APPENDIX 10

Noise Assessment Report

Victoria GOLD CORP

Stantec

EAGLE GOLD PROJECT

Noise Assessment Report

FINAL REPORT

Prepared for:

Victoria Gold Corp
680 – 1066 West Hastings Street
Vancouver, BC
V6E 3X2

Prepared by:

Stantec
4370 Dominion Street, Suite 500
Burnaby, BC
V5G 4L7
Tel: (604) 436-3014 Fax: (604) 436-3752

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Victoria GOLD CORP

Stantec

Victoria
GOLD CORP

Stantec

AUTHORSHIP

Allison L. Fisher, M.A.Sc., Team Lead, Air and Noise Management..Author

Michael B. Schroeder, M.Sc., Senior Air Quality Specialist..Senior Review

Ben Coulson, M.Sc., P.Eng. ....Senior Review

Lina Wang, B.Sc., Noise Scientist .... Noise Modelling

Emilie To, B.Sc., Noise Scientist ....Technical Support

EXECUTIVE SUMMARY

Victoria Gold Corp. (VIT) is proposing to develop the Eagle Gold Project (the Project) within the Dublin Gulch Property, in the central Yukon Territory, approximately 45 km north-northeast of the village of Mayo and 350 km north of Whitehorse. Stantec Consulting Ltd. (Stantec) has conducted a noise assessment on behalf of VIT in support of the Project. This noise assessment of potential Project-noise effects serves to address *Yukon Environment and Socio Economic Assessment Act* (YESAA) requirements.

Yukon has no specific regulatory guidance that relates to environmental noise effects on the general public. Hence, guidelines widely used in other jurisdictions where no provincial noise assessment regulations exist were considered in scoping and evaluating the potential Project effects. Following these guidelines, a study area, encompassing the Project footprint, the physical area occupied by the Project infrastructure, and an extension beyond the footprint boundary (the Project boundary) of approximately 2 km in all directions, was selected for the noise assessment. Baseline ambient sound levels of 35 dBA Leq(9) nighttime and 45 dBA Leq(15) daytime were applied for the assessment. Sound level modelling was conducted using the software CADNA/A Version 4.0 (DataKustik GmbH (DataKustik) 2009) for Project construction, operations, blasting, and decommissioning. Predictions at 1.5 km from the Project boundary were compared to the regulatory noise criteria to evaluate Project compliance.

The construction-related noise limits for residential areas are 65 dBA Leq(12) for daytime, 60 dBA Leq(4) for evening, and 55 dBA Leq(8) for nighttime and all day for Sundays and holidays set by Environment Canada (1989) *Code of Practice*. Because the Project construction equipment will be operating continuously, the focus was to assess the effects of construction noise in relation to the most stringent regulatory criteria (nighttime limit of 55 dBA Leq(8)). During Project construction and decommissioning, the maximum predicted nighttime sound level associated with the Project alone is 42 dBA Leq(8). The maximum cumulative predicted nighttime sound level, including ambient baseline sound levels, is 43 dBA Leq(8). This is less than the Environment Canada (1989) *Code of Practice* nighttime limit of 55 dBA Leq(8) for construction-related noise. Therefore predicted noise levels during the construction phase are within the generally accepted applicable regulatory criteria in Canada.

The calculated permissible sound levels (PSLs) based on regulatory guidance are 50 dBA Leq(15) for operations during daytime and 40 dBA Leq(9) for operations during nighttime, respectively. During Project operations, the maximum predicted daytime sound level associated with the Project alone is 41 dBA Leq(15). The maximum cumulative predicted daytime sound level, including ambient baseline sound levels, is 46 dBA Leq(15), which is less than the daytime PSL of 50 dBA Leq(15). During Project operations, the maximum predicted nighttime sound level associated with the Project alone is 36 dBA Leq(9). The maximum cumulative predicted nighttime sound level, including ambient baseline sound levels, is 39 dBA Leq(9), which is lower than the PSL of 40 dBA Leq(9). Therefore predicted noise levels during the operation phase are within the generally accepted applicable regulatory criteria in Canada.

