

# Highway 26 BC Hydro Transmission Line Upgrade Review

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## ACKNOWLEDGMENTS

We respectfully acknowledge that Clear Course's main office is located within the Liłwatátkwa7 (Lillooet River) watershed which is part of the unceded Traditional Territory of the Státyemc Ucwalmicwts (language) speaking Liłwa7ul (Liłwat People). For more information, please visit Clear Course's [Indigenous Pledge](#).

Front page photo of rural power line along BC Highway 26 by Cameron Bevers, [www.thekingshighway.ca](http://www.thekingshighway.ca).

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# 1 OVERVIEW

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## 1.1 Purpose

In August 2022, Clear Course Consulting Ltd. (Clear Course) was retained by the District of Wells to conduct engagement to help determine the feasibility of aligning a transmission line planned for Cariboo Gold Project along Highway 26 from Quesnel to Barkerville, BC. The Highway 26 alignment was one of several options explored by Barkerville Gold Mines Ltd./Osisko Development (BGM) in the provision of three-phase power to its new mine location in Wells, BC. The District of Wells believes that by installing the line required for BGM along Highway 26, this would provide more reliable and sufficient power to residents, businesses, and communities along the corridor as well as the proposed mine.

During initial discussions with representatives from BC Hydro and BGM, it was quickly determined that changing the transmission route alignment at the advanced stage of the permitting process was highly unlikely based on the existing commissioning schedule and budget. However, we were given direction to continue to explore opportunities for upgrading power to Wells and the surrounding region. Two of the main drivers for upgrading the power supply are economic development (e.g., business expansion and attraction) and de-carbonizing the region.

This document summarizes the information collected by Clear Course and provides recommendations for next steps for increasing the power capacity of the BC Hydro transmission line along Highway 26.

## 1.2 Background

To determine the status of the existing powerline and the opportunities associated with the proposed Cariboo Gold Project, we reviewed available documents related to the new transmission line. Due to ongoing design and mitigation requirements, some project details have changed over time, specifically between the release of BGM's technical reports (2020) and the most recent feasibility study released in January 2023 (ODC, 2023). A detailed bibliography of the documents is presented in Appendix A. Key discrepancies and clarifications are noted below:

1. Although the length of the northern transmission line route was originally measured as 72 km (with the route along Highway 26 being 69 km), the 2023 feasibility study states that the northern route now measures approximately 69 km. A detailed design of the line is ongoing and may vary with mitigation and avoidance measures during construction.
2. The new transmission line was originally stated as providing 69 kV of power. The proposed voltage at the start of the transmission line (i.e., at the Barlow substation) is 69 kV. By the time the power reaches its destination at the mine site near Wells, the total voltage is estimated to be approximately 66 kV (allowing for a drop in power due to the distance travelled). These two measurements of energy are used interchangeably.

3. Although BGM previously reported it would complete the new transmission line by 2024, according to the 2023 feasibility report, it doesn't plan to start construction until Q4 2025 and won't tie into BC Hydro's grid until Q3 2026.
4. BGM doesn't require additional power for Phase 1 of the project. Phase 1 will rely on existing BC Hydro power and generators as well as a new natural gas power plant that will be constructed at the Bonanza Ledge site (ODC 2023, p. 18-20). The new 66 kV transmission line, described below as Alternative C, will support Phase 2 of the project.
5. The power line currently serving Wells/Barkerville along Highway 26 is a single-phase distribution line (as opposed to the proposed three-phase transmission line) and operates at 25 kV.

BGM is projected to spend at least \$32 million to build a new transmission line to power its proposed mining operations. Three routes were considered for the power upgrade—they are as follows:

- **Alternative A: Twin the existing line:** Install a 69 km 69 kV overhead line from BC Hydro's (BCH) Barlow substation near Quesnel following Highway 26 along a new right-of-way (ROW) alongside the existing 25 kV distribution line (DL). The existing ROW will be widened by at least 12 m.
- **Alternative B: Build the new transmission line in the existing right-of-way:** Install a 69 km 69 kV overhead line from BCH Barlow substation near Quesnel following Highway 26 along existing ROW with upgraded line and existing 25 kV distribution line underbuilt. The existing ROW will be widened by approximately 12 m.
- **Alternative C: Build a new northern transmission line route:** Install a 69 km 69 kV overhead line from BCH Barlow substation near Quesnel routed north of Highway 26 along a new 36 m wide ROW that would follow along existing forest service roads and other disturbed areas, where possible.

Ultimately, Alternative C was deemed the most viable based on the number of issues associated with upgrading the power along the existing Highway 26 route which could have significant impact on both budget and timeline for construction. Table 1 outlines the issues with using the existing right-of-way for BGM's project.

**Table 1– Issues and concerns raised regarding the transmission power upgrade Highway 26 alignment.**

Issue / Concern	Rationale	Raised by/ Decision maker	Source
1. <b>Timing of Power Upgrade</b>	<p>BC Hydro indicated that current demand does not justify investment in an upgrade to the distribution line that provides power along Hwy 26. They estimate any upgrades initiated by BC Hydro wouldn't likely occur until 2027 or later. This development timeline introduces unacceptable delays to the mine's project schedule. Additionally, MOTI does not allow the construction of private utility infrastructure along a public highway ROW; therefore, BGM is not permitted to independently build a new transmission line without the project being led by BC Hydro.</p>	BGM, BC Hydro	ODC 2022
2. <b>Insufficient Power Load Allowances</b>	<p>BC Hydro's operational standards require voltage drops along a transmission line not exceed 5% of the total voltage. As per ODC (2022),</p> <p><i>"The amount of power that can be transmitted along the length of the line that would run from the existing Barlow substation to the Project site in Wells, when constrained to a 5% voltage drop, is limited to 19 MW. Further detailed design of the Project has resulted in a peak load demand of 22 MW, with future potential decarbonization measures (e.g., incremental electrification of mine site operations) resulting in a load demand higher than this number. In order to transmit 22+ MW of power through a line from Barlow substation to the Project site, a 230 kV transmission line would be required; however, BC Hydro is not willing to place a 230 kV line along Highway 26. A 230 kV transmission line would require the use of significantly larger H-shaped poles, larger conductors (i.e., wires), significantly higher ground clearance, and a 62% increase in ROW width."</i> (Page 3)</p> <p>The installation of the larger H-shaped poles significantly increases the transmission line footprint and increases the related issues described here.</p> <p>NOTE: BC Hydro's standard design practices preclude the construction of private transmission lines along major transportation routes including Highway 26. Even though BC Hydro has indicated that they would be willing to make an exception to this standard practice and eventually construct a transmission line with a voltage of up to 69 kV, this voltage is insufficient to power the mine project, nor could this process align with the planned schedule for commissioning the mine.</p>	BGM, BC Hydro, MOTI	ODC 2022
3. <b>Ministry of Transportation and Infrastructure</b>	<p>MOTI does not allow the construction of private utility infrastructure along a public highway ROW; therefore, BGM is not permitted to independently build a new transmission line along Hwy 26 route. The request to build this line would have to come from BC Hydro.</p>	MOTI, BC Hydro	ODC 2022
4. <b>Burial Sites</b>	<p>Following community engagement initiated through BGM, multiple Lhtako Dené Elders have indicated that there are known and unknown burial sites along Highway 26 and the Elders are not supportive of any kind of ground disturbance along the highway.</p>	Lhtako Dené Nation	ODC 2022, Golder 2021, Golder 2020

