BW GOLD LTD
a subsidiary company of Artemis Gold Inc

Blackwater Gold Project

Noise and Vibration Effects Monitoring and Mitigation Plan

August 2023

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ACRONYMS AND ABBREVIATIONS

Indigenous Groups	Ulkatcho First Nation, Lhoosk'uz Dené Nation, Nadleh Whut'en First Nation, Stellat'en First Nation, Saik'uz First Nation, and Nazko First Nation as defined in Environmental Assessment Certificate #M19-01
Application	Application for an Environmental Assessment Certificate
Artemis	Artemis Gold Inc.
BC	British Columbia
Blackwater	Blackwater Gold Project
BW Gold	BW Gold LTD.
CEA Agency	Canadian Environmental Assessment Agency
CEO	Chief Executive Officer
CLC	Community Liaison Committee
CM	Construction Manager
Code	Health, Safety and Reclamation Code for Mines in British Columbia
COO	Chief Operating Officer
dBA	A-weighted decibel
DS	Decision Statement
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office
EIS	Environmental Impact Statement
ELoMC	Environmental Life of Mine Committee
EM	Environmental Manager
EMLI	Ministry of Energy, Mines and Low Carbon Innovation
EMPR	Ministry of Energy, Mines and Petroleum Resources
EMP	Environmental Management Plan
EMS	Environmental Management System
EPCM	Engineering, Procurement and Construction Management
ENV	Ministry of Environment and Climate Change Strategy
Indigenous groups	Lhoosk'uz Dené Nation, Ulkatcho First Nation, Nadleh Whut'en First Nation, Saik'uz First Nation, Stellat'en First Nation, Nazko First Nation, Skin Tyee Nation, Tŝilhqot'in Nation, Métis Nation British Columbia, and Nee-Tahi-Buhn Band.
km	Kilometre
L_d	Daytime (7am to 10pm) Leq (in dBA)

L_{eq}	Energy Equivalent Sound Level (in dBA)
L_n	Nighttime (10pm to 7am) Leq (in dBA)
m	Metre
mm/s	Millimetres per second
Mtpa	Million tonnes per annum
NEF	Noise Exposure Forecast
New Gold	New Gold Inc.
NVMP	Noise and Vibration Effects Monitoring and Mitigation Plan
Project	Blackwater Gold Project
PPV	Peak Particle Velocity (in mm/s)
t	Tonnes
TSF	Tailings Storage Facility
VP	Vice President

1. PROJECT OVERVIEW

The Blackwater Gold Project (the Project) is a gold and silver open pit mine located in central British Columbia (BC), approximately 112 kilometres (km) southwest of Vanderhoof, 160 km southwest of Prince George, and 446 km northeast of Vancouver.

The Project is presently accessed via the Kluskus Forest Service Road (FSR), the Kluskus-Ootsa FSR and an exploration access road, which connects to the Kluskus-Ootsa FSR at km 124.5. The Kluskus FSR joins Highway 16 approximately 10 km west of Vanderhoof. A new, approximately 13.8 km road (Mine Access Road) will be built to replace the existing exploration access road, which will be decommissioned. Driving time from Vanderhoof to the mine site is about 2.5 hours.

Major mine components include a tailings storage facility (TSF), ore processing facilities, waste rock, overburden and soil stockpiles, borrow areas and quarries, water management infrastructure, water treatment plants, accommodation camps and ancillary facilities. The gold and silver will be recovered into a gold-silver doré product and shipped by air and/or transported by road. Electrical power will be supplied by a new approximately 135 km, 230 kilovolt (kV) overland transmission line that will connect to the BC Hydro grid at the Glenannan substation located near the Endako mine, 65 km west of Vanderhoof.

The Blackwater mine site is located within the traditional territories of Lhoosk'uz Dené Nation (LDN), Ulkatcho First Nation (UFN), Skin Tyee Nation and Tsilhqot'in Nation. The Kluskus and Kluskus-Ootsa FSRs and Project transmission line cross the traditional territories of Nadleh Whut'en First Nation (NWFN), Saik'uz First Nation (SFN), and Stellat'en First Nation (StFN; collectively, the Carrier Sekani First Nations) as well as the traditional territories of the Nazko First Nation (NFN), Nee Tahi Buhn Band, Cheslatta Carrier Nation, and Yekooche First Nation (EAO 2019a).

Project construction is anticipated to take two years. Mine development will be phased with an initial milling capacity of 15,000 tonnes per day (t/d) or 5.5 million tonnes per annum (Mtpa) for the first five years of operation. After the first five years, the milling capacity will increase to 33,000 t/d or 12 Mtpa for the next five-years, and to 55,000 t/d or 20,000 Mtpa in Year +11 until the end of the 23-year mine life. The Closure phase is Year +24 to approximately Year +36, and is defined by the duration required to fill the Open Pit to the target closure level and the TSF is allowed to passively discharge to Davidson Creek via a closure spillway. The Closure phase is shorter than that what was presented in the *Joint Mines Act* / *Environmental Management Act* Permits Application (March 2022) as a result of optimizations to the Project. The Post-closure phase is now estimated to being in Year +37.

New Gold Inc. (New Gold) received Environmental Assessment Certificate EAC #M19-01 on June 21, 2019 under the 2002 *Environmental Assessment Act* (EAO 2019b) and a Decision Statement (DS) on April 15, 2019 under the *Canadian Environmental Assessment Act, 2012* (CEA Agency 2019b). In August 2020, Artemis Gold Inc. (Artemis) acquired the mineral tenures, assets and rights in the Blackwater Project that were previously held by New Gold Inc. On August 7, 2020, the Certificate was transferred to BW Gold LTD. (BW Gold), a wholly-owned subsidiary of Artemis, under the 2018 *Environmental Assessment Act*. The Impact Assessment Agency of Canada notified BW Gold on September 25, 2020 to verify that written notice had been provided within 30 days of the change of proponent as required in Condition 2.16 of the DS, and that a process had been initiated to amend the DS.

2. PURPOSE AND OBJECTIVES

The purpose of the Noise and Vibration Effects Monitoring and Mitigation Plan (NVMP) is to provide the framework needed to manage the effects of noise and vibration as per the BC Environmental Assessment Office (EAO) Condition 21 for Environmental Assessment Certificate (Certificate) and the Canadian Environmental Assessment Agency (CEAA) Decision Statement conditions 6.3 and 6.4. Human exposure to noise at mine sites is also managed through the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) who have codified the noise exposure requirements for mine site workers in the Health, Safety and Reclamation Code for Mines in British Columbia (Code; 2022) in Part 2, section 2.6, tables 2-2 and 2-3.

EAO Certificate condition 21 dictates that the Holder must retain a Qualified Professional (QP) to develop and implement a NVMP. The plan must be developed in consultation with Ministry of Energy, Mines and Petroleum Resources (EMPR), Ministry of Environment and Climate Change Strategy (ENV), Northern Health Authority (NHA), and Indigenous Groups. Table 2-1 summarizes the Condition 21 requirements and the applicable section in the NVMP. A concordance table identifying the requirements of the Environmental Assessment Certificate #M19-01 is provided in Appendix A. The Noise and Vibration Management Plan for the Transmission Line is provided in Appendix B.

Table 2-1: EAO Certificate Condition 21

EAO Certificate Condition 21	NVMP Section
a) the means by which the mitigation measures identified in the Mitigation Table required under Condition 43 for the valued component Noise and Vibration will be implemented, including at least the following: i. locating Construction and Operations camps so that noise levels experienced by Construction and Operations camps residents from road and air traffic and mine equipment are consistent with triggers developed by a Qualified Professional that are protective of human health;	Section 10.1
ii. a description of how the development of triggers under a) i. took into account Health Canada's "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise" (April 25, 2017 or as updated or replaced from time to time);	Section 4.3
iii. how the Holder will minimize noise through the consideration of the type of aircraft used and frequency of flights; and	Section 10.1
iv. the means by which the Holder will provide to individuals or groups that could hear the blasts a schedule for the timing of blasting;	Section 11.1.3
b) the following specific mitigations: i. housing the pebble crusher and grinding circuits in insulated structures, and positioning equipment in sheltered or enclosed locations; and	Section 10.1
ii. limiting aircraft taking off or landing at the Project to daylight hours only;	Section 10.1
c) identification of noise receptor locations for monitoring programs;	Section 10.2
d) how and when monitoring will be undertaken;	Section 10.2
e) identification of the area where noise from the Project could be heard, and consultation with Indigenous Groups regarding how different noise levels potentially affect their activities within the identified area and the mitigation measures to address those effects;	Section 9.5
f) identification of land users who may be affected by Project noise and how information related to Project activities and the potential for noise will be communicated; and	Section 11.1.2
g) the process, including timelines, for receiving and responding to noise complaints.	Section 11.1.3

The Holder must provide the draft plan that was developed in consultation with ENV, EMPR, NHA, and Indigenous Groups to ENV, EMPR, NHA, Indigenous Groups, and the EAO for review a minimum of 60 days prior to the planned commencement of construction or as listed in the Document Submission Plan required by Condition 10 of the Conditions of Environmental Assessment Certificate.

Table 2-2 below summarizes Canadian Environmental Assessment Agency (CEAA) Decision Statement conditions and the applicable section in the NVMP.

Table 2-2: Applicable CEAA Decision Statement Conditions

CEAA Decision Statement Conditions Related to Noise and Vibration	NVMP Section
6.3 The Proponent shall develop, prior to construction and in consultation with Indigenous groups, a protocol for receiving complaints related to the exposure to noise and dust from the Designated Project. The Proponent shall respond to any noise or dust complaint(s) within 48 hours of the complaint being received and shall implement corrective actions to reduce exposure to noise or dust in a timely manner. The Proponent shall implement the protocol during construction, operation and decommissioning.	Section 11.1.3
6.4 The Proponent shall, during all phases of the Designated Project, limit landing and take-off of flights to daylight hours and shall limit taxiing time of aircraft on the ground to time necessary for take-off and landing manoeuvres, except if not feasible for safety reasons.	Section 10.1

3. ROLES AND RESPONSIBILITIES

BW Gold has the obligation of ensuring that all commitments are met and that all relevant obligations are made known to mine personnel and site contractors during all phases of the mine life. A clear understanding of the roles, responsibilities, and level of authority that employees and contractors have when working at the mine site is essential to meet Environmental Management System (EMS) objectives.

Table 3-1 provides an overview of general environmental management responsibilities during all phases of the mine life for key positions that will be involved in environmental management. Other positions not specifically listed in Table 3-1 but who will provide supporting roles include independent environmental monitors, an Engineer of Record (EOR) for each tailings storage facility and dam, an Independent Tailings Review Board (ITRB), TSF qualified person, geochemistry qualified professional, and other qualified persons and qualified professionals.