The maximum predicted daytime peak (instantaneous) sound level at 1.5 km from the Project boundary during blasting is approximately 104 dBA. All predicted peak sound levels at receptors located 1.5 km from the Project boundary are well below the cautionary limit of 120 dB, as specified by the Ontario MoE (1978) *NPC-119 Blasting*.

Based on the results of this assessment, predicted sound levels at 1.5 km from the Project boundary during construction, operation, and decommissioning phases are expected to remain within acceptable limits of the generally accepted criteria for ambient sound quality in Canada.

ABBREVIATIONS AND ACRONYMS

ADR .... adsorption, desorption, and refining

BC OGC .... British Columbia Oil and Gas Commission

BSL .... basic sound level

CADNA/A .... Noise Modelling Software Program

CDED .... Canadian Digital Elevation Data

CSL .... cumulative sound level

dB .... decibel

dBA .... A-weighted decibel (A-scale gives proportional weighting according to the sensitivity of the normal human ear at different frequencies of sound)

dBC .... C-weighted decibel (C-scale gives proportional to lower frequencies, such as those associated with low frequency noise)

EC .... Environment Canada

EMP .... Environmental Management Plan

ENC .... Engineering Noise Control

ERCB .... Alberta Energy Resources Conservation Board

g/t .... grams per tonne

GVM .... gross vehicle mass

HLF .... heap leach facility

HP .... horsepower

Hz .... Hertz

ISO .... International Organization for Standardization

kg .... kilogram

km .... kilometres

Leq .... equivalent continuous sound level

Leq(15) .... 15-hour equivalent continuous sound level

Leq(12) .... 12-hour equivalent continuous sound level

Leq(9) .... 9-hour equivalent continuous sound level

Leq(8) .... 8-hour equivalent continuous sound level

Leq(4) .... 4-hour equivalent continuous sound level

m asl .... metres above mean sea level

mE .... metres East

mN .... metres North

MoE .... Ministry of the Environment

N/A .... not applicable

NAD .... North American Datum

NAIMA .... North American Insulation Manufacturer Association

NEB .... National Energy Board

NPC .... Noise Pollution Control

PSL .... permissible sound level

PWL .... sound power level

SWRPA .... Scott Wilson Roscoe Postle Associates Inc.

SPL .... sound pressure level

STC .... sound transmission class

UTM .... Universal Transverse Mercator

VSEC .... valued environmental and socio-economic component

YESAA .... Yukon Environmental and Socio Economic Assessment Act

VIT .... Victoria Gold Corp.

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1 INTRODUCTION

Stantec Consulting Ltd. (Stantec) has conducted a noise assessment on behalf of Victoria Gold Corp. (VIT) in support of the Eagle Gold Project (the Project). This assessment of potential Project-related noise effects serves to address *Yukon Environment and Socio Economic Assessment Act* (YESAA) requirements. Noise has been selected for assessment because of its intrinsic importance to the quality of life for humans and wildlife in the vicinity of the Project. In humans, elevated noise levels may lead to annoyance, stress, disruption in sleep and sleep patterns, decreased ability to concentrate, lowered learning performance, and other negative health effects (enHealth Council 2004). For wildlife, noise may lead to habitat avoidance, as well as unfavourable physiological and behavioural responses (National Park Service 2009).

Mine construction and operation may be a substantial contributor to elevated sound levels in the vicinity of the Project. The use of large-scale heavy machinery, high-capacity drills, blasting of explosives, rock crushers, and large capacity material-handling devices are major sources of potential Project-related noise. The movement of construction materials, mining equipment, and geological materials, as well as vehicle traffic may also contribute to noise. As such, it is necessary to evaluate sound levels associated with the Project to ensure that they are within accepted permissible limits during both the day and nighttime.

1.1 Project Setting

The Project is located in the central Yukon Territory, approximately 45 km north-northeast of the village of Mayo and 350 km north of Whitehorse (Scott Wilson Roscoe Postle Associates Inc. (SWRPA) 2010). The Project location is shown in Figure 1.1-1. The Project is situated on mountainous terrain with mainly forest cover.

The projected 8-year mine life of the Project will involve open pit mining at a production rate of approximately 9 million tonnes per year ore and 8 million tonnes per year waste. Current mineable reserves of leachable ore are 66 million tonnes at a grade of 0.82 grams of gold per ton, containing 1.8 Million ounces (SWRPA 2010).