Issue / Concern	Rationale	Raised by/ Decision maker	Source
	A Heritage Resource Impact Assessment of the Highway 26 alignment identified only one historical feature along the alignment (original identified in 2016, Golder 2020) (Golder 2021).		
5. Landowner Impact – Right-of-way (ROW)	A Highway 26 alignment would impact significantly more private landowners than the proposed northern alignment. The number of privately owned land parcels along Alternative C is four; even if Alternative A followed the initial leg of Alternative C leaving the Barlow substation as suggested by FLNRORD (i.e., to the south and east, avoiding the approximately 40 parcels clustered along Highway 26 immediately east-northeast of the substation), it would impact 66 privately owned land parcels along the remaining length of Highway 26 to Wells. Furthermore, many of these private land parcels are residential and are so small that a new utility ROW through them would render them unusable, effectively displacing the residents. The amount of time and resources required to reach binding agreements with every affected private landowner along the Highway 26 route would present an unacceptable financial and schedule burden for BGM, as well as significant burden on landowners.	Ministry of Transportation and Infrastructure (MOTI), BGM	ODC 2022
6. Landowner Impact – Power Reconnection	If BC Hydro’s policies and standard operating procedures supported upgrading the transmission line along Hwy 26 to meet the mine’s power voltage needs—which they presently do not—all residents along Highway 26 would remain connected to the original 25kV line unless each household paid BC Hydro to disconnect them from the old line and connect them to the upgraded transmission line.	BC Hydro	ODC 2022
7. Endangered Caribou Populations & Habitat	Highway 26 runs through endangered South Mountain caribou ( <i>Rangifer tarandus</i> ) <sup>1</sup> habitat that connects the townsites of Wells and Barkerville to Highway 97. Through the <i>Wildlife Act</i> , the BC government has implemented motorized restrictions along Highway 26 between Beaver Pass and Barkerville (Ernst, 2022). The threat to caribou from the expansion of the existing transmission line and development of a new transmission lines is estimated to create negligible risk (Environment Canada, 2012, p.17) and the Barkerville population is the only increasing population according to population estimates in 2012 (p. 10). However, given the federally listed status of the endangered population, the impacts to caribou must be considered. The preferred route for Caribou protection was along the Highway 26 route according to Ministry representatives (ODC 2022, p. 13).	Lhtako Dené Nation, Williams Lake First Nation	Gov’t of BC, ODC 2022, BCCDC 2022, Ernst, 2022
8. Visual Impact	Concerns have been raised regarding the visual impact of an expanded or additional ROW along Highway 26 to support a new transmission line. This could the compromise the visitor experience of driving along the scenic highway between Quesnel and Barkerville and impact tourism to the region.	Various stakeholders (e.g., community members)	BGM 2020

<sup>1</sup> <https://species-registry.canada.ca/index-en.html#/species/1295-945>

Issue / Concern	Rationale	Raised by/ Decision maker	Source
<p>9. Demand Doesn't Exceed Supply...Yet</p>	<p>BC Hydro has confirmed that current demand does not exceed the power supply along Highway 26, though it is nearing capacity. In recent years, BC Hydro has completed projects in Wells designed to increase efficiency, which has been deemed successful (D. Mosure, BC Hydro, personal communication, October 26, 2022).</p> <p><a href="#">The BC Electric Tariff prevents BC Hydro from building infrastructure in anticipation of load so that the potential for stranded assets isn't an unfair burden for the rate payers in the province.</a> BC Hydro will address power supply upgrades once demand exceeds supply.</p> <p>Note: BC Hydro has previously discussed extending three-phase distribution to Wells and Barkerville with the District of Wells and advised the district that BC Hydro does not have a program to invest in the extension of distribution infrastructure in anticipation of future customer connections but will only consider this is demand exceeds supply. Furthermore, any extension of BC Hydro infrastructure is in accordance with the <i>Electric Tariff</i> and approved extension policies which may result in BC Hydro recovering appropriate costs from the customer.</p>	BC Hydro	Comms. with BC Hydro staff
<p>10. Upgrade fee for power users is not feasible for residents, businesses, and communities</p>	<p><a href="#">Users are required to pay for increased power as per the BC Electric Tariff and BC Hydro Design Standards. These costs are likely prohibitive for residents, businesses, and communities that need or desire increased power capacity, e.g., Troll Ski Resort, Barkerville, local schools, tech businesses. Service is sized based on the request received by BC Hydro and the design is created accordingly. For example, if a developer wants to build a new housing subdivision, BC Hydro sizes the system accordingly so that the developer is not paying for more power or infrastructure than is required to power the development. A subsequent developer then pays for the appropriately sized (new or upgraded) system for their development, and so on</a> (D. Mosure, BC Hydro, personal communication, April 27, 2023).</p> <p><a href="#">Furthermore, although BC Hydro provides revenue credits for new developments (that reduce the cost of connection per residence), alternations and upgrades to existing power connections are not eligible for these credits</a> (D. Mosure, BC Hydro, personal communication, April 27, 2023).</p>	BC Hydro	Comms. with BC Hydro staff

## 2 POWER DISTRIBUTION

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### 2.1 Highway 26 BC Hydro Transmission Line Operations

#### 2.1.1 Electric Tariff

BC Hydro maintains the existing 25 kV single-phase distribution line along Highway 26 in accordance with the *Electric Tariff*, which mandates how BC Hydro supplies power to its customers.

BC Hydro has recognized that there are limitations to the number of homes or new businesses that can access the existing power supply (D. Mosure, BC Hydro, personal communication, October 26, 2022). Once demand exceeds available power, this will trigger BC Hydro to address this deficiency (as per the *Electric Tariff*). There may be requirements for communities and proponents to contribute to any upgrades (D. Mosure, BC Hydro, personal communication, October 26, 2022).

