tourism and recreation values (BC Ministry of Forests, Mines and Lands, 2010). The Project area is recognized as having visual landscapes associated with tourism (i.e., Barkerville) and access corridors leading to tourism and recreation areas such as Jack of Clubs Lake, Wells Snowmobile Club trails, and Bowron Lakes Provincial Park. Scenic areas management of the landscape surrounding the Project is identified as an objective in current land and resource planning (i.e., CCLUP and the Quesnel Sustainable Resource Management Plan [QSRMP]) (FLNRORD, 1998, 2007).

A desktop review of existing information provided an understanding of the current visual quality and context of visual quality management in the Project area. The desktop analysis of existing information included the following data sources and processes:

- Review of the Barkerville Gold Mine 2010 *Mines Act* Permit Application for the Bonanza Ledge Mine (BGM, 2010) and the Barkerville Gold Mine 2016 *Mines Act* Permit Amendment Application for the Bonanza Ledge Mine (BGM, 2016);
- Review of local, regional, and provincial land use plans, visual assessment studies, and reports to identify visual quality management policy and objectives;
- Review of the current BC Visual Landscape Inventory database to identify established viewpoints, related visually sensitive areas, and classification of visual characteristics (Government of BC, 2018d); and
- Review of data describing topography, water features, land cover, transportation networks, recreation and tourism features, and orthographic imagery to understand the existing landscape and cultural features surrounding the Project, and to determine preliminary locations for viewing the Project.

A photographic field survey program was undertaken in 2018 to inventory and describe the existing landscape setting and viewing conditions surrounding the Mine Site as a baseline for measuring potential visual effects. This program included ground level site photography taken from several potential viewing locations along Highway 26, from the town of Wells, and from recreation and tourism sites. A second field program occurred in July 2019 to collect a daytime and nighttime photographic inventory of the Project Area from viewing location within the District of Wells, Cottonwood House, Barlow Creek, along Highway 26 and the 500 Nyland Lake Road, and from nearby recreational areas (e.g., Cow Mountain Trail, Deacon Creek Trail, Troll Ski Resort). Photos were compiled into a photographic inventory, which includes panoramic images.

While there is no provincial or federal legislation that regulates the effects of mine development on visual quality, guidance for management of visual quality exists in part through a number of relevant regional and local strategic land use and resource planning policies and guidelines (e.g., the CCLUP, the QSRMP, the District of Wells Official Community Plan). These indicate that viewing opportunities of the environment surrounding the Project area are valued and that scenic landscapes are important for recreation and tourism opportunities in the region.

Additional baseline surveys in 2020 will be completed along the Northern Transmission Line Route.

11.6 Heritage

The Project is located in the Quesnel Resource District within the Interior Plateau Culture Area, defined by the FLNRORD Archaeology Branch (FLNRORD, 2018b). The heritage resources within the Project area are composed of palaeontological, archaeological, and historical sites, objects, and features. Archaeological or historical sites that predate AD 1846 are automatically protected under the *Heritage Conservation Act* (Government of British Columbia, 1996a).

Palaeontological sites are defined as locations containing fossilized remains, imprints, or traces of past plants or animals. Archaeological sites are defined as locations containing physical remains of past human activity which are studied through the methods and techniques employed in the discipline of archaeology (FLNRORD, 2018c). Indigenous nations have been present in the Project area since time immemorial. Archaeological sites can be associated with pre-contact or post-contact periods, that is, the time before and after the first arrival of non-Indigenous people in the region.

Historical sites are defined as any structure, site, or thing that is of historical or architectural significance (Parks Canada, 2018). Historical sites and locations in BC are primarily attributable to post-contact Euro-Canadian settlement and land use, but also include habitations and other evidence left by Indigenous people. These historical sites include structures, engineering works, architectural features, and artifacts.

Information and data sources accessed to compile baseline heritage data include:

- Geoscience Data Repository, Earth Science Sector (Government of Canada, 2018b);
- Geoscan (Government of Canada, 2018a);
- Geogratis – geographical maps, data, and publications (Government of Canada, 2018c);
- National Research Council Research Press (NRC Research Press, 2018);
- Provincial reports and maps (using the online publication database maintained by the Province of BC and the Provincial Archaeological Report Library maintained by the Archaeology Branch [FLNRORD, 2018d]);

- Provincial Heritage Register (using the Remote Access to Archaeological Data [RAAD] application maintained by the Archaeology Branch [FLNRORD, 2018a]);
- Ethnographic reports (Archaeo, 2002);
- Archival photographs (Barkerville Historic Town and Park, 2018; Holler, 2015);
- Historical land use records (Barkerville Historic Town and Park, 2018; FLNRORD, 2018d); and
- Canadian Register of Historic Places (Parks Canada, 2018).

A palaeontological resource baseline overview and a heritage resources overview assessment have been completed for the Project (Branta, 2017; Golder, 2017). Both studies focused on existing information, identified the distribution of known heritage resources, and modelled heritage site potential. Heritage resources are known to exist within, and adjacent to, the Project area. Recorded sites and features strongly correlate with specific landforms and environmental characteristics present elsewhere in the Project area, suggesting that there are areas with potential for as-yet unrecorded heritage resources.

Heritage resources that have the potential to interact with the Mine Site were identified through a review of available information and a heritage resource impact assessment (HRIA), recognizing that undetected heritage resources may also be encountered during the life of the Project. Field work was conducted August 9 to 25, 2017, guided by the results of the heritage resources overview assessment (HROA) completed in early 2016. A total of 679.4 ha was surveyed by pedestrian and vehicle reconnaissance and 58 subsurface tests were excavated. The field survey identified one new archaeological site and 381 historical features were observed and recorded. An additional 301 inferred historical features were identified following the field survey and a cross comparative analysis using the recovered data and available LiDAR, for a total of 682 historical features.

An HRIA was completed June 25 and 26, 2019 for the area potentially affected by upgrades to the QR Mill and new workers camp at the Mine Site, respectively. No areas of potential for the presence of subsurface archaeological materials or protected archaeological sites were identified at the QR Mill or workers camp. Nine properties, characterized as historical features, were identified at the workers camp that post-date AD 1846, which are not automatically protected under the *Heritage Conservation Act.* Additional archaeology work is not recommended for these areas, provided no additional ground disturbance is required outside of the existing QR Mill or Mine Site footprint.

Although the *Heritage Conservation Act* does not confer automatic protection to historical features and properties that post-date AD 1846, due to their historical value, detailed documentation is recommended prior to ground altering activities. Management of heritage resources will be on-going as detailed design plans for the Project progress. BGM will have a Chance Find Procedure in place during all phases of the Project. Identified heritage resources will be managed and mitigated in a manner consistent with applicable legislation, policies, and guidelines.

11.6.1 Baseline Studies Recently Completed and Proposed / Planned

The heritage inspection baseline program for the Northern Transmission Line route option was conducted during the summer of 2020. The results, which are currently being compiled, will be incorporated into the EAC Application.

11.7 Human Health and Ecological Risk Assessment

Project site information specific to the Human Health and Ecological Risk Assessment (HHERA) component will be described using a combination of available information from previous reports and data collected during the 2016, 2018, 2019 and 2020 baseline sampling programs.

A summary of the following previously prepared documents is provided below as it relates to the type of information available and whether it can be utilized to support the HHERA for this Project:

- Human Health Risk Assessment for Wells, BC (Golder, 1993);
- Island Mountain and Cariboo Gold Quartz Mine Waste Preliminary Ecological Risk Assessment (Azimuth, 2010);
- Preliminary Human Health Risk Assessment of the Wells Tailings Site (SNC Lavalin, 2010); and
- Risk Based Detailed Site Investigation, Wells Tailings Deposit, Wells, BC (SNC Lavalin, 2011).

In 1993, a human health risk assessment was conducted for residents of Wells associated with exposure to arsenic in soils for concentrations ranging from 30 to 150 milligram/gram (mg/g) (Golder, 1993). The human health risk assessment was undertaken following large-scale remediation of soil containing arsenic concentrations in excess of 150 mg/g within the town and utilized a multi-media approach (Golder, 1993). The exposure pathways included in the risk assessment were soil, sediment, and tailings (adjacent to the Jack of Clubs Lake and the Willow River), ground and surface water, fish from Jack of Clubs Lake and the Willow River, and fruit and vegetables grown in the arsenic-containing soils within the town (Golder, 1993). While the data used in the 1993 risk assessment are too old to be representative of current conditions, they do provide historical context that can be included in the HHERA to support the Project.

In 2009-2010, a Risk Based Detailed Site Investigation (DSI) was conducted for the crown-related portions of the tailings and aquatic receiving environment associated with the historic Island Mountain and Cariboo Gold Quartz mines (SNC Lavalin, 2011). The DSI identified areas of concern (AEC) and contaminants of potential concern (COPCs) within each AEC. In addition, a detailed field investigation was conducted in 2009 to support the HHERA, including the collection of sediment, water, soil, vegetation, and insects. Following the DSI, a Preliminary Ecological Risk Assessment (Azimuth, 2010) and a Human Health Risk Assessment (SNC Lavalin, 2010) were conducted to evaluate the potential health risks of COPCs identified in the DSI to people and ecological receptors. These reports were used to provide context to the Project, but the data are again not current enough to provide an estimate of baseline conditions for the HHERA.

Based on the review of the above documents, proposed baseline sampling and data collection within the Project area to support the HHERA included the following:

- Co-located soil, vegetation (grass, leaves, and berries), and soil invertebrate samples to be analyzed for metals and polycyclic aromatic hydrocarbons (PAHs) (soil was also be analyzed for total organic carbon);
- Fish tissue samples to be analyzed for metals and PAHs;
- Surface water sample collection and field measurement of physical parameters;
- Dietary preferences and consumption rates for local Indigenous nations; and
- Drinking water quality data from communities using public water supply in proximity to the Project.

Co-located soil and vegetation samples and co-located soil and soil invertebrate samples were collected in 2018 and fish tissue samples were collected and analyzed in 2016 and 2018. Additional baseline sampling was completed in 2019 to include the QR Mill.

The soil, vegetation, and soil invertebrate baseline sampling program was developed in general accordance with the BC Field Sampling Manual (BC Ministry of Environment and Climate Change Strategy, 2013), the First Nations Food, Nutrition and Environment Study (FNFNES) (Chan et al. 2011), and the Supplemental Guidance on Human Health Risk Assessment for Country Foods ($HHRA_{Foods}$) (Health Canada, 2010). The guidance documents were used to develop study objectives, sampling procedures, and quality assurance / quality control (QA/QC) protocols for the sampling of soil, vegetation, and soil invertebrates.

Soil samples were collected from each plant and soil invertebrate sample location from the surface (top 15 cm). The types of vegetation collected were selected to represent plant types consumed by humans and/or wildlife and included berries, grasses, and leaves consumed by humans and wildlife. Soil, vegetation and soil invertebrate samples were sent to an accredited laboratory and the following analyses completed:

- Soil samples - moisture content; pH; total organic carbon; total metals, including mercury; and polycyclic aromatic hydrocarbons (PAHs);
- Vegetation samples: moisture content; total metals, including mercury; and PAHs; and
- Soil invertebrate samples - moisture content; total metals, including mercury; and PAHs (composite samples only).

Fish samples for chemical analysis were captured opportunistically during fish distribution and abundance fieldwork, and certain locations identified as having target species present were revisited to collect fish samples. Fish were captured through a combination of electrofishing, gill netting, minnow trapping, and angling. Samples of rainbow trout (*Oncorhynchus mykiss*), burbot (*Lota lota*), pygmy whitefish (*Prosopium coulterii*), and mountain whitefish (*Prosopium williamsoni*) were collected for muscle and liver tissues analysis as these species are likely to be consumed by humans. Samples of rainbow trout, longnose sucker (*Catostomus catstomus),* and white sucker (*Catostomus commersonii*) were collected for whole body tissue analysis as these species are likely to be consumed by wildlife. Surface water samples were collected from Rudy Creek and Sandy Lake on 11 June 2019 and from Maud Creek on 12 June 2019. The following analyses were completed for the fish tissue and surface water samples:

- Fish tissue samples - moisture content; total metals, including mercury; PAHs; and speciated mercury (a sub-set of samples only).
- Surface water samples - physical tests: colour, hardness, pH, total suspended solids (TSS), total dissolved solids (TDS), and turbidity; anions and nutrients: acidity (as $CaCO_3$), alkalinity (as $CaCO_3$), total ammonia (as N), bromide, chloride, fluoride, nitrate (as N), nitrite, total nitrogen, total phosphorus, and sulfate (SO4); dissolved and total organic carbon; total metals, including mercury.

Following a review of the laboratory results, it was determined that the data collected are considered suitable for inclusion in the human and wildlife health risk assessment because the data will be pooled for calculation of statistics, and the variability within samples was random (i.e., no systematic bias).

Sensitive or vulnerable environmental, economic, social, heritage, or health values considered in the HHERA are as follows:

- Indigenous interests and land use (refer to Section 9.6); and
- Federally and provincially listed fish, plant, and wildlife species with the potential to occur in the Project area (see Sections 10.3.7, 10.3.10 and 10.3.11).

11.7.1 Baseline Studies Recently Completed and Proposed / Planned

The HHERA baseline program for the Northern Transmission Line route option will include two main field surveys.

Co-located soil and vegetation (grass, leaves, and berries) baseline samples will be collected for analysis of metals and polycyclic aromatic hydrocarbons (PAHs). Soil will also be analyzed for total organic carbon. Baseline metals and PAH data are necessary to determine current exposure via plant ingestion and incidental soil ingestion, and to determine the uptake relationship between soil and plants in the area. This uptake relationship will be used to predict future concentrations of metals and PAHs in soils and plants due to deposition. Samples of vegetation likely consumed by people and/or wildlife will be targeted for collection. A soil sample will be collected at each of the vegetation sampling sites.

In addition to the above, co-located soil and soil invertebrate baseline samples will be collected for analysis of metals and PAHs, which will be used as inputs into the wildlife food chain model.

12.0 PUBLIC AND ENVIRONMENTAL SAFETY

BGM acknowledges that the Project must take into account the environmental effects of accidents and malfunctions that may occur in connection with the Project. General categories pertaining to malfunctions or accident scenarios associated with public and environmental safety, including preliminary risk ratings and risk management, are summarized below. The EAC Application will provide additional details on potential accidents or malfunctions which could occur in connection with the Project, the potential effect of such incidents on the environment and the public, and mitigation measures that will be implemented as part of the Project design.

12.1 Project Updates and Changes

Information pertaining to Public and Environmental Safety was not provided for the IPD submission; therefore, no updates or changes to Project information have resulted.

12.2 Engagement Activities

Early engagement activities identified concerns related to Public and Environmental Safety, including issues related to water quality, tailings management and residential traffic safety, among others. These concerns and the project decisions relating to them are summarized and provided in Table 15 of Section 2.4.BGM acknowledges that the Project must take into account the environmental effects of accidents and malfunctions that may occur in connection with the Project. General categories pertaining to malfunctions or accident scenarios associated with public and environmental safety, including preliminary risk ratings and risk management, are summarized below. The EAC Application will provide additional details on potential accidents or malfunctions which could occur in connection with the Project, the potential effect of such incidents on the environment and the public, and mitigation measures that will be implemented as part of the Project design.

12.3 Malfunction or Accident Scenarios

Table 38 provides a preliminary summary of potential Project malfunctions and accidents, including potential environmental effects, and associated consequence, likelihood, and risk ratings. Within this table, consequence ratings provide context on the significance of potential environmental effects, likelihood ratings provide context on the probability of a potential accident or malfunction occurring, and risk ratings are derived from the product of the consequence and likelihood ratings. These ratings, as well as the proposed malfunction and accident list, will be holistically reviewed as part of the Environmental Assessment process, and ratings may alter based on the detailed assessment; this assessment will include the potential effects on the biophysical and human environment as well as mitigation and proposed associated management plans.

Table 38: Preliminary Project Malfunction or Accident Scenarios

Accident or Malfunction	Potential Environmental Effects	Consequence[1]	Likelihood[2]	Risk[3]
Fire	Effects to human health (injury) and temporary changes to air quality.	Moderate	Unlikely	Moderate
Explosive accident (accidental detonation of explosives, fly rock from blasting)	Changes to air quality and effects to human health.	Major to Critical	Rare	Low to moderate

Accident or Malfunction	Potential Environmental Effects	Consequence[1]	Likelihood[2]	Risk[3]
Flood - Accidental discharge of sediment and metals from tailings management facility or waste rock stockpile	Increased total suspended solids and metal contaminants downstream resulting in changes to surface water quality and sediment quality which can affect aquatic resources, fish and fish habitat, human health, and current use of lands and resources for traditional purposes.	Moderate	Rare	Low to Moderate
Flood - Inability to manage water inflow into underground mine works	Decreased air and water quality in the underground environment affecting human health.	Major to Critical	Unlikely	Moderate
Spill - Hazardous materials release to land	Changes to soil quality which can affect vegetation, and current use of lands and resources for traditional purposes.	Minor	Likely	Moderate
Spills - Hazardous materials release to water	Changes to surface water and sediment quality which can affect aquatic resources, fish and fish habitat, and current use of lands and resources for traditional purposes.	Moderate	Possible	Moderate
Vehicle or Equipment Accidents	Effects to human health (injury or fatality).	Major to Critical	Unlikely	Moderate
Tailings dam breach	Localized changes to soil quantity and quality, terrain stability, hydrology, and surface water quality and quantity which can affect vegetation, wildlife and wildlife habitat, aquatic resources, fish and fish habitat, human health, and current use of lands and resources for traditional purposes.	Moderate to Minor	Rare to not applicable	Low
Waste rock stockpile slope failure	Effects to human health (injury).	Moderate	Unlikely	Moderate
Failure of underground mine stability	Effects on terrain stability and human health (injury or fatality).	Major to critical	Rare	Low to Moderate
Power Failure	Potential effects to human health in the underground environment.	Major	Rare	Low
Adverse Weather	Effects to human health (injury).	Moderate	Rare	Low

Notes:

[1] Consequence is categorized into five different categories: Critical – Long-term, widespread, significant environmental effects; Major – relatively widespread, long-term, serious environmental effects; Moderate – Moderate short-term, widespread effects, some impairment on ecosystem; Minor - minor short-term damage to small areas; and Insignificant – limited damage to minimal area of low significance.

[2] Likelihood is categorized into five categories: Almost certain (90 to 100 percent chance of occurring); Likely (55 to 90 percent chance of occurring); Possible (30 to 55 percent chance of occurring); Unlikely (5 to 30 percent chance of occurring); and Rare (less than five percent chance of occurring).