Figure 1.1-2 presents an overview of the Project layout. The open pit will be developed using standard drill and blast technology. Ore will be removed from the open pit by haul truck and delivered to the first stage crushing plant (the primary crusher), situated on the north side of the open pit rim. Waste rock will be removed from the open pit by haul truck and delivered to one of two waste rock storage areas or will be used as haul road and infrastructure construction fill.

Ore will be crushed onsite in a three-stage crushing process. Ore will be delivered by haul truck to the first of three crushing plants, located on the rim of the open pit, at a rate of 26,000 tonnes per day. Ore will be crushed then transported to a second stage of crushing by covered conveyor. The secondary crusher is contained within a building. The secondary crusher product will be transported overland by covered conveyor to a crushed ore stockpile. Ore will be reclaimed from the stockpile and processed through a tertiary crushing circuit, and then transported by covered conveyor to the heap leach facility (HLF) for stacking. The tertiary crushing circuit is also contained within a building. Gold extraction will utilize sodium cyanide heap leaching technology.

In addition to these key mine components, the Project will be supported by a gold recovery plant (with a laboratory), waste rock dumps, fuel storage facilities, fire suppression system, storage facilities, water treatment facilities, and offsite infrastructure (e.g. access road, transmission line).

The Project schedule is as follows:

- Project Construction – Q1 2012 to Q3 2013
- Project Operations – Q4 2013 to Q4 2020
- Reclamation – Q1 2021 – Q4 2030.

1.2 Environmental Sound Level Descriptors

The A-weighted Leq is the energy average of a varying sound level signal over a specified period of time. The use of this measure permits the description of a varying sound level environment as a single number. As the Leq is an average level, the measured sound level might exceed the criteria level for a short period, provided that the duration of exceedance is limited. The most common averaging period is hourly; however, Leq can describe any series of sound level events for any selected duration. Therefore, the Leq value considers both the sound level and the length of time that the sound occurs. The A-scale (i.e., presented as dBA) gives proportional weighting according to the sensitivity of the normal human ear at different frequencies of sound. There is a relationship between the subjective loudness of a sound and its intensity. The human ear begins to perceive a change in sound level when the sound level changes by 3 dB. Each 10 dB increase in sound is perceived as a doubling of loudness (Alton Everest 2001). Other weighting filters might also be used in acoustics, including C-weighting. C-weighted decibels (dBC) are used to evaluate low frequency noise (Alberta Energy Resources Conservation Board (ERCB) 2007).

1.3 Regulatory Setting

Within the Yukon, there are no specific regulatory guidance documents that relate to environmental noise effects on the general public or on wildlife (i.e., human receptors and residential dwelling locations that are located outside of a project footprint and not associated with a project). There is specific noise-related regulatory guidance contained within the British Columbia Occupational Health and Safety Regulations Part 7 (Government of British Columbia 2005); however this information pertains to Occupational Health and Safety regulations for humans and is not applicable in cases when considering environmental noise, wildlife, and the general public. In the absence of specific guidelines or best practices for wildlife, human receptors were considered in this assessment.

This noise assessment focuses on addressing potential Project environmental effects with respect to the general public outside of the Project footprint. Hence, guidelines issued by regulators in other jurisdictions were considered to scope and evaluate the potential Project effects. These guidelines, while developed outside of the Yukon, have been widely used as guidance in neighboring jurisdictions where no provincial noise assessment regulations exist. The guidelines include the British Columbia Oil and Gas Commission (BC OGC 2009) *Noise Control Best Practices Guideline* and the ERCB (2007) *Directive 38: Noise Control* for the evaluation of Project operational noise. Similarly, guidance from Environment Canada (EC 1989) in the *Code of Practice* was considered to scope and evaluate the potential Project effects on sound quality during construction. Guidance from the Ontario Ministry of the Environment (MoE 1978; 1985) was considered for the evaluation of Project blasting noise. The following sections highlight the associated regulatory noise criteria.