#### 2.1.2 Maintenance 2015–2022

BC Hydro maintains annual briefing notes to track the maintenance of transmission lines within its jurisdiction. The following information was taken from BC Hydro’s 2022 briefing note for Highway 26 (D. Mosure, BC Hydro, personal communication, October 31, 2022).

1. Prior to the summer of 2015, the three-phase portion of the Hwy 26 line was 11.8 km from the Barlow Substation. In the fall of 2016, the three-phase line was further extended by 3.5 km to perform load balancing between project phases at a cost of \$1.1 million. This freed up capacity on the single-phase line to Wells and improved voltage levels in the community to within acceptable CSA standards. The remaining feeder (approximately 69 km) is a single-phase distribution line to Barkerville.
2. BC Hydro has performed various system upgrades and vegetation management to improve system reliability to Wells and Barkerville.
  - In 2023, BC Hydro will upgrade two single-phase voltage regulators with higher capacity voltage regulators for improved winter load handling.
  - From 2019 to 2022, \$483K was spent on routine vegetation maintenance and \$112K on hazard tree removals.
  - On March 20, 2020, BC Hydro installed a new recloser device near Wells to reduce tree branch-related outages.
  - On August 30, 2019, BC Hydro installed additional distribution devices (secondary capacitors) to improve the voltages in Wells.
3. To improve feeder reliability, BC Hydro is planning to incrementally increase the number of hazard tree removals over the coming years (2023–2025). Planning is currently underway to identify specific circuits where additional hazard trees will be removed. This will also help mitigate wildfire risk.

## 2.2 Cariboo Gold Project Transmission Line

To support the operational power needs for phase one of the Cariboo Gold Project, BGM will use generators and a new natural gas power plant (ODC 2023). Phase two of the mine's development will involve larger mining infrastructure and greater production levels thereby requiring a significant increase in power. BGM will build a new three-phase transmission line to power phase two (K. Dodd, Osisko Development Corp., personal communication, February 15, 2023). The new line is scheduled to be operational by 2026.

The mine is funding the construction of the line and is required to maintain the line. BC Hydro is not responsible for the installation and maintenance of this new line. Active operations are anticipated to range from thirteen to forty years and the line must be removed at the end of the tenured operation. The new line is being constructed to an industrial-use standard; therefore, due to BC Hydro's operational standards (which exceed industry standards), it cannot be transferred to BC Hydro at its end-of-life.

It is highly unlikely that BGM would enter into an agreement with Wells to supply power following the closure of operations, nor are they required to do so in their operating agreement.

If communities were to connect to this new transmission line, power would be provided by BGM (not BC Hydro) and BGM would be responsible for maintaining the line. As a private operation, BGM is not required to meet BC's power regulations as defined by BC's *Electric Tariff* and therefore is not required to ensure uninterrupted power to users.

### 3 RECOMMENDATIONS

The development of the Cariboo Gold Project represents a significant regional investment and an opportunity to create mutually beneficial infrastructure and amenities, and positively impact the local economy. Given the known challenges and limitations with power distribution along Highway 26, combining BGM's new transmission line with increased community access to power would appear to make sense. However, as outlined in Table 1, there is a myriad of challenges with upgrading the existing Highway 26 powerline that cannot be easily addressed within the budget and timeline that BGM has committed to launching its operations. While there may be some flexibility in politically influencing regulatory approvals, there are some issues that require further consideration. As such, we have provided the following recommendations for pursuing the Highway 26 powerline upgrade.

**Table 2 – Recommendations**

<b>Key:</b>	<b>Lead</b>	<b>BCH</b> BC Hydro	<b>MOF</b> Ministry of Forests	<b>Wells</b> District of Wells
	<b>Abbreviations:</b>	<b>BGM</b> Barkerville Gold Mines Ltd.	<b>MOTI</b> BC Ministry of Transportation and Infrastructure	
	<b>Complexity:</b>	<b>Simple</b> – little to moderate amount of planning, collaboration, and coordination; <b>Complex</b> – significant planning, collaboration, and coordination		
	<b>Estimated Cost:</b>	<b>\$</b> – Less than \$1,000; <b>\$\$</b> – \$1,000–\$10,000; <b>\$\$\$</b> – \$10,000–\$100,000; <b>\$\$\$\$</b> – more than \$100,000		
	<b>Status:</b>	<b>NS</b> – Not Started; <b>U</b> – Underway; <b>P</b> – Postponed; <b>CX</b> – Cancelled; <b>C</b> – Completed		

Actions		Lead	Complexity	Est. Cost	Status
<b>QUICK WINS</b>	<i>Simple solution, implemented within 12 months</i>				
	Initiate a Highway 26 Power Collaborative. This collaborative would prioritize power needs, lobby for infrastructure and service upgrades, and could include the Cariboo Regional District, District of Wells, Barkerville, Lhatko Dené, City of Quesnel, and other incorporated and unincorporated communities along Hwy 26. This collaborative would also provide a united front when working with BC Hydro and other agencies (e.g., Ministry of Forests, Ministry of Transportation and Infrastructure). The collaborative’s role needs to be well-defined including members, purpose, assumptions, constraints, and dependencies.	Wells	Simple	\$	NS
	Continue to work with BC Hydro to actively improve power along Highway 26. BC Hydro is committed to improving the power quality along the corridor using strategies that can be easily implemented (e.g., weather stripping, rebates for power-friendly appliances, routine maintenance, etc.). Tracking power challenges and opportunities over time (e.g., outages, limitations for future developments, economic development opportunities) will be important to justify a costly upgrade. Schedule annual BC Hydro updates to District of Well’s mayor and council.	BCH, Highway 26 residents	Simple	\$	U