[3] Risk is derived from the product of likelihood and consequences.

12.4 Discussion of Moderate and High Malfunctions and Accident Scenarios

Tailings Dam Breach

A tailings dam breach is preliminarily rated as a “very high” consequence classification according the Canadian Dam Association’s Dam Safety Guidelines. Failure of the tailings dam would result in increased total suspended solids and metals into the receiving environment. BGM proposes the Filtered Stack Tailings Storage Facility (FSTSF) with a design that takes into consideration the dam consequence classification to establish factors of safety and design basis that are conservative to migitate the potential risk. The FSTSF incorporates the three components of Best Available Technology (BAT) for tailings management: 1) the existing TSF surface water will be dewatered from the impoundment; 2) the tailings will achieve unsaturated conditions through drainage; and 3) the tailings will achieve dilatant conditions (i.e., increased viscosity) through compaction. Thus, the likelihood for FSTSF failure is considered Rare to not applicable due to the lack of free water in the FSTSF and water in tailings voids to drive the process. The consequence of failure of the FSTSF would be considered Moderate to Minor, and would be limited to localized slumping of the tailings. Additional information related to filtered tailings is provided in Appendix E.

Flood - Accidental Discharge of Sediment and Metals from the Tailings Management Facility or Waste Rock Storage Facility

Release of tailings and potential increased scouring from that release as a result of flooding would be the worst-case scenario of an accidental discharge of sediment or metals from tailings or waste rock. The FSTSF relies on the MZP to store excess runoff and flood water during operations. This release of water from the MZP would lead to effects on surface water and sediment quality, vegetation, fish and fish habitat, and human health. It’s anticipated that this release could lead to multiple exceedances of surface water quality guidelines for the protection of aquatic life and could potentially effect drinking water quality for downstream communities.

The MZP has the capacity to store a 50-year, 100-day rain-on-snow event (with treatment); in the unlikely event that the Water Treatment System at the QR Mill site is non-operational, the MZP has the capacity to store a 1,000-year, 10-day rain-only event below the spillway invert. Thus, the likelihood of an accidental discharge from the MZP is considered Rare. Release of the MZP can cause increased contaminant loading in the downstream receiving environment.

Hazardous Materials Release to Land and Water

Vehicle accidents, containment leaks or ruptures, or poor storage and handling could result in a minor fuel spill or hazardous materials release to land or water. The consequence rating is higher for a spill or release to water than it is to land because aquatic systems tend to be more sensitive to the effects of spills and releases than terrestrial systems. However, the likelihood of a spill or release to water was predicted to be lower than a potential spill to land because of Project design criteria and multiple management plans that would be designed to minimize the potential for adverse effects to water quality.

Hazardous materials release to water could result in elevated concentrations of hydrocarbons above applicable guidelines affecting vegetation and fish and fish habitat through the alteration of soil and water quality, or direct physical damage to plants and fish through contact or ingestion of contaminants. In addition, fish behaviour can change after exposure to sublethal concentrations of spilled contaminants in response to the physiological changes caused by the toxins. It is anticipated that effects of hazardous materials release on biophysical valued components would be of high magnitude, short to long term in duration, and reversible. Based on these

considerations, the proponent predicted that the effects of hazardous materials release to fish and fish habitat, wildlife and wildlife habitat, human health, and the current use of lands and resources would be not significant.

Failure of Waste Rock Storage Facilities or Stockpiles

The current Project design standards incorporate the potential for stockpile failure at maximum capacity and; therefore, did not identify any environmental effects from a failure of waste rock storage facilities. While the worst-case scenario involves failure of the waste rock pile at the peak storage capacity, this is unlikely based on the conservative design standards, the geological stability of the Project area, the implementation of best management practices for waste rock storage facility construction, and proactive monitoring of facility stability. Although it is predicted that human injury may occur as a result of a waste rock storage facility slump or failure, effects on human health were considered not significant and are unlikely to occur.

Failure of Underground Mine Stability

The failure of underground mine stability would be very rare because of design safety factors and continuous inspection. The worst-case scenario would result in one or more injuries or fatalities. BGM is committed to developing and implementing a detailed Emergency Response Plan to address mine collapse incidents. The magnitude of the potential effect on human health is considered high due to the possibility of injury or fatality. It is concluded that the effects on human health as a result of the failure of underground mine stability would be significant, but that these events would be rare in occurrence.

Explosive Accident

Based on historical trends, the likelihood of an explosive accident or potential accidents resulting from the use of explosives, including injury to personnel from fly rock during blasting activities, would be rare. A worse-case scenario would involve the detonation of a fully stocked explosives magazine, which would likely be caused by human error and have major to critical consequences.

In the event of an explosion, there would be short-term air quality effects from fire and smoke which would be reversible. It is predicted that in the worst-case scenario, detonation of an explosives magazine could largely affect human health and safety, including fatality and injury. The magnitude of a potential explosion on human health is predicted to be high, long-term and partially reversible to permanent depending on the consequence. Therefore, it is predicted that the potential effects of an explosive accident to human health would be significant, but that the event would be unlikely to occur. It is not anticipated that any other biophysical or socio-economic effects to occur as a result of an explosive accident.

Vehicle Accidents

It is anticipated that Project-related traffic would increase the overall vehicle collision rate along the Transportation Routes during operations. Preventative measures such as strict adherence to speed limits, communication protocols, driver codes of conduct, and maintenance of access and haul roads would lower the risk of the worst-case scenario vehicle accident.

Based on these considerations, it is predicted that the potential effects of vehicular accidents to human health would be significant but unlikely to occur.

12.5 Associated Mitigation and Management Plans

Additional information on the potential for accidents and malfunctions to occur during construction and operations will be assessed in the EAC Application. The assessment will include the potential effects on the biophysical and human environment and include mitigation and proposed management plans. The mitigation measures and

management plans will align with plans implemented by local agencies, such as emergency response plans and procedures. The Construction Environmental Management Plan will include emergency response procedures to address events related to accidents and malfunctions during construction, such as spills and unauthorized releases.

During operation, measures will be implemented to mitigate the potential for accidents and malfunctions occurring, as well as resulting consequences, through adherence to regulatory requirements and management practices. Emergency response procedures will be prepared to address events related to waste resulting from accidents and malfunctions. Precautions will be taken to avoid spills of hazardous materials to both land and aquatic environments. To reduce the potential for accidental discharges of emissions or effluent, Project personnel will be trained in the handling, containment, storage, transport, and replenishment of the materials.

BGM has prepared a general Emergency Response Plan (ERP) for the Project as well as Site-Specific Emergency Response Plans (SSERP) for the QR Mill and the Mine Site (including Bonanza Ledge Mine and the Underground Mining Program). These Plans address potential malfunctions or accidents with the potential to affect the natural environment or the public.

Risks associated with the features above will be addressed in detail for each Project component through appropriate studies, site selection and design where feasible, and will be incorporated into the emergency response plans. Site selection and design alternatives for the Project is discussed in Sections 7.5 and 7.6, respectively.

Specific environmental risks and potential impacts will be addressed as a component of the EAC Application. Risks, impacts and mitigation approaches will also be provided as part of the EAC Application.

12.6 Risk Management

Risk Management is addressed in BGM's Emergency Response Plan. BGM manages risks associated with incident response actions based on the following principles:

- Activities that present a high risk to workers, responders and the public must be limited to only situations where there is a potential to save endangered lives. Life preservation is the number one priority in every incident; this includes the safety of responders.
- Where there is no possibility to save lives, personnel should not attempt high-risk operations.
- Activities to protect the environment or property are recognized as inherent risks to the safety of response personnel, and actions should be taken to reduce or avoid these risks.

13.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

This section provides a summary of climate change projections, such as precipitation, solar radiation and snow cover. A description of potential extreme weather events and changes in the physical environment is also provided.

The climate conditions encountered throughout the Project area influence many physical processes, for example flooding, drought and wildfire frequency and intensity. The characterization of the climate conditions is important to support the EAC Application assessment studies (e.g., hydrology, water quality, and aquatic life impact assessments) and allows for assessment of potential impacts that these climate changes may have on the Project.

Reviews of the existing climate conditions for the Mine Site and the QR Mill were completed between 2016 to 2019. The scope of work for these climate studies included literature reviews, statistical analysis of historical climate records in the Project vicinity, field surveys, and mathematical modelling.

13.1 Project Updates and Changes

Additional information will be required to address potential effects of the environment on the Northern Transmission Line Route, as this is a new Project component.

13.2 Climate Change Projections

Typically, for the area of BC in which the Project is located, we can expect a number of changes in the climate into the late century, including increased summer temperatures, increased precipitation intensity and frequency, increased wildfires, changes to flood timing and intensity, changes to snowpack and drought conditions, and changes to winter precipitation and temperature.

Results of the initial studies are provided below, describing conclusions on climate change predictions. Further studies are needed using local climate projections from sources such as the Climate Atlas of Canada, Pacific Climate Impacts Consortium, Intensity-Duration-Frequency Curves under Climate Change tool, and other local climate studies to identify the key climate risks for the Project. Once the changes in climate parameters have been identified, this will help to inform an assessment of climate risks to the site in order to complete resilience planning for the infrastructure and operations.

13.2.1 Precipitation

While the statistical increasing precipitation trend from historical data recorded at the ECCC Barkerville station is weak and based on the timing of a few dry and wet years which occurred more than 60 years ago, recent climate change model predictions concur and also indicate likely increasing precipitation totals over the next several decades (until 2100). According to the climate change model predictions, most of the increase is expected to come during winter, with the least during summer.

13.2.2 Air Temperature

Climate change predictions indicate an increase in air temperature over the next several decades and across all seasons.

13.2.3 Relative Humidity

While the historical trend analysis indicates a decrease in mean annual relative humidity over time, climate change model predictions suggest an increase, although a very small one, over the next several decades up to 2100. The influence of a 0% to 2% absolute increase in relative humidity, as suggested by the climate change model predictions, on evaporation and evapotranspiration rates would be small.

13.2.4 Solar Radiation

Historical trend analysis of the derived solar radiation records indicates a historical decreasing trend of mean annual solar radiation of approximately 14 watts per square meter (W/m^2) over 100 years (or 0.14 W/m^2/year).

13.2.5 Evaporation and Potential Evapotranspiration

Evaporation and evapotranspiration are likely to change as depending variables, primarily air temperature, are changing. The extent of the change depends on the climate change scenario. It is recommended that the Morton Model be used to estimate the change rates once specific climate change scenarios are selected.

13.2.6 Snow Cover

Potential changes in winter air temperature will likely lead to changes in snow cover. Climate change model data published for the province of BC by ECCC (2018c) indicate an overall decrease in snow depth moving into the future. Based on scenarios derived from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report (AR5), snow depth for the Project area is predicted to decrease by 12.9 cm for December to February, and 16.1 cm for March to May relative to the 1986 to 2005 reference normal levels. As snowfall is predicted to increase, the decrease in snow depth on the ground is related to an increase in mid-winter thaw events and/or to an increase in snow cover density.

13.3 Extreme Weather Events

Extreme weather events which may impact the Project include heavy precipitation, extreme temperatures, flooding, drought, wind, and wildfire. As part of the review of changes to climate parameters, we will review typical historical extreme weather events, and complete an assessment of how the intensity or frequency of these events may change in years to come. Engagement with local Indigenous nations community members is recommended at this stage to understand typical extreme weather events and associated environmental impacts.

13.4 Physical Environment

Changes in the physical environment, including fire, natural seismic events and associated effects such as liquefaction or subsidence, and slope stability, may affect proposed Project activities. Due to the physiography of the surrounding environment (predominantly mountainous, sub-alpine forest), likelihood and consequences will be reviewed as a component of the environmental risks described in the EAC Application. The physical environment can also be affected by climate change, thereby increasing or decreasing the magnitude of effects from the scenarios described above.

13.5 Risk Management and Mitigation

Once climate risks have been established, a fulsome inventory of all project and mine lifecycle components which might be impacted by changes to the future climate can be developed, including site infrastructure, buildings, operations, mine decommissioning/reclamation planning, impacted personnel, fish, vegetation, wildlife and the natural habitat within which they exist. Following the development of this breakdown, BGM will complete a high-level risk assessment to address which Project components will be impacted by each of the identified climate parameters and extreme weather events, along with a magnitude of the severity of impact for each. Through this risk assessment, BGM will prioritize core climate risks to be addressed in the short and long term in order to ensure climate resilience is integrated into mine planning and operational strategy. For example, the overall water balance for the mine operations and processing will be impacted by changes to precipitation and drought patterns. The water balance will be updated for future climate based on the timeline for impacts and the mine lifecycle.

14.0 POTENTIAL PROJECT EFFECTS

The assessment of potential Project effects is described in the section below and includes the following tasks: issues scoping and preliminary identification of Valued Components (VCs); determination of potential effects; mitigation and management strategies; determination of residual effects and cumulative effects; and monitoring requirements. Trans-boundary effects are also described. Preliminary project effects have been identified here and will be further discussed in the EAC Application.

14.1 Project Updates and Changes

A summary of Project updates and changes related to Project components that may impact VCs is discussed in Section 7.1, and further information will be provided in the EAC Application. The effects assessment will focus on the Project details and potential effects associated with the Project description.

14.2 Engagement Activities

The selection of Project-specific VCs will take into consideration comments collected during engagement activities, ensuring VCs and the corresponding effects assessment addresses regulatory agency, community and Indigenous nation's concerns. Engagement activities are summarized in Section 2.0.

14.3 Issues Scoping and Selection of Valued Components (VCs)

Candidate VCs will be identified based on the results of the baseline studies, described in Section 10.3, input from the feedback received during consultation and engagement activities described in Section 2.3. The process and rationale for VC selection will be included in the Application Information Requirements. Refinement of the assessment areas will be described in the Application Information Requirements. Study areas will be applicable to the VC they represent and will include the extent of direct and indirect effects. The approach to selecting VCs for the EA is consistent with the requirements under the 2018 EAA and follows the guidance of the Application Information Requirements Guideline (2020) and the Effects Assessment Policy (2020). The selection process includes the following steps:

1. Issues scoping: Potential project-related issues and effects identified based on:
    a. Knowledge of the proposed Project, including its components and activities
    b. Potential effects the proposed Project may have on the biophysical and human environment
    c. Information collected during baseline and investigative use studies
    d. Requirements of 2018 EAA
    e. Discussions with technical experts and various provincial and federal agencies, including discussions during the development of the proposed Project Description
    f. Ongoing consultations with stakeholders
    g. Ongoing consultations with Indigenous nations
    h. Publicly available information and findings from recent studies or assessments of mining projects in the region
    i. Professional judgment based on the experience of the assessment team

2. Initial identification and evaluation of candidate VCs: VCs are identified based on the issues and concerns identified in step 1 and following BC EAO guidance. VCs are then evaluated on the attributes identified by the 2018 EAA to ensure their relevancy and applicability.
3. Selection of appropriate VCs: The process for selecting VCs follows applicable BC EAO guidance and involves refinement through on-going discussions with provincial and federal regulatory agencies such as the BC EAO, Ministry of Environment (ENV), Ministry of Health, Department of Fisheries and Oceans (DFO), and through consultation with Indigenous nations and stakeholders.

In selecting VC's, the following attributes are considered during the decision-making process:

- **Relevant** to at least one of the assessment matters and clearly linked to the values reflected in the issues raised in respect of the Project;
- **Comprehensive**, so that taken together, the VCs selected for an assessment should enable an understanding of the potential effects of the Project;
- **Representative** of the important features of the biophysical and human environment likely to be affected by the Project;
- **Responsive** to the potential effects of the Project; and
- **Concise**, so that the nature of the interactions between the Project and the VCs can be clearly articulated and understood and redundant analysis is avoided.

Candidate VCs may be considered through an assessment or may be identified as a pathway component for a VC assessment. Subcomponents may also be identified for a VC to divide broadly defined VCs and help frame the analysis. Subcomponents are smaller distinct aspects of a VC that can be used to classify, assess, or characterize the effects assessment into meaningful parts. When determining effects pathways, the cause and effect linkage between the Project and the VC can have a direct or indirect effect.

Table 39 was developed based on the standard list of Valued Components and subcomponents provided in the Application Information Requirements Guidelines (2020) and was modified appropriately for the site-specific requirements of the Project. This table describes the potential VC's and subcomponents to be included in the EAC Application. References are provided to the specific sections of the DPD where the VC's were assessed during the baseline assessments and existing conditions reports.