Table 3-1: Roles and Responsibilities

Position	Responsibility
Chief Executive Officer (CEO)	The CEO is responsible for overall Project governance. Reports to the Board.
Chief Operating Officer (COO)	The COO is responsible for engineering and Project development and coordinates with the Mine Manager to ensure overall Project objectives are being managed. Reports to CEO.
Vice President (VP) Environment & Social Responsibility	The VP is responsible for championing the Environmental Policy Statement and EMS, establishing environmental performance targets, and overseeing permitting. Reports to the COO.
General Manager (GM) Development	The GM is responsible for managing project permitting, the Project's administration services and external entities, and delivering systems and programs that ensure Artemis's values are embraced and supported, Putting People First, Outstanding Corporate Citizenship, High Performance Culture and Rigorous Project Management and Financial Discipline. Reports to the COO.
Mine Manager	The Mine Manager, as defined in the *Mines Act*, has overall responsibility for mine operations, including the health and safety of workers and the public, EMS implementation, overall environmental performance and protection, and permit compliance. The Mine Manager may delegate some of their responsibilities to other qualified personnel. Reports to the GM.
Construction Manager (CM)	The CM is accountable for ensuring environmental and regulatory commitments/ and obligations are being met during the construction phase. Reports to Mine Manager.
Environmental Manager (EM)	The EM is responsible for the day-to-day management of the Project's environmental programs and compliance with environmental permits, updating the EMS and Management Plans. The EM or designate will be responsible for reporting non-compliance to the CM, and Engineering, Procurement and Construction Management (EPCM) contractor, other contractors, the Company and regulatory agencies, where required. The EM informs the Environmental Monitors of current site conditions that may influence monitoring programs. Supports the CM and reports to the Mine Manager.
Departmental Managers	Departmental Managers are responsible for implementation of the EMS relevant to their areas. Reports to Mine Manager.
Indigenous Relations Manager	Indigenous Relations Manager is responsible for Indigenous engagement throughout the life of mine. Also responsible for day-to-day management and communications with Indigenous groups. Reports to the VP Environment & Social Responsibility.
Community Relations Advisor	Community Relations Advisor is responsible for managing the Community Liaison Committee and Community Feedback Mechanism. Reports to Indigenous Relations Manager.

Position	Responsibility
Aboriginal Monitors	Aboriginal Monitors are required by EAC M#19-01 Condition 17 and will be responsible for monitoring the Project's potential effects on Indigenous interests. Aboriginal Monitors will be involved in the environmental monitoring, adaptive management and follow-up monitoring programs. Report to the EM.
Employees and Contractors	Employees are responsible for being aware of permit requirements specific to their roles and responsibilities. Report to departmental managers.
Qualified Registered Professionals or Qualified Persons	Qualified registered professionals and qualified persons will be retained to review objectives and conduct various aspects of environmental and social monitoring as specified in Environmental and Social Management Plans.

BW Gold will employ a qualified person as an EM who will ensure that the EMS requirements are established, implemented and maintained, and that environmental performance is reported to management for review and action. The EM is responsible for retaining the services of qualified persons or qualified professionals with specific scientific or engineering expertise to provide direction and management advice in their areas of specialization. The EM will be supported by a staff of Environmental Monitors that will include Environmental Specialists and Technicians and by a consulting team of subject matter experts in the fields of environmental science and engineering.

During the Construction phase, BW Gold will be entering into multiple Engineering, Procurement and Construction contracts, likely for the Transmission Line, Process Plant, Tailings and Reclaim System, and 25 kV Power Distribution. Each engineer/contractor will have their own CM and there will be a BW Gold responsible PM and/or Superintendent who ultimately reports to the GM Development. Some of the scope, such as the TSF and Water Management Structures will be self-performed by BW Gold, likely using hired equipment. Other smaller scope packages may be in the form of Engineering, Procurement and Construction Management (EPCM) contracts. The EPCM contractors will report to the CMs who will ultimately be responsible for ensuring that impacts are minimized, and environmental obligations are met during the Construction phase. For non-EPCM contractors, who will perform some of the minor works on site, the same reporting structure, requirements, and responsibilities will be established as outlined above. BW Gold will maintain overall responsibility for management of the construction and operation of the mine site and will therefore be responsible for establishing employment and contract agreements, communicating environmental requirements, and conducting periodic reviews of performance against stated requirements.

The CM is accountable for ensuring that environmental and regulatory commitments/obligations are being met during the construction phase. The EM will be responsible for ensuring that construction activities are proceeding in accordance with the objectives of the EMS and associated MPs. The EM or designate will be responsible for reporting non-compliance to the CM, and EPCM contractor, other contractors, and regulatory agencies, where required. The EM or designate will have the authority to stop any construction activity that is deemed to pose a risk to the environment; work will only proceed when the identified risk and concern have been addressed and rectified.

Environmental management during operation of the Project will be integrated under the direction of the EM, who will liaise closely with departmental managers and will report directly to the Mine Manager. The EM will be supported by the VP of Environment and Social Responsibility in order to provide an effective and integrated approach to environmental management and ensure adherence to corporate environmental standards. The EM will be accountable for implementing the approved MPs and reviewing them periodically for effectiveness. Departmental area managers (e.g., mining, milling, and plant/site services) will be directly responsible for implementation of the EMS and EMPs relevant to their areas. All employees and contractors are responsible for daily implementation of the practices and policies contained in the EMS.

Pursuant to Condition 19 of the EAC, BW Gold has established an Environmental Life of Mine Committee (ELoMC) to facilitate information sharing and provide advice on the development and operation of the Project, and the implementation of EAC conditions, in a coordinated and collaborative manner. Committee members include representatives of the EAO, UFN, LDN, NWFN, StFN, SFN, NFN, EMLI, ENV, and Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

Pursuant to Condition 17 of the EAC, Aboriginal Group Monitor and Monitoring Plan, BW Gold will retain or provide funding to retain a monitor for each Indigenous nations defined in the EAC #M19-01 prior to commencing construction and through all phases of the mine life. The general scope of the monitor's activities will be related to monitoring for potential effects from the Project on Indigenous nations' interests.

4. COMPLIANCE OBLIGATIONS, GUIDANCE, AND BEST MANAGEMENT PRACTICES

4.1 Legislation

Federal legislation applicable to the NVMP includes:

- *Canadian Environmental Protection Act, 1999;*
- *Impact Assessment Act;* and
- *United Nations Declaration on the Rights of Indigenous Peoples Act.*

Provincial legislation applicable to the NVMP includes:

- *Declaration on the Rights of Indigenous Peoples Act;*
- *Environmental Assessment Act;*
- *Environmental Management Act*; and
- *Mines Act,* including:
  - Health, Safety and Reclamation Code for Mines in British Columbia.

4.2 Existing Permits

Mines Act permit M-246 issued for the BW Gold site must ensure that all work isin compliance with all sections and parts of the *Mines Act* and Code, and the Permittee must also obey all orders issued by the Chief Inspector of Mines (Chief Inspector) or their delegate. Noise management requirements are outlined under Part 2, section 2.6.1, tables 2-2 and 2-3 of the Code. Permits issued for the mine site from other agencies defer to the permit M-246 for management of human exposure to noise.

4.3 Guidelines and Best Management Practices

Guidance relevant to NVMP and applicable to the Project include:

- Environmental Code of Practice for Metal Mines (ECPMM; Environment Canada 2009); and
- Guidance Evaluating Human Health Impacts in Environmental Assessment: Noise (Health Canada 2017).

Noise and vibration objectives are specified in Environment Canada's ECPMM. With respect to noise, the ECPMM requires that, in residential areas adjacent to mine sites, the equilibrium sound pressure level (Leq) from mining activities should not exceed 55 A-scale decibel (dBA) during the day (L_d), and 45 dBA at night (L_n).

With regards to vibration, the ECPMM advises that mines in areas where ground vibration and environmental noise from blasting are not regulated and should design their blasts so that the following criteria are not exceeded at or beyond the boundaries of the mine property:

- Ground vibration of 12.5 mm/s peak particle velocity (PPV) measured below grade or less than 1 metre (m) above grade; and
- Concussion noise of a maximum of 128 dBA.

Since the original assessment of the project, Health Canada has issued guidance for evaluating major development noise effects on human health. For potential adverse health effects associated with sleep disturbance due to night-time noise, Health Canada references the World Health Organization's (WHO)

2009 document (WHO 2009) which recommends an annual average of 40 dBA (L_n) outdoors. As this is an annual average, there may be times when the sound level is above and below 40 dBA; however, there should be no long-term impact on health if the annual average does not exceed 40 dBA.

4.4 Linkages to Other Management Plans

This plan links to Community Effects Monitoring and Management Plan (EAC 37), which includes a community feedback mechanism and resolution process.

The NVMP interacts with the following plans:

- Health and Safety Plan; and
- Community Effects Monitoring and Management Plan.

5. ADAPTIVE MANAGEMENT FRAMEWORK

The NVMP is a living document that will evolve over time in response to monitoring results and regulatory changes. Adaptive management is a tool that is used within the planning stages of the Project (e.g., equipment selection) based on analysis using the best available information or during the life of the Project based on monitoring results. The plan incorporates adaptive management as follows:

- Plan

  Use the results of analysis or monitoring to inform the need to adjust future planned or current activities. Adjustments are required where activities are predicted to be or are verified to be in excess of noise and vibration triggers. This can apply to construction, operations, closure and decommissioning or post-closure activities.

- Do

  Once an activity has been identified as potentially problematic in the planning process or through complaint, an investigation must be carried out to determine what measures may be required to ensure the activity will be in compliance with the noise and vibration triggers.

  The investigation will involve either a desktop noise analysis study and/or monitoring by a QP. Desktop analysis may be comprised of simple comparative analysis or detailed noise propagation calculations. The results of the investigation then inform if corrective actions are required to reduce or prevent excess noise and vibration.

  Corrective actions, if needed, are then put in place.

- Monitor

  Monitoring will occur based on the following:

  - Compliance monitoring as detailed in Section 10.2 below; or
  - Complaint monitoring as detailed in Section 11.1.3 below.

  Follow-up monitoring may also be required to verify the efficacy of additional mitigation measures.

- Adjust

  A review of the effectiveness of applied management measures will be conducted by the EM. Review of monitoring results and/or corrective actions should be performed with support of the QP. This may involve applying additional administrative or technical controls as appropriate, and in some cases follow-up monitoring.

  Appropriate adjustments to the NVMP will be made according to the findings, and incorporated into the adaptive management follow-up framework as discussed in Section 12.

6. SUPPORT

6.1 Training and Education

Employees and contractors will receive training in noise management on their arrival on site through an environmental on-boarding training session and prior to the start of work as part of the Site Orientation. The purpose of this training is to provide all site personnel with a basic level of environmental awareness and an understanding of their obligations regarding compliance with regulatory requirements, commitments, and best practices.

As part of the training for employees and contractors on noise management, workers will be instructed on reporting any noise or vibration observations to the EM through their site supervisors. Employees will also be instructed that complaints can be made via the onsite Joint Occupational Health and Safety Committee (JOHSC). Site supervisors will be provided with a copy of the NVMP and will receive additional training with respect to the requirements that are outlined in the form of operational standard operating procedures, including where a QP may be required to address requirements in the NVMP.

BW Gold will regularly review and update the training and awareness plan based on changes in training needs and regulatory requirements.

7. NOISE PREDICTION

Noise and vibration due to construction and operation of the Project was modelled or evaluated as part of the Assessment of Potential Environmental Effects within the Application for an Environmental Assessment Certificate (the Application). Modelling or estimated results are summarized below. Additional information is found in the Environmental Impact Statement (EIS; Section 5.2.2), the Noise Modelling Report (Appendix A5.2.2A) and the Airstrip Noise Impact Assessment (Appendix A5.2.2B) prepared in support of the Application.

7.1 Construction

Noise from construction was approximated at various setback distances assuming hemispherical spreading of sound with the attenuation rate at 6 dBA per doubling of distance from the sound source.