1.3.1 Construction Noise

The BC OGC (2009) *Noise Control Best Practices Guideline* and the ERCB (2007) *Directive 38* do not set specific limits for construction noise. However, these guidelines require that consideration be given to construction noise levels and that construction noise be addressed through noise mitigation measures to reduce construction noise effects as much as practicable. Further guidance on acceptable construction sound levels was obtained from the EC (1989) Code of Practice. EC (1989) recommends that maximum construction-related sound levels for residential areas near construction sites be 65 dBA Leq(12) for daytime (07:00 to 19:00), 60 dBA Leq(4) for evening (19:00 to 23:00), and 55 dBA Leq(8) for nighttime (23:00 to 07:00) and all day for Sundays and holidays. These limits will be applied to both construction and decommissioning activities, since similar equipment will be used.

1.3.2 Operations Noise

The BC OGC (2009) *Noise Control Best Practices Guideline* defines a fixed limit on sound levels from facilities measured at a receptor location. A receptor is defined as a permanent or seasonally occupied human dwelling. For receptors, it is recommended that a nighttime (22:00 to 7:00) Permissible Sound Level (PSL) of 40 dBA Leq at 1.5 km from the Project boundary be applied for areas where no human dwellings exist within a distance of 1.5 km.

The ERCB (2007) *Directive 38* is similar to the BC OGC (2009) and specifies maximum allowable outdoor sound levels from facilities measured at receptor locations. Further, the National Energy Board (NEB 2008) requires that provincial and local noise regulations be considered in effects assessments, and refers to the ERCB for additional guidance.

ERCB (2007) *Directive 38* defines a noise limit for a receptor by calculating a PSL. For areas where no human dwelling exists within a distance of 1.5 km from the Project, ERCB (2007) *Directive 38* requires that operational noise from the fenceline (boundary) of planned new Projects should be designed to meet a target sound level of 40 dBA Leq(9) at a 1.5 km distance during nighttime (22:00 to 7:00).

As no dwellings are known to exist within a 1.5 km distance from the Project boundary, a nighttime permissible sound level of 40 dBA Leq(9) at 1.5 km is used in the assessment (consistent with both the BC OGC (2009) and ERCB (2007) recommendations).

BC OGC (2009) and ERCB (2007) allow a +10 dB adjustment to daytime PSLs above nighttime PSLs because daytime ambient sound levels are commonly 10 dB above nighttime levels. As a result, a daytime PSL of 50 dBA Leq(15) at 1.5 km has also been used in the assessment for evaluating daytime (7:00 to 22:00) noise effects.

1.3.3 Blasting Noise

The BC OGC (2009) *Noise Control Best Practices Guideline* and the ERCB (2007) *Directive 38* do not specify sound level limits for blasting noise. Further regulatory guidance on assessing noise effects from blasting was obtained from Ontario Ministry of the Environment (MoE 1978) *Noise Pollution Control (NPC) NPC-119 Blasting*. The Ontario MoE (1978) specifies a standard limit, applicable to operations where routine monitoring of peak pressure level is carried out by the Project operator. The peak (instantaneous) sound pressure level of 128 dB (at any location) is the standard limit for this case. Also specified is a cautionary limit, applicable to operations not subjected to routine monitoring. The peak sound pressure level of 120 dB is the cautionary limit for this case. The cautionary limit is the more stringent and has been applied in this noise assessment to evaluate Project noise from blasting.

2 METHODS

The general approach used to assess the potential Project-related noise effects is as follows:

1. Select a study area for the assessment of potential Project-related noise effects.
2. Establish baseline conditions for the Project area based on available literature and regulatory guidance.
3. Determine PSLs for selected receptor locations (e.g., according to BC OGC (2009) and ERCB (2007) protocols).
4. Predict sound levels from the Project by:
   a) Identifying contributing noise sources from the Project.
   b) Characterizing these sources in terms of sound power levels.
   c) Modelling the propagation of sound from these sources.
5. Assess compliance of the Project by comparing predicted sound level contributions from Project-related sources to the PSLs.
6. Estimate the cumulative sound levels (CSLs) by adding the predicted noise contributions from the Project to the baseline levels and compare the resulting CSLs to the PSLs.
7. Assess follow-up monitoring requirements and review available Project mitigation.