Table 39: Potential Valued Components and Subcomponents for Assessment

Valued Components	Subcomponents	Topics Captured by the Assessment	Anticipated Linkages to other Valued Components
Air Quality	Air quality	■ Criteria Air Contaminants ■ Volatile Organic Compounds (VOCs) ■ Other air pollutants	Human Health Vegetation Water Quality Land and Resource Use
	Acidifying emissions Eutrophying emissions	■ Acidification and eutrophication	
	n/a	■ Odour	
Acoustic	Noise	■ Audible noise levels ■ Low-frequency noise levels	Human Health Wildlife Land and Resource Use
	Vibration	■ Vibration	
Surface Water	Surface water quality	■ Acidification and eutrophication ■ Metals ■ Acid Rock Drainage ■ Nutrients ■ Sedimentation	Freshwater Fish Human Health Wildlife Land and Resource Use Groundwater Air Quality
	Surface water quantity (Hydrology)	■ In-stream flow ■ Runoff dynamics and pattern	
Groundwater	Groundwater quality	■ Groundwater contamination (drilling fluids, seepage, acid mine drainage)	Surface Water Human Health Vegetation Land and Resource Use
	Groundwater quantity	■ Groundwater flow (direction and quantity) ■ Interactions with surface water	
Soil	Soil quality	■ Acidification ■ Eutrophication ■ Contamination ■ Erosion ■ Dust accumulation	Vegetation Human Health Groundwater Surface Water
	Soil quantity	■ Soil disturbance ■ Soil alteration and removal	

Valued Components	Subcomponents	Topics Captured by the Assessment	Anticipated Linkages to other Valued Components
Vegetation	Plant species of interest	■ Rare plants ■ Traditional use species ■ Species of conservation concern ■ Invasive species	Land and Resource Use Wildlife Soil Air Quality
	Plant communities of interest	■ Ecological communities of conservation concern	
	Wetland functions	■ Wetland ecosystems	
	Ecosystems	■ Alpine/subalpine ■ Riparian	
Wildlife	Birds (including individual species or species groups as appropriate)	■ Species at risk ■ Traditional use species ■ Migratory birds ■ Habitat (including sensory disturbance such as light / zone of influence as appropriate) ■ Important habitat features (for example, protected nests; leks, breeding sites, mineral licks; roosts; dens) ■ Mortality ■ Movement ■ Health	Air Quality Surface Water Vegetation Land and Resource Use Human Health
	Mammals (including individual species or species groups as appropriate)		
	Reptiles and Amphibians (including individual species or species groups as appropriate)		

Valued Components	Subcomponents	Topics Captured by the Assessment	Anticipated Linkages to other Valued Components
Freshwater Fish	Fish habitat	■ Riparian ecosystems ■ In-stream flow	Surface Water Vegetation Human Health Land and Resource Use
	Aquatic resources	■ Benthic invertebrates ■ Periphyton ■ Bioaccumulation	
	Fish	■ Fish tissue ■ Fish communities ■ Species at risk ■ Traditional use species ■ Other aquatic species of management concern	
Employment and Economy	Employment	■ Jobs and training ■ Labour income ■ Access to economic opportunities / economic equity	Land and Resource Use Infrastructure and Services
	Economy	■ Tax revenues and government expenditures ■ GDP contributions ■ Business revenue ■ Land and resource valuations (including tourism) ■ Cost of living (for example, housing, food, goods and services)	Infrastructure and Services Land and Resource Use

Valued Components	Subcomponents	Topics Captured by the Assessment	Anticipated Linkages to other Valued Components
Land and Resource Use	Private property	■ Use and enjoyment of private property	Air Quality Acoustic Surface Water Groundwater Vegetation Wildlife Freshwater Fish Employment and Economy Infrastructure and Services Human Health Archaeological and Heritage Resources Culture
	Tenured land and resource use	■ Industrial land uses (for example, mining, oil and gas) ■ Other tenured, permitted or licensed land uses	
	Public land and resource use	■ Consumptive land uses (for example, hunting, fishing, trapping, vegetation gathering) ■ Non-consumptive land uses (for example, camping, hiking, skiing, boating, climbing, caving) ■ Agriculture ■ Tourism	
	Parks and protected areas	■ Federal, provincial, regional, municipal parks ■ Other protected areas ■ Recreation Sites and Trails B.C. areas	
	Visual resources	■ Visual resources	

Valued Components	Subcomponents	Topics Captured by the Assessment	Anticipated Linkages to other Valued Components
Infrastructure and Services	Community infrastructure and services	■ Health care and social services and facilities ■ Emergency response services ■ Domestic water supply ■ Sewage and water treatment facilities ■ Landfills and recycling facilities ■ Community recreational facilities ■ Educational services and facilities, including daycare ■ Other public and private sector services	Employment and Economy Land and Resource Use
	Transportation infrastructure	■ Transportation infrastructure	
	Housing and accommodation	■ Housing and accommodation	
Human Health		■ Air quality ■ Drinking water quality ■ Noise ■ Light ■ Soil quality ■ Quality and quantity of country foods ■ Population health[1]	Air Quality Acoustic Surface Water Groundwater Soil Vegetation Wildlife Freshwater Fish Employment and Economy Infrastructure and Services Land and Resource Use Culture

Valued Components	Subcomponents	Topics Captured by the Assessment	Anticipated Linkages to other Valued Components
Archaeological and Heritage Resources[2]		■ Sites of historical importance ■ Sites of archaeological importance (including CMTs) ■ Paleontological resources	Land and Resource Use Culture
Culture		■ Customs, beliefs and values ■ ■ Potential for intergenerational knowledge transfer ■ Community and cultural cohesion, including governance and stewardship systems ■ Changes to availability of resources important to traditional, current, and potential future use of land and resources ■ Changes to access ■ Changes to quality of resources or experience (e.g., due to dust, noise, habitat loss or other effects)	Land and Resource Use
Indigenous nation identified VC[3]		■ Specific to an Indigenous nation's interests	Other related VCs depending on VC Indigenous nation-specific assessment

Notes: [1] Population health includes an integrated analysis of the social, economic and cultural determinants of health that may be captured under other VCs (for example, Employment and Economy, Infrastructure and Services, and Culture) and which would then support the characterization of receptors for a human health risk assessment.

[2] Includes intangible values related to these sites and resources as applicable.

[3] It is expected that many Indigenous interests can be captured by the standard VC list. In cases where an Indigenous interest is identified that is not able to be represented by a standard VC, and it is conducive to assessment via the VC framework it may be appropriate to identify a new Indigenous specific VC.

The EAC Application will summarize the process and methodologies used to identify and select the VCs for assessment. The EAC Application will also include the rationale for any differences in the list of VCs presented in the EAC Application from those listed in the DPD.

14.4 Determination of Potential Effects

Potential interactions between the Project activities and the selected VCs within the defined spatial and temporal boundaries of the Project will be identified to evaluate the potential effects of the Project. A summary of the Project components and associated activities is presented in Table 40.

Table 40: Summary of Project Components and Associated Project Activities by Project Phase

Project Phase	Project Component	Project Activity
Pre-Construction	Planning and Development	Engagement, feasibility studies, baseline environmental studies, design, permitting
Construction	Mine Site	Grading, soil salvage, construction of main and ancillary facilities, portal development (use of explosives), water diversion/ collection/ treatment/ discharge, management of construction wastes, workforce accommodation
	Transmission Line	Clearing, preparation, soil management, construction of towers and cable installation
	Transportation Routes	Transport of workforce and construction materials and removal of wastes
	QR Mill	Grading, soil salvage, construction / upgrading of main and ancillary facilities, water diversion/ collection/ treatment upgrades, management of tailings, management of construction wastes, workforce accommodation
Operations	Mine Site	Blasting, ore and waste rock loading, waste rock storage, maintenance of equipment and management of materials / wastes, water management, workforce accommodation
	Transmission Line	Maintenance
	Transportation Routes	Transport of ore to QR Mill, transport of workforce and material required for operations and removal of wastes
	QR Mill	Ore crushing, processing, tailings management, maintenance of equipment and management of materials / wastes, water management, workforce accommodation
Closure	Mine Site	Decommissioning and removal of facilities, mine shaft, Site reclamation including re-contouring and re-vegetation
	Transmission Line	Decommissioning and removal of towers and cables once power is no longer required, reclamation including re-contouring and re-vegetation
	Transportation Routes	Transport of workforce and materials required for closure and removal of equipment and wastes
	QR Mill	Decommissioning and removal of facilities, tailings, site reclamation including re-contouring and re-vegetation

Project Phase	Project Component	Project Activity
Post-closure	Mine Site	Post-closure care and maintenance of site and environmental monitoring
	Transmission Line	Monitoring as required
	Transportation Routes	Monitoring as required
	QR Mill	Post-closure care and maintenance of site and environmental monitoring

As a component to the assessment process, a preliminary determination has been made as to how the VCs may be affected by the Project, including direct and indirect effects and positive and negative effects. Final determination and assessment will be included in the EAC Application as per guidance from the Effects Assessment Policy (2020). The EAC Application will include a detailed effects assessment, including the following categories:

Direct effects: a consequence of a cause-effect relationship between a project and a specific VC.

Indirect effects: those that occur because of a change that a project may cause, often produced away from or as a result of a complex effects pathway and are at least one step removed from a project activity in terms of cause-effect linkages.

Positive Effects: desirable or beneficial effects of the project on the environmental, social, economic, cultural, and health attributes in the surrounding area.

Negative Effects: undesirable or adverse effects of the project on the environmental, social, economic, cultural, and health attributes in the surrounding area.

14.5 Mitigation and Management Strategies

Technically and economically feasible measures to avoid, minimize, restore, or otherwise offset potential effects on environmental, social, economic, heritage, and health components have been considered early in the project planning process and will be described in the EAC Application. Overarching measures BGM is taking to prevent or reduce the adverse effects caused by the Project include plans to:

- Use disturbed areas and brownfields sites for the Project footprint, including the historic mill and tailings area at the Mine Site, and previously disturbed areas at QR Mill to reduce ground disturbance and vegetation clearing, whenever possible;
- Consolide processing activities within the Services Building to reduce noise, dust and air quality issues;
- Minimize surface activities by mining underground; and
- Plan underground ore crushing to reduce visual and noise disturbances.

Examples of potential mitigation measures for biophysical and human environment are presented in Table 41 and Table 42, respectively. Appropriate mitigation strategies will be incorporated into the Project design and/or implemented during all Project phases to avoid or reduce the potential adverse effects.

The provincial Procedures for Mitigating Impacts on Environmental Values (ENV, 2014) will be followed, as appropriate. In addition, relevant provincial guidelines, BMPs, and other general practices will be identified so that Project activities are planned and conducted in compliance with applicable legislation, regulations, permits, standards, policies, procedures, and BMPs. If it is not feasible to follow applicable guidelines or BMPs, consultation with the primary regulatory authority will be undertaken to discuss the most appropriate course of action.

Table 41: Preliminary Identification of Potential Interactions of the Project with the Biophysical Environment and Examples of Potential Mitigation

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Air Quality	■ Change in air quality due to increased emissions of criteria air contaminants and particulates from construction and operation activities (i.e., dust from WRSF) resulting in potential impacts on human health and wildlife ■ Increase in greenhouse gas emissions from construction and operation activities (i.e., increased transportation)	■ Implement an air quality / dust control management plan ■ **Select machinery / technology to reduce emissions** [1] ■ Water roads and other exposed areas during dry conditions ■ Limit exposed soils by re-vegetating as soon as possible ■ Cover trucks along Transportation Route ■ Limit idling of vehicles ■ Minimize use of diesel generators ■ Maintain equipment on a regular basis ■ Progressive covering of exposed tailings slopes
Acoustic	■ Disturbance to human populations and displacement and/or sensory disturbance to wildlife caused by noise from mining activities (i.e., blasting) ■ Disturbance to human populations, wildlife and aquatic community caused by vibrations from mining activities (i.e., blasting)	■ **Use acoustical enclosures, insulation and other noise reduction technology** ■ Maintain equipment on a regular basis ■ **Use physical barriers such as berms to limit noise effects** ■ Implement a noise and vibration management plan that limits blasting events to daytime hours
Light	■ Increase in light trespass and sky glow (i.e., from mining operations) during nighttime hours, resulting in disturbance to human populations and displacement and/or sensory disturbance to wildlife	■ **Use directional lighting and adjustment of light fixture height** ■ Use low lumen fixtures ■ Implement a light management plan that takes into consideration sensitive receptors

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Surface Water	■ Alteration of stream flows near the Project resulting from the construction of mine site and transmission line ■ Change in runoff and drainage patterns ■ Channel erosion, sedimentation and flooding with changes in stream flows ■ Changes to surface water quality due to resource extraction, waste rock placement, storage of tailings and surface water management including acidification, geochemical loading of water quality constituents, erosion and dust deposition ■ Aggravating existing contamination from historical mine waste ■ Changes in water quality due to accidental fuel or chemicals spills	■ **In collaboration with design engineers identify project engineering structures for water collection and freshwater diversion** ■ Implement water management plans that address drainage, erosion and sediment control, associated water treatment references, and storm water runoff for all Project phases ■ Implement a reclamation and closure plan ■ Implement water management plan including aquatic effects monitoring program for all Project phases ■ Implement a reclamation and closure plan ■ Minimize acid generation by implementing a PAG material management plan
Groundwater	■ Changes to groundwater levels and flows resulting from Mine Site construction and operations ■ Changes in groundwater quality due to infiltration of contact water from waste rock piles, water treatment ponds and tailings storage facility and collection ponds, soil acidification or accidental chemical, fuel, or sewage releases ■ Alteration of groundwater recharge and discharge locally due to an increase in impervious areas and construction of a storm-water collection system ■ Aggravating existing contamination from historical mine waste.	■ Implement a groundwater management plan during all Project phases ■ Reuse water to the maximum extent possible ■ Implement a reclamation and closure plan

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Soil	■ Loss and alteration of soils due to admixing, compaction, and erosion of soil materials during site clearing and the removal of vegetation cover ■ Changes in soil quality due to contamination by fuel or chemical spills and alterations in chemical and physical characteristics during mining and reclamation activities ■ Changes in terrain stability due to alterations in slope morphology and/or drainage ■ Opportunity to improve stability of historic waste dumps and soil conditions	■ **In collaboration with design engineers identify project engineering structures to avoid, where possible, and minimize Project disturbances** ■ Implement environmental management plans that address soil erosion control, soil quality maintenance, soil contamination mitigation and terrain stability for all Project phases ■ Implement a reclamation and closure plan that ensures land use objectives are addressed
Geochemistry	■ Acid rock drainage or metal leaching potential within excavated rock materials, exposed rock cuts, and tailings, resulting in groundwater and surface water quality effects	■ Minimize acid generation by implementing a PAG material management plan ■ Implement a reclamation and closure plan

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Freshwater Fish	■ Changes to fish habitat as a result of Mine Site and transportation route construction, including habitat availability and indirect effects due to sensory disturbance (e.g., habitat avoidance), and reduction of habitat patch size (i.e., increased fragmentation) ■ Changes to fish habitat during construction and decommissioning of the transmission line due to erosion and sedimentation ■ Changes in fish mortality risk ■ Alteration of migration or spawning use patterns from disturbance, flow changes, habitat suitability, habitat quality, flow timing, and water quality ■ Health effects to fish and aquatic resources due to changes in water quality	■ Implement applicable BMPs and environmental management plans during all Project phases (i.e., sediment and erosion control) ■ Maintain water flows, quality and habitat values ■ Implement reclamation and closure plan
Vegetation	■ Loss and /or alteration of vegetation and wetland ecosystems from clearing and restoration during all Project phases ■ Health effects to vegetation and wetland species and ecosystems due to alterations in drainage patterns, loss or degradation of soil, dust deposition, changes in chemical compounds in the environment, or proliferation of noxious/invasive species	■ Limit clearing to required areas only ■ Implement applicable BMPs and environmental management plans including air quality and dust control plan and surface water runoff control plan ■ Implement a reclamation and closure plan

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Wildlife	■ Change in habitat availability due to construction of Mine Site and transportation route ■ Change in habitat distribution or access due to construction of Mine Site and transportation route ■ Change in wildlife survival and reproduction due to construction of Mine Site and transportation route, as well as operations if Mine Site and QR Mill	■ Limit clearing to required areas only ■ Implement appropriate BMPs and wildlife management plans ■ Limit Project interaction with wildlife ■ Implement a reclamation and closure plan that ensures land use objectives are addressed ■ Incorporate a wildlife component into the water management plan ■ Conduct clearing outside of the migratory bird nesting period
Contaminated Sites	■ Erosion of contaminated soil materials and mobilization of historical contaminants due to site clearing, excavating and soil stockpiling ■ Localized changes to natural drainage patterns, dust deposition, or airborne deposition of chemical compounds ■ Opportunity to improve historically contaminated areas	■ Limit contaminant transport (i.e., runoff, infiltration, dust deposition) during the removal of contaminated soil materials ■ Areas of historical contamination and opportunities for remediation will be identified for all Project phases and outlined in a site-specific remediation plan developed in collaboration with appropriate regulatory agencies

Notes: [1] Mitigation by Design: Mitigation measures that have been implemented as a component of project design have been identified by use of **bold red**.

Table 42: Preliminary Identification of Potential Interactions of the Project with the Human Environment and Examples of Potential Mitigation

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Socio-Community	■ Changes to community health, well-being with a focus on vulnerable sub-populations including low-income families, children and seniors ■ Changes in community character ■ Pressures on infrastructure, traffic and roads, and community services, due to Project demand or Project-driven population change ■ Changes to local and regional population and demographics due to Project-driven labour market changes ■ Changes to availability of local housing and temporary accommodation ■ Changes to health and safety of workers and public	■ Work with Indigenous nations and communities to understand their interests and issues to ensure that proposed mitigation reflect their needs ■ Implement a mechanism that facilitates feedback ■ Work cooperatively with Indigenous nations and communities in the development of initiatives that contribute to health and well -being and maintenance of community character ■ Initiate skills inventory and employment planning ■ Implement appropriate BMPs and EMPs that address specific socio-community concerns (i.e., traffic management plan, occupational health and safety plan) ■ Implement a reclamation and closure plan that ensures land use objectives are addressed
Land and Resource Use	■ Changes to opportunities associated with public and tenured land and resources including forestry, mineral exploration and development, hunting, fishing, guide outfitting and trapping due to changes in access to the Project area, increases in noise and other disturbance and availability of certain species ■ Changes in tourism and outdoor recreation opportunities due to changes in, infrastructure, access, use, and environmental setting (through Project related changes in air quality [dust], noise, and visual)	■ Identify access opportunities and issues and implement a communication plan that facilitates community feedback and information exchange to ensure that community members and other land and resource users are aware of areas where activities can be undertaken ■ Implement appropriate BMPs and EMPs that address specific concerns (i.e., traffic management plan, noise management plan, dust management plan) ■ **Maximize use of brownfield sites for Project infrastructure and activities** ■ Implement a reclamation and closure plan that ensures land use objectives are addressed

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Current Use of Lands and Resources for Traditional Purposes	■ Change in the ability to access preferred locations used for traditional purposes ■ Change to the safe and productive use of the land for traditional purposes by Indigenous nations ■ Changes in presence, absence, abundance, quality or spatial distribution of freshwater, terrestrial, or other resources that are currently used for traditional purposes ■ Changes in the quality of experience associated with the current use of lands and resources for traditional purposes as a result of items such as increased activity in the area, noise, dust, light, etc. ■ Changes to Indigenous interests including socio-economic status, community well being and cultural sustainability (e.g., the ability to transfer Indigenous knowledge)	■ Work cooperatively with Indigenous nations to identify concerns and develop specific mitigation plans that address use of lands and resources ■ Incorporate traditional knowledge and traditional land use in Project planning ■ Maintain an ongoing dialogue with Indigenous nations to ensure that their specific interests and concerns are understood and that such Indigenous nations have the information required to inform consideration of potential effects ■ Mitigation as discussed earlier for noise, dust, light, water quality, traffic, etc. Develop participation agreements with Indigenous nations
Visual Quality	■ The introduction and development of vegetation clearing, landform modifications (e.g., grading, earthworks, storage, and stockpiles), and mine infrastructure features (i.e., built structures) during all Project phases ■ Changes in air quality (dust) from vehicle traffic could potentially result in visual disturbance and alteration to existing visual resources	■ **Retain landforms and existing vegetation where possible and revegetate new landforms to provide screening of the Project area** ■ Implement a dust control plan that focuses on limiting dust and utilize suppression techniques during all Project phases ■ Implement a reclamation and closure plan that ensures land use and visual quality objectives area addressed

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Employment and Economy	■ Change in employment, income, and labour market ■ Direct and indirect demand for goods and services may affect availability ■ Change in government revenues ■ Change in gross domestic product (GDP) ■ Change in economic activity associated with businesses in the Project area (i.e., forestry, recreation and tourism) ■ Increased demand for local government expenditures	■ Implement a communication plan that facilitates feedback ■ Work with Indigenous nations and communities in the development of local initiatives that address concerns ■ Work to understand the local labour market and implement employment and training plans, as needed
Archaeological and Heritage Resources	■ Changes to resource integrity and increased or decreased accessibility to palaeontological, archaeological, or historical sites could result during all Project phases ■ disturbance to archaeological sites	■ Conduct an archaeological impact assessment ■ Develop an archaeology chance to find procedure ■ Implement a heritage resources management plan that outlines any areas where ground disturbance should be avoided and mitigative strategies if disturbance to archaeological sites is anticipated

Component	Examples of Potential Interactions	Examples of Potential Mitigation
Human Health	■ Changes in ambient particulate matter concentrations (i.e., TSP, $PM_{2.5}$ and PM_{10}), which may cause health risk to local communities ■ Deposition of dust to plants and soil, which can result in uptake of contaminants of concern (i.e., metals and polycyclic aromatic hydrocarbons [PAHs]) in plants and animals, and could be consumed by people or by wildlife ■ Changes in water quality may result in uptake of metals and PAHs in fish which are then consumed by people or wildlife ■ Surface water affected by the Project may be consumed by wildlife or by people (in a recreational scenario) ■ Alterations in noise, traffic and vibrations may cause stress to people and wildlife ■ Alterations in community character, increased pressure on limited local infrastructure, and increased discrepancy in wages in the local area which may cause stress to people	■ Implement appropriate BMPs and EMPs ensuring sensitive human and ecological receptors are identified (i.e., air quality / dust, noise, traffic and water management plans) ■ Work with Indigenous nations and the community to identify potential stressors and implement mitigation identified in the previous Human Health sections above ■ Avoiding subsurface excavation in areas of historic mining activities

Notes: [1] Mitigation by Design: Mitigation measures that have been implemented as a component of project design have been identified by use of **bold red**.