Construction phase noise impacts would result largely from noise generated by mechanized equipment such as loaders, bulldozers, sidebooms, generators, and trucks. Although not specified in the EIS, it is assumed that the majority of the construction noise impacts will be during daytime hours.

7.2 Closure and Decommissioning

Noise sources during the decommissioning phase will be similar to the construction phase impacts. However, noise effects will be lower because high-level noise sources such as drills and blasting will be absent.

Therefore, the construction phase noise assessment can be used as a conservative assessment of noise during the decommissioning phase.

7.3 Operations

Noise modelling was completed using the computer-based model SPM9613 developed by Power Acoustics for most aspects on project operation. Aircraft and blasting activity were modelled using methods specific to those sources. Off-site infrastructure was assessed qualitatively. The results of the major portions of the assessment are summarized below.

7.3.1 Mine and Processing Plant

For mining activity, modelling results reveal that the major noise sources within the Project area will be inside the pit, where equipment (e.g., shovels, loaders, trucks, drills, etc.) will be simultaneously removing overburden and waste ore and extracting the high-grade ore. As well, crushing operations will be a notable source of noise where ore will be crushed in three stages using a gyratory crusher for primary ore size reduction and secondary and tertiary cone crushers. Run-of-mine ore will be fed from haul trucks or via front end loader from the run-of-mine stockpile directly into the gyratory crusher. Primary crushed material will then be transferred to the secondary cone crusher and eventually the tertiary cone crushers. Crushed ore is conveyed via the stockpile feed conveyor to the coarse ore stockpile.Spatial contours indicating the extent of sound from the Project were provided in Figure 5.2.2-1 of the Environmental Impact Statement (Section 5.2.2).

7.3.2 Tatelkuz Lake Pump Station

For the Tatelkuz Lake Pump Station, noise from electrical equipment such as motors and transformers is characterized generally as a discrete low-frequency hum. Spatial contours indicating the extent of sound from the Project were provided in Figure 5.2.2-2 of the Environmental Impact Statement (Section 5.2.2).

7.3.3 Aircraft Noise

The aircraft noise assessment for the Project follows the Transport Canada computer model NEFCalc Version 206 (NEF Calc). The potential impact of airstrip noise and related perceptions are delineated by Noise Exposure Forecast (NEF) contour lines representing noise levels. The modelling considered the landing and takeoff of a Boeing 737 aircraft, which generates the greatest noise of potential aircraft landing at the site. The modeling considers a single take-off and landing per day during daytime hours. The NEF contours were provided in Figures 5.2.2-3 and 5.2.2-4 in the Environmental Impact Statement. The contours are representative of flat terrain.

7.3.4 Blasting Noise and Vibration

Blast noise is predominantly low frequency sound, with most of the audible sound energy below 50 Hz. In order to predict peak overpressures from blasting, the prediction formula adopted for the project is one derived by Linehan and Wiss for the US Bureau of Mines. The magnitude of the air blast overpressure measured in dBA depends on the explosive type, loading densities, weight, the spacing of blasting holes, the detonator delays, and other factors. Ground-borne vibration was not predicted. Overpressure noise modelling considered blasting effects from 1,000 kg of ammonium nitrate/fuel oil (ANFO) charge at a depth of 15 m.

7.3.5 Off-site Infrastructure

In addition to airstrip and water intake pump station discussed in specific subsections, off-site infrastructure includes a transmission line, freshwater supply system and a mine access road that were assessed qualitatively in Section 5.2.2 of the Environmental Impact Statement. Aeolian noise from the transmission line will predicted to be hardly noticed because of blowing winds and no noise will be generated along the 20 km long freshwater supply pipeline during operation. Access road impacts on environmental noise is predicted to be low due to low traffic volumes (17 one-way trips per day), standard exhaust mufflers and negligible tire noise (at the posted speed limit of 60 km/h).

7.4 Post-Closure

No post-closure impacts are anticipated, since no noise-generating activities or equipment will be present once the Project is decommissioned.

8. IDENTIFICATION OF NOISE SOURCES

Noise source details are summarized below. Additional information is found in the Noise Modelling Report in support of the Application (Appendix A5.2.2A).

8.1 Construction

Construction noise emissions are expected to occur during the following activities:

- Levelling and grading;
- Vehicle/heavy equipment traffic;
- Excavation;
- Pile driving;
- Concrete pouring;
- Steel erection;
- Mechanical installation;
- Commissioning and start-up;
- Tree clearing and grubbing;
- Soil salvage; and
- Bridge installation.

8.2 Operations

Noise sources consist of mine equipment in the quantity based on the annual mine production schedule, the mine work schedule, and equipment shift production estimates. Operations noise is split into the following subsections:

- Mine and Processing Plant;
- Tatelkuz Lake Pump Station;
- Aircraft Noise;
- Blasting Noise and Vibration; and
- Off-site Infrastructure.

8.3 Closure and Decommissioning

The closure phase of the Project is dominated by reclamation activities, and therefore noise will primarily be associated with vehicles and activities associated with the decommissioning of the mine site, such as dismantling infrastructure, land restoration, re-vegetation, access and haul road decommissioning and ongoing monitoring.

8.4 Post-Closure

Only an occasional, minor noise will occur due to some activities associated with ongoing monitoring and inspection programs involving small vehicles.

9. IDENTIFICATION OF POTENTIAL NOISE EFFECTS

9.1 Construction

Impact construction equipment typically includes small hand-held, pneumatic, hydraulic, or electric powered tools. The primary noise source for conventional piledrivers is the impact of the hammer striking the pile. Engine-related noise sources, such as combustion explosion or the release of steam at the head of some equipment, are usually secondary. The predominant sources of noise in pneumatic tools are the high-pressure exhaust and the impact of the tool bit against the material on which it acts. Welding noise is generally negligible; the main sources of noise are the generators that support the welding equipment. The residual effect of construction was rated “low” with the extent of effects identified in Appendix A5.2.2A, calculated to 3 km.

9.2 Operations

9.2.1 Mine and Processing Plant

As the Project is at a relatively remote location, a camp will be provided for personnel on site. The operations camp will include standalone, dormitories designed to house 400 personnel and core services facilities. The modelling results show ambient noise levels outside of building structures at the camp location will be approximately 40 dBA. The camp will be constructed as prefabricated modules, made of metal-cladwalls with thick thermal insulation. Because of this, the walls will serve as effective noise barriers. Actual noise levels at affected points may vary somewhat, as several unpredictable factors may increase or decrease the propagation of sound. In general, these can be summarized as:

- Increase in trucking noise due to roughness of road surface;
- Increase due to multiple reflections from vertical surfaces;
- Decrease due to trees;
- Decrease due to barriers of all types, mainly hills; and
- Lower composite noise level, as not all equipment will be used at the same time.

9.2.2 Tatelkuz Lake Pump Station

Noise from the pump station was predicted to drop below the night-time background sound level of 30 dBA at 200 m distance. Sound levels from the Project at the recreation reserve drop to below 20 dBA. Since the recreation reserve is not used for sleep, it is not assessed against the HC 40 dBA nighttime trigger level, and only considers the daytime trigger level of 55 dBA.

9.2.3 Aircraft Noise

A Noise Exposure Forecast (NEF) was predicted using NEF Calc model, modelling a Boeing 737 as a worst case aircraft. It showed that the NEF isopleth of 25 is located very close to the airstrip. No annoyance is experienced for a NEF below the 25 level. Based on sound exposure level and NEF predictions, and the short-term durations of landings and takeoffs (no more than one flight per day), none of the five families living in the Project region will be exposed to noise levels above the permissible criteria, i.e., a daytime PSL of 45 dBA and NEF of 25. Details of the airstrip noise impact assessment are shown in Appendix A5.2.2B.

9.2.4 Blasting Noise and Vibration

Blast noise levels at different distances caused by the explosion of 1,000 kg of ANFO charge at a depth of 15 m have been calculated using the Linehan and Wiss equation published by the US Bureau of Mines (Linehan and Wiss, 1980). Calculation details are shown in Appendix A5.2.2A, Section 2.4. A summary of results are shown in Table 9-1.

Table 9-1: Predicted Blasting Noise Levels

Distance (m)	30	100	500	600	1,000	1,500	2,000	3,000
SPL (dBA)	137	125	109	107	102	98	95	91

Under typical conditions, blasting vibration intensity diminishes with distance at a rate of about one third of its previous value each time the distance from the vibration source is doubled. Ground-borne vibrations can cause annoyance above levels of about 5 mm/s because of the perception of movement. Structural damage may also occur at significantly higher levels, about 50 mm/s. Additional information is included in Appendix A5.2.2A, Section 2.4.

9.2.5 Off-site Infrastructure

Vehicular traffic along a new 15 km long mine access road will be the noise source. Traffic noise is generated by three sources: manage noise, exhaust system noise and tire noise. Engine noise can only be controlled by vehicle manufacturers and through proper maintenance. Exhaust noise is controlled by mufflers and relies on proper maintenance and upkeep by the Proponent or subcontractor. Tire noise is caused by the interaction between tire and road surface (gravel) and is insignificant at a posted speed of 60 km/h. Because of low traffic volume (17 one-way trips per day), mitigated engine noise and negligible tire noise, access road impact on environmental acoustic will be low.

9.3 Closure and Decommissioning

The construction phase noise assessment can be used as a conservative assessment of noise during the closure phase.

9.4 Post-Closure

Noise is not expected to be a concern for the post-closure phase.

9.5 Traditional Ecological or Community Knowledge

Local residents and Indigenous groups and their members have also expressed interest in the proposed Project's potential effects from noise and vibration. These groups' comments during the engagement and consultation process have provided insights into traditional, ecological, or community knowledge, which is defined as a body of knowledge built up by a group of people through generations of living in close contact with nature. This includes unique knowledge about the local environment, how it functions, and its characteristic ecological relationships. Community knowledge provided by local trappers and cattle ranchers indicate that a quiet environment is important to their livelihoods. They anticipate an increase in noise as a result of the proposed Project. Traditional knowledge suggests that a quiet, peaceful environment is important to Indigenous groups, and that noise and vibrations may negatively affect Indigenous and non-Indigenous use and enjoyment of the land and environment, and disrupt wildlife and livestock. A local outfitter noted that noise/human activity related to power line construction and wildlife may be a problem during fall hunting (Appendix A3.1.3C to the Application).

Identifying the extent to which the Project mining activities may be heard cannot be well defined as it depends on actual ambient conditions. Ambient conditions can fluctuate based on wind and weather and seasonality. It is possible for the Project to be distinguishable from natural sounds at sensitive receptor locations, but at the distances involved, sounds from the Project are not expected to be louder than ambient. In the areas within 3 km from the Project the potential for audibility is high especially when ambient levels are low (calm quiet days). At distances equal or greater than 3 km the potential for audibility decreases significantly, and the operation will become less discernable from natural sounds.

Additional detail on comments and issues raised can be found in the Environmental Impact Statement Section 3 which contains the public and Indigenous issues tracking tables for the Project. Sections 14 through Section 16 of the Environmental Impact Statement provide a summary of the Indigenous background, rights, and interests for the Project.