2.1 Study Area Boundaries

Study area boundaries were selected to include all areas where measurable changes in sound levels might be caused by the Project, regardless of administrative or political boundaries.

A study area encompassing the Project boundary and extending approximately 2 km in all directions was selected for the noise assessment (see Figure 2.1-1). This area includes the 1.5 km boundary around the edges of the Project boundary along which predicted sound levels are to be compared with regulatory objectives for sound quality. Based on available information, there are no known permanent human dwellings within the study area.

Four key receptor locations were selected for the purposes of evaluating noise effects from the Project at 1.5 km in all four cardinal directions, including north, south, east, and west. These receptors are summarized in Table 2.1-1.

As there are no other major industrial facilities within a 5 km distance of the Project boundary, there are no anticipated cumulative interactions, and as such these have been excluded from further consideration herein.

Table 2.1-1: Locations of Receptors for the Evaluation of Project Noise Effects

Receptor	ID	Location (UTM NAD83)		Elevation (m asl)
		mE	mN	
R1	West	456,729	7,100,110	3,128
R2	North	459,756	7,103,875	2,977
R3	East	462,403	7,100,149	4,502
R4	South	459,904	7,097,234	2,543

2.2 Baseline Conditions

The Project is located in a remote area in the central Yukon Territory. The existing sound quality for such a site is expected to be quiet and dominated by sounds of nature (e.g. wind noise, vegetation rustling, bird chirping, etc.). No baseline sound level measurements have been taken in or around the Project vicinity. However, based on the remote location of the Project, the existing nighttime acoustic environment (i.e., ambient conditions) is expected to be similar to the average nighttime ambient sound level for rural areas as established by the ERCB (2007). Therefore, in the absence of a similar average nighttime ambient sound level value for the Yukon, the ERCB (2007) nighttime average rural ambient sound level of 35 dBA Leq(9) has been used for this assessment. The ERCB (2007) recognizes that daytime ambient conditions are commonly 10 dB higher that nighttime levels and as such an average daytime ambient sound level of 45 dBA Leq(15) has been used for this assessment.

2.3 Determination of Permissible Sound Levels

To calculate the PSLs for receptors, the BC OGC (2009) and ERCB (2007) first define the Basic Sound Level (BSL) for nighttime, which is the allowable sound level, including industrial presence, based on the nearby residence dwelling unit density and the proximity to transportation noise sources during nighttime periods. This concept is used because typical ambient sounds are usually dominated by the extent of local development, and by the effects of transportation in the area. Additive adjustments to the nighttime BSL set out in the BC OGC (2009) and ERCB (2007) to account for certain sound characteristics that can affect human responses to noise include the following:

- Daytime adjustment
- Class A adjustment (i.e., seasonal adjustment and ambient sound level monitoring adjustment)
- Class B adjustment (i.e., duration of activity adjustment).

The PSL is equal to the BSL, plus the allowable adjustments. For an outline of the method for determining the nighttime BSL, refer to Table 2.3-1.

Table 2.3-1: Nighttime Basic Sound Level Determination

Proximity to Transportation	Dwelling Unit Density per Quarter Section of Land [d]		
	1 to 8 Dwellings	9 to 160 Dwellings	More than 160 Dwellings
	22:00-07:00 (Nighttime) dBA L_{eq} (9)	22:00-07:00 (Nighttime) dBA L_{eq} (9)	22:00-07:00 (Nighttime) dBA L_{eq} (9)
Category 1 [a]	40	43	46
Category 2 [b]	45	48	51
Category 3 [c]	50	53	56

NOTES:

[a] Category 1: Dwelling units more than 500 m from heavily travelled roads or rail lines and not subject to frequent aircraft flyovers.

[b] Category 2: Dwelling units more than 30 m but less than 500 m from heavily travelled roads or rail lines and not subject to frequent aircraft flyovers.

[c] Category 3: Dwelling units less than 30 m from heavily travelled roads or rail lines and subject to frequent aircraft flyovers.

[d] Refers to a quarter section with the affected dwelling at the centre (a 451 m radius). For quarter sections with various land uses or with mixed densities, the density chosen is then averaged for the area under consideration.

The average rural ambient sound level is 5 dB less than the BSL.