14.6 Residual Effects

Residual effects are those effects remaining after the implementation of all mitigation measures, including offsetting measures and, therefore, are the expected consequences of the reviewable project for the selected VC or Indigenous interest. Characteristics of residual effects will be assessed based on the following criteria:

- **Context:** environmental, economic, social, cultural and/or health matters affecting the sensitivity and/or resilience of identified VCs will be considered. Additional supporting narratives will be provided to explain contextual factors that cannot adequately be communicated in a simple ranking.
- **Magnitude:** expected scale and/or severity of the residual effect, considering both the proportion of the VC affected within the spatial boundaries and the relative effect.
- **Extent:** spatial area over which the residual effect is expected to occur (local or regional).
- **Duration:** length of time the residual effect persists.
- **Reversibility:** whether the residual effect on a VC can be reversed once the physical work or activity causing the disturbance ceases or a mitigation measure takes effect (fully reversible, partially reversible, or irreversible).
- **Frequency:** how often the residual effect occurs (once, regular, irregular or continuous).
- **Affected Populations:** distribution of the effect amongst the population of affected people.

Additional considerations pertaining to importance, risk and uncertainty of residual effects will be assessed.

14.7 Cumulative Effects Assessment

A cumulative effects assessment will be conducted to identify the potential interactions of residual project effects with residual effects from other existing and reasonably foreseeable projects and activities in the vicinity of the Project.

Currently, nine EA-reviewable projects (Figure 22) are located within a 150-km radius of the Project (BC EAO, 2018a). As appropriate, publicly available information from all relevant EAs in the surrounding area will be reviewed, and any relevant information will be incorporated into the EAC Application. Future projects and activities considered in the cumulative effects assessment will be restricted to those that:

- Have been publicly announced with a defined project execution period and with sufficient project details for assessment;
- Are currently undergoing an EA; or
- Are in a permitting process.

As described in Sections 7.0 and 11.4.2, the Project area supports a diverse range of activities, including forestry, mining and mining and mineral exploration, hunting and trapping, berry picking and gathering, guide outfitting, outdoor recreation, and residential settlements. Heritage tourism is also an important activity in the Project area. Potential existing cumulative effects could be associated with historical and on-going mining and forestry activities. There is also the potential for recreational activities, such as all terrain vehicle and snowmobile use of trails in the Project area, to contribute to cumulative effects on the receiving environment.

Section 2.2 describes specific issues and concerns related to cumulative effects as identified in the BC EAO Summary of Engagement. Concerns from the technical advisors were noted pertaining to the Projects use of existing facilities and operations and how these should best be considered in evaluating effects on wildlife and habitat resources. Lhtako Dené Nation identified concerns related to the cumulative impacts in the region from forestry and other industry, as well as the interactions with moose and moose hunting. Soda Creek Indian Band identified concerns related to cumulative impacts in the region due to other industry activity including placer mining and effects of traffic on access roads to QR Mill. BGM will work cooperatively with participating Indigenous nations, the public and the technical advisors to address these concerns as a component of the Cumulative Effects Assessment.

Cumulative effects related to the issues and concerns raised during Early Engagement will be assessed along with other previously identified values for the region. The Cumulative Effects Framework for the Cariboo Region identifies six values that are currently undergoing assessment.

- Forest Biodiversity,
- Hydrologic Stability,
- Grizzly Bear,
- Moose,
- Mule Deer, and
- Pine Marten.

Expanding on information from existing and available EA's, identified concerns, and identified values related to cumulative effects, the cumulative effects assessment will examine the extent of spatial and temporal overlap of residual Project effects with those of other projects and activities. Study areas for the cumulative effects assessment will be focused on affected VCs. Where possible, the cumulative effects will be quantified in terms of the degree of change in a measurable parameter(s) where and when the interactions between the Project residual effects and the residual effects of other projects and activities are expected to occur. The Cumulative Effects Framework, specific to the Cariboo Region will inform the cumulative effects assessment.

14.8 Trans-Boundary Effects

Trans-boundary effects are not expected as the Project is located more than 400 km to the north of the United States border and 120 km to the west-northwest of the border with Alberta.

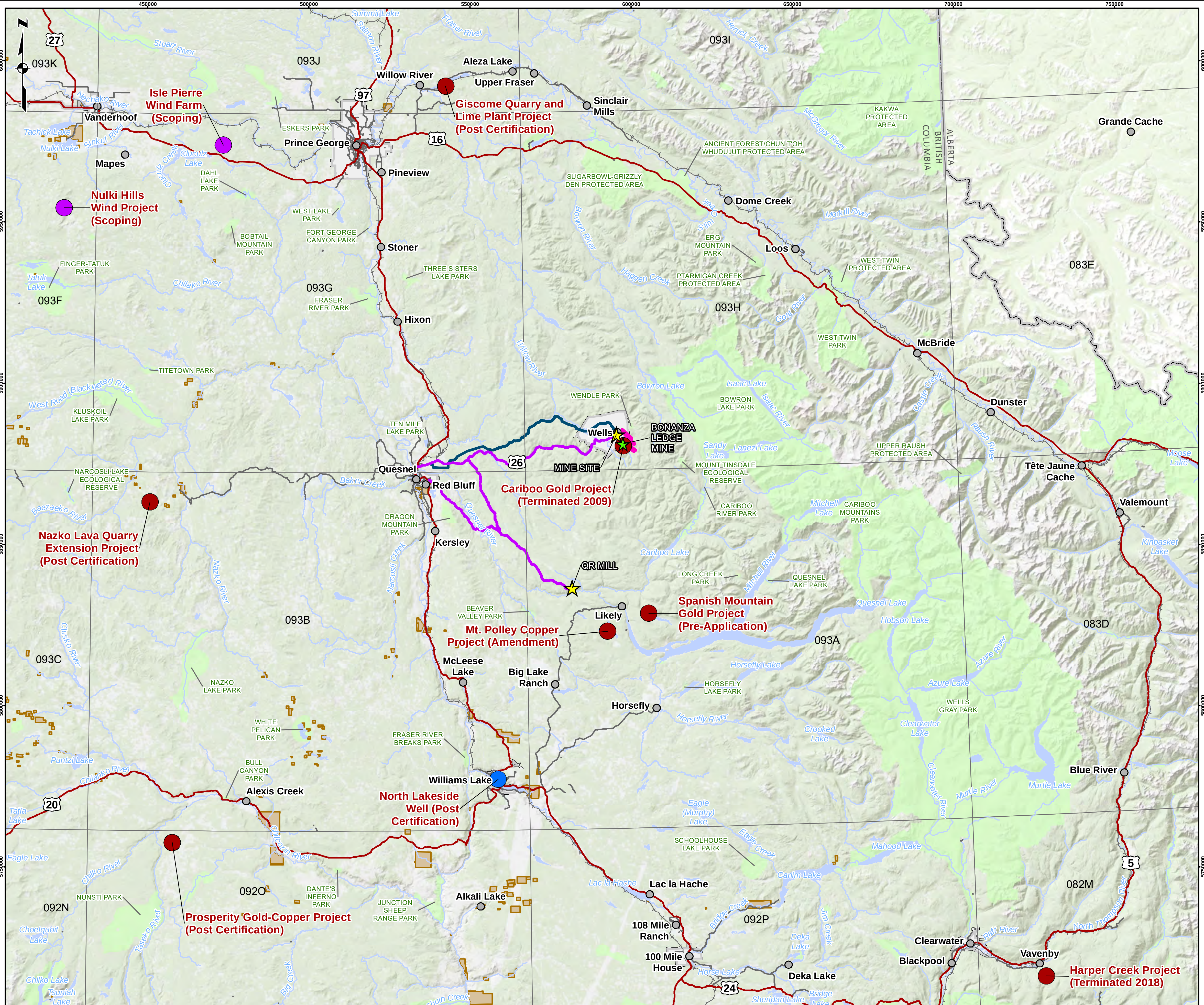
14.9 Management and Monitoring Plans

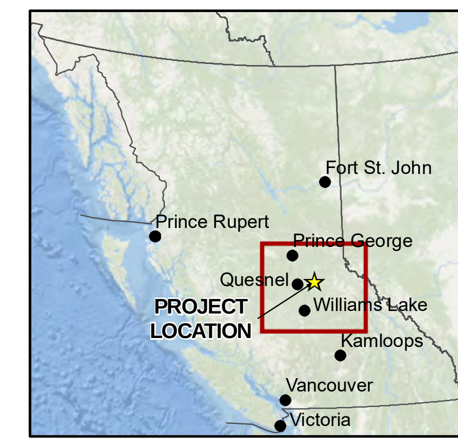
The EAC Application will include a conceptual description of the monitoring and management plans for Project construction and operation. A range of measures will be described in these management plans to mitigate the potential effects of the Project and to assess the effectiveness of the mitigation measures. These plans will include adhering to guidelines and BMPs, reducing the incidence of adverse Project effects, as well as monitoring and reporting requirements. Preliminary monitoring and management plans for the Project are expected to include:

- Ground Control Management Plan,
- Erosion and Sediment Control Plan,

- Metal Leaching and Acid Rock Drainage Management Plan,
- Transportation Management Plan,
- Access Management Plan,
- Noise Management Plan,
- Air Quality and Dust Control Management Plan,
- Water Management Plans;
  - Mine Site Water Management Plan, and
  - QR Mill Water Management Plan;
- Surface and Groundwater Monitoring Plan,
- Aquatic Effects Monitoring Plan,
- Fish Habitat Offsetting Plan (if triggered),
- Wetland Offsetting Plan (if triggered),
- Landscape and Soil Management Plan,
- Invasive Species Management Plan,
- Bat Management Plan,
- Wildlife Management Plan,
- Caribou Mitigation and Management Plan,
- Waste Management Plan,
- Spill Prevention and Response Plan,
- Operational Health and Safety Plan including Emergency Response,
- Heritage Resources Management Plan, and
- Reclamation and Closure Plan.

Additional Management Plans will be developed as required.





LEGEND

- POPULATED COMMUNITY
- MUNICIPALITY BOUNDARY
- HIGHWAY
- ROAD
- RAILWAY
- WATERCOURSE
- WATERBODY
- PARKS/PROTECTED AREA
- FIRST NATION RESERVE
- BARKERVILLE HISTORIC TOWN AND PARK
- PROJECT INFRASTRUCTURE LOCATION
- BONANZA LEDGE MINE
- TRANSPORTATION ROUTE
- NORTHERN TRANSMISSION LINE ROUTE

ENVIRONMENTAL ASSESSMENT PROJECTS

- ENERGY
- MINING
- WATER MANAGEMENT

REFERENCE(S)

1. TRAILS, WATER FEATURES, ROADS, MUNICIPAL BOUNDARY, PARK/PROTECTED AREAS, BARKERVILLE HISTORIC TOWN/PARK, CITIES (INSET), PROVINCIAL BORDERS (INSET) OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
2. HILLSHADE DERIVED FROM LIDAR DATA FLOWN BY MCELHANNAY CONSULTANTS LTD. JUNE 27, 2016.
3. BASE DATA SOURCE: ESRI, GEOBASE, NRCAN, AND THE GIS USER COMMUNITY.
4. INSET BASE SOURCE: ESRI, DELORME, GEBCO, NOAA NGDC, AND OTHER CONTRIBUTORS.

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1:1,200,000

CARIBOO GOLD PROJECT

PAST AND CURRENT ENVIRONMENTAL ASSESSMENTS NEAR THE PROJECT

REV.	DESCRIPTION	DATE	INITIALS
A		2020-10-29	M.Y

PROJECT NO.	PHASE	REV.	FIGURE
151-11330-70	00	B	22

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BGM

APPENDIX A- TABLE OF CONCORDANCE

Detailed Project Description Guidelines - Early Engagement Policy Version 1.0

Detailed Project Description Requirements		Section
Executive Summary		
1	Any updates to information in the IPD	Executive Summary
General Information and Contacts		
2	Any updates to information in the IPD; and	Section 1.0
3	Anticipated cost of construction and decommissioning as well as projected annual operating costs	Section 7.7.1
Purpose and Rationale		
4	Any updates to information in the DPD	Section 3.0
Legislative and Regulatory Context		
5	Any updates to information in the DPD	Section 4.0
Project Status and History		
6	Any updates to information in the DPD	Section 5.0
Project Timing		
7	Any updates to information in the IPD, including a justification for any updates/changes to project timing and a description of how engagement was considered; and	Section 6.0 Section 2.0
8	A list of timelines for the proposed project's EA and permitting processes and expected timing to submit key permit applications	Section 6.2
Project Location, Activities and Components		
9	Any updates to information in the IPD, including a justification for any updates, changes to the project location, activities and/or components, and a description of how engagement was considered	Sections 7.1, 7.2, 7.3 Section 2.0

Detailed Project Description Requirements		Section
10	Include what further information, if any, is needed to confirm design and siting options, and approximate timelines; and	Section 7.8
11	A description of the work that has been conducted to arrive at the proposal, including what other options were considered and how engagement was considered	Section 7.6 Section 2.0
Maps and Shapefiles		
12	Any updates to information within the IPD;	All figures
13	When known, include landscape features of importance to Indigenous nations and local communities in maps;	All figures
14	Any new maps showing the boundary within which the project would be built, including updated location, project components and transportation routes;	Figures 1 to 7
15	Maps must be presented in the required standard format with legible grids and suitable scaling (typically 1:100,000 to 1:150,000 for centralized projects such as a mine, and up to 1:1,500,000 or 1:1,250,000 scale for linear projects such as a pipeline or transmission line); and	All figures
16	Maps must also include NTS Maps number, latitude and longitude references, titles, a north arrow, and relevant legends.	All figures
Indigenous Nations Interests		
17	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered;	Section 2.1 Section 2.3 Section 9.0
18	For each Indigenous nation identified, an overview of engagement activities that have been carried out, a description of issues that have been raised with respect to the proposed project, and an explanation of how those issues have been or will be addressed by the proponent;	Section 2.1 Section 2.3 Section 9.0
19	A description of how Indigenous nations plan to work with the proponent moving forward;	Section 2.1.3
20	A list of agreements the proponent has entered into with Indigenous nations during Early Engagement	Section 9.3
21	A description of opportunities for the proponent to work with the EAO and Indigenous nations;	Section 2.1.3
22	Additional information provided by participating Indigenous nations	Section 2.0

Detailed Project Description Requirements		Section
23	An identification of potential effects on Indigenous interests;	Section 9.7
24	A description of how this engagement and information was considered in the DPD, and corresponding changes that were made with justification for these changes; and	Section 2.1 Section 2.3 Section 9.7
25	A description of how information contained in the EAO's Summary of Engagement provided by the EAO was addressed in the DPD.	Section 2.3
Biophysical Environment		
26	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered	Section 10.0
27	A table showing a list of studies that are underway and those that are anticipated, including guidance and standards to be used in preparing these studies;	Section 10.0
28	A description of engagement that occurred following acceptance of the IPD and Engagement Plan, including any additional information collected during this period on sensitive or vulnerable environmental values that may be affected by the proposed project and any further understanding of the potential effects of the project, including cumulative effects;	Section 2.0
29	A description of future methods of information collection that will occur through continuing engagement;	Section 10.0
30	A description of Indigenous knowledge that may have been incorporated into the description of existing biophysical environment, with permission of the Indigenous nation;	Section 9.0
31	A description of how this engagement and information was considered, and corresponding changes that were made with justification for these changes.	Section 10.0
Human and Community Wellbeing		
32	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered;	Section 11.0
33	An outline of the anticipated number of construction and operating jobs and anticipated percent of workforce from local community;	Section 7.7.2
34	A description of how the proposed project may affect the local and regional economy	Section 11.3