10. IMPLEMENTATION

10.1 Mitigation Measures

Proposed mitigation to be implemented or considered as needed through the adaptive management process, and as prepared according to Condition 43 includes the following:

1. Select equipment with industry standard noise abatement technology, including exhaust, and compressor/fan noise. Use a noise-attenuating jacket around the jackhammer.
2. Maintain equipment in good working condition, on a regular basis replace worn parts, lubricate as required.
3. Minimize the height of material drops from the plant and machinery.
4. Locate construction and operations camps to minimize noise disturbance from road and air traffic, and mine equipment based on adaptive management framework as outlined in Section 5.
5. Perform regular inspections and maintenance of material-handling vehicles and equipment, ensuring that noise abatement components are working as intended, worn parts replaced, and lubricants applied, so that manufacturers' noise output specifications continue to be met.
6. Turn off equipment when not in use as will be described in the Noise and Vibration Effects Monitoring and Mitigation Plan (now named the Noise and Vibration Monitoring Plan).
7. Operate utilities and provide services in adherence to relevant standards and guidelines (including at least pump stations, wastewater treatment plant, fueling station).
8. Avoid low altitude flights except on final approach and take-off.
9. Limit taxiing time.
10. Use low-noise supporting ground equipment (including at least a power generator with muffler).
11. Implement airstrip construction noise mitigation measures the same as those for the mine site.
12. Establish an Environmental Monitoring Board to monitor project-related effects and make recommendations related to adaptive management.
13. Establish a Traditional Knowledge/ Traditional Land Use (TK/TLU) Committee to monitor project development and provide TK/TLU information to incorporate during final project design, construction, operations, closure and post-closure.
14. Conduct blasting on day shifts only.
15. Operate equipment within specifications and capacities (i.e., do not overload machines).
16. Minimize the impact of aircraft noise within the community through the consideration of the type of aircraft used and frequency of flights based on adaptive management framework as outlined in Section 5.
17. House the pebble crusher and grinding circuits in insulated structures, and position equipment in sheltered or enclosed locations.
18. Limit aircraft taking off or landing at the Project to daylight hours only.

In addition to the agreed mitigations listed above, supplementary controls have been identified and will be considered during Project operations:

1. Air brakes: Restrict use of engine braking in proximity to residential and/or important wildlife areas along the access road where safe and feasible – signage to be posted in these areas to notify operators of this restriction.
2. Control and mitigation of blasting effects through the design of the blasting program, to be established by a blasting QP to meet ECPMM vibration and concussion limits at the mine boundaries.

10.2 Monitoring

Monitoring throughout the life of the Project will be conducted in response to a noise complaint by community stakeholders (known as “complaint monitoring”) or to verify effectivity of mitigation and compliance with trigger levels (known as “compliance monitoring”).

Complaint monitoring will occur in support of the adaptive management strategy. Further details related to complaint monitoring are provided in Section 11.1.3 of the NVMP. Compliance noise and blast monitoring details are provided below.

10.2.1 Compliance Monitoring Thresholds

To facilitate noise compliance monitoring during the Project, noise level triggers not to be exceeded are taken from the most stringent daytime (ECPMM) and nighttime (HC) criteria levels detailed in Section 4.3 above. They are summarized as follows:

- 55 dBA (L_d)
- 40 dBA (L_n)

With regards to vibration, the ECPMM advises the following criteria are not exceeded at or beyond the boundaries of the mine property:

- Ground vibration of 12.5 mm/s peak particle velocity measured below grade or less than 1 metre (m) above grade; and
- Concussion noise of a maximum of 128 dBA.

10.2.2 Noise Compliance Monitoring

To verify effectiveness of mitigation and compliance with trigger levels, compliance monitoring will be conducted at distinct periods throughout the life of the Project. As well, compliance monitoring will occur at different times throughout the year in order to capture seasonal variations that may exist.

To achieve these objectives, compliance monitoring will occur a total of six (6) times throughout the life of the Project. Three distinct periods of monitoring throughout the life of the Project will be conducted, these will be during the construction of the Project, the start of mining and processing operations, and during operations at peak mining output.

For each of these distinct monitoring periods, two (2) seasonal measurements will be conducted; the first being during the early spring/summer (March through June), and the second being during the late fall (September through November).

Compliance monitoring will be conducted at two (2) locations, summarized as follows:

- M1 – Construction / operation camp area; and
- M2 – Doug short ranch.

The locations are shown in Figure 10-1.

Compliance monitoring will require a minimum of 48 hours of continuous monitoring at each location, which may be extended depending on local influences (wind, rain, abnormal noise events etc.), as directed by the QP for environmental noise. Monitoring must capture one take-off and one arrival from the airport.

Monitoring shall be conducted with a sound level meter that meets the minimum technical specifications in the IEC or EN 61672-2 (2013) + AMD1:2017 CSV Class 1 or newer, for Class 1 sound level meters.

Monitoring during the decommissioning and post-close phases of the Project is not required due to insignificant predicted affects.

All monitoring results will be analyzed to verify the quality of data. Invalid data will be documented and removed from the analysis, then summarized and directly compared to the thresholds identified to determine compliance. Reporting will include a list of any data removed and the justification for the removal.

10.2.3 Blast Compliance Monitoring

Blast compliance monitoring will involve measuring ground-borne vibration and air concussion levels at the beginning of blasting. ECPMM suggests that blasts should be designed to meet maximum ground vibrations of 12.5 mm/s PPV and maximum concussion noise of 128 dBA at the boundaries of the mine property.

Therefore blast monitoring should occur at the southern mine boundary south of the open pit where the impacts from the blasting will have most impacts on the mine boundary. The boundary along which the monitoring should occur is shown in Figure 10-1.

Blast compliance monitoring will occur a total of two (2) times during the life of the Project, both during early spring/summer (March through June). These will be conducted at the start of mine blasting and during operations at peak mining output.

Blast compliance monitoring will be conducted using a remotely deployable recording device capable of recording triaxial PPV and concussion sound levels typically used for blast monitoring. Monitoring will require that two (2) individual blasts be captured.

All monitoring results will be analyzed the verify the quality of data. Invalid data will be documented and removed from the analysis, then summarized and directly compared to the thresholds identified to determine compliance. Reporting will include a list of any data removed and the justification for the removal.

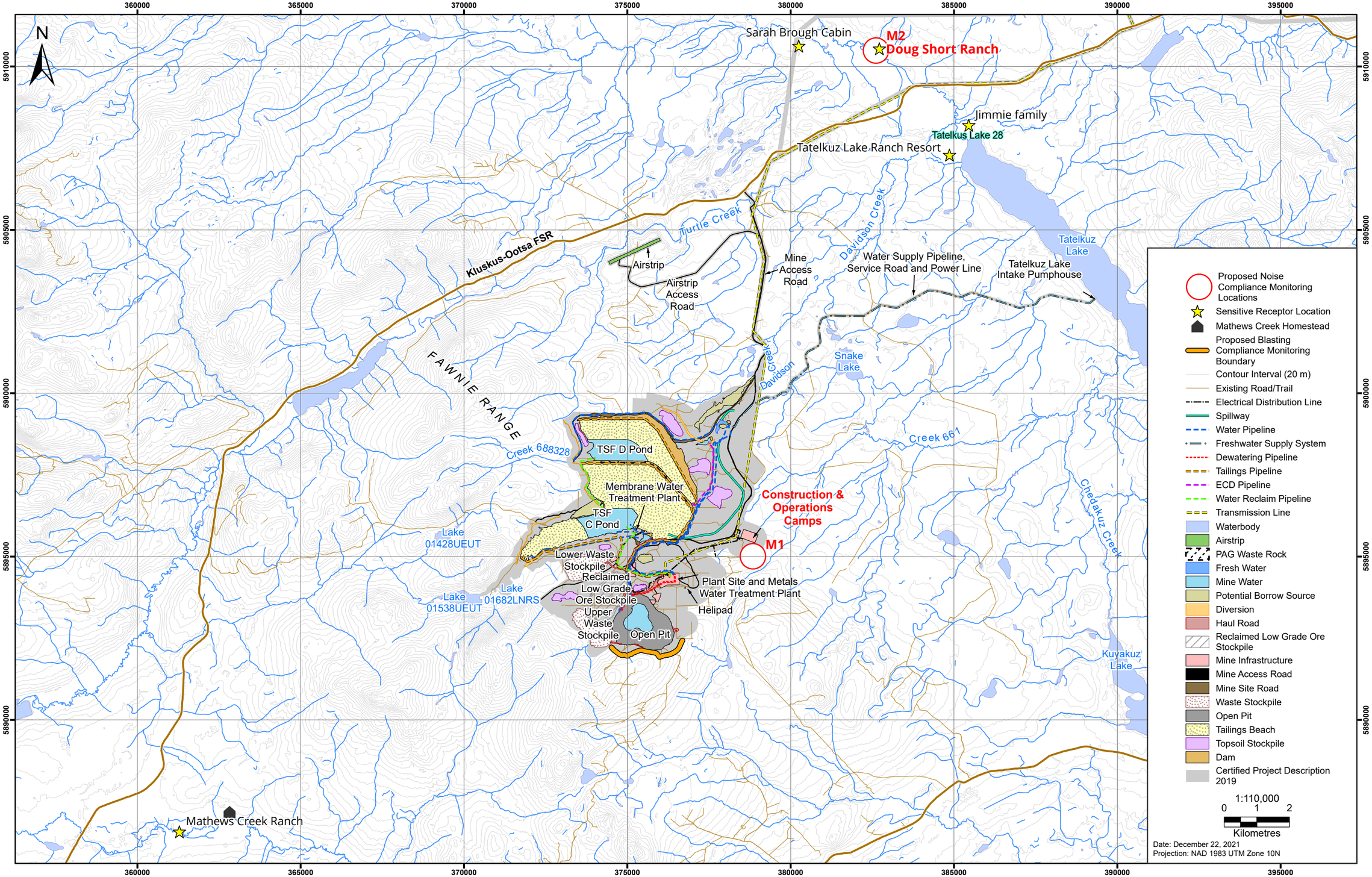


Figure 10-1: Proposed Monitoring Locations with Year 23+ Mine Operation General Arrangement

11. REPORTING AND RECORD KEEPING

11.1 Reporting

11.1.1 Official Regulatory Reporting

Condition 5 of the EAC sets out reporting requirements.

BW Gold will provide the draft plan that was developed in consultation with ENV, EMPR, NHA, and Indigenous Groups to ENV, EMPR, NHA, Inidgenous Groups and the EAO for review a minimum of 60 days prior to the planned commencement of Construction or as listed in the Document Submission Plan required by Condition 10 of this Certificate.

BW Gold will submit a report to the attention of the Environmental Assessment Office and Indigenous Groups on the status of compliance with EAC #M19-01 at the following times:

a) at least 30 days prior to the start of Construction;

b) on or before March 31 in each year after the start of Construction;

c) at least 30 days prior to the start of Operations;

d) on or before March 31 in each year after the start of Operations;

e) at least 30 days prior to the start of Closure;

f) on or before March 31 in each year after the start of Closure until the end of Closure;

g) at least 30 days prior to the start of Post-Closure; and

h) on or before March 31 in each year after the start of Post-Closure until the end of Post-Closure.

Noise and vibration activities will be summarized for the period before each report for inclusion.

11.1.2 Community Engagement

BW Gold has developed a Community Effects Monitoring and Management Plan (CEMMP), Section 11 of which is an Engagement and Community Feedback Mechanism. Notification of major noise generating activities, like start of construction, blasting schedules, and flight schedules, will be communicated to the Community Liaison Committee (CLC) and community as outlined in Section 11.1 of that plan. Opportunities for the CLC and community to provide feedback on the success of planned mitigation, or to provide input on their experience with noise or vibration will be available per Section 11.2 of the CEMMP.