Actions	Lead	Complexity	Est. Cost	Status
Determine the actual limitations of the existing power supply to Wells and surrounding communities in terms of future planned growth. Understanding the limitations with more accuracy will help inform future power upgrades.	BCH, Communities	Simple	\$--\$	NS
Determine a more accurate cost for a three-phase power upgrade along Highway 26. BC Hydro has estimated that upgrading the Wells distribution line to three-phase power would cost \$16-20 million (D. Mosure, BC Hydro, personal communication, October 26, 2022). This estimate does not include supporting infrastructure such as sub-station improvements, upgrades required to support three-phase power, <a href="#">and any user connections (e.g., residents and businesses along Highway 26)</a> . Communities and other end users (e.g., Troll Ski Resort, communities requesting the power upgrade) are required to <a href="#">pay in full for</a> upgrades <a href="#">per the BC Electric Tariff and BC Hydro Design Standards</a> .	BCH	Complex	\$--\$	NS
<b>SHORT-TERM ACTIONS</b> <i>Implemented within 1-3 years</i>				
Initiate engagement and consultation with Lhtako Dené Nation regarding the burial sites along Highway 26 identified during BGM's engagement. Although this action is listed as short-term, it should be initiated immediately as it is anticipated engagement will continue over a longer timeline. These discussions will be sensitive and will require adherence to community protocols, as determined by Lhtako Dené. Although complex, addressing these utility alignment issues provides an opportunity to address resource and access inequities (e.g., power, highway alignment) and advance Reconciliation with the Nation.	BCH, MOTI	Complex	\$\$	NS
Use emissions reduction as a driver for power upgrades to align with BC Hydro/provincial/federal mandates (e.g., Troll Ski Resort, future Wingdam Mine operation, furnace oil transition). The primary emissions are from homes and transportation. As the corridor continues to develop (e.g., Troll Ski Resort expansion), understanding emissions and using it as leverage to access funding to support an upgrade will become increasingly important.	Communities	Simple	\$	NS
<b>LONG-TERM ACTIONS</b> <i>Implemented within 4-10 years</i>				
Explore transferring ownership of the three-phase power transmission line to a third-party operator at the end of the BGM project (BGM is required to remove its transmission line once operations conclude). This may present a unique opportunity to transfer ownership to an Indigenous or community utility. This will require ample time and effort to determine how this would be implemented. BGM's underground operation is expected to run a minimum of 13 years (ODC 2023, p. 1-11). This could be an economic development opportunity for Lhtako Dene (e.g., business, housing, and utility).	Lhtako Dene, BGM, BCH	Complex	\$--\$\$\$	NS
Develop a funding strategy to determine how communities can cover the <a href="#">cost of</a> a three-phase power upgrade. This will require partnerships between communities, Troll Ski Resort, and other residents and light industrial end users.	Communities	Simple	\$	NS

## 4 DEFINITIONS

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**Amperage (A).** A unit measure of the strength in which an electrical current flows, expressed in amperes (A).

**Distribution Line.** An overhead or underground system transporting a lower nominal high voltage electricity (“medium voltage”) (4 kV–35 kV) over regional distances for safe transformation and use by consumers.

**Electrical Tariff.** As per BC Hydro's website, the *Electric Tariff* is "BC Hydro's service agreement with customers, and it governs all aspects of using our services, including: Provision of electricity (connections, equipment on private property, upgrades, etc.); metering (installation, testing, etc.), meter reading and billing; rates and charges; load changes and operations; distribution extensions (35 kV and less); general provisions (resale of electricity, rental premises, liabilities, etc.); rate zone special terms; and, schedule of standard charges.

**High Voltage.** Any voltage exceeding 750 volts to ground.

**Kilovolts (kV).** Represents a voltage nominal multiplier of 1,000 x to the voltage unit measurement or system it is describing. For example, 230 kV (kilovolts) is equal to 230,000 V (volts).

**Single-phase.** In BC Hydro terms, a single-phase *primary* power system comprises two-wires, i.e., a “hot” line and a neutral line). This high voltage power line (i.e., 4 kV–35 kV) distributes single-phase power over a regional area to consumers. A single-phase *secondary* power system (i.e., 120/240 V; three-wire consumer connection) is used by most residential homes and small businesses in BC.

**Substation.** A substation is an integral part of the electrical generation, transmission, and distribution system. Substations transform transmission voltage from high to medium, or vice versa, regulate and transmit electrical power over long distances, and transform electricity into medium voltages for local distribution. Between the generating stations and end consumer, electric power may flow through several substations at different voltage levels to maintain the integrity of the power system.

**Three-phase.** In BC Hydro terms, three-phase *primary* power distribution comprises three or four wires i.e., three “hot” lines, plus one neutral line in some distribution systems. This high voltage power line system is used to distribute three-phase power over a regional area to consumers (commonly up to 25 kV). A three-phase *secondary* power system can comprise various voltages and configurations (e.g., 120/208 V, 277/480 V, 347/600 V). This power configuration is intended for commercial and industrial use. Three-phase power delivers power more efficiently to consumers due to the consistency in which the voltage is maintained between phases. Three-phase systems are essential for equipment and production assemblies that require larger quantities of electrical power.

**Transmission Line.** Used for transporting high voltage (60 kV–500 kV) electricity over long distances—between a network of hydro-electric generation stations—to distribution substations for conversion into lower voltages for distribution and use by consumers. All transmission-type lines are three phase power. Refer to <https://www.bchydro.com/energy-in-bc/operations/transmission.html> for more information.

**Voltage (V).** A unit measure of electrical potential, i.e., the electromotive force or potential difference between points, expressed in volts (V).

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## 6 APPENDIX

### 6.1 Highway 26 Powerline Upgrade – Background Document Review

Document:	<a href="#">Feasibility Study for the Cariboo Gold Project (NI 43-101 Technical Report)</a>
Prepared by:	Osiko Development Corp.
Date:	January 2023
Summary:	This study provides a base case assessment for developing the Cariboo Gold deposit as an underground mine.

**NOTE:** The highlights listed below only address new information presented in the most recent feasibility study. More general project details and information about the transmission line routes are highlighted in older reports and studies in this Appendix.

#### Document Highlights:

- Phase 1 of the Project will commence in 2024 with 1,500 tonnes per day (tpd) production, ramping up to 4,900 tpd production in 2027 for Phase 2. Phase 1 does not require additional power supply.
- There are two main portals that will power the underground Project site: Valley Portal and Cow Portal. These portals will provide 13.8 kV of power to the mine.
- 13.8 kV power is required to power various underground mine equipment that use voltages of 66 V and 1000 V. Lighting and other low voltage services only require 120/208 V.
- During Phase 1, electrical power will be delivered to the mine through the existing “Cow Portal” from a 13.8 kV overhead power line originating from Bonanza Ledge Site. For Phase 2 (which requires more power to support increased production), the Project will rely on a newly constructed 69 kV (origin)/66 kV (terminus) three-phase transmission line that connects BC Hydro’s Barlow substation (Quesnel) to the mine’s 66 kV/13.8 kV substation. The higher voltage of 69 kV is required to sustain power distribution along the 69 km span from Barlow to the mine in Wells. The incoming voltage of 66 kV (with some loss of voltage) is then transformed to 13.8 kV at the mine site.
- **Timeline for new 69 kV Transmission Line:** The licence of occupation for the new transmission line is anticipated in Q3 2023; transmission line clearing and construction will commence in Q4 2025; the new line will be connected to BC Hydro’s grid by Q3 2026.
- During the early construction stages of Phase 2, and before the energization of the transmission line, the MSC will be connected to the natural gas power plant at the Bonanza Ledge site through a 13.8kV overhead power line.
- **Processing Plants Power:** There is an existing 25 kV overhead distribution line already supplying the QR Mill site with power and will continue to serve mine operations during Phase 1. For the Bonanza Ledge site, a newly constructed natural gas powerplant (supported by diesel generators) will power Phase 1.
- Environmental Studies, Permitting and Social or Community Impact:

- The Cariboo Gold Project (“the Project”) area is composed of a Transmission Line (“TL”) and three main locations: the Mine Site Complex, the Quesnel River Mill (“QR Mill”), and the Bonanza Ledge Site. The Mine Site Complex and east portion of the transmission line route are located within the Columbia Highlands Ecoregion and Bowron Valley Ecosection. The QR Mill and the west portion of the transmission line route are located within the Fraser Plateau Ecoregion and Quesnel Lowlands Ecosection.
- The Project spans two biogeoclimactic zones: (1) Sub-Boreal Spruce (“SBS”) which occurs throughout the QR Mill site, lower elevations at the Mine Site Complex, and large portions of the transmission line route; and (2) Engelmann Spruce-Subalpine Fir (“ESSF”) which occurs the higher elevations along the Transmission Line route, and at the Mine Site.

Document:	<a href="#">Osisko Development Corp. Technical Memo 5 – Cariboo Gold Project EAC Application Responses to Review Comment ID # DoW-4 (Revision 1) – Transmission Line Routing</a>
Prepared by:	Osisko Development Corp.
Date:	January 2022
Summary:	This technical memo explains the factors that influenced the decision-making process when arriving at the proposed powerline route alignment.

#### Document Highlights:

- Three routing options:
  - **Alternative A:** Approximately 69-km long 69kV overhead line from BC Hydro’s (BCH) Barlow substation near Quesnel following Highway 26 along a new ROW alongside the existing 25kV distribution line (DL).
  - **Alternative B:** Approximately 69-km long 69kV overhead line from BCH Barlow substation near Quesnel following Highway 26 along existing ROW with upgraded line and existing 25kV distribution line underbuilt. The existing ROW will be widened by approximately 12 m.
  - **Alternative C:** Approximately 72-km long 69kV overhead line from BCH Barlow substation near Quesnel routed north of Highway 26 along new 36 m-wide ROW
- Refer to document for more details on powerline routing considerations, power supply and demand considerations, and economic and development timeline considerations.

Document:	<a href="#">Osisko Development Corp. Technical Memo 9 – Cariboo Gold Project EAC Application Responses to Review Comment ID #s FLNRORD 218-237, 240 – Transmission Line Routing</a>
Prepared by:	Osisko Development Corp.
Date:	January 2022
Summary:	This technical memo provides responses to the comments provided by FLNRORD related to the Transmission Line and routing. Additionally, this memorandum will be used to convey the general updates and considerations made to the selection of the Line’s routing that have resulted from further design development of the Project.

#### Document Highlights:

- During initial project planning stages, ODV engaged with BC Hydro to determine the best path forward for supplying power to the Project, with the stated desire being to utilize a line along Highway 26. At this

time, the Project design had an expected peak power load of approximately 12 MW, which could be transmitted along the existing distribution line (with some upgrades). BC Hydro informed ODV that they would not be able to prioritize upgrading or replacing the existing distribution line from Quesnel to Wells over other projects that were underway or planned across the province. BC Hydro informed ODV that it was estimated to take 5 years before any upgrades to the existing distribution line could take place, with further upgrades or new installs potentially having a longer timeline.

- This development timeline would introduce unacceptable delays to the overall project schedule. As a result, ODV began planning to privately construct a new power line along Highway 26, the ownership of which could be transferred to BC Hydro following its construction, thus accelerating the development timeline. When ODV proposed this solution during a meeting between ODV, BC Hydro and the Ministry of Transportation and Infrastructure (MOTI), they were informed by a MOTI representative that they would not allow the construction of private utility infrastructure along the public highway ROW associated with Highway 26, effectively precluding ODV from being able to develop a new power line along this route. Meeting minutes from this meeting between ODV, BC Hydro and MOTI have been included in Appendix 1.
- Beyond the MOTI protocol and BC Hydro scheduling barriers associated with Alternatives A and B, there are also technical constraints that prevent them from being feasible. If BC Hydro were able to construct a new or upgraded power line within a timeframe acceptable to the Project, they would not be able to supply sufficient power to meet the peak load demand of the Project based on their operational standards.
- BC Hydro's standard design practices dictate that they prefer not to construct transmission lines along major transportation routes (e.g. highways). Engagement between BC Hydro and ODV led to BC Hydro communicating that they would be willing to make an exception to this standard practice and construct a transmission line with a voltage of up to 69 kV. However, BC Hydro operational standards dictate that voltage drop along a transmission line must be kept to a maximum of 5%. The amount of power that can be transmitted along the length of the line that would run from the existing Barlow substation to the Project site in Wells, when constrained to a 5% voltage drop, is limited to 19 MW. Further detailed design of the Project has resulted in a peak load demand of 22 MW, with future potential decarbonization measures (e.g. incremental electrification of mine site operations) resulting in a load demand higher than this number.
- In order to transmit 22+ MW of power through a line from Barlow substation to the Project site, a 230 kV transmission line would be required; however, BC Hydro is not willing to place a 230 kV line along Highway 26. A 230 kV transmission line would require the use of significantly larger H-shaped poles, larger conductors (i.e. wires), significantly higher ground clearance, and a 62% increase in ROW width.
- Subsequent community engagement between ODV and the Lhtako Dené Nation has also revealed the presence of burial sites, both known and unknown, along the length of Highway 26. Per the Community Engagement document attached in Appendix 2, multiple Lhtako Elders have indicated that there are burial sites present along the length of the Barkerville Highway (Highway 26) and they are not supportive of any kind of ground disturbance along this highway.
- Additionally, Alternative A would impact significantly more private landowners than Alternative C. The number of privately owned land parcels intersected by Alternative C is four; even if Alternative A followed the initial leg of Alternative C leaving the Barlow substation as suggested by FLNRORD (i.e. to the south and east, avoiding the approximately 40 parcels clustered along Highway 26 immediately east-

northeast of the substation), it would impact 66 privately owned land parcels along the remaining length of Highway 26 to Wells. Furthermore, many of these private land parcels are residential and are so small that a new utility ROW through them would render them unusable, effectively displacing the residents. The amount of time and resources it is expected would be required to reach binding agreements with every affected private landowner along the length of the Alternative A route would present an unacceptable financial and schedule burden on the Project.