Detailed Project Description Requirements		Section
35	A description of the engagement that occurred following acceptance of IPD and Engagement Plan and any additional information collected during this period regarding sensitive or vulnerable economic, social, heritage, or health values that may be affected by the proposed project; and	Section 2.0
36	A description of how this engagement and information was considered, and corresponding changes that were made with justification for these changes. Refer to the Human and Community Wellbeing Guidelines for further information.	Section 2.0
Emissions, Discharges and Waste		
37	Any updates to information in the IPD, including a justification for updates or changes and a description of how engagement was considered;	Section 8.1
38	An estimate of direct and indirect project GHG emissions by phase;	Section 8.2
39	A description of the potential effects on the province being able to meet its targets under the Greenhouse Gas Reduction Targets Act; and	Section 8.2
40	A justification for updates or changes to expected emissions, effluents, discharges and/or wastes and a description of how engagement was considered.	Section 8.0
Public and Environmental Safety		
41	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered	Section 12.0
42	Include a description of potential project-related scenarios when there is a real or perceived risk of a malfunction or accident; and,	Section 12.1
43	Identification of moderate-to high-risk potential malfunctions or accidents associated with the proposed project and how they will be managed: - Refer to risk disclosure standards and provincial risk management policy, including the Risk Management Guideline for the B.C. Public Sector (Province of British Columbia Risk Management Branch and Government Security Office, April 2019).	Section 12.2
Alternative Means to Carrying Out the Project		
44	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered; and	Section 7.6
45	Provide clear definitions with transparent weighting and criteria for assessing alternative means.	Section 7.6
Effects of the Environment on the Project		

Detailed Project Description Requirements		Section
46	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered; and	Section 13.0
47	A justification for updates/changes to potential effects and a description of how engagement was considered, especially Indigenous knowledge and local knowledge gathered during Early Engagement.	Section 13.0
Land and Water Use		
48	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered	Section 7.4
49	Identification of the location of previously disturbed site or green field site, agricultural land, foreshore;	Section 7.4
50	Legal information regarding land title, authorization, permits;	Section 5.3 Section 7.3
51	Identification of the proximity to seasonal or temporary residences;	Section 7.3
52	Description of the relationship to known regional initiatives (e.g. Elk Valley Water Quality Plan or Indigenous land use plans); and	Section 11.4
53	A description of project land and water use following engagement clearly noting any changes and a justification for why changes were made and how engagement was considered.	Section 7.2
Land Use Plans		
54	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered; and	Section 11.4
55	A justification for updates/changes to relevant provincial land use plans and a description of how engagement was considered	Section 11.4
Potential Project Effects		
56	Any updates to information in the IPD, including a justification for updates/changes and a description of how engagement was considered	Section 14.0
57	A description of potential positive and negative effects of the project on the biophysical and human environments, and Indigenous interests, including any potential cumulative effects;	Section 14.4 Section 14.5
58	A summary of key conclusions from any biophysical feasibility studies undertaken that may be pertinent to understanding potential interactions, if applicable;	Section 10

Detailed Project Description Requirements		Section
59	An initial description of measures to prevent or reduce the potential negative effects to an acceptable level. Include measures that could be integrated into project design, compliance with applicable regulations, standards, codes of practice, or Best Management Practices, corporate management systems, and/or project-specific measures that will be implemented; and	Section 14.5
60	A brief description of proposed monitoring programs, if known, that will be implemented to measure the effectiveness of mitigations to prevent or reduce the potential negative project effects.	Section 14.9

APPENDIX B – QUALIFICATIONS

Name	Qualifications	Responsibility
WSP Canada Inc.		
Kourtney Bradley B.Sc., R.P.Bio., PMP Team Lead Ecology & EIA	Registered Professional Biologist with over 19 years experience in environmental consulting. Project Manager and lead author/editor for numerous environmental assessment projects within western Canada. Experienced in project permitting, regulatory approvals, engagement activities and construction environmental compliance.	Writer
Michael Taylor BLA, MRM Team Lead Ecology & EIA	Professional Planner with over 13 years experience in environmental consulting and project delivery. Project Manager and environmental coordinator for multiple linear infrastructure projects throughout Western Canada. Specializing in environmental regulatory coordination.	Writer
Sandra Baker M.Sc. R.P.Bio., Environmental Assessment and Regulatory Specialist	Registered Professional Biologist with over 25 years experience in the environmental assessment field. Project Manager / coordinator for numerous large mining projects in Western Canada. Experienced in Permitting, Land Use and Cumulative Effects Assessments.	Research and writer
Debra Lamash B.A., Senior Human Environment Specialist	Debra has over 25 years of experience and has been involved in more than 30 projects proceeding through the BCEAA and/or CEAA processes as a Project Manager or as the socio-economic and/or consultation and engagement lead. She also has experience leading or participating in projects being reviewed in other provincial, national and international regulatory processes.	Reviewer and writer.
Golder Associates Ltd.		

Name	Qualifications	Responsibility
Sean Weston B.Sc., EP, PMP, R.P.Bio., EA Specialist & Project Manager	Biologist and Project Manager with over 15 years of experience with environmental assessments and environmental management of largescale projects, including multi-disciplinary environmental assessments under the British Columbia *Environmental Assessment Act* (BCEAA) and the *Canadian Environmental Assessment Act* (CEAA).	Contributions to baseline
Falkirk Environmental Consultants Ltd.		
Jennifer Turner M.Sc., R.P.Bio, PMP President and Founding Partner	Ms. Turner is a senior regulatory specialist with nearly 20 years' experience encompassing environmental impact assessment, permitting coordination, and environmental management planning. This experience spans an array of infrastructure projects in a variety of sectors.	Writer and Reviewer
Weymark Consulting		
Ryan Weymark P.Eng Principal	Mr. Weymark is a mining engineer (P.Eng.) and project manager with experience leading mining, heavy civil and infrastructure projects. Mr. Weymark has worked on numerous advanced stage projects undergoing Environmental Assessments in strategic roles, with the ability to bridge the gap between engineering and permitting teams.	Writer

APPENDIX C – ENGAGEMENT MATERIALS

A summary of communications materials and methods used during Early Engagement to submission of the Draft DPD is provided in Table C-1. This table will be updated for the Final DPD.

Table C-1: Communications Materials

Communications Material	Description
Info Sheets	■ Existing information sheets were updated as the Project advanced, and new information sheets were developed. Information sheets are available on BGM's website and in the BGM office and are provided by e-mail or mail to Interested Parties to address questions raised or as requested.
Presentations	■ Presentations were prepared for community meetings and meetings with Interested Parties and were tailored to the audience. A presentation providing a Project overview is on the website.
Advertisements	■ Advertisements were prepared prior to EAO Open Houses and BGM community meetings. Ads for the BC EAO meetings were placed in the Quesnel Observer, Williams Lake Tribune and Prince George Citizen. Ads also ran on radio stations in Quesnel and Williams Lake. Ads for the Open Houses and BGM community meetings were placed at community locations, placed on the Project website and sent to Interested Parties. An ad for the September community meeting was also placed in the Quesnel Observer.
Letters	■ Letters were prepared and sent to Interested Parties to inform them that the Early Engagement Phase was underway, advise them of opportunities to provide feedback during the BC EAO's formal Public Engagement and Comment Period and inviting participation in the development of the DPD. The letter provided links to the BC EAO websites and provided contact information for BGM. A copy of the BC EAO Public Comment Period advertisement was included as an attachment. ■ Additional letters were sent to Interested Parties, including local and regional governments and property owners to provide Project updates.
FAQ	■ Existing FAQs were updated, and additional FAQ prepared to address items of interest identified during engagement.
Website	■ The BGM website was updated and provided information on the Project and Project-related activities such as the EAO Open Houses and BGM engagement activities. Contact information is provided on the website. During the Public Comment Period, the EAO ad, as well as links to the EAO's Electronic Project Information Centre (e-PIC) were provided.
Media Contact/ Release	■ BGM discussed the Early Engagement Phase with local print and radio media and advised them of the open houses being hosted by the BC EAO. BGM advised that a link to the BC EAO website and other contact information was included in the advertisement. ■ Local media representatives (Quesnel Observer) were invited to community events, and BGM will be available to discuss the Project as required, and a link to the Project website and BC EAO website will be provided to media representatives.
Corporate Initiatives - Facebook/Newsletter	■ BGM had identified corporate newsletters as a means through which to distribute Project Information. As discussions with interested parties continued, it became clearer that many were using Facebook to communicate, particularly in the District of Wells. As such, BGM decided to refresh their Facebook page and use both the Facebook page and newsletters to communicate with interested parties.

Communications Material	Description
	■ BGM refreshed their Facebook page in August, and key information relative to the Project is, and will continue to be, posted on the page ■ BGM drafted a corporate newsletter in September and a second newsletter will be prepared following submission of the final DPD. The newsletter will be available on the Project website and Facebook page and will be e-mailed or mailed to those individuals on the stakeholder list interested in receiving them. The newsletter will also be available at the community office, meetings and events.
Third-party distribution	■ BGM disseminated information through the District of Wells, Positively Wells Facebook pages. ■ BGM provided ads for Community Meetings to key interest groups and organizations in the local study area and requested that they place the ads on their webpages or distribute the information to their membership.
Display Materials	■ Maps and figures were available at the BGM office and were used during meetings with stakeholders to support the discussion of Project components. ■ Initial renderings of the concentrator building, Island Mountain Portal and the transmission line in Wells were prepared and are in the process of being updated.

ID #	Stage	Subject - EA Topic	Comment/Issue Date	Comment Author	Comment Organization	Application/Document	Participant Issues, Description or Comment	Response Date	BGM Response	DPD Section Cross Reference	Status	EAO Response
1	Early Engagement	Additional Topics	20-Jul-20	Name hidden for privacy	Env	Project Description	Oct-20		BGM appreciates ENV's comment and looks forward to further engagement throughout the process.	n/a		
2	Early Engagement	Consultation and engagement	20-Jul-20	Name hidden for privacy	ENV	Project Description	It is good to see that BGM started to engage with indigenous nations early in the process.		BGM appreciates ENV's comment and looks forward to continued engagement through the upcoming process.	n/a		
3	Early Engagement	Baseline	20-Jul-20	Name hidden for privacy	ENV	Project Description	It would be useful to discuss baseline study details (which are not required in this document) with appropriate agencies early in the process to ensure, data collected are sufficient.		BGM acknowledges the ENV's request, and has included a description of baseline studies completed, as well as studies currently underway, in the Detailed Project Description. BGM also notes that baseline studies have been underway since 2016, all of which will be characterized in this provided description.	10		
4	Early Engagement	Groundwater	20-Jul-20	Name hidden for privacy	ENV	Project Description	Baseline Studies for Hydrogeology seem to have been conducted and should be added to the list of baseline studies in the Executive Summary.		BGM acknowledges ENV's comment and has included a list of hydrogeology baseline studies in the Executive Summary of the Detailed Project Description.	10.3.6		
5	Early Engagement	Editorial	20-Jul-20	Name hidden for privacy	ENV	Project Description	Not all figures seem to be numbered. To avoid confusion, I recommend numbering all figures.		BGM acknowledges ENV's comment and verifies that all included figures are appropriate numbered in the Detailed Project Description.	All sections		
6	Early Engagement	Surface water	20-Jul-20	Name hidden for privacy	ENV	Project Description	Also, in addition to what has been provided the figures should identify all discharge points into receiving waters.		BGM acknowledges ENV's comment and confirms that figures identifying all discharge locations into receiving waters are clearly indentified for the Mine Site and QR Mill Site in the Detailed Project Description.	Figure 19		
7	Early Engagement	Editorial	20-Jul-20	Name hidden for privacy	ENV	Project Description	Not all abbreviations used are listed in the abbreviations list, e.g. MZP.		BGM acknowledges ENV's comment and verifies that all abbreviations referenced in the Detailed Project Description are included in the abbreviations list of this document.	Abbreviations (pg v)		
8	Early Engagement		20-Jul-20	Name hidden for privacy	ENV	Project Description	This figures do not identify where on the new Cariboo Gold mine site the waste rock would be placed.		BGM clarifies that, during the Construction Phase of the Project, waste rock will be placed as bulk fill material and used for the construction of the Mine Site. After the Construction Phase, waste rock will be trucked from the Mine Site to the WRSF at the existing Bonanza Ledge Site or used as backfill material for the underground mine workings. This information has been provided in the Detailed Project Description.	Figure 4 (Bulk Fill Storage Facility); Figure 5 (Waste Rock Storage Facility)		
9	Early Engagement		20-Jul-20	Name hidden for privacy	ENV	Project Description	The figures also do not show, where the sedimentation pond on the Bonanza Ledge site, a sed pond is shown; however, it is not clear, where the sedimentation pond discharges to.		BGM clarifies that the Sediment Pond at Bonanza Ledge currently discharges to Lowhee Creek. However, for the Cariboo Gold Project, water will be piped from the WRSF Sediment Pond, to the Water Treatment Plant that BGM proposes to locate at the Mine Site near Wells. BGM verifies the location of the Sediment Pond at Bonanza Ledge and proposed Water Treatment Plant at the Mine Site near Wells are shown in figures in the Detailed Project Description.	Figure 4 (Water Treatment Plant); Figure 5 (Sediment pond)		
10	Early Engagement	Permitting	20-Jul-20	Name hidden for privacy	ENV	Project Description	Table 2 lists Effluent "Discharge permit and Waste Storage Approval" as permits/approvals required under the Environmental Management Act. There may be a number of permits/approvals/certificates required, including an effluent discharge permit, an emissions discharge permit, there could be a refuse permit. In addition, several regulations may apply, e.g. Municipal Waste Regulation, Hazardous Waste Regulation, etc.		BGM acknowledges ENV's comment and verifies that *Table 2: Provincial Permits and Approvals Potentially Applicable to the Proposed Project* is updated in the Detailed Project Description to address any potential items not currently listed.	Table 17 (Provincial Permits); Table 18 (Federal Permits)		
11	Early Engagement	Concentrator	20-Jul-20	Name hidden for privacy	ENV	Project Description	This chapter should also mention the concentrator.		BGM acknowledges ENV's comment and has included additional details on the Services Building (formerly referred to as the Concentrator) in the Detailed Project Description.	7		
12	Early Engagement		20-Jul-20	Name hidden for privacy	ENV	Project Description	It is mentioned that the Mine Office and Dry, Maintenance Shop, Warehouse and Laydown Area will also be used for "mine rescue and training". Is that "mine rescue training"?		BGM acknowledges ENV's comment and has provided clarification in the Detailed Project Description. The Mine Office and Dry, Maintenance Shop, and Warehouse will be located in the Services Building (with the Laydown Area next to the Services Building). The Services Building will also be used for both mine rescue training and general training of personnel.	7.5.1.1		
13	Early Engagement	Water treatment	20-Jul-20	Name hidden for privacy	ENV	Project Description	It is mentioned that water treatment systems at the Bonanza Ledge site, "will be based on those remaining after the completion of Bonanza Ledge Phase II." Since the Environmental Assessment Application should be a stand-alone document and reviewers should not be referred to other unrelated documents for the review, I recommend including a description of the treatment concept proposed for the Cariboo Gold Project.		The water treatment concept proposed for the Cariboo Gold Project is introduced in the Detailed Project Description (DPD). At the Bonanza Ledge site, there is currently a water treatment system available from existing operations that will be utilized as part of the Cariboo Gold Project (CGP). The systems remaining from the Bonanza Ledge Phase II at the BL Mine will be relocated to a central water treatment location near the Cariboo Mine site near Wells, connected to the BL site by a 4-km pipeline, and typically used for peak flows, if necessary. This is a modular plant with a design capacity of 180 m3/h. Therefore the existing systems supplement the new, expanded treatment systems at the Mine Site. Further details on the water treatment systems proposed at the Mine Site or QR Mill will be provided in the EAC Application.	7.5.1.6		
14	Early Engagement	Water treatment	20-Jul-20	Name hidden for privacy	ENV	Project Description	It seems that three water treatment plants may be proposed: One at the Cariboo Mine site, one at Bonanza Ledge (based on what is left after the Bonanza Ledge Phase 2 completion) and one at the QR site. Some conceptual information about the various treatment approaches should be included into the EA Project Description.		The water treatment concept proposed for the Cariboo Gold Project is introduced in the Detailed Project Description (DPD). There will be three water treatment plants for the CGP: one at the QR Mill, and two at a central location at the Mine Site (including the relocated modular system and a new expanded system). At the Mine Site, the Wells Water Treatment Plant (WTP), with a capacity of 600 m3/h, is a High Density Sludge (HDS) system used to mainly treat slightly acidic water from dewatered historic underground workings, other contact water requiring treatment (WRSFs included), and excess process water from the concentrator. This Bonanza Ledge Water Treatment System (BL WTS), with a capacity of 180m3/h uses chemical-physical processes and is intended to supplement the capacity of the new Wells WTP treating mainly storm flows of surface water. See response to IR 13 for additional details of the BL WTS. The system remaining from the Bonanza Ledge Phase II at the QR site will be modified and expanded. The existing system is based on a nanofiltration membrane separation process and will be supplemented with systems for brine desaturation using lime addition, and with new ammonia treatment facilites. A conceptual description of the treatment approaches for all sites will be included in the EAC Application.	7.5.1.6; Section 7.5.3.4		