Sources: BC OGC (2009), ERCB (2007).

2.3.1 Class A Adjustment

There is no Class A adjustment for the Project location because:

- A seasonal adjustment applies to activities that occur in the winter only (Adjustment A1).
- An ambient monitoring adjustment is applicable only when the BSL is thought not to be representative of the actual sound environment, and when ambient sound levels have been determined without the presence of other industrial facilities and associated activities (Adjustment A2).

2.3.2 Class B Adjustment

This PSL adjustment is applicable to activities with a duration of less than 60 days. The PSL would be increased by:

- 5 dB for noise-generating activities longer than one week but less than or equal to 60 days
- 10 dB for noise-generating activities more than one day but less than or equal to one week
- 15 dB for noise-generating activities less than or equal to one day.

As the Project will operate throughout the year, there is no Class B adjustment.

2.3.3 Summary

The calculated daytime and nighttime PSLs for the receptors at 1.5 km from the Project boundary are presented in Table 2.3-2. These daytime and nighttime PSLs are used to assess compliance of the Project with regulatory guidelines.

Table 2.3-2: Calculated Daytime and Nighttime Permissible Sound Levels

Receptor ID	Dwelling Unit Density per Quarter Section	Proximity to Transportation (Category)	Nighttime Basic Sound Level (dBA Leq (9))	Class A Adjustments (dBA)	Class B Adjustments (dBA)	Nighttime Permissible Sound Level (dBA) Leq(9)	Daytime Adjustments (dBA)	Daytime Permissible Sound Level (dBA) Leq (15)
R1 – R4	1 to 8 Dwellings	Category 1	40	0	0	40	10	50
Rmax	1 to 8 Dwellings	Category 1	40	0	0	40	10	50

NOTE:
Information based on procedures outlined in BC OGC (2009) and ERCB (2007).

2.4 Computer Modelling

Sound propagation methods used in this assessment are those prescribed by the International Organization for Standardization (ISO) Standard *9613* (ISO 1993; 1996). The BC OGC (2009) and ERCB (2007) have accepted the ISO *9613* standard for noise assessments. Sound propagation from the Project was calculated using software CADNA/A Version 4.0 (DataKustik 2009), an advanced sound level modelling software package incorporating ISO *9613* algorithms.

The modelling approach accounts for:

- Distance attenuation (geometrical dissipation of sound with respect to distance)
- Atmospheric attenuation (effect of sound absorption by the mass of air between sound sources and receptors)
- Directivity of the sound sources
- Mitigation measures incorporated in the equipment design (e.g., silencers)
- Ground attenuation (effect of sound absorption by the ground as sound passes over various terrain types between the source and receptor)
- Meteorological conditions and effects on sound propagation.

The conservative assumptions regarding meteorology and terrain which were applied in the sound level modelling for this assessment are discussed within the following sections.

2.4.1 Meteorology

Meteorological factors, such as temperature, humidity, wind speed, and wind direction, affect sound propagation. The speed of sound is variable and depends on the properties of the substance through which the wave is travelling. Higher air temperatures tend to allow for greater sound propagation. Under conditions of a temperature inversion (temperature increasing with increasing height), sound waves are refracted downwards, and therefore may be heard over larger distances (Ingard 1953). Humidity has a small but measurable effect on sound propagation, causing it to increase slightly, because oxygen and nitrogen molecules of the air are replaced by lighter molecules of water.

Effects of wind on outdoor sound propagation during various weather conditions can cause large variations in Project-related sound levels at a specific location. If a location is upwind of the Project, the wind could cause greater than normal outdoor sound attenuation and lower sound levels at the location than would occur with no wind. However, if the location is downwind of the Project, the opposite effect could occur, resulting in higher sound levels than normal at the location. Crosswinds do not affect outdoor sound propagation and would result in sound levels at the residence that are essentially the same as those during calm conditions.

The ISO *9613* (1993; 1996) algorithms used in this noise assessment simulate downwind propagation, or a mildly developed temperature inversion (both of which enhance sound propagation), and provide a reasonably conservative assessment of potential effects.