- Refer to document for more details on the transmission line project.

Document #1:	<u>Cariboo Gold Project – Detailed Project Description</u>
Prepared by:	Barkerville Gold Mines Ltd. (BGM), wholly owned by Osisko Gold Royalties Ltd. (OGR)
Date:	October 2020
Summary:	This document outlines how information collected during the BC Environmental Assessment Office-led Early Engagement Phase has been used to inform project decisions and design. Information in this report, including the proposed transmission line, has been updated since the Initial Project Description (October 2019).

#### Document Highlights:

- P. ii – Infrastructure outside of the historical mine footprint will be located on previously disturbed areas or **follow existing alignments** where possible.
- P. iii – BGM is committed to developing the Project in a sustainable manner that respects environmental, social, heritage, and health values **while providing economic benefits for the region**.
- P. iv – Stakeholders & Rightsholder engaged include:
  - Lhtako Dené Nation
  - Soda Creek Indian Band (Xatśúll)
  - 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
  - Several government ministries, departments, agencies, and Crown corporations
- P. 2 – 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.
- P. 6 – Proposed Project and Components Map – *See end of this report*
- P. 30 – Engagement comments from Early Engagement. In summary, “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.”

Responses & actions taken by BGM in response to the comments:

- 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.
- P. 35 & 36 – Technical Advisor input during Early Engagement—in summary:
  - Biophysical Environment Interactions: “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.’
  - Permitting Considerations: “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.”
- P. 38–43 – Interests & Concerns by Indigenous Nations in Early Engagement—in summary:
  - 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.”  
RESPONSE/ACTIONS: 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.
  - Williams Lake First Nation: “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.”  
RESPONSE/ACTIONS: Studies related to the transmission line are being undertaken, and the findings will be discussed with Williams Lake First Nation.
- P. 46 – Role of engagement in project definition & planning prior to Early Engagement—Transmission line routing: Two routes were considered: (1) a route along Highway 26 and (2) a northern route. Preference for the existing right-of-way along Highway 26 rather than opening a new right-of-way.
  - INPUT: 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.
  - PROJECT REFINEMENT/DISCUSSIONS: (1) 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. (2) An additional option (the Northern Transmission Line Route) from the Highway 26 route was presented. (3) BGM commits to continue to work with other local organizations to advocate for improved electricity service for the area.

- P. 49 – Role of engagement in project definition & planning prior resulting from comments received on the Initial Project Description during the Early Engagement Phase—Transmission Line:
  - INPUT: Concern regarding visual effects along Highway 26, about opening a new corridor, and 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.
  - PROJECT REFINEMENT/DISCUSSIONS: (1) 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. (2) The line routing is being further evaluated in consideration of all environmental constraints, including caribou habitat. (3) Where trade-offs between values are required, options will be developed for discussion with community stakeholders and Indigenous nations. (4) BGM will continue to work with other local organizations to advocate for improved electricity service for the area.
- P. 54 – Permits required:
  - Licence of Occupation from FLNRORD (*Land Act*) to 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 from FLNRORD (*Land Act*) for standard tenure for electrical transmission lines on Crown Lands.
- P. 61 – Project Schedule: Transmission line preparation construction to start Q3 2022 and be completed by Q4 2023.
- P. 62 – Project Permitting Timeline: 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.
- P. 64 – Project Updates and Changes: A preferred option for the 69-kV transmission line route has been selected. BGM has selected the Northern Transmission Line Route for the Project.
- P. 72 – Land and Water Use: 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.

- P. 92 – 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. 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.
- P. 94–96 – 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 megawatts (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 Partnership), 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. 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.

**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	<ul style="list-style-type: none"> <li>Ministry of Transportation and Infrastructure does not allow any proponent besides BC Hydro to build in their right-of-way.</li> <li>Upgrading this line or building a new transmission line to Wells has not been identified as a priority by BC Hydro.</li> </ul>	<ul style="list-style-type: none"> <li>Transmission line would be located outside of BC Hydro and MOTI right-of-ways.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>New 36-m right-of-way would be constructed parallel to existing forest service roads and cutblocks, where possible, to minimize new disturbance.</li> </ul>
Clearing	<ul style="list-style-type: none"> <li>Additional clearing along Highway 26 required to meet vegetation clearance requirements.</li> <li>Constrained by existing right-of-way and private properties thus limiting flexibility in routing to minimize clearing.</li> </ul>	<ul style="list-style-type: none"> <li>Additional clearing along Highway 26 required to meet vegetation clearance requirements.</li> <li>Constrained by existing right-of-way and private properties thus limiting flexibility in routing to minimize clearing.</li> </ul>	<ul style="list-style-type: none"> <li>Additional clearing required.</li> <li>Flexibility to route through previously cleared areas to minimize new disturbance.</li> </ul>
Access Roads	<ul style="list-style-type: none"> <li>Construction access would be via Highway 26.</li> <li>May result in temporary one-way highway closures or diversions during construction.</li> </ul>	<ul style="list-style-type: none"> <li>Construction access would be via Highway 26.</li> <li>May result in temporary highway diversions during construction (material delivery).</li> </ul>	<ul style="list-style-type: none"> <li>Construction access would be via existing forest service roads.</li> <li>Additional access would be via the construction right-of-way thus limiting the need for new access roads.</li> </ul>
Caribou Habitat	<ul style="list-style-type: none"> <li>Route intersects high and low elevation core caribou habitat and matrix habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Route intersects high and low elevation core caribou habitat and matrix habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Route avoids high and low elevation core caribou habitat.</li> <li>Route crosses caribou matrix habitat.</li> </ul>
Private Properties (current route)	<ul style="list-style-type: none"> <li>77 properties directly affected by transmission line footprint.</li> </ul>	<ul style="list-style-type: none"> <li>77 properties directly affected by transmission line footprint.</li> </ul>	<ul style="list-style-type: none"> <li>25 properties directly affected by transmission line footprint.</li> </ul>
Crown Land	<ul style="list-style-type: none"> <li>Route intersects Crown Lands located along the highway.</li> </ul>	<ul style="list-style-type: none"> <li>Route intersects Crown Lands located along the highway.</li> </ul>	<ul style="list-style-type: none"> <li>Route intersects Crown Lands along forest service roads.</li> </ul>
Visual Effects	<ul style="list-style-type: none"> <li>Concerns regarding visual effects along the highway on tourism.</li> <li>Clearing would remove established buffers exposing clear cut areas along Highway 26.</li> </ul>	<ul style="list-style-type: none"> <li>Concerns regarding visual effects along the highway on tourism.</li> <li>Clearing would remove established buffers exposing clear cut areas along Highway 26.</li> </ul>	<ul style="list-style-type: none"> <li>Concerns regarding visual effects near Wells and visibility of the transmission line from the community.</li> </ul>
Schedule	<ul style="list-style-type: none"> <li>BC Hydro project schedule (study design, procurement and construction) of approximately 5 years.</li> <li>In-service date of transmission line would not meet start of mine production.</li> </ul>	<ul style="list-style-type: none"> <li>BGM project schedule of approximately 3 years.</li> <li>In-service date of transmission line coincides with start of mine production.</li> </ul>	<ul style="list-style-type: none"> <li>BGM project schedule of approximately 3 years.</li> <li>In-service date of transmission line coincides with start of mine production.</li> </ul>
Cost	<ul style="list-style-type: none"> <li>Approximately \$70-90 million.</li> </ul>	<ul style="list-style-type: none"> <li>Approximately \$22 million.</li> </ul>	<ul style="list-style-type: none"> <li>Approximately \$19 million.</li> </ul>
Noise and Air Quality	<ul style="list-style-type: none"> <li>Longer construction time for the BC Hydro partnered line thus, mine is reliant on diesel generators (noise, air quality concerns) for a longer period.</li> <li>Larger greenhouse gas contribution due to reliance on diesel generators.</li> </ul>	<ul style="list-style-type: none"> <li>Private transmission line can be constructed more quickly, thereby reducing the use of diesel generator and, in turn: <ul style="list-style-type: none"> <li>Reducing noise</li> <li>Reducing fuel deliveries</li> <li>Reducing GHG generation</li> </ul> </li> <li>Improving air quality.</li> </ul>	<ul style="list-style-type: none"> <li>Private transmission line can be constructed more quickly, thereby reducing the use of diesel generator and, in turn: <ul style="list-style-type: none"> <li>Reducing noise</li> <li>Reducing fuel deliveries</li> <li>Reducing GHG generation</li> </ul> </li> <li>Improving air quality.</li> </ul>