CLC and community input to the NVMP has been incorporated into this plan including:

- CLC comments received December 14, 2021; and
- Northern Health comments received December 17, 2021.

Consideration of these comments has resulted in added mitigations that will be considered as activities progress, as well as clarifications to multiple portions of the NVMP. Where comments or requests could not be included, the reasons were documented and provided back to the reviewer.

11.1.3 Complaint Process and Reporting

In the event of a noise or vibration complaint, the complaint will be addressed in accordance with the Community Feedback Mechanism, specifically the complaint resolution process described in Section 11.2.2 of the CEMMP.

BW Gold shall respond to any noise or vibration complaint within 48 hours of the complaint being received, per Step 1 of the complaint resolution process.

As part of the adaptive management process, a qualified professional(s) will assist in the investigation of the complaint. This may include a desktop study or monitoring to determine if the applicable threshold has been exceeded at the location of the complaint and if the project is the source of the exceedance. Any additional monitoring would be carried out at relevant locations under the supervision of a qualified professional(s).

An evaluation report will document the compliance results and the steps taken to determine the source of the exceedance. If a source(s) other than the project is determined to cause the exceedance, no further action will be required. If the project is determined to be the cause of the exceedance, adaptive management actions will be triggered. BW Gold shall implement corrective actions (if identified) to reduce exposure to noise or vibration in a timely manner.

Timelines for resolution and communications will follow those outlined in Section 11.2.2 of the CEMMP.

BW Gold shall implement the protocol during construction, operation and decommissioning.

11.2 Record Keeping

The EM is responsible for data management and reporting related to data management. The data management system will include conducting inspections and monitoring, and providing these results to appropriate parties as required. The EM will also report key results of noise monitoring and related environmental, health and safety incidents to the Blackwater Environmental Life of Mine Committee (ELoMC) and Indigenous Groups during routine meetings.

Monitoring data will be entered into an electronic database and have quality control checks completed upon receipt of results. Data will be entered into a standard format that allows for data reporting and analyses. Data and data comparisons will be stored in a single file format for each type of survey or monitoring activity. Monitoring data will be stored for the life of the mine and will be made available for review upon request.

12. ADAPTIVE MANAGEMENT AND FOLLOW-UP

The NWMP will be reviewed annually by the ELoMC to assess its effectiveness and evaluate noise management strategies. The strategy employed by BW Gold will be monitoring as described in Section 10.2, supported by operational change and adoption of other mitigating measures as warranted.

BW Gold will conduct and document management reviews of the NVMP on a regular basis. Such reviews will ensure the integration of monitoring results with other aspects of the Project (e.g., other management plans) and that necessary adjustments are implemented as required.

The timing of plan updates may be informed by changes to other relevant management plans, monitoring results; and regulatory changes.

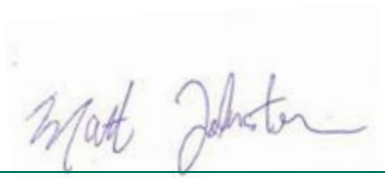
13. PLAN REVISION

Proposed revisions will be reviewed and discussed with the ELoMC prior to adopting and implementing the changes to the NWMP. Revised versions of the plan will be filed with EAO, ENV, Northern Health, and EMLI, and provided to Indigenous groups.

14. QUALIFIED PROFESSIONALS

This management plan has been prepared and reviewed by the following QPs:

Prepared by:



Matthew Johnston, P.Eng.

Reviewed by:

Teresa Drew, B.Sc., INCE

15. REFERENCES

Legislation

Canadian Environmental Protection Act, 1999, SC 1999, c 33.

Environmental Assessment Act, SBC 2018, c 51.

Environmental Management Act, SBC 2003, c 53.

Impact Assessment Act, RSC 2019, c 28.

Mines Act, RSBC 1996, c 293.

Secondary Sources

BC EAO. 2019a. *In the matter of the* Environmental Assessment Act *S.B.C. 2002, c. 43 (the Act) and in the matter of an Application for an Environmental Assessment Certificate (Application) by New Gold Inc. (Proponent) for the Blackwater Gold Project Environmental Assessment Certificate #M19-01.*

BC EAO. 2019b. *Assessment Report for Blackwater Gold Mine Project (Blackwater) with respect to the Application by New Gold Inc. for an Environmental Assessment Certificate pursuant to the Environmental Assessment Act, S.B.C. 2002, c.43*. Prepared by the Environmental Assessment Office. May 17, 2019.

BC MOH. 2017. *BC Guidelines for Industrial Camps Regulation*. Prepared by Health Protection Branch, Ministry of Health. https://www2.gov.bc.ca/assets/gov/health/keeping-bc-healthy-safe/industrial-camps/bc_guidelines_for_industrial_camps_regulation.pdf.

CEA Agency. 2019a. *Blackwater Gold Project Environmental Assessment Report*. April 15, 2019.

CEA Agency. 2019b. *Decision Statement Issued under Section 54 of the Canadian Environmental Assessment Act, 2012* to New Gold Inc. c/o Ryan Todd, Director, Blackwater Project Sunlife Plaza Suite 610, 1100 Melville Street Vancouver, British Columbia V6E 4A6 for the Blackwater Gold Project.

EMLI. 2021. *Health, Safety and Reclamation Code for Mines in British Columbia.* British Columbia Ministry of Energy, Mines and Low Carbon Innovation.

Environment Canada. 2009. *Environmental Code of Practice for Metal Mines*.

Health Canada. 2017. *Guidance Evaluating Human Health Impacts in Environmental Assessment: Noise.*

Linehan, P and J. Wiss (1980). *Vibration and air blast noise from surface coal mine blasting.* Preprint No. 80-336. Society of Mining Engineers of AIME. Littleton, Colorado. 5 pp.

WHO. 2009. *Night Noise Guidelines for Europe.* World Health Organization.

APPENDIX A CONCORDANCE WITH ENVIRONMENTAL ASSESSMENT CERTIFICATE #M19-01 (JUNE 2019)

Appendix A: Concordance with Environmental Assessment Certificate #M19-01 (June 2019)

Description	Location in Plan
Document Review and Implementation Where a condition of this Certificate requires the Holder to provide a plan, program or other document, the Holder must provide the plan, program or other document to the EAO and Aboriginal Groups in the timeframe referenced in such condition, unless otherwise approved by the EAO. The EAO may, within 60 days of receiving a copy of such plan, program or other document, advise that: a) the Holder may proceed to implement the plan, program or other document with or without revisions; or b) a revised plan, program, or other document must be provided for approval of the EAO prior to a specified activity or milestone. If the EAO advises pursuant to paragraphs (a) or (b) that changes are required to a plan, program, or other document, then the Holder must follow the instructions of the EAO in that regard. If the EAO does not advise on paragraphs (a) or (b) within 60 days of the EAO receiving a plan, program, or other document, the Holder may proceed to implement the plan, program or other document. The Holder may, or the EAO may require the Holder to, revise any plan, program or other document if the Holder or the EAO determines that the implementation of the plan, program or other document is not: c) meeting one or more objectives of the plan, program or other document set out in the relevant condition of this Certificate; d) having the effects contemplated or intended, as set out in the plan, program or other document itself; e) consistent with the Certificate; or f) consistent with changes in industry best practices or technology.	Section 10 Section 13
Plan Development Where a condition of this Certificate requires the Holder to develop a plan, program or other document, any such plan, program or other document must, at a minimum, include the following information: a) purpose and objectives of the plan, program or other document;	Section 2
b) roles and responsibilities of the Holder and Employees;	Section 3
c) names and, if applicable, professional certifications and professional stamps/seals, of those responsible for the preparation of the plan, program, or other document;	Section 14
d) schedule for implementing the plan, program or other document throughout the relevant Project phases;	Section 10
e) means by which the effectiveness of the mitigation measures will be evaluated including the schedule for evaluating effectiveness;	Section 10.2
g) schedules and methods for the submission of reporting to specific agencies, Aboriginal Groups and the public and the required form and content of those reports; and	Section 11

Description	Location in Plan
h) process and timing for updating and revising the plan, program or other document, including any consultation with agencies and Aboriginal Groups that would occur in connection with such updates and revisions.	Section 9.5 Section 12 Section 13
Adaptive Management Where a condition of this Certificate requires the Holder to develop a plan, program or other document that includes monitoring, including monitoring of mitigation measures or monitoring to determine the effectiveness of the mitigation measures, the Holder must include adaptive management in that plan. The objective of the adaptive management is to address the circumstances that will require the Holder to implement alternate or additional mitigation measures to address effects of the Project if the monitoring shows that those effects: a) are not mitigated to the extent contemplated in the Application; b) are not predicted in the Application; or c) have exceeded the triggers identified in paragraph g) of this condition. The adaptive management in the plan must include at least the following: d) the monitoring program that will be used including methods, location, frequency, timing and duration of the monitoring;	Section 5 Section 12
e) the baseline information that will be used, or collected where existing baseline information is insufficient, to support the monitoring program;	Section 5
f) the scope, content and frequency of reporting of the monitoring results;	Section 11
g) the identification of qualitative and quantitative triggers, which, when observed through monitoring required under paragraph d), will require the Holder to alter existing, or develop new, mitigation measures to avoid, reduce, and/or remediate effects;	Section 10.2
h) the methods that will be applied to detect when a numeric trigger, or type or level of change referred to in paragraph g), has occurred.	Section 10.2
i) a description of the process for and timing to alter existing mitigation measures or develop new mitigation measures to reduce or avoid effects;	Section 10.1
j) identification of the new and/or altered mitigation measures that will be applied when any of the changes identified in paragraphs a) to c) occur, or the process by which those will be established and updated over the relevant timeframe for the specific condition;	Section 10.1 Section 5
k) the monitoring program that will be used to determine if the altered or new mitigation measures and/or remediation activities are effectively mitigating or remediating the effects and or avoiding potential effects; and,	Section 10.2
l) the scope, content and frequency of reporting on the implementation of altered or new mitigation measures.	Section 11 Section 12
If there are any requirements or mitigation measures required in the plan, program or other document for which adaptive management, or elements of adaptive management listed in paragraphs d) to l) are assessed to be not appropriate or applicable, the plan must include identification of those requirements and measures, and the rationale for that assessment.	Section 10.2

Description	Location in Plan
Consultation Where a condition of this Certificate requires the Holder consult a particular party or parties regarding the content of a plan, program or other document, the Holder must, to the satisfaction of the EAO: a) provide written notice to each such party that: i) includes a copy of the plan, program or other document; ii) invites the party to provide its views on the content of such plan, program or other document; and iii) indicates: i. if a timeframe for providing such views to the Holder is specified in the relevant condition of this Certificate, that the party may provide such views to the Holder within such time frame; or ii. if a timeframe for providing such views to the Holder is not specified in the relevant condition of this Certificate, specifies a reasonable period during which the party may submit such views to the Holder;	Section 11
b) undertake a full and impartial consideration of any views and other information provided by a party in accordance with the timelines specified in a notice given pursuant to paragraph (a);	Section 11.1.2
c) provide a written explanation to each such party that provided comments in accordance with a notice given pursuant to paragraph (a) as to: i. how the views and information provided by such party to the Holder have been considered and addressed in a revised version of the plan, program or other document; or ii. why such views and information have not been addressed in a revised version of the plan, program or other document;	Section 11.1.2
d) maintain a record of consultation with each such party regarding the plan, program or other document; and	Section 11.2
e) provide a copy of such consultation record to the EAO, the relevant party, or both, promptly upon the written request of the EAO or such party. The copy of such consultation record must be provided to the EAO, relevant party, or both, no later than 15 days after the Holder receives the request for a copy of the consultation record, unless otherwise authorized by the EAO.	Section 11.1.2
The Holder must retain a Qualified Professional to develop and implement a Noise and Vibration Effects Monitoring and Mitigation Plan. The plan must be developed in consultation with EMPR, ENV, NHA, and Aboriginal Groups. The plan must include at least the following: a) the means by which the mitigation measures identified in the Mitigation Table required under Condition 43 for the valued component Noise and Vibration will be implemented, including at least the following: i. locating Construction and Operations camps so that noise levels experienced by Construction and Operations camps residents from road and air traffic and mine equipment are consistent with triggers developed by a Qualified Professional that are protective of human health;	Section 10.1
ii. a description of how the development of triggers under a) i. took into account Health Canada's "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise" (April 25 2017 or as updated or replaced from time to time);	Section 4.3