The following meteorological parameters, consistent with BC OGC (2009) and ERCB (2007) requirements were applied in the sound level modelling:

- Temperature = 10°C
- Relative humidity = 70%
- Wind direction = downwind (i.e., blowing from the facility to the receptor)
- Wind speed of 3 m/s (Based on ISO *9613* (1993; 1996), an average wind speed of 3 m/s typical of representative prevailing site conditions was assumed in the sound level model).

These meteorological parameters and modelling approach are considered typical of nighttime conditions in the spring and summer when outdoor activities are more likely.

2.4.2 Terrain and Ground Cover

The terrain around the Project site is mountainous (refer to Figure 2.1-1). Terrain data were applied in the sound level model based on Canadian Digital Elevation Data (CDED 2009). These data have a horizontal resolution of 50 m, which is considered sufficient for sound propagation modelling assessments.

As the Project will be operating year-round, a variety of ground conditions could occur, ranging from soft, porous ground in spring, summer, and fall (i.e., high ground attenuation values) to hard, frozen ground in winter (i.e., low ground attenuation values). Winter ground conditions might also range from soft, fresh snow with high ground-attenuation values to hard, crusty snow with low ground-attenuation values. Awareness of noise by humans and wildlife is more likely in spring and summer than in winter when people are often indoors and wildlife is more inactive. To provide a representative assessment of the noise impacts during summer conditions when outdoor activities are more likely, the ground condition was modelled as soft porous ground (80% absorptive) and partly hard ground (20% reflective).

2.5 Assessment Cases

The following Project phases were considered in this noise assessment:

- Construction
- Operations
- Blasting (to occur primarily during operations)
- Decommissioning.

The following sections present the equipment lists and noise source information for each of the above assessment Project phases. For the purposes of this assessment, offsite infrastructure (i.e., access road and transmission line) was not considered and noise effects were evaluated for the Project based on activities occurring within the main mine and processing areas. These offsite noise sources are considered to be periodic and transient in nature, and with standard mitigation measures are not expected to result in sound levels exceeding regulatory criteria. Similarly, emergency-related noise sources (such as alarms, emergency horns, short-term emergency backup generator usage, etc.) were not considered in this assessment as facility noise during emergency situations is not regulated, and noise from these sources is expected to occur infrequently over the Project life and would be of short-term duration.

2.5.1 Project Construction Noise Sources

Key Project construction activities that will produce noise include the following:

- Site clearing and grubbing
- Salvaging and stockpiling of top and sub soils
- Site grading including blasting, overburden removal and overburden disposal
- Borrow areas development and use
- Camp construction
- Diesel power generation
- Use of large construction vehicles and equipment
- Construction of mine site infrastructure
- Onsite vehicular traffic.

A summary of the noise sources associated with these Project construction activities are provided in Table 2.5-1. These sources were included in the modelling for prediction of Project construction-related noise effects. It was conservatively assumed that all construction equipment will operate at full capacity 24 hours a day. For more detailed information and sound level spectral data for these sources, refer to Appendix A.

Table 2.5-1: Project Construction Noise Sources

Type	Description	Maximum Units Required	Engine Type	Engine Size (HP)
Support Equipment (Mainly for Stockpiles, Conveyors)				
Feller/Buncher	541	1	Diesel	305
Log Skidder	324D-FM	1	Diesel	200
HIAB Flat Bed Utility Truck	3/4t	1	Diesel	200
Track Dozer	D5N/D8T	2	Diesel	310
Backhoe/Loader	CAT 93G	1	Diesel	300
Tandem Dump Truck	Various	4	Diesel	300
Wheel Loader	992G	1	Diesel	800
Mobile Crusher	HX	1	Diesel	420
Motor Grader	16H	1	Diesel	265
Wheel Tractor Scraper	CAT 613G	1	Diesel	193
Fork Lift	Manitou Mc	1	Diesel	50
Concrete Mixing Trucks	Various	2	Diesel	200
Mobile Crane	Terex	1	Diesel	300
Major Equipment				
Sandvik DX800 Drill	DX800	1	Diesel	225
Excavator	CAT 365	3	Diesel	400
Haul Truck	Art6x6	10	Diesel	400
Track Dozer	CAT D10	1	Diesel	580
Track Dozer	CAT D8	2	Diesel	310
Motor Grader	CAT 16H	1	Diesel	265
Light Vehicles	3/4t	20	Diesel	300
Support Equipment (Mainly for Roads, ADR, Waste Dumps)				
Wheel Loader	992G	1	Diesel	800
Track Dozer	D5N/D8T	1	Diesel	310
Excavator	Hitachi EX1900-6	2	Diesel	1087
Personnel Carrier	3/4T	2	Diesel	300
Compactor	CS-573E	1	Diesel	150
Motor Grader	CAT16H	1	Diesel	265