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15	Early Engagement		20-Jul-20	Name hidden for privacy	ENV	Project Description	Table 6 lists the QR Mill Project Components. One of the components listed are overburden stockpiles. It needs to be clarified whether these are from proposed construction at QR or from the original construction of the QR Mill/Mine or both.		BGM notes the purpose of *Table 6 QR Mill Project Components* of the Initial Project Description (IPD) was to identify all new Project components associated with the Project. An overburden stockpile would be a new project component, should a new disturbance footprint be required for the proposed new Filtered Stack Tailings Storage Facility (FSTSF). However, as noted in the Cariboo Gold Supplemental Information to Project Description (June 11, 2020), BGM is evaluating other options for storing filtered tailings in the existing QR Mill Tailings Storage Facility (TSF). The currently preferred option is the placement of filtered tailings on the existing tailings and waste rock deposited in the QR Mill TSF, and then covering the tailings with an engineered cover at the end of the operation. Should this currently preferred option be selected for tailings management and storage, no additional surface disturbance is currently aniticipated, and as such, no new overburden stockpile is expected at the QR Mill Site. Further information regarding existing and any potential new overburden stockpiles at the Wells Mines Site and QR Mill will be provided with the EAC Application. The Detailed Project Description updates this table to clarify the overburden stockpile as a potential new project component.	Table 23		
16	Early Engagement	Water treatment	20-Jul-20	Name hidden for privacy	ENV	Project Description	The 2nd paragraph in this section indicates that post-closure, monitoring and maintenance activities will be carried out for five years. Please note, if treatment facilities and function will be maintained, it is assumed that maintenance of these facilities and monitoring of these facilities, effluent and receiving environments will need to continue.		At this current stage in the project design, BGM does not yet have confirmation that water treatment will be required beyond the 2 year Reclamation and Closure Phase. Test are underway to confirm the necessity of the water treatment post-closure and further discussion will be provided in EAC application. BGM acknowledges ENV's comment and recognizes that, if water treatment facilities are required beyond the indicated 5-year period, that maintenance and monitoring of these facilities, as well as monitoring of effluent and and receiving environments will also continue. BGM has clarified this point in the Detailed Project Description.	7.5.5		
17	Early Engagement	Editorial	20-Jul-20	Name hidden for privacy	ENV	Project Description	Table 8 needs to be updated to reflect the current schedule.		BGM acknowledges ENV's comment and verifies that the requested table, *Table 8: Preliminary Environmental Assessment and Project Schedule* , is updated to reflect the current proposed schedule in the Detailed Project Description.	Table 20		
18	Early Engagement	Water treatment	20-Jul-20	Name hidden for privacy	ENV	Project Description	The section indicates that "at Bonanza Ledge Mine, contact water draining from the proposed WRSF will report to an existing sediment control pond and be treated in accordance with applicable regulatory requirements." Treatment types/concepts that could be used and have been shown to achieve target concentrations in similar settings should be included into the application.		Details of existing water treatment plans at the Bonanza Ledge site can be see in comment response #13. The sedimentation pond for the CGP will be located in the same location as the existing sedimentation pond used currently for Bonanza Ledge. The CGP sedimentation pond will be upgraded to satisfy new requirements for the WRSF and satisfy design criteria. BGM confirms that additional information on treatment types / concepts that could be used and have been shown to achieve target concentrations in similar settings will be included in the EAC Application. A commitment on the provision of this additional information has been made in the Detailed Project Description.	7.6.4		
19	Early Engagement		20-Jul-20	Name hidden for privacy	ENV	Project Description	The 25 monitoring well locations seem to not be shown in Figure 12. It would be useful for us to see them to provide further recommendations regarding baseline sufficiency.		BGM acknowledges ENV's request, and includes the 25 monitoring well locations in an updated version of *Figure 12: Air Quality, Noise and Light Assessment Monitoring / Sampling Location*s in the Detailed Project Description.	Figure 19		
20	Early Engagement	Freshwater Fish	20-Jul-20	Name hidden for privacy	ENV	Project Description	Table 9 shows the fish species documented from historic data sources within the project area near the Mine Site and QR Mill. We noticed that Jack of Clubs Lake is missing from this list. We understand that surveys were conducted in the lake. Are there no fish?		BGM acknowledges ENV's comment and clarifies that fish were captured in Jack of Clubs Lake during the 2016 program. Detailed sampling information for this lake will be included as part of the EAC Application and associated technical reports. A commitment to the provision of this detailed information has been made in the Detailed Project Description.	10		
21	Early Engagement	Baseline	20-Jul-20	Name hidden for privacy	ENV	Project Description	We understand that the mine will need to collect data for baseline before this mine will potentially affect the water quality/quantity. However, it would also be very useful, if there was any control data of the area available, where no effects from historic mining occurred (if that exists). Even if this is done in a stream that has similar conditions (incl. water quality) but may not be directly in the area affected.		BGM confirms that the baseline sampling program completed in 2016 included stations from the west side of Cow Mountain, specifically Jack of Clubs Creek, Victoria Creek, and Stoney Creek. BGM notes that while it is not possible to verify that there is no mining influence in these locations, BGM can confirm that these stations are outside the main area of historic mining activities.	10.3.4		
22	Early Engagement	Permitting	22-Jul-20	Name hidden for privacy	FLNRORD	Project Description	I will just reiterate the need for the SROW application required to be submitted to our Regional Crown Lands group/ Front counter BC office here in Williams Lake as well as asking for as much detail/ history on the process they went through narrowing down all the options to get to this preferred Northern route as we really try to overlap these large utilities when we can. I might also give them a heads up on the timeframe required for these SROW applications to go through to decision even when grouped in a larger project and ask what their expectation for completion of the transmission line is?		BGM acknowledges FLNRORD's comment and confirms that an SROW application will be submitted to the Regional Crown Lands Office. Details associated with anticipated permits to be required for the Project is provided in the Detailed Project Description.	Table 17		
23	Early Engagement	Archaeological and Heritage Resources	23-Jul-20	Name hidden for privacy	FLNRORD	Project Description	Paleontology, Historic Era Heritage and Archaeology are lumped in together. Yet the regulations and requirements under the Heritage Conservation Act (HCA) treat these differently or not at all. Sites that pre date 1846 are granted automatic protection under the act while historic era sites (those that post date 1846) require an order from the Minister to grant protection. Paleontology is not even noted under the HCA and, as far as I am aware, there is no specific legislation governing paleontological remains in the province. I recommend separating these three into different sections and accurately discuss the developers requirements and responsibilities under the HCA and other appropriate Provincial legislation. Further, considering the large number of Mining Era Heritage sites that could be impacted, I recommend contacting Heritage Branch for their input.		BGM acknowledges FLNRORD's comment. Please note this separation is to be provided in the more detailed reporting on these aspects; specifically the Heritage Resource Impact Assessment, which discusses Historic Era Heritage and Archaeology but in separate headings, and the stand-alone paleontological report that assessed the mine site. These documents will be provided with the EAC Application. In regards to the inclusion of Paleontology under the Heritage Conservation Act (HCA), BGM has interpreted the Land Act to be broad and flexible in it's protection of public interest on Crown land through reservations or through designations for the conservation of natural or heritage resources. BGM further interprets that the HCA provides protection and regulation for fossils or fossil sites when they are designated as Provincial Heritage Objects or Sites under the Act. Given this interpretation, BGM has chosen to conservatively consider potential paleontological aspects that may exist for the Project. BGM can also confirm that Golder Associates Ltd., on behalf of BGM, reached out to the Heritage Branch following the initial 2018 assessment and was advised at the time to share spatial data and reports with BGM once the final HCA 2016-0276 report is complete.	11.6		
24	Early Engagement	Archaeological and Heritage Resources	23-Jul-20	Name hidden for privacy	FLNRORD	Project Description	There is no mention of the archaeological/heritage inspection that has been conducted under HCA Permit 2016-0276 or the upcoming work under HCA permit application 20A0164. I recommend that they provide a short summary of past work and highlight their commitment to future assessments once development plans are finalized.		In response to FLNRORD's recommendation, BGM is providing a summary table of historic inspections conducted under the HCA Permit 2016-0276 as an appendix to the Detailed Project Description with the TAC Comment Responses. BGM reiterates their commitment to future assessments once development plans are finalized, and has also included some information on these potential plans in the provided summary table.	Appendix D		

ID #	Stage	Subject - EA Topic	Comment/Issue Date	Comment Author	Comment Organization	Application/Document	Participant Issues, Description or Comment	Response Date	BGM Response	DPD Section Cross Reference	Status	EAO Response
25	Early Engagement	Human Health	27-Jul-20	Name hidden for privacy	IH	Project Description	Thank you for the opportunity to provide input on the Initial Project Description (IPD) and Supplemental Information for the proposed Cariboo Gold Project. The proposed mine site is near Wells, BC and most of the associated transport routes and infrastructure are located within the jurisdiction of the Northern Health Authority. As such, our comments are limited to the QR Mill Site and parts of the proposed transportation routes that are within the boundaries of the Interior Health Authority.		BGM acknowledges the comment and thanks Interior Health for their confirmed scope of jurisdiction on the Cariboo Gold Project.	n/a		
26	Early Engagement	Human Health	27-Jul-20	Name hidden for privacy	IH	Project Description	Worker's Accommodations at QR Mill, IPD Section 4.2.4.1 The IPD indicates that the existing QR Mill camp will be re-used to accommodate workers. Current capacity is noted to be 40 workers and it is unclear whether upgrades intend to accommodate more.		BGM acknowledges IH's comment and clarifies that a new worker accommodation is currently proposed at the QR Mill. The existing QR Mill camp will be utilized during the construction period to handle increased accommodation requirements and then decommissioned. Additional details on this proposed accommodation is provided in the Detailed Project Description.	7.5.3.1		
27	Early Engagement	Human Health	27-Jul-20	Name hidden for privacy	IH	Project Description	Worker's Accommodations at QR Mill, IPD Section 4.2.4.1 Sewerage System The Sewerage System Regulation pursuant to the BC Public Health Act requires that an Authorized Person under the Regulation inspect, design, install, and upgrade new or existing works. When a change in design flow or intended use occurs, it is required for the system to be upgraded to meet current standards and a filing must be submitted with the Health Authority.		BGM notes IH's comment and confirms that any proposed camp upgrades would include the appropriate system upgrades to meet current standards as outlined in the BC Public Heath Act. BGM also acknowledges that should these upgrade occur, the appropriate filing would be submitted with the Health Authority.	Table 17		
28	Early Engagement	Human Health	27-Jul-20	Name hidden for privacy	IH	Project Description	Worker's Accommodations at QR Mill, IPD Section 4.2.4.1 Drinking Water System A scan of our current active permits for drinking water systems did not identify a permitted water system for the QR Mill site. Please note that source approval, construction permit, and permit to operate a drinking water system per the BC Drinking Water Protection Act and Regulation must be obtained by the Health Authority prior to use.		BGM acknowledges the comment and confirms that source approval, construction permit, and permits to operate a drinking water system per the BC Drinking Water Protection Act and Regulation will be obtained by the Health Authority prior to use. It should be noted tha BGM receives monthly forms from Northern Health for sending samples of our potable water from two locations at the QR Mine Site (Office and Kitchen). The forms are pre-filled by Northern Health noting Dr. Rakel Kling as the MHO in charge and Joan Cooke as the Drinking Water Officer.	Table 17		
29	Early Engagement	Human Health	27-Jul-20	Name hidden for privacy	IH	Project Description	Transportation Route, IPD Section 4.2.3 A portion of the proposed transportation routes between the mine site and QR Mill is within IHA jurisdiction. IPD indicates that roads to QR Mill are unpaved and will not undergo upgrades as part of this project. IHA urges the applicant to address air quality impacts, including impacts on country foods, associated with increased traffic on gravel roads in their planning. It is noted that greenhouse gas emissions and air contaminants associated with the use of engines is acknowledged in the Preliminary Identification of Potential Interactions with the Biophysical Environment (IPD Table 14). Emphasis should also be placed on road dust and fugitive dust mitigation and its impacts on air quality and country foods.		BGM acknowledges IH's comment and confirms that road dust and fugitive dust mitigation attributable to the Project and its potential impacts on air quality and country foods will be considered in the EAC Application.	Table 37		
30	Early Engagement	Human Health	27-Jul-20	Name hidden for privacy	IH	Project Description	Water Management and Emergency Response Planning Given the history of significant environmental public health impacts due to mine associated dam failures in the region, there should be a strong emphasis on best management and monitoring practices for tailings storage and water management on both the mine site and QR Mill site. Flood and freshet events that could negatively impact storage facilities, dams, or cause overland flow of mine affected runoff should be included in emergency response planning. Plans should also inventory potential downstream impacts in an emergency and describe processes for notification of applicable regulatory agencies as well as water users and impacted residents/communities.		BGM acknowledges the importance of best management and monitoring practices for associated with tailings and water management, both historically as well as for the proposed Cariboo Gold Project. BGM verifies that flood events are currently included in the existing design at the QR Mill, as is the associated appropriate emergency response planning. BGM also confirms that these aspects will be considered and included in the proposed design and planning for the Project, including the appropriate emergency notifications processes. It should be further noted that BGM intends to move forward with a filtered tailings strategy to reduce the risk fo dam failure as well as the amount of water that will need to be managed. This approach follows best practice guidelines and is in accordance with recommendations coming from the Mount Polley incident.	7.5.3.3 (Tailings Design); 7.5.3.4 (QR Water Management); 12 (Public and Environmental Safety); 14.9 (Management and Monitoring Plans)		
31	Early Engagement	Design	27-Jul-20	Name hidden for privacy	EMPR Geotech	Project Description	EMPR expects that design of project components is advanced to (at minimum) a feasibility design level prior to submittal of the Detailed Project Description.		The design of project components will be advanced to a feasibility design level prior to submittal of the EAC Application. BGM understands this is acceptable to EMPR based on clarification received from Brennan Hutchinson (EAO) on this comment via email August 5, 2020.	6.2		
32	Early Engagement	Waste Management	27-Jul-20	Name hidden for privacy	EMPR Geotech	Project Description	EMPR expects that the Detailed Project Description will include discussion of best practices and Best Available Technologies (BATs) for waste management.		A discussion of best practices and Best Available Technologies for waste management will be provided in the EAC Application.	8.4		
33	Early Engagement	Design	27-Jul-20	Name hidden for privacy	EMPR Geotech	Project Description	Section 4.2.2.2 Mining, Mine Development: How are historical underground workings being considered and incorporated into the mine design?		The strategy for designing of the underground infrastructure is to construct all new excavation and avoid any use of or interaction with historical underground workings. A complete investigation of historical workings will be completed and a management plan will be submitted for dewatering, as part of the EAC Application. While in operation old working will ba backfilled to allow for pillar recuperation.	7.5.1.2		
34	Early Engagement	Waste Management	27-Jul-20	Name hidden for privacy	EMPR Geotech	Project Description	Section 4.2.2.4 Mine Waste Management Facilities, Waste Rock Storage Facilities: Please ensure that the WRSF designs describe the foundation conditions of all proposed WRSFs, including where founded on historic mine rock. WRSF designs should also specify the type of liner (if any) proposed to be used to separate the new waste rock from foundation materials or underlying historic waste rock.		The Waste Rock Storage Facility (WRSF) planned for the Operations Phase of the Cariboo Gold Project (CGP) is proposed to be located at the Bonanza Ledge Site, called the BL WRSF. The BL WRSF, which has a capacity of approximately 9.5 Mt, will have a low permeability liner installed, where practical. An underdrain may be utilized to help control the water level within the BL WRSF and to direct waters to the sediment pond at Bonanza Ledge. The proposed underdrain would consist of clean, coarse, and segregated material or perforated pipes and would be located above the liner at the lowest elevation of the facility area (along the existing natural valley), with all water draining to the BL sediment pond. During the Construction Phase of the Project, a total of approximately 1.8 million tonnes (Mt) of waste rock will be extracted and placed at the Bulk Fill Storage Facility (BFSF), for use as bulk fill material and for the construction of the Mine Site. The BFSF will have a liner underneath to separate this new facility from the historic waste rock and tailings below. This liner will be extended and keyed-in to the existing waste rock surface. Additional information regarding the WRSF and BFSF foundation conditions, liner designs, and quantity divisions will be provided with the EAC Application.	7.5.1.5		
35	Early Engagement	Waste Management	27-Jul-20	Name hidden for privacy	EMPR Geotech	Project Description	Section 4.2.2.4 Mine Waste Management Facilities, Tailings Storage Facility: What is the anticipated volume of tailings to be produced for the project and stored in the dry stack TSF?		Based on the current resources used for the Life of Mine, the anticipated volume of tailings produced for the Project and stored in the new Filtered Stack Tailings Storage Facility (FSTSF) is approximately 4 million tonnes with an assumed density of 1.7 t/m3. BGM confirms that no additional tailings volume will be generated as part of the Project.	7.5.3.3		
36	Early Engagement	Design	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	Please explain why the north east portion of Jack of Clubs Lake is excluded from the project footprint? **[Clarification]**		The project footprint is spatial area where activities or development of infrastructure are expected to occur. This is in contrast to the local study area boundary, which is a valued component-specific and larger area encomassing the project footprint to establish the spatial boundaries of where there is the potential for adverse effects attributable to the Project. The northeast portion of the Jack of Clubs Lake is not part of the project footprint given there are no project activities proposed to occur in this area; however, it will form part of the local study area for several valued components to be assessed as part of the effects assessment provided int the EAC Application. It should be noted that BGM intends to have the ability to extract water from Jack of Clubs Lake as necessary for emergency water supply in case of fire. These has been considered in the project footprint designation.	Figure 4		