- P. 106 – Greenhouse Gas Emissions: 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.
- P. 113 – Indigenous Nation Interests/Traditional Use and Knowledge: 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.
- P. 121 – In 2020, the following biophysical baseline studies were completed along the Northern Transmission Line Route:
  - Presence/absence survey and fish habitat survey
  - Terrain Ecosystem Mapping (TEM), species at risk and invasive plant surveys
  - Amphibian surveys
  - Breeding bird surveys
  - Winter track surveys (continued to 2021)
  - Wildlife cameras (continued to 2021)
  - Contaminated site Environmental Site Assessment (ESA)
  - Heritage preliminary field reconnaissance
- P. 127 – Additional biophysical baseline studies for 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.
- P. 128 – Hydrology: The Transportation Route and Northern Transmission Line Route are located within the Willow River, Cottonwood River and Quesnel River watersheds.
- P. 130 – Additional hydrology baseline studies for 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.
- P. 138–141 – Soils, Terrain and Terrain Stability / Geochemistry / Vegetation: Additional baseline studies in these disciplines will be completed for the Northern Transmission Line route in 2020.
- P. 143–144 – Wildlife and Wildlife Habitat: There is critical caribou habitat and ungulate winter range in the Project area. 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 eastern portion of the Northern Transmission Line route is also within matrix habitat.

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.

- P. 159 – Heritage: 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.
- P. 162 – Human Health and Ecological Risk Assessment: The HHERA baseline program for the Northern Transmission Line route option will include two main field surveys: (1) co-located soil and vegetation baseline samples for metal and polycyclic aromatic hydrocarbon (PAHs) and organic carbon testing, and (2) co-located soil and soil invertebrate baseline samples for analysis of metal and PAHs as inputs into wildlife food chain models.
- P. 179 – Project activities associated with transmission line:
  - Construction: clearing, preparation, soil management, construction of towers and cable installation
  - Operations: maintenance
  - Closure: decommissioning and removal of towers and cables once power is no longer required, reclamation including re-contouring and re-vegetation
  - Post-closure: monitoring as required
- P. 183 – Potential project interactions:
  - Surface Water: Alteration of stream flows near the Project resulting from the construction of mine site and transmission line
  - Freshwater Fish: Changes to fish habitat during construction and decommissioning of the transmission line due to erosion and sedimentation
- D-6 – Appendix D – Issues Tracking Table – Comment received 17-Aug-2020 from FLNRORD: “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 RESPONSE: BGM notes FLNRORD's comment and confirms that a high-level comparison 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.
- D-7 – Appendix D – Support Documents: 2019 – 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).



Document:	<a href="#">Environmental Assessment Cariboo Gold Project, Appendices</a>
Prepared by:	Golder Associates Ltd.
Date:	May 2021
Summary:	These appendices accompany the proponent's environmental assessment application.

#### Document Highlights:

- Appendix 01.0-12 Transmission Line Geochemical Characterization Report (May 2021)
- **Appendix 07.09-03 Fish and Fish Habitat Transmission Line Existing Conditions Report (May 2021)** – this document provides an update on the fish and fish habitat found along the revised transmission line (north of Highway 26). The primary changes to the alignment are located at the western end (Barlow Options) and at the eastern end (Wells Options). In total 22 watercourses are located on the 2021 alignment. Additional assessments were conducted after this report (i.e., summer 2021).
- Appendix 07.15-04 Heritage Resources Overview Assessment, Transmission Line and Bonanza Ledge Waste Rock Storage Facility (May 2021) – a 1 km wide corridor on either side of the Transmission Line alignment and around the WRSF (i.e., the Study Area) was examined for the likelihood that heritage sites may be, or may have been, present. The Study Area falls within the area of interest of five Indigenous representative groups and organizations that include the following: Lhtako Dené Nation, Nazko First Nation, Neskonlith Indian Band, Tsilhqot'in National Government, and Xat'sùll First Nation (Soda Creek Indian Band).