Description	Location in Plan
iii. how the Holder will minimize noise through the consideration of the type of aircraft used and frequency of flights; and	Section 10.1
iv. the means by which the Holder will provide to individuals or groups that could hear the blasts a schedule for the timing of blasting;	Section 11.1.3
b) the following specific mitigations: i. housing the pebble crusher and grinding circuits in insulated structures, and positioning equipment in sheltered or enclosed locations; and	Section 10. 1
ii. limiting aircraft taking off or landing at the Project to daylight hours only;	Section 10.1
c) identification of noise receptor locations for monitoring programs;	Section 8
d) how and when monitoring will be undertaken;	Section 10.2
e) identification of the area where noise from the Project could be heard, and consultation with Aboriginal Groups regarding how different noise levels potentially affect their activities within the identified area and the mitigation measures to address those effects;	Section 8 Section 9.5 Section 11.1.2 Section 10.1
f) identification of land users who may be affected by Project noise and how information related to Project activities and the potential for noise will be communicated; and	Sections 11.1.2 and 11.1.3
g) the process, including timelines, for receiving and responding to noise complaints.	Section 11.1.3
The Holder must provide the draft plan that was developed in consultation with ENV, EMPR, NHA, and Aboriginal Groups to ENV, EMPR, NHA, Aboriginal Groups and the EAO for review a minimum of 60 days prior to the planned commencement of Construction or as listed in the Document Submission Plan required by Condition 10 of this Certificate.	Section 11.1.1

APPENDIX B TRANSMISSION LINE NOISE AND VIBRATION MANAGEMENT PLAN

ARTEMIS GOLD INC

Blackwater Mine

Transmission Line Noise and Vibration Management Plan

Table of Contents

List of Tables

Work Instructions

Transmission Line Noise and Vibration Management Plan

Version	E.1
Replaces	D.1
Creation Date	09/04/2023
Scheduled Review Date	
Review Date	
Document Team Members	
Document Owner:	
Document Approver:	
Related Documents:	
Key Contacts:	
Change Requests:	

Acronyms and Abbreviations

Aboriginal Groups or Indigenous Nations	Lhoosk'uz Dené Nation, Ulkatcho First Nation, Nadleh Whut'en First Nation, Stellat'en First Nation, Saik'uz First Nation, and Nazko First Nation (as defined in Environmental Assessment Certificate #M19-01)
Artemis	Artemis Gold Inc.
BC	British Columbia
Blackwater	Blackwater Gold Project
BW Gold	BW Gold LTD.
CSFN	Carrier Sekani First Nations
CCN	Cheslatta Carrier Nation
CEO	Chief Executive Officer
CM	Construction Manager
Code	Health, Safety and Reclamation Code for Mines in British Columbia
COO	Chief Operating Officer
dBA	A-weighted decibel
DFO	Department of Fisheries and Oceans
DS	Decision Statement
EAC	Environmental Assessment Certificate
EAO	Environment Assessment Office
ECCC	Environment and Climate Change Canada
ECMPP	Environment Canada's Environmental Code of Practice for Metal Mines
ELoMC	Environmental Life of Mine Committee
EM	Environmental Manager
EMLI	Ministry of Energy, Mines and Low Innovation Carbon Innovation
EMP	Environmental Management Plan
EMPR	Ministry of Energy, Mines and Petroleum Resources
EMS	Environmental Management System
FSR	Forest Service Road
GM	General Manager
km	Kilometre
kPa	Kilopascal
LDN	Lhoosk'uz Dené Nation
LOO	License of Occupation

L_d	Daytime (7am to 10pm) Leq (in dBA)
L_{eq}	Energy Equivalent Sound Level (in dBA)
L_n	Nighttime (10pm to 7am) Leq (in dBA)
m	Metre
mm/s	Millimetres per second
MEMPR	Ministry of Energy, Mines and Petroleum Resources
MMWMP	Major Mine Wildlife Management Plan
MP	Management Plan
NFN	Nazko First Nation
NWFN	Nadleh Whut'en First Nation
Project	Blackwater Gold Project Transmission Line
QP	Qualified Professional
RoW	Right of Way
SFN	Saik'uz First Nation
SOP	Standard Operating Procedure
StFN	Stellat'en First Nation
TL	Transmission Line
TLAQDMP	Transmission Line Air Quality and Dust Management Plan
TLCEMP	Transmission Line Construction Environmental Management Plan
TL IPD	Transmission Line Initial Project Description
TLNVMP	Transmission Line Noise and Vibration Management Plan
TLIPMP	Transmission Line Integrated Vegetation Management Plan
TLRCP	Transmission Line Reclamation Plan
TLSEPSCP	Transmission Line Surface Erosion Prevention and Sediment Control Plan
TN	Tŝilhqot'in Nation
UFN	Ulkatcho First Nation
VC	Valued Component
VP	Vice President
WHO	World Health Organization

1.0 Project Overview

The Blackwater Gold Project (the Project) is a gold and silver open pit mine located in central British Columbia (BC), approximately 112 kilometres (km) southwest of Vanderhoof, 160 km southwest of Prince George, and 446 km northeast of Vancouver. The Project site is presently accessed via the Kluskus Forest Service Road (FSR), the Kluskus-Ootsa FSR and an exploration access road, which connects to the Kluskus-Ootsa FSR at km 142. Electrical power for the Project will be supplied by a new approximately 135 km and up to 140 m wide corridor, 230 kilovolt overland transmission line (TL) that will connect to the BC Hydro grid at the Glenannan substation located near the Endako mine, 65 km west of Vanderhoof. A brief description of the proposed TL is as follows:

- From the Glenannan substation to the mine site permit area, the TL will be permitted by way of Licence of Occupation (LOORoW);
- The TL will be constructed within a cleared right of way (RoW) of 40 metre (m) width for standard spans, but up to 50 m width for longer spans in select areas. The TL RoW area is approximately 541 ha for the entire length of 135 km;
- Existing permitted and non-status roads will be used for the purpose of accessing the RoW. New access trails and stream crossings will be located only within the TL cleared RoW;
- Equipment and material laydown areas will also lie within the cleared RoW; and
- The construction workforce will be housed at the Project camp or other independent commercial accommodations in the area.

Overall Project construction is anticipated to take two years. The TL is anticipated to take approximately 14 months to construct. Post-construction, most of the temporary access trails used for construction on the TL RoW will be deactivated and/or decommissioned within 3 years except for those required for maintenance. During operation of the TL there will be periodic inspections and maintenance as well as occasional unscheduled power supply interruptions that will require inspection and maintenance/repair activities.

Once commissioned, the TL will support mine development, through operations and mine closure.

The Blackwater mine site is located within the traditional territories of Lhoosk'uz Dené Nation (LDN), Ulkatcho First Nation (UFN), Skin Tyee Nation and Tsilhqot'in Nation. The Kluskus and Kluskus-Ootsa Forest Service Roads (FSRs) and Project TL crosses the Traditional Territories of Nadleh Whut'en First Nation (NWFN), Saik'uz First Nation (SFN), and Stellat'en First Nation (StFN; collectively, the Carrier Sekani First Nations) as well as the Traditional Territories of the Nazko First Nation (NFN), Nee Tahi Buhn Band, Cheslatta Carrier Nation and Yekooche First Nation (EAO 2019a and 2019b).

Additional details on TL components and activities are presented in Section 3.2 of the Transmission Line Initial Project Description (TL IPD; BW Gold 2022).

2.0 Purpose and Objectives

The purpose of the Transmission Line Noise and Vibration Management Plan (TLNVMP) is to provide a framework to manage the effects of noise and vibration during pre-clearing, clearing and construction activities. This TLNVMP has been prepared to support the License of Occupation (LOO) and the Statutory Right of Way (RoW) application and to provide noise and vibration management and mitigation strategies consistent with select EA requirements, and applicable government guidelines.

The objective of the TLNVMP is to:

- Manage the level of noise and vibration during the TL construction in order to limit the impact that construction may have on any potential receptors in the TL area.

This plan addresses:

- Background noise;
- Construction noise;
- Noise legislation; and
- The effects of noise on the ambient environment, including humans and wildlife, in the relevant sections of the Application report.

2.1 Related Documents

The TLNVMP is linked to the Transmission Line Integrated Vegetation Management Plan (TLIPMP); Transmission Line Reclamation and Closure Plan (TLRCP); Transmission Line Surface Erosion Prevention and Sediment Control Plan (TLSEPSCP); Transmission Line Construction Environmental Management Plan (TLCEMP); Wildlife Mitigation and Management Plan (WMMP); and Transmission Line Air Quality and Dust Management Plan (TLAQDMP).

3.0 Scope

The scope of this TLNVMP includes all TL construction activities and is a standalone document. The scope of the Plan is to enhance existing policies and procedures for all relevant stakeholders. The Plan is supplementary to, and does not replace or override, any existing Government legislation, and associated Regulations.

4.0 Roles and Responsibilities

BW Gold has an obligation to meet previous commitments and delegate responsibilities associated with those commitments to mine personnel and site contractors during all phases of the mine life. A clear understanding of the roles, responsibilities, and level of authority that employees and contractors have when working at offsite infrastructure such as the Transmission Line as addressed by this plan, is essential to meet EMS objectives.

Table 4-1 provides an overview of general environmental management responsibilities during all phases of the mine life for key positions that will be involved in environmental management. Other positions not specifically listed in Table 4-1 that will provide supporting roles include independent environmental monitors, Independent Tailings Review Board, TSF qualified person, and other qualified persons and qualified professionals.