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37	Early Engagement	Permitting	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	Please be aware that proposed activities associated with the Cariboo Gold Mine are anticipated to require Mines Act permit amendments for the Bonanza Ledge site, QR Mill site, and Mosquito Creek Site. [Comment]		BGM notes EMPR's comment and acknowledges that Mines Act permit amendments are anticipated to be necessary for the Bonanza Ledge Site and the QR Mill. A permit amendment for the Mosquito Creek Site is not anticipated at this time.	Table 17		
38	Early Engagement	Soil	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	For the application, please provide information on the soil and overburden inventories for the disturbance associate with the Cariboo Gold mine site, Bonanza ledge site, QR Site, and Mosquito Creek Site? If a soil and overburden shortfall is expected, what measures will be implemented to meet end land use and capability objectives? [Clarification]		BGM confirms that information on soil and overburden inventories for disturbances associated with the Project sites will be provided in the EAC Application. BGM will also include potential measures to meet end land use objectives in this application should a shortfall of these materials be anticipated.	7.5.5		
39	Early Engagement	Soil	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	Please note that soil and overburden suitable for the use of reclamation should not be used as fill. **[Comment]**		BGM notes EMPR's comment and confirms that soil and overburden suitable for reclamation use is not intended for use as fill on the Project.	7.5.1.4		
40	Early Engagement	Design	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	For the application, please describe the engineered covers that are being considered for progressive reclamation of WRSFs. **[Clarification]**		BGM acknowledges EMPR's comment and confirms that any consideration of WRSF progressive reclamation will be described in the EAC Application.	7.5.5		
41	Early Engagement	Design	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	For the application, please describe the results of previous research programs to assess the development of a dry-cover systems for the TSF at the QR site. [Clarification]		As noted in the Cariboo Gold Supplemental Information to Project Description (June 11, 2020), BGM is evaluating multiple options, including storing filtered tailings in the existing QR Mill Tailings Storage Facility (TSF). Further information on tailings storage options, including previous research programs to assess the development of dry-cover systems, will be provided with the EAC Application.	7.5.5		
42	Early Engagement	Waste Management	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	For the application, please describe the projected short-term and long-term implications of the dry stack tailings on the availability of metals, and accumulation in vegetation growing on tailing storage facilities? [Clarification]		BGM notes EMPR's comment and intends to include consideration of long-term closure implications associated with potential tailings storage options in the EAC Application.	7.5.5		
43	Early Engagement	Waste Management	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	How will the various tailings storage options influence the volume requirements of overburden and soil materials to meet end land use and closure objectives? [Clarification]		BGM acknowledges that tailings storage options have the potential to influence material requirements to meet final land use and closure objectives for the Project. The current preferred tailings handling option for the Project is a new Filtered Stack Tailings Storage Facility (FSTSF). Should this option be selected, required subsoil and topsoil is already allocated to this location, and no changes are anticipated. Details associated with tailings storage options and associated potential closure implications are provided in the Detailed Project Description.	7.6.1		
44	Early Engagement	Management Plans	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	How will pre-existing management plans or technologies eliminate, control, or mitigate the impacts of windblown dust associated with the various tailings handling options. [Clarification]		BGM verifies that the current tailings facilities at the QR Mill are flooded under water, which effectively eliminates the potential for windblown dust generation; as such, no dust control measures are currently employed for tailings. The planned tailings handling option for the Project is a new Filtered Stack Tailings Storage Facility (FSTSF). BGM will address dust generation in the EAC Application by proposed mitigation measures such as: 1) watering the working areas, 2) applying dust-suppressing agents, 3) progressive covering of the exposed tailings slopes with soil as part of reclamation and closure efforts.	Table 37		
45	Early Engagement	Waste Management	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	Please explain how precipitate from the water treatment plan will be managed during operation and closure at the Cariboo gold site. [Clarification]		The precipitates from the WTP at the Mine Site will be managed on site, mainly by backfilling of the precipitates with a binding agent, as part of the stope backfilling strategy. Details regarding the management of precipitate from the water treatment plant during operation and closure at the Wells and QR Mine Sites will be provided in the EAC Application.	7.5.1.6		
46	Early Engagement	Waste Management	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	Section 5.4: Please explain why overburden is classified as waste for the project. [Clarification]		BGM acknowledges the comment and has updated the DPD to reflect that overburden should not be classified as waste for the Project.	7.5.1.4		
47	Early Engagement	Management Plans	27-Jul-20	Name hidden for privacy	EMPR Reclam	Project Description	A Bat Management Plan is required if project activities have the potential to effect bats and/or bat habitat. [Comment]		BGM will provide a bat management plan as part of the EAC Application, should project activities have the potential to effect bats and/or bat habitat.	14.9		
48	Early Engagement	Human Health	28-Jul-20	Name hidden for privacy	NH	Project Description	The World Health Organization's definition of health states that "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."1 In line with this definition, Northern Health is fully committed to ensuring the preservation of the dignity (physical, social and mental health and wellness) of our people and the protection of their built and natural environment (determinants of health, services and infrastructure, land, air and water). Our comments contained herein are a reflection of this commitment.		BGM appreciates NH's engagement and commitment in the process to date and looks forward to future consultation.	n/a		
49	Early Engagement	Human Health	28-Jul-20	Name hidden for privacy	NH	Project Description	exposures, in accordance with Health Canada's guidance documents (links below) and including the following key steps: problem formulation, toxicity (or hazard) assessment, exposure assessment and risk characterization (health-based indicators, guidelines and methodologies must be used). The HHRA technical report should be a stand-alone section of the Application. This should include a Screening Level Human Health Risk Assessment before any pathways and parameters are eliminated from the assessment. For exposure pathways to be deemed incomplete, a rationale for exclusion must be provided. Indicators should include the change in health risk due to changes in the biophysical environment. Please ensure that sampling protocols for environmental data intended to feed into the HHRA adhere to health-based guidance for sampling programs (e.g. Health Canada Federal Contaminated Sites Risk Assessment in Canada guidance for HHRAs), which may be quite different from sampling methodologies for assessing environmental VCs. We expect that the HHRA be conducted by a professional with expertise and experience conducting human health risk assessments, recognizing that health assessment principles and methodologies can be very different from those used to assess environmental effects. Please include a professional statement in the Application which includes demonstrable qualifications and experience in conducting HHRAs relevant to the purposes of supporting an EA. We ask that Barkerville Gold Mines (BGM) consult the following guidance throughout the EA application process: **Northern Health – Office of Health and Resource Development** - Health and Medical Services Plan Best Management Guide For Industrial Camps - Standard Working Group Comments for Environmental Assessments - The social determinants of health impacts of resource extraction and development in rural and northern communities: A summary of impacts and promising practices for assessment and monitoring - Indicators for monitoring the SDOH related to resource development in Northern BC - January 2019 - Communicable Disease Control Plan - Best Management Guide for Industrial Camps June 2017 - Health and Safety During the Opioid Overdose Emergency: Northern Health's Recommendations for Industrial Camps - NH Quick Guide to HHRA in EAs **Health Canada Human Health Risk Assessment Documents:** - HHRA Guidance for Contaminated Sites - Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment (2019) - Guidance for Evaluating Human Health Impacts in Environmental Assessments: - Noise		BGM acknowledges NH's comment and confirms that a Human Health Risk Assessment (HHRA) will be completed for the Project, in accordance with Health Canada's guidelines and in consultation of the listed guidance documentation. This HHRA assessment and technical report, which will be conducted by an appropriately accredited professional, will be provided as a stand-alone section of the EAC Application.	11.7		
50	Early Engagement	Environmental and Social Effect	28-Jul-20	Name hidden for privacy	NH	Project Description	1.1, p.1, , 1.3, p. 2 -*The majority of Project infrastructure at the Mine Site will be located on brownfield sites that have been previously disturbed by historical mining operations….This will reduce the potential environmental effects associated with ground disturbance and vegetation clearing at both sites.* - Though building on a previously used industrial site prevents destruction of undisturbed vegetation and fauna, such sites—especially those that have undergone no reclamation—can pose additional environmental hazards and therefore compound potential biophysical risks. Throughout the EA process we ask that BGM describe and account for potential threats posed by utilizing an un-reclaimed mine site.		BGM acknowledges NH's requests and confirms that potential effects associated with utilizing un-reclaimed historic mining areas will be considered through the Environmental Assessment process.	3.2; Table 38		

ID #	Stage	Subject - EA Topic	Comment/Issue Date	Comment Author	Comment Organization	Application/Document	Participant Issues, Description or Comment	Response Date	BGM Response	DPD Section Cross Reference	Status	EAO Response
51	Early Engagement	Environmental and Social Effect	28-Jul-20	Name hidden for privacy	NH	Project Description	1.3 The Cariboo Mine and its workforce camp are very close to the town of Wells. We commend BGM for keeping many operations underground, such as ore crushing, to reduce noise and dust. However, the location of the mine will still amplify any noise, dust, and biohazard risks. This needs to be carefully accounted for in future EA phases. Additionally, the close proximity of the camp to Wells means that BGM must explain measures that will be taken around managing worker conduct and interactions within Wells.		BGM acknowledges NH's comment. The air quality, noise assessment and human health risk assessments being undertaken for the project will account for potential noise, dust and human health risks associated with the Project, and will be provided in the EAC Application. Mitigation measures for minimizing potential project effects will be outlined as part of the effects assessment presented in the Application.	Table 37 and 38		
52	Early Engagement	Employment and Economy	28-Jul-20	Name hidden for privacy	NH	Project Description	4.4, p. 44 In the Detailed Project Description, we ask that BGM include workers employed during the construction phase in their employee count. Additionally, we ask that BGM describe where employees will reside during the construction period.		BGM acknowledges NH's comment and confirms employment totals in the Detailed Project Description include construction phase staff, as well as details on worker accommodations.	7.7.2; 7.7.2.4		
53	Early Engagement	Baseline	28-Jul-20	Name hidden for privacy	NH	Project Description	6.2.1 p. 50 - *Two periodic (24-hour) sampling events for PM10 and metals using MiniVols near the Mine Site (September 2016 and April 2017)* - This has been used to determine baseline air quality conditions. Air quality will be a very important consideration for this project given the proximity to Wells. The 2 short-term sampling events do not seem sufficient to characterize baseline conditions. Please explain how these sampling events represent baseline conditions (under a variety of meteorological conditions) and how fine particulates will be characterized (PM2.5) and assessed.		In addition to the two periodic sampling events in 2016 and 2017, air quality data from stations operated by the BC Ministry of Environment and Climate Change Strategy (ENV) were used to characterize existing conditions. The ENV data is continuous monitoring data. In continuous monitoring air quality is constantly measured by drawing ambient air into a monitoring instrument that is connected to a datalogger. The resulting ENV data are provided as an hourly average, for each hour of a year. For fine particulates (PM2.5) three years of hourly data from the ENV monitoring station in Quesnel were summarized, and will therefore capture air quality conditions under a wide range of meteorological conditions.	10.3.1		
54	Early Engagement	Human Health	28-Jul-20	Name hidden for privacy	NH	Project Description	7.2, p. 83, We recognize that the mitigation measures and components included are examples, but moving forward we emphasize the urgency of considering the current medical infrastructure of nearby communities (Wells, Quesnel). BGM must identify any potential burdens on the local medical infrastructure, and explain how they will be prevented and mitigated. (For example, we expect that BGM will develop a detailed health and medical services plan for their worker camp).		BGM confirms that potential burdens on local medical infrastructure will be identified as soon as feasible, as well possible solutions to mitigate or prevent potential associated effects on nearby communities.	11.2.3		
55	Early Engagement	GBA	28-Jul-20	Name hidden for privacy	NH	Project Description	7.2, p. 83 - We recognize again that this section provides examples of what will be considered as the EA application continues. However, because of its recent enactment and potential complexity, we emphasize that under 25(2)(d) of the BC 2018 EA Act: "…effects on distinct human populations, including populations identified by gender" must be considered in every assessment. For guidance on Gender Based Analysis plus (GBA+), we recommend that BGM refer to the following: - Canadian Environmental Assessment Agency. "Gender-based Analysis Plus in Impact Assessment (Interim /Guidance."(2019) - Status of Women Canada. "Fact Sheet: GBA+." (2017)		BGM thanks NH for highlighting the importance of the Gender Based Analysis plus (GBA+) in the new environmental assessment process and for identifying the appropriate reference material. BGM refers to the identified documents in the Detailed Project Description as the requisite analysis to be undertaken.	11.2.1		
56	Early Engagement	Greenhouse Gas Emissions	14-Aug-20	Name hidden for privacy	ENV	Project Description	CAS notes that this project is in Early Engagement and that the proponent is still gathering baseline and project information. CAS would like the opportunity to review greenhouse gas (GHG) information when it becomes available.		BGM intends to provide greenhouse gas (GHG) information in the EAC Application and looks forward to future review opportunities with CAS.	4.3.2		
57	Early Engagement	Greenhouse Gas Emissions	14-Aug-20	Name hidden for privacy	ENV	Project Description	At this early stage, CAS would like to identify that the Greenhouse Gas Industrial Reporting and Control Act (GGIRCA) should be considered in the Initial Project Description and ask that it be included in the Application Information Requirements and the Environmental Assessment Application. CAS is also interested in knowing the effects of the project on legislated targets as described in the Climate Change Accountability Act (CCAA).		BGM acknowledges the reviewer's comment and confirms the regulatory requirements of the Greenhouse Gas Industrial Reporting and Control Act (GGIRCA) relevant to the Project has been provided in the Detailed Project Description in the Regulatory Context section, as will the overarching impact of the Climate Change Accountability Act (CCAA).	4.3.2		
58	Early Engagement	Greenhouse Gas Emissions	14-Aug-20	Name hidden for privacy	ENV	Project Description	The proponent should note that any industrial operation exceeding the emissions threshold of 10,000 t CO2e/year will be required to report to the Government of BC under GGIRCA. If emissions exceed 25,000 t CO2e/year, third party verification will also be required. For additional information see the Greenhouse Gas Emission Reporting Regulation.		BGM confirms it will adhere to all reporting and regulatory requirements under the Greenhouse Gas Industrial Report and Control Act (GGIRCA) for the Project. This has been clarified in the DPD.	4.3.2		
59	Early Engagement	Greenhouse Gas Emissions	14-Aug-20	Name hidden for privacy	ENV	Project Description	CAS asks the proponent determine likely GHG emissions from base case of project for all sources covered by GGIRCA. Forecast annual and lifetime emissions. Calculate the percent change in progress to legislated provincial greenhouse gas targets in the CCAA (Climate Change and Accountability Act).		BGM confirms that a preliminary estimate of the likely annual and lifetime greenhouse gas (GHG) emissions from the Project is included in the Detailed Project Description, along with a comparison of these emissions to the Climate Change and Accountability Act (CCAA) GHG targets.	8.2.2		
60	Early Engagement	Other	14-Aug-20	Name hidden for privacy	ENV	Project Description	Section 3.3 (page 24) – Water Use – it is recommended that during the analysis of required water resources for the project, climate change impacts are considered in assessing whether additional water resources are required. Climate change has already had a large impacts on the availability of water resources regionally throughout BC. This could pose a risk to the project if it is granted a water license with a low priority date and severe drought conditions occur in the areas surrounding the mine site.		BGM acknowledges ENV's comment and confirms that climate change impacts will be considered in the analysis of required water resources for the Project. Details on this matter will be provided in the EAC Application. Generally, BGM notes that contact water for the Project will be recycled as much as practicable for industrial uses, which will reduce fresh water requirements for the Project; it's also noted that Project has a positive water balance.	13.2		
61	Early Engagement	Other	14-Aug-20	Name hidden for privacy	ENV	Project Description	Section 4.2.2.5 (page 37) – Water Management – it is recommended that climate change is incorporated into water management measures related to larger precipitation events in related to infrastructure, and extended periods of drought related to potentially exacerbated impacts to receiving water bodies and water quality.		BGM acknowledges ENV's comment and confirms that climate change impacts will be considered in the design of water management measures for the Project. Details on this will be provided in the EAC Application.	13.2		
62	Early Engagement	Other	14-Aug-20	Name hidden for privacy	ENV	Project Description	Section 5.7 (page 48) – Decommission and Reclamation – It is recommended that climate change is incorporated into the design of mine decommissioning activities and reclamation.		BGM acknowledges ENV's comment and confirms that climate change impacts will be considered in the closure and reclamation of the Project. Details on this will be provided in the EAC Application.	13.2		
63	Early Engagement	Wildlife	17-Aug-20	Name hidden for privacy	FLNRORD	Project Description	Thank you for the opportunity to review and participate in the Early Engagement Phase process for the proposed Cariboo Gold Project. The following high-level comments are from our Wildlife and Terrestrial Section. It is important to note that the Fish and Aquatics Section have not review the draft Project description and may have comments later in the process.		BGM appreciates FLNRORD's participation in the process to date, and looks forward to future consultation with FLNRORD going forward.	n/a		
64	Early Engagement	Wildlife	17-Aug-20	Name hidden for privacy	FLNRORD	Project Description	1.0 Cumulative Effects Due to the close proximity and proposed use of the QR and Bonanza Ledge mine sites, we recommend that these areas and associated transportation routes be included in the footprint of the proposed Cariboo Gold project (mine site, transmission line, access routes, etc.) for an environmental assessment, to evaluate the potential cumulative impact on wildlife and habitat resources. The provincial Cumulative Effects Framework, specific to the Cariboo region, should be used as part of an overall assessment.		The footprint of the proposed Cariboo Gold Project includes the mine site, portions of Bonanza Ledge, the QR mill, transmission line, and access routes. The provincial Cumulative Effects Framework, specific to the Cariboo region, will be used as part of an assessment of cumulative effects to be provided in the EAC Application.	14.7		
65	Early Engagement	Wildlife	17-Aug-20	Name hidden for privacy	FLNRORD	Project Description	2.0 Caribou Related Comments Concerns extend beyond the actual footprint of the mine, and there needs to be consideration of the entire picture (access to mine, waste rock storage facility (WRSF), etc.): • Overall disturbance associated with the mine o 12-15 years of active mining followed by any restoration/reclamation o Prolonged disturbance inside caribou range - Barkerville herd • Increased use of Bonanza Ledge o Bonanza Ledge is inside core caribou habitat o Cariboo Gold will make use of the WRSF at Bonanza ledge o Expansion of Bonanza site footprint o Increased mine life at Bonanza o Increased disturbance at Bonanza site o Increased traffic in and out of Bonanza • Northern transmission line option o Increased linear features inside both core and matrix caribou habitat o Matrix habitat is supposed to be managed to limit predators, predators thrive with increased linear features (facilitate movement) o Intersects the route used by caribou to access Mt. Tom		BGM agrees with FLNRORD's assertion that potential effects could extend beyond the actual footprint of the Cariboo Gold Project. Local and regional study areas are established for the assessment of potential project effects and cumulative effects. The spatial extent of these areas for each valued component that is considered for the effects assessment will be described in the EAC Application.	14.3		
66	Early Engagement	Wildlife	17-Aug-20	Name hidden for privacy	FLNRORD	Project Description	Barkerville Gold Mine has a caribou mitigation and management plan associated with their adjacent Bonanza Ledge Mine. Due to increased Bonanza Ledge site use and extended time periods beyond that considered in the caribou mitigation and management plan, the plan for Bonanza Ledge may not be adequate for that site anymore and there is potential that the mitigation strategy needs to be revised. It is uncertain at this time if a similar type of caribou mitigation plan alone would be able to adequately mitigate additional, cumulative impacts to caribou as a result of the Cariboo Gold project.		BGM acknowledges the comment and proposes to work with FLNRORD to ensure an appropriately scoped Caribou Mitigation and Management Plan is outlined in the EAC Application.	14.9		