During the preliminary field reconnaissance, the following were identified along the transmission line:

- One hundred and seventy-eight historical features within the Transmission Line component Study Area.
- Thirty-two areas of potential (AOPs) for future subsurface testing in snow-free conditions within the Transmission Line component Study Area.
- No Heritage Conservation Act (HCA)-protected archaeological sites within the Transmission Line study areas.

Due to the preliminary nature of the Transmission Line design, we recommend that once detailed Project designs are available, a review by a qualified archaeologist be conducted to determine the scope of additional heritage assessment, if required.

- Appendix 07.15-03 Heritage Resource Impact Assessment Interim Report Form (May 2021):
  - P. 10–11 – In field observations: The Highway 26 Transmission Line (Figures 4-1 to 4-18) route primarily parallels the existing Highway 26 between Quesnel and the District of Wells. The exception is a 3.4 km-long section, located approximately 3.1 km west of Jack of Clubs Lake, where the Highway 26 Transmission Line alignment leaves Highway 26 (Figure 4-16). Overall, the terrain varies from low, poorly drained wetlands and swamps (Attachment A; Photograph 22) to steeply sloping mountainous terrain (Attachment A; Photograph 23). The alignment crosses the Cottonwood River (Attachment A; Photograph 24), passes over some small named and unnamed drainages (Attachment A; Photograph 25), and passes beside a number of small lakes (Attachment A; Photograph 26). Elevation along the Highway 26 Transmission Line alignment varies from 580 m to 1,300 m asl. Private properties that overlap with the alignment were not surveyed.

West end of the Highway 26 Transmission Line: The west end of the Highway 26 Transmission Line (Figures 4-1 to 4-2) alignment is primarily comprised of developed private properties. It was

determined prior to the field program that the heritage team would not assess the private properties where the proposed Highway 26 Transmission Line alignment is located at this time, but they will be assessed at a later date to be determined if the alignment option were to proceed.

On the western end of the Highway 26 Transmission Line, the mature forest canopy, where present, is most often dominated by Douglas-fir, but hybrid white spruce is usually present. Deciduous forests (paper birch, cottonwood, and trembling aspen) are very common (Attachment A; Photograph 27). The undergrowth has a relatively large number of species and a high percent cover of both shrubs and herbs. Common species include beaked hazelnut (*Corylus cornuta*), Douglas maple, thimbleberry, prickly rose (*Rosa acicularis*), wild sarsaparilla (*Aralia nudicaulis*), cream-flowered peavine (*Lathyrus ochroleucus*), common miterwort (*Mitella nuda*), and roughleaved ricegrass (*Oryzopsis asperifolia*). Mosses cover a relatively small percentage of the forest floor.

Central Section and Eastern end of the Highway 26 Transmission Line: For the central and eastern sections of the Highway 26 Transmission Line alignment (Figures 4-4 to 4-18), the predominant tree cover consists of mature hybrid white spruce and subalpine fir, Douglas-fir, and lodgepole pine (Attachment A; Photograph 28). The understory has a moderate cover of low shrubs, primarily black huckleberry, falsebox (*Paxistima myrsinites*), and thimbleberry. Moss cover is nearly continuous.

Disturbance: Most of the Highway 26 Transmission Line alignment has been disturbed by the construction of the existing transmission line, road building, residential development, agricultural activities, and forestry. Transmission line disturbance includes logging and excavations for power poles / anchors (Attachment A; Photograph 27). Road building disturbance includes earth moving, paving, and ditching (Attachment A; Photograph 23). Agricultural disturbance includes logging, clearing, and fence building. Forestry disturbance factors include extensive surface and subsurface disturbance (10-20 cm) from timber harvesting, excavating ditches, skidding, grubbing, and constructing landings (Attachment A; Photograph 29).

- P. 11 – Results: Fieldwork for the Highway 26 Transmission Line Project Area was conducted on October 18 to 21, 2019. The majority of the Highway 26 Transmission Line Project Area was determined to have low archaeological potential due to sloping terrain and poorly drained / swampy land. In addition, much of the Highway 26 Transmission Line Project Area was heavily disturbed by road and transmission line construction.
- P. 14 – Recommendations: For the Highway 26 Transmission Line Project Area, there is a section at the east end of the proposed alignment that still requires a HRIA (Figure 4-13 to 4-18), and there are four AOPs that still require subsurface testing (Figure 4-13), if the option were to be re-considered. The section of the Cariboo Wagon Road that was identified in Robber’s Roost Canyon should be recorded and registered on the Provincial Heritage Register maintained by the Archaeology Branch. This section of road should be mapped and documented, and a basic site form should be completed and provided to the Archaeology Branch in the event future development is proposed within the area. For the sections of the Highway 26 Transmission Line Project Area that have been surveyed and tested, no further archaeological work is required, provided that development plans are not altered to include areas that have not been previously assessed for archaeological resources.

Document:	District of Wells Official Community Plan, Draft
Prepared by:	District of Wells
Date:	Fall 2021

#### Document Highlights:

- P. 15 – 2.6.3 Electricity: Single-phase overhead power runs down Highway 26 from Quesnel to service the community. The power service is not looped such that power is supplied only from one direction. An interruption to this power service line means a power outage in Wells. In the future, Wells’ electrical infrastructure could be expanded as the future Barkerville Gold Mine plans to expand the availability of three phase power to its own operations.
- P. 88 – Implementation: Economy – Support Phase 3 electricity in the community

#### Additional Documents:

- Environmental Assessment Office Project Information Centre (ND). Cariboo Gold Project Documents. <https://projects.eao.gov.bc.ca/p/5d40cc5b4cb2c7001b1336b8/documents>
- Galbraith, Alison. Additional Comments on the Cariboo Gold Project EAC Application (October 2021). <https://projects.eao.gov.bc.ca/api/public/document/615fbd1e384aa500222a768d/download/Comments%20on%20Cariboo%20Gold%20Project%20EAC%20Application%20%281%29.pdf>
- Jlewis. CGP EAO-Application\_Summary\_jlewis.pdf. [https://projects.eao.gov.bc.ca/api/public/document/61607a3f2115a3002325d72d/download/CGP%20EAO-Application\\_Summary\\_jlewis.pdf](https://projects.eao.gov.bc.ca/api/public/document/61607a3f2115a3002325d72d/download/CGP%20EAO-Application_Summary_jlewis.pdf)

Note: No additional information was found regarding power or electricity upgrades or shortages, three-phase power, Highway 26, BC Hydro, or the Cariboo Gold project for the following communities: Barkerville, Wingdam, Pinegrove, Bowron Lake, Lhtako Dené Nation, Troll Ski Resort, Barlow Creek, Quesnel, or the Cariboo Regional District (CRD).