Table 4-1: Blackwater Roles and Responsibilities

Position	Responsibility
Chief Executive Officer (CEO)	The CEO is responsible for overall Project governance. Reports to the Board.
Chief Operating Officer (COO)	The COO is responsible for engineering and Project development and coordinates with the Mine Manager to ensure overall Project objectives are being managed. Reports to the CEO.
Vice President (VP) Environment & Social Responsibility	The VP is responsible for championing the Environmental Policy Statement and EMS, establishing environmental performance targets, and overseeing permitting. Reports to the COO.
General Manager (GM) – Development	The GM is responsible for managing project permitting, the Project's administration services and external entities, and delivering systems and programs that ensure Artemis's values are embraced and supported: Putting People First, Outstanding Corporate Citizenship, High Performance Culture, Rigorous Project Management and Financial Discipline. Reports to COO.
Mine Manager	The Mine Manager, as defined in the *Mines Act*, has overall responsibility for mine operations, including the health and safety of workers and the public, EMS implementation, overall environmental performance and protection, and permit compliance. The Mine Manager may delegate their responsibilities to qualified personnel. Reports to GM.
Construction Manager (CM)	The CM is accountable for ensuring environmental and regulatory commitments and obligations are being met during the construction phase. Reports to the GM.
Environmental Manager (EM)	The EM is responsible for the day-to-day management of the Project's environmental programs and compliance with environmental permits, updating EMS and management plans. The EM or designate will be responsible for reporting non-compliance to the CM, and Engineering, Procurement and Construction contractor, other contractors, the Company, and regulatory agencies, where required. Supports the CM and reports to the Mine Manager.
Departmental Managers	Departmental Managers are responsible for implementation of the EMS relevant to their areas. Report to the Mine Manager.
Indigenous Relations Manager	Indigenous Relations Manager is responsible for Indigenous engagement throughout the life of mine. Also responsible for day-to-day management and communications with Indigenous groups. Reports to the EM.
Community Relations Advisor	Community Relations Advisor is responsible for managing the Community Liaison Committee and Community Feedback Mechanism. Reports to the Mine Manager.
Environmental Monitors	Environmental Monitors (includes Environmental Specialists and Technicians) are responsible for tracking and reporting on environmental permit obligations through field-based monitoring programs. Report to the EM.

Position	Responsibility
Aboriginal Group Monitors	Aboriginal Group Monitors are required by EAC #M19-01 Condition 17 and will be responsible for monitoring the Project's potential effects on Indigenous interests. Aboriginal Group Monitors will be involved in adaptive management and follow-up monitoring programs. Report to the EM.
Employees and Contractors	Employees are trained and responsible for being aware of permit requirements specific to their roles and responsibilities. Report to the Departmental Managers.
Qualified Professionals and Qualified Persons	Qualified professionals and qualified persons will be retained to review objectives and conduct various aspects of environmental and social monitoring as specified in Environmental and Social Management Plans.

BW Gold will employ a qualified person as Environmental Manager (EM) who will ensure that throughout the TL Construction phase, the EMS requirements are established, implemented, and maintained, and that environmental performance is reported to management for review and action. The EM is responsible for retaining the services of qualified persons or QPs with specific scientific or engineering expertise to provide direction and management advice in their areas of specialization. The EM will be supported by a staff of Environmental Monitors that will include Environmental Specialists and Technicians and a consulting team of subject matter experts in the fields of environmental science and engineering.

During the TL Construction phase, the EPC contractor, and subcontractors, will report to the CM. The EPC contractor will be responsible for ensuring that impacts are minimized, and environmental obligations are met during the Construction phase. For non-EPC contractors, who will perform some of the minor works on site, the same reporting structure, requirements, and responsibilities will be established as outlined above. BW Gold will maintain overall responsibility for management of the construction and operation of the TL and will therefore be responsible for establishing employment and contract agreements, communicating environmental requirements, and conducting periodic reviews of performance against stated requirements.

The CM is accountable for ensuring that environmental and regulatory commitments/obligations are being met during the construction phase. The EM will be responsible for ensuring that construction activities are proceeding in accordance with the objectives of the EMS and associated management plans. The EM or designate will be responsible for reporting non-compliance to the CM, and EPC contractor, other contractors, the Company, and regulatory agencies, where required. The EM or designate will have the authority to stop any construction activity that is deemed to pose a risk to the environment; and work will only proceed when the identified risk has been addressed and concerns rectified.

Environmental management during operation of the Project will be integrated under the direction of the EM, who will liaise closely with Departmental Managers and will report directly to the Mine Manager. The EM will be supported by the VP of Environment and Social Responsibility in order to provide an effective and integrated approach to environmental management and ensure adherence to corporate environmental standards. The EM will be accountable for implementing the approved management plans and reviewing them periodically for effectiveness. It is expected that following construction the operations, inspection, and maintenance/repair of the TL will fall under the Mine Site Services Department, with some of the services being assigned to qualified consultants and contractors. All employees and contractors are responsible for daily implementation of the practices and policies contained in the EMS.

During closure and post-closure staffing levels will be reduced to align with the level of activity associated with these phases. Prior to initiating closure activities, BW Gold will revisit environmental and health and safety roles and responsibilities to ensure the site is adequately resourced to meet permit monitoring and reporting requirements. The Mine Manager will have overall responsibility for Closure and Post-closure activities.

Pursuant to Condition 19 of the EAC #M19-01, BW Gold has established an Environmental Life of Mine Committee (ELoMC) to facilitate information sharing and provide advice on the development and operation of the Project, and the implementation of EAC conditions, in a coordinated and collaborative manner. Committee members include representatives of the Environmental Assessment Office (EAO), UFN, LDN, NWFN, StFN, SFN, NFN, Ministry of Energy, Mines and Low Carbon Innovation (EMLI), ENV Ministry of Environment and Climate Change Strategy (ENV) and Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

Pursuant to Condition 17 of the EAC #M19-01, Aboriginal Group Monitor and Monitoring Plan, BW Gold will retain or provide funding to retain a monitor for each Indigenous nation defined in the EAC #M19-01 prior to commencing construction and through all phases of the mine life. The general scope of the monitor's activities will be related to monitoring for potential effects from the TL on the Indigenous nations' interests.

The TL Engineering Procurement and Construction Management or Engineering, Procurement, and construction contractor roles and responsibilities relating to environmental management, industrial and domestic waste management, and environmental protection are identified below in Table 4-2.

Table 4-2: Transmission Line Construction Contractor Roles and Responsibilities

Role	Responsibility
Contractor Construction Manager (CCM)	The Contractor Construction Manager (CCM) has ultimate responsibility for construction proceedings, including worker and public health and safety and environmental protection. The CCM will ensure the implementation of training programs as well as support the Blackwater Gold Environmental Policy. The CCM will ensure that adequate support and resources are made available for the implementation and maintenance of the Environmental Management System, including the management plan implementation and review. The CCM may, as needed, delegate their duties to Qualified Professionals. Report to the BW Gold Construction Manager.
Contractor Construction Superintendents	The Contractor Construction Superintendents have an administrative responsibility and requirement to act upon the directions, guidance, and support of the Construction Manager. They are resources to the CCM, and have the following responsibilities: • Support the implementation of the Blackwater Gold Environmental Policy; • Ensure that environmental matters are given consideration in pre-planning of construction activities, budgets, training, and operations; and • Ensure that workers under their supervision are made aware of known, or foreseeable, environmental aspects where they work.

Role	Responsibility
Construction Employees, Contractors, and Sub-contractors	Employees have general responsibilities for environmental protection, which include: • Supporting the Blackwater Gold Environmental Policy; • Supporting implementation of Environmental Management Plans; • Cooperating with the Blackwater Environmental Monitoring Committee representative(s); Learning and following environmental best practices and procedures relevant to their work; • Following instructions and directives given by supervisors; • Operating equipment in an environmentally responsible manner to avoid environmental impacts; • If training another worker, ensuring that they are properly completing all required tasks and responsibilities in accordance with environmental best practices procedures; • Reporting all environmental incidents immediately to their supervisor, who will expedite a response to address the incident; • Participating in mitigating or minimizing harm to the environment should an environmental incident occur; and • Asking for help or information when unsure how to perform a task without compromising social, cultural, archaeological, or environmental values.

5.0 Compliance Obligations, Guidelines, and Best Management Practices

Construction of the TL is temporary, and as such, there are no Canadian and provincial environmental legal requirements respecting noise in the TL Project area, except linked to specific activities (e.g., blasting adjacent fish bearing watercourses). Furthermore, a noise impact assessment was not required to be completed because the TL construction is a temporary activity and once constructed, will operate as a passive transmission facility.

The TL is not adjacent to any residential areas so noise and vibration objectives specified in the Environment Canada's Environmental code of Practice for Metal Mines (ECPMM; EC, 2009) do not apply.

5.1 Environmental Assessment Certificate and Decision Statement Conditions

The Project received Environmental Assessment Certificate #M19-01 (EAC) on June 21, 2019. EAC conditions relevant to noise and vibration management include Condition 13 which requires the development of a Construction Environmental Management Plan.

5.2 Permit Requirements

There are no permit conditions relating to noise and vibration relevant to the construction of the TL since it is considered a temporary activity that does not generate substantial noise.

5.3 Traditional Ecological or Community Knowledge

Local residents and Aboriginal groups and their members have also expressed interest in the TL Project's potential effects from noise and vibration. These groups' comments during the engagement and consultation process have provided insights into traditional, ecological, or community knowledge, which is defined as a body of knowledge built up by a group of people through generations of living in close contact with nature. This includes unique knowledge about the local environment, how it functions, and its characteristic ecological relationships.

Community knowledge provided by local trappers and cattle ranchers indicate that a quiet environment is important to their livelihoods. They anticipate an increase in noise as a result of the temporary TL construction. Traditional knowledge suggests that a quiet, peaceful environment is important to Aboriginal groups, and that noise and vibrations may negatively affect Aboriginal and non-Aboriginal use and enjoyment of the land and environment and disrupt wildlife and livestock. A local outfitter noted that noise/human activity related to TL construction may be a problem during fall hunting.

BW Gold acknowledges these concerns and is committed to constructing the transmission line in a responsible manner. Measures to mitigate potential effects from noise and vibration that will be implemented during construction are provided in Section 8.1.1 of this Plan. In addition, and in accordance with EAC Condition 37, BW Gold has developed the Community Effects Monitoring and Management Plan which includes the Community Feedback Mechanism BW Gold will establish to manage feedback and Project-related complaints. Correspondence received through the Community Feedback Mechanism associated with noise and vibration from TL construction will be managed in accordance with Section 11 of this Plan.

5.4 Other Government Guidelines and Best Management Practices

The Effects Assessment of Proposed Change to Transmission Line Alignment Addendum Report (ERM, 2017) excluded noise and vibration as a VC (Valued Component) that have the potential to interact with the TL project. The majority of noise and vibration effects are primarily attributed to the mine site, and the noise associated with the TL construction is considered to be temporary and intermittent (ERM, 2017, p. 5-2). As the TL construction is temporary and the TL will be a passive transmission facility, not a continuously operating facility, there are no Canadian and provincial environmental legal requirements for a noise impact assessment.

Noise and vibration objectives are specified in the Environment Canada's *Environmental Code of Practice for Metal Mines* (ECPMM) (Environment Canada, 2009). The ECPMM requires that special consideration be given in residential areas adjacent to the Project sites; the closest residence to the TL RoW is just over 300 m away and mitigation measures will be implemented in this specific area. Ambient noise can also affect wildlife, so sites in remote locations should work to meet these objectives for off-site ambient noise levels at sensitive receptor locations. BW Gold will work to maintain equilibrium sound pressure level (L_{eq}) from TL activities below:

- 55 A-weighted decibels (dBA) during the day ($L_{eq\ d}$), and
- 45 dBA at night ($L_{eq\ n}$).

Regarding vibration, the ECPMM advises that TL construction activities in areas where ground-borne vibration and environmental noise from blasting are not regulated should design blasts to ensure that following criteria are not exceeded at or beyond the TL boundary:

- Ground vibration of 12.5 mm/s peak particle velocity measured below grade or less than 1 m above grade; and
- Concussion noise of a maximum of 128 dBA. (Environment Canada, 2009)

Blasting conducted in or adjacent to any fish-bearing water body should be done in accordance with the *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters*, prepared by the Department of Fisheries and Oceans (DFO) (1998). DFO defines setback distances from the centre of detonation of a confined explosive to fish habitat to achieve the 100 kPa guideline criteria (Wright & Hopky, 1998).