ID #	Stage	Subject - EA Topic	Comment/Issue Date	Comment Author	Comment Organization	Application/Document	Participant Issues, Description or Comment	Response Date	BGM Response	DPD Section Cross Reference	Status	EAO Response
67	Early Engagement	Wildlife	17-Aug-20	Name hidden for privacy	FLNRORD	Project Description	3. Other Habitat comments • The proposed mine footprint (including mine site, transmission corridor, adjacent mine sites, access routes) includes many habitat areas managed by Land Use Order under the Land Act (e.g. grizzly bear habitat, Old-Growth Management Areas, moose habitat) as well as whitebark pine critical habitat (proposed), and area managed as Mule Deer Winter Range. Baseline studies undertaken will need to follow provincial inventory standards set by the Resources Information Standards Committee (RISC).		BGM acknowledges FLNRORD's comment and confirms that wildlife survey methods for the Project were based on relevant Resources Information Standards Committee (RISC) Inventory standards, where standards exist. Targeted surveys for plant species at risk during 2016 and 2018 field seasons followed methods outlined in Penny and Klinkenberg (2016) and Alberta Native Plant Council (2012). Targeted surveys for plant species at risk during the 2019 and 2020 field seasons followed protocols outlined in Ministry of Environment and Climate Change Strategy (2018). BGM also confirms that Whitebark Pine (Pinus albicaulis) was included in the scope of the plant species at risk surveys completed during the 2016, 2018, 2019, and 2020 field seasons. References: Alberta Native Plant Council. 2012. Guidelines for Rare Plant Surveys: 2012 Update. http://anpc.ab.ca/wp-content/uploads/2015/01/Guidelines-For-Rare-Plant-Surveys-in-AB-2012-Update.pdf. Accessed 1 December 2018. Ministry of Environment and Climate Change Strategy. (2018). Inventory and Survey Methods for Rare Plants and Lichens Standards for Components of British Columbia's Biodiversity No. 43. Penny J. and Klinkenberg R. 2016. Protocols for Rare Plant Surveys. In: Klinkenberg B. (Editor) 2016. E-Flora BC: Electronic Atlas of the Flora of British Columbia. Lab for Advanced Spatial Analysis, Department of Geography, UBC, Vancouver. http://www.eflora.bc.ca. Accessed 1 December 2018.	10.3.10 (Vegetation) ; 10.3.11 (Wildlife)		
68	Early Engagement	Wildlife	17-Aug-20	Name hidden for privacy	FLNRORD	Project Description	• The original proposed location of the transmission line (along Highway 26) would likely have greatly reduced impacts compared to the newly proposed northern route. A comparison of impacts between the two locations would be useful.		BGM notes FLNRORD's comment and confirms that a high-level comparsion of transmission line alternatives is included in the Detailed Project Description. A fulsome discussion of transmission line alternatives will be included in the EAC Application.	7.6.2		

APPENDIX D - SUPPORT DOCUMENTS

TAC ID #	Support Document		
	Year of Assessment	Development	Comment
24	2016	Mine Site (Wells, BC)	A Golder (2016) desktop Heritage Resource Overview Assessment (HROA) was conducted and produced heritage sensitivity mapping for the project.
	2017	Mine Site (Wells, BC)	A HRIA (Golder 2020a) under HCA permit 2016-0276 used sampling methods to ground-truth HROA and the heritage sensitivity mapping. One new protected archaeological site was identified (FgRj-14) and 381 historical features were observed and recorded. This assessment help to establish baseline data that was used for a cross comparative analysis that added an additional 301 inferred historical features for a total of 682 historical features.
	2019	Wells' workers camp, QR mill, southern transmission line	As development plans were provided to Golder, additional assessment under HCA permit 2016-0276 was conducted. Nine historical features were identified and recorded within the Project area for the Worker's Camp component and one historical feature (a section of the Cariboo Wagon Road) was identified during the assessment of the southern Transmission Line HRIA (Golder 2020b).
	2020 and Beyond	Northern Transmission line	In the Summer of 2020, Golder conducted a preliminary field reconnaissance (PFR) to gather baseline data to assess the 2 km right of way. Baseline data collection focused on ground-truthing a previous archaeological model, reviewing past land-alteration (i.e., forestry and mining), and identifying areas of potential or historical sites. Future HRIA is being proposed once a transmission line alignment has been formalized and will focus on results of the PFR. An HCA permit application has been submitted to cover the Project and the North Transmission line.

September 19, 2020

Barkerville Gold Mines Ltd.
365 Bay Street, Suite 400
Toronto, ON
M5H 2V1

Mayana Kissiova, P.Eng.
Director, Tailings and Water Management
Osisko Gold Royalties

Dear Ms. Kissiova:

Cariboo Gold Project Tailings Management Filtered Tailings Technology at QR Mine

1 INTRODUCTION

Barkerville Gold Mines Ltd. (BGM), owned by Osisko Gold Royalties (OGR), is proposing the development of the Cariboo Gold Project (CGP) as underground mine in the District of Wells, British Columbia. The ore will be mineral sorted at Wells to produce a pre-concentrate (total of 3.4 million tonnes over a 16-year mine life) which will be transported to the QR Mine for further milling (BBA 2019) [1]. At QR Mine, the tailings will go through cyanide destruction, thickening, pressure filtering, and will be compacted to form a filtered stack on the existing QR Mine tailings storage facility (TSF). The collected seepage and runoff from the filtered stack will be treated prior to discharge into the receiving environment.

BGM selected the filtered tailings over conventional slurry tailings for the following reasons:

- Filtered stacking reduces the long-term geotechnical risks compared to conventional tailings facilities. It would also reduce the geotechnical risk of the current TSF at QR Mine.
- Filtered stacking reduces the overall project footprint and allows for progressive reclamation.

The objective of this letter is to provide additional commentary to demonstrate that filtered tailings technology is considered a best available technology (BAT)[2] for tailings management at QR Mine. Klohn Crippen Berger Ltd. (KCB) prepared this letter with input from BGM and OGR.

[1] BBA Inc. (BBA). 2019. "Preliminary Economic Assessment of the Cariboo Gold Project NI 43-101 Technical Report." Prepared for Barkerville Gold Mines Ltd. September 17.
[2] Best available technology, or BAT is defined in the 2019 Mining Association of Canada (MAC) "Guide to the Management of Tailings Facilities Version 3.1", as the site-specific combination of technologies and techniques that is economically achievable and that most effectively reduces the physical, geochemical, ecological, social, financial and reputational risks associated with tailings management to an acceptable level during all phases of the life cycle, and supports an environmentally and economically viable mining operation.

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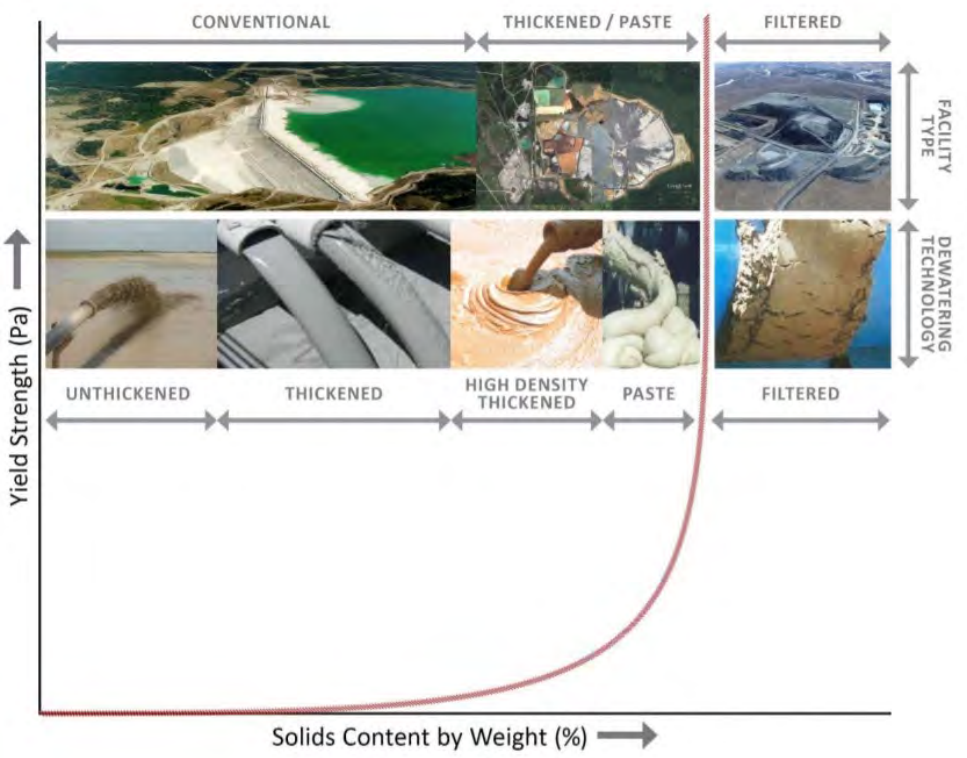
2 FILTERED TAILINGS TECHNOLOGY

Tailings dewatering technologies can produce a range of tailings and properties (Figure 2.1) from conventional un-thickened slurry, to thickened and high-density thickened tailings, to paste tailings, and finally to soil-like filtered tailings as the percentage of water in the voids is reduced.

Figure 2.1 Dewatered Tailings Properties and Corresponding Facility Type (MEND 2017) [3]



Photograph reference:
Facility type images (left to right: KCB 2017[4], Google 2016 & @ Digital Globe 2016[5], and Levac 2016[6]
Dewatering technologies images: Fourie 2015[7] and Jewell and Fourie 2015[8]

In the report on the Mount Polley Tailings Storage Facility (TSF) Breach (IEEIRP 2015)[9], the Independent Expert Engineering Investigation and Review Panel (IEEIRP) states that the overarching

[3] Mine Environment Neutral Drainage (MEND). 2017. "Study of Tailings Management Technologies. MEND Report 2.50.1". October.
[4] Klohn Crippen Berger (KCB). 2017. "Highland Valley Copper Mine." Accessed February 20. www.klohn.com
[5] Google, Digital Globe. 2016. Map Data.
[6] Levac, C. 2016. "Raglan as a case study in MEND Tailings Study Report." E-mail message to K. Patterson, October 10.
[7] Fourie, A. 2015. Presentation entitled: "BAP or BAT? A review of some dramatic changes in tailings management in the recent paste and potential changes in the future" for Tailings and Mine Waste Management for the 21st Century. July.
[8] Jewell, R.K. and Fourie, A.B. 2015. Paste and Thickened Tailings – A Guide the Third Edition.
[9] Independent Expert Engineering Investigation and Review Panel (IEEIRP). 2015. "Report on Mount Polley Tailings Storage Facility Breach". January 30.

goals of BAT are "*to assure physical stability of the tailings deposit*" and "*to reduce the number of tailings dams subject to failure*". According to IEEIRP (2015), there are three BAT components that achieve these objectives. The components are:

- *"Eliminate surface water from the impoundment;*
- *Promote unsaturated conditions in the tailings with drainage provisions; and*
- *Achieve dilatant conditions throughout the deposit by compaction".*

The IEEIRP states that "*filtered tailings embodies all three BAT components*", and that "*there are no overriding technical impediments to more widespread adoption of filtered tailings technology*" (2015). This position is supported by Earthworks (USA) and MiningWatch Canada (2020)[10].

The following sections describe how the filtered tailings stacking would achieve BAT objectives at QR Mine.

2.1 Physical Stability

Filtered tailings that are well drained and adequately compacted promote physical stability. Compaction is necessary to prevent liquefaction flowslides that can and have occurred in loosely placed dewatered materials due to infiltration of ponded surface runoff (IEEIRP 2015). There is a lower risk associated with geotechnical instability for a filtered stack than a conventional TSF that stores loose tailings and has an operational reclaim pond and/or a permanent water cover.

During a hypothetical dam breach, filtered tailings have the least potential for mobilization and transportation of tailings due to having the least amount of free water and water in voids (MEND 2017). Failure of a filtered stack, if it occurs, would likely be local slumping and consequences would be restricted to the local area unless the material slumps into a water body (MEND 2017).

Since the filtered stack would be constructed on top of the existing QR TSF, the water in the existing pond would have to first be removed and, based on the water balance and drainage conditions, the existing conventional tailings would become partially drained over time, which also increases the geotechnical stability.

2.2 Geochemical Stability

The CGP tailings at QR Mine will have strong potential to generate acid rock drainage (ARD) and metal leaching (ML) (Golder 2020)[11]. Controls of sulphidic ARD/ML would be achieved by retarding the sulphide oxidation process by limiting the availability of oxygen and/or water (MEND 2017). Disposal

[10] Earthworks USA and MiningWatch Canada. 2020. "Safety First: Guidelines for Responsible Mine Tailings Management" report. June.
[11] Golder Associates Ltd. (Golder). 2020. "Cariboo Gold Project: Geochemistry Baseline Report". February 3.

of acid generating materials below a water cover is one of the most effective methods to limit oxygen diffusion, but on the other hand, runs counter to the BAT components defined above (IEEIRP 2015).

The partially-saturated CGP tailings in the filtered stack will oxidize and generate ML/ARD. However, when placed and compacted, filtered tailings can also have a low hydraulic conductivity which can reduce the flow of water through the tailings and limit oxygen diffusion (MEND 2017). Seepage and runoff from the ARD tailings would need to be treated prior to offsite discharge.

2.3 Reclamation and Closure

Filtered stacks are amenable to closure as a landform and progressive reclamation. A closure cover can be placed over tailings to reduce infiltration and limit oxygen diffusion to reduce post-closure water treatment.

2.4 Social, Ecological, Reputational, and Financial Considerations

The social, ecological, and reputational considerations are achieved indirectly by addressing physical stability and geochemical stability and implementing the closure plan. Financially, in KCB's opinion, filtered tailings stacking on the existing TSF will achieve closure in a timelier and more cost-effective way than the other alternatives under consideration.

3 CONCLUSION

In summary, BGM's proposed filtered tailings stack for the CGP tailings management at QR Mine meets the intent of BAT:

- Filtered tailings stacking achieves physical stability by promoting unsaturated and dilative conditions and eliminating long-term water cover from the impoundment.
- Filtered tailings stacking achieves geochemical stability with a closure cover over tailings to reduce infiltration and retard oxygen entry to reduce post-closure water treatment.
- Filtered tailings stacking meets the social, ecological, and reputational objectives indirectly by addressing geotechnical and geochemical stability.

As part of the CGP alternatives assessment (KCB in progress), KCB is conducting a multiple accounts analysis in accordance with ECCC (2016)[12] guidelines that considers the environmental, technical, project economics and socio-economic aspects of each alternative throughout the project life cycle. Other amendments and mitigation methods to reduce the geochemical risk will also be considered.

[12] Environment and Climate Change Canada (ECCC) (2016). "Guidelines for the assessment of alternatives for mine waste disposal." December. Accessed on September 18, 2020. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal.html

4 CLOSING

This letter is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the exclusive use of Barkerville Gold Mines Ltd. (Client) for the specific application to the Cariboo Gold Project at QR Mine, and it may not be relied upon by any other party without KCB's written consent.

KCB has prepared this letter in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

Yours truly,

KLOHN CRIPPEN BERGER

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
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Sept 19, 2020

Michelle Liew, P.Eng.
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APPENDIX F – PHOTOGRAPHS

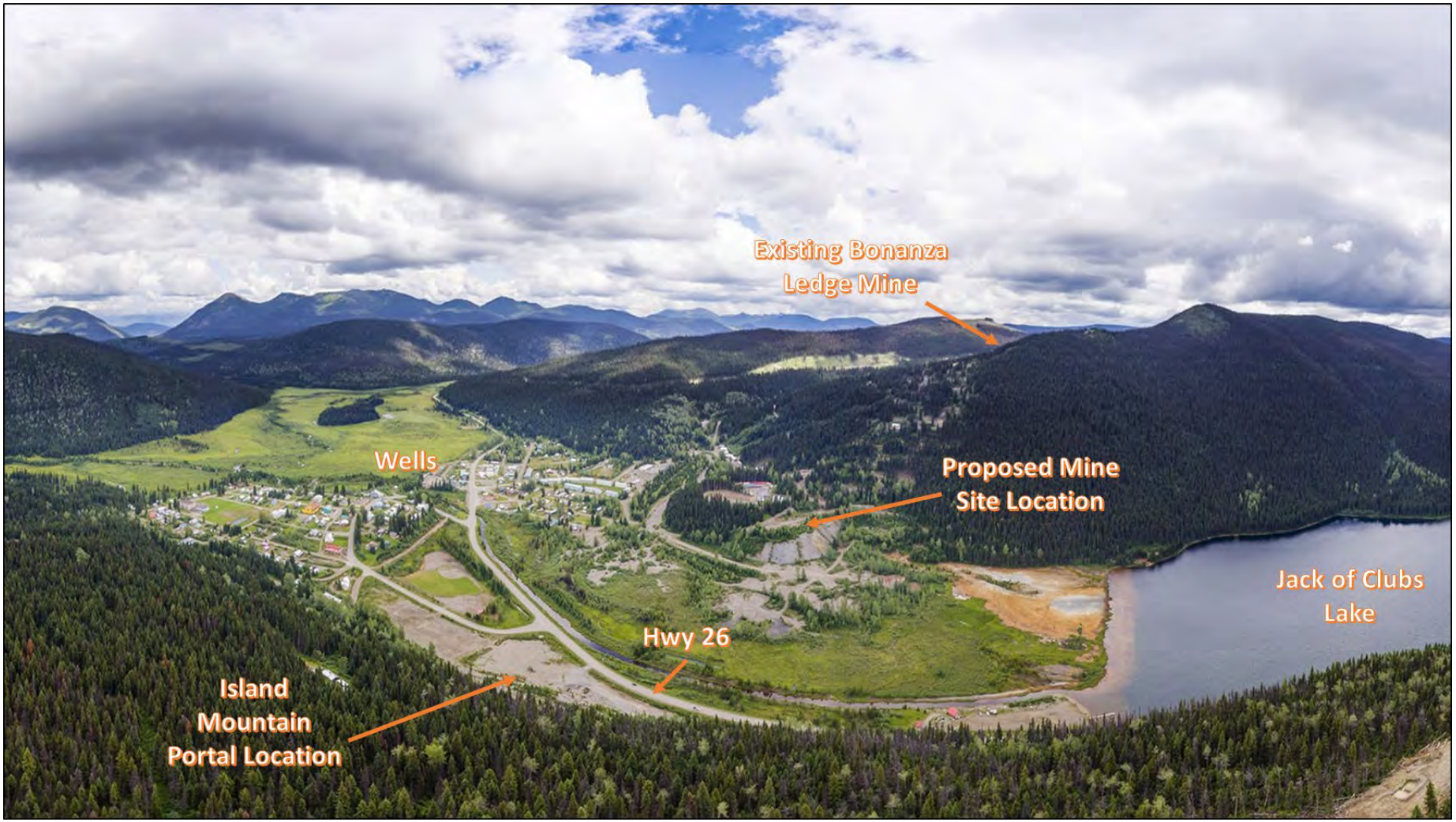

Photo 1. View of the town of Wells, the current BGM Camp and proposed Mine Site

Photo 2. View towards Mine Site from Jack of Clubs Lake Viewpoint

Photo 3. Willow River in Wells, at Approximate Site of Bridge Crossing for Mine Site Access Road

Photo 4. Proposed Mine Site Location.

Photo 5. Island Mountain Portal Location.

Photo 6. Intersection of Highway 26 and 500 Nyland Lake Road

Photo 7. Typical Section of 500 Nyland Lake Road

Photo 8. Typical Section of Highway 26

Photo 9. View of the existing QR Mill