Health Canada does not have noise guidelines or enforceable noise thresholds or standards.

6.0 Support

6.1 Training and Education

All those responsible for the management, implementation, and operation of any aspect of this plan will be competent for their role. All workers will be adequately trained for their roles to implement this plan and will be aware of BW Gold's commitments to uphold this plan. Training will cover safety and measures to mitigate effects arising from noise and vibration on ecosystems and emphasize the importance of being aware of mitigations and following procedures in the TLNVMP.

Contractor Site supervisors will be provided with a copy of the TLNVMP and will receive additional training with respect to the requirements that are outlined in the form of operational standard operating procedures (SOPs). Targeted training related to noise and vibration will be provided to individuals and/or groups of workers assuming a specific authority or responsibility related to activities that can generate noise and or vibrations.

BW Gold will regularly review and update the training and awareness plan based on changes in training needs and regulatory requirements.

Employee and contractor education and outreach on noise and vibration generation will be supported by:

- Development and delivery of educational material to site personnel; and
- EPC and Construction Managers maintaining updated information related to noise and vibration management at construction site(s) in a location available to employees.

Prior to the commencement of work on the Project, all personnel will:

- Have reviewed and be aware of the requirements of this plan.

6.2 Internal and External Communication

6.2.1 Internal Communication

Environmental incidents for potential non-compliance or actual non-compliance with applicable regulations, legislation, or guidelines / best management practices will be:

- Reported by construction personnel to their supervisors, who will adequately log and document the incident;

- Reported immediately to the BW Gold CM and EM by the Contactor Construction Manager; and
- Document and file all incidents of potential or actual non-compliance in a manner that is acceptable to the BW Gold EM.

6.2.2 External Communication

The BW Gold Environmental Manager is responsible for communicating with applicable regulatory authorities after receiving the initial report, (e.g., Ministry of Environment (MOE)) depending on the reporting threshold and environmental impact of an incident.

7.0 Noise Predictions

Potential effects of the Project on the acoustic environment are assessed by predicting noise and vibration levels in the Project area and determining whether this will comply with relevant permissible levels. The activities required for the TL construction, including timber harvesting, road construction, and forestry logging have the potential to generate noise.

During construction, there will be intensive activity along the TL. Different types of heavy machinery, vehicles and power generators driven by diesel engines will be used.

When comparing sound level values, the following general rules from Cowan (1994) can be applied:

- A difference in sound level of less than 3 dBA is barely perceptible to the human ear;
- A difference of 5 dBA is noticeable;
- A difference of 10 dBA corresponds to a halving or doubling in perceived loudness; and
- A 20 dBA difference corresponds to a four-fold difference in perceived loudness (Cowan, 1994).

7.1.1 Construction Noise

TL Construction noise emissions are expected to occur during the following activities:

- Tree falling;
- Grubbing and Stripping
- Road and access trail construction;
- Vehicle/heavy equipment traffic;
- Running compressors and/or generators;
- Excavation;
- Steel and Wood Pole Erection;
- Mechanical installation;
- Tensioning;
- Bridge installation; and.
- Road and trail deactivation

Impact construction equipment typically includes piledrivers, rock drills, and small, hand-held, pneumatic, hydraulic, or electric powered tools. The primary noise source for conventional piledrivers is the impact of the hammer striking the pile. Engine-related noise sources, such as combustion explosion or the release of steam at the head of some equipment, are usually secondary. The predominant sources of noise in pneumatic tools are the high-pressure exhaust and the impact of the tool bit against the material on which it acts. Welding noise is generally negligible; the main sources of noise are the generators that support the welding equipment.

An effects assessment has been carried out for a typical construction scenario where common equipment types are used. The prediction of sound pressure levels at different distances from the TL's central location where most of the equipment would be located (reasonable worst-case scenario) is shown below in Table 7.1-1.

Table 7.1-1: Propagation Rate of Construction Noise

Case	Loudest Equipment	Leq @ 15 m (dBA)	Noise Level (dBA) at Distance (m)					
			15	100	500	1,000	1,500	3,000
A	Truck	88	89	73	59	53	49	43
	Grader	83						
	Backhoe	80						
B	Truck	88	90	74	60	54	50	44
	Backhoe	80						
	Concrete Mixer	85						
C	Front-End Loader	85	89	73	59	54	49	43
	Grader	82						
	Pneumatic Tools	86						

(based on Holland & Attenborough, 1981)

The noise emissions of various alternatives would likely differ somewhat depending on the types of number of pieces of mechanized equipment in use at a given time, location, and on the duration of construction activities (the usage factor). With use of the typical construction equipment, the noise levels are expected to be similar to those shown above in Table 7.1-1, which is a typical scenario involving the noisiest equipment operated at full power.

Construction of the TL will be broken into manageable lengths, called construction spreads, to be served by a fully equipped, highly specialized qualified workgroup. Each spread will be composed of various crews, each with its own set of responsibilities. As one crew completes its work, the next crew will move into position to complete its piece of the construction process.

Construction phase noise impacts would result largely from noise generated by mechanized equipment such as loaders, bulldozers, side booms, generators, and trucks.

7.1.2 Operations

Operation of the TL will generally be noise-free except some minor occurrences involving corona, insulator, and Aeolian noise and periodic vehicle noise arising from access for vegetation management, maintenance, and wildlife studies. During relatively dry conditions, corona noise typically results in continuous noise levels of 40 to 50 dBA at the edge of the 40 m wide right-of-way. This noise level is similar to ambient noise conditions in the environment. During wet or high humidity conditions, corona noise levels typically increase to 60 dBA or even higher (SaltWells Energy Projects, 2011). Insulator noise is similar to corona noise, but it is not dependent on weather. It is caused by faulty insulators. New polymer insulators minimize this type of noise. Aeolian noise is caused by wind blowing through the conductors and/or structures. This type of noise is usually infrequent and depends on wind velocity and direction. Wind must blow steadily and perpendicular to the lines to set up an Aeolian vibration, which can produce resonance if the frequency of the vibration matches the natural frequency of the line. Dampeners can be attached to the lines to minimize Aeolian noise. The environmental impact is hardly noticed because blowing wind generates higher background noise which could be higher than the Aeolian noise.

7.1.3 Reclamation

Reclamation of the TL has two components: Firstly, deactivation of temporary roads within the TL RoW within three years of construction and secondly, full closure of the TL which will occur following the full closure and monitoring phase of the mine. Noise will primarily be generated by vehicles and activities associated with deactivation of roads post construction and finally decommissioning the TL RoW, including cutting off the TL poles and removing guy systems, land restoration and re-vegetation. Reclamation activities in both contexts are described in the TL Reclamation and Closure Plan, and post-construction, also in the TL Surface Erosion Prevention and Sediment Control Plan which addresses drainage control, overburden application and revegetation.

8.0 Implementation

8.1 Noise Management Mitigation Measures

The following provides noise management measures that will be implemented during the construction phase of the TL Project.

8.1.1 Construction Phase

Construction phase mitigation measures, grouped by activity or equipment, are shown in Table 8.1-2.

Table 8.1-2: Construction Phase Mitigation Measures

Activity or Equipment	• Mitigation Measures
Road traffic	• Speed limits will be established based on road design class, with the maximum speed limit of 50 km/h on all Project roads. • During maintenance, check that noise abatement devices are in good order (e.g., brakes, exhaust mufflers, engine hoods) • Select vehicles with industry standard noise abatement technology, including exhaust and compressor/fan noise

Activity or Equipment	• Mitigation Measures
Impact equipment (piledrivers, jackhammers, drills, pneumatic tools)	• Use a noise-attenuating jacket around the jackhammer
Explosives (if required)	• Conduct blasting only during daylight hours.
Stationary equipment (compressors, generators, pumps)	• Position noisy equipment in sheltered or enclosed locations if practicable. • Select and use low-noise portable ground support equipment (e.g., power generators, pumps) if practicable.
Material handling equipment (crushers, concrete mixers, cranes)	• Maintain equipment in good working condition. • Equipment will not idle, unless operational requirements and ambient temperatures require engines to continue running (e.g., extreme cold conditions where there is a risk the machine may not restart) or if the equipment or vehicle is being used for refuge (e.g., warming or cooling and lunch breaks).
Earthmoving equipment (trucks, loaders, dozers, scrapers)	• Machinery and equipment will be fitted with a properly maintained muffler or other noise reducing device, in accordance with manufacture specifications. • In order to mitigate noise and vibration during the construction phase, the operation of heavy equipment will only take place between 7:00am to 9:00pm while operating within 300 m of any residence(s).
Other internal combustion engine powered equipment	• Select equipment with industry standard noise abatement technology, including exhaust, and compressor/fan noise. • At manufacturer recommended intervals, check that noise abatement devices are in good order (e.g., brakes, exhaust mufflers, engine hoods). • Equipment maintenance: maintain equipment on a regular basis, replace worn parts, lubricate as required

9.0 Monitoring, Measurement, Analysis and Evaluation

9.1 Monitoring

Monitoring may be conducted on an as-needed basis if noise complaints arise or at the request of a regulatory body. If required, monitoring will be performed by a QP under the direction of the BW Gold EM.

Additional mitigations (ERM 2017), to address recreation and tourism interests include:

- Scheduling construction and decommissioning activities during mutually agreed hours daily until the work is completed; and
- Notifying the Recreation Sites and Trails Branch of Ministry of Forests of construction and decommissioning activities. (ERM 2017). The latter mitigation was also reflected in Condition 43 mitigation, which commits to notifying recreational user groups in the region prior to construction.

10.0 Reporting and Record Keeping

The EM is responsible for data management and reporting related to data management. The data management system will include conducting inspections, monitoring, and providing these results to appropriate parties as required. The EM will also report key results of noise monitoring and related environmental, health and safety incidents to the Blackwater Environment Committee and Aboriginal Groups during routine meetings.

Monitoring data will be entered into an electronic database and have quality control checks completed upon receipt of results. Data will be entered into a standard format that allows for data reporting and analyses. Data and data comparisons will be stored in a single file format for each type of survey or monitoring activity. Monitoring data will be stored for the life of the mine and will be made available for review upon request.

11.0 Evaluation

The TL NVMP will be reviewed midway through the TL construction by the BW Gold EM or delegated QP until monitoring confirms that noise and vibration management is no longer required.

In the event that a noise complaint is received, or an adverse impact related to noise or vibration generated by the TL Project is observed the Contractor Construction Manager and BW Gold EM will consider adapting or implementing new mitigation measures. If long-term monitoring identifies new information that could improve management practices, then adaptive management actions will be implemented.

12.0 Plan Revision

The TL NVMP is a ‘living document’ and any plan revisions will be made in accordance with the plan this is appended to (Condition 21 – Noise and Vibration Effects Monitoring and Mitigation Plan)

13.0 Qualified Professionals

Under the direction of ERM Consultants Canada, this management plan has been prepared and reviewed the following QPs:

Prepared by:

Amirhossein Salimian, MA.Sc
Triton Environmental Consultants

Reviewed by:

Craig Vatcher, CET, B.Tech., EP
Triton Environmental Consultants

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Approval Signature Record

Reviewer Role	Name	Signature	Date