Table 2.5-1: Project Construction Noise Sources (*cont'd*)

Type	Description	Maximum Units Required	Engine Type	Engine Size (HP)
Secondary Support Equipment				
Personnel Carrier	3/4t	2	Diesel	300
Flatbed Truck	3/4t	1	Diesel	215
Water Truck, 14,000 gal	773	1	Diesel	550
CAT 0.5 MW Generator (Plant Area)	–	1	Diesel	–
Portable CAT 0.25 MW Generator (Pit Development)	–	1	Diesel	–
Portable CAT 10 kW Generator (Construction Area)	–	10	Diesel	–

NOTES:
All Project construction equipment will be operating with full load 24 hours a day.
– Not applicable.

2.5.2 Project Operations Noise Sources

Key Project operations activities that will produce noise include the following:

- Open-pit mining (blasting, ore/waste hauling, pit dewatering)
- Ore processing (crushing and hauling)
- Waste-rock disposal
- Camp operation
- Onsite vehicular traffic
- Quarry/borrow pit operations.

A summary of the noise sources associated with these Project operations activities are provided in Table 2.5-2. These sources were included in the modelling for prediction of Project operations-related noise effects. It was conservatively assumed that major equipment (i.e., crushers, conveyors, pumps, boilers, etc.) were operating at full capacity 24-hours a day. Other equipment (i.e., support equipment, ancillary equipment, forklifts, trucks, etc.) will decrease to a 25% capacity during nighttime (22:00 – 7:00).

Noise sources within buildings may generate sound to the environment through the building shell (e.g., walls and roof), as well as through ventilation openings and doorways. The amount of noise generated through the building shell is dependent on the building shell sound transmission loss characteristics. Based on SWRPA (2010), the proposed Project building-shell design will be pre-engineered steel buildings insulated to 12-R specifications. This building-shell design results in wall and roof partitions with minimum sound transmission class (STC) ratings of STC 28-30 according to metal building test data from the North American Insulation Manufacturers Association (NAIMA

2005). Therefore, these ratings were applied to the equipment housed within buildings at the site during Project operations, including:

- Project Adsorption, Desorption, and Refining (ADR) building
- Primary Crusher Building
- Secondary Crusher Building
- HPGR Crusher Building
- Heap Leaching Area Building for housing pumps and motors.

Table 2.5-2: Project Operations Noise Sources

Type	Description	Area of Equipment within Project Boundary	Maximum Units Required	Engine Type	Engine Size (HP)
Drills and Excavators [a]					
Rotary Blasthole Drill	Reichdrill C-700-D	Mine Pit	2	Diesel	700
Rotary Blasthole Drill	Sandvik DX800	Mine Pit	1	Diesel	225
Excavator	Hitachi EX1900-6	Mine Pit	2	Diesel	1090
Major Equipment [b]					
Primary Crusher	Metso Gyratory 50 – 65	Primary Crushing	1	Diesel	500
Primary Crushing Discharge Conveyor	–	Primary Crushing	1	Diesel	450
Rock Breaker	–	Primary Crushing	1	Diesel	120
Secondary Crusher	Metso MP1000	Secondary Crushing	2	Diesel	1000
Secondary Crushing Discharge Conveyor	–	Secondary Crushing	1	Diesel	450
Overland Conveyor	–	Secondary Crushing	1	Diesel	450
Secondary Crusher Belt Feeder	–	Secondary Crushing	2	Diesel	187
HPGR Crusher	–	HGPR	1	Diesel	7510
HPGR Crushing Reclaim Conveyor	–	HGPR	1	Diesel	514
HPGR Discharge Conveyor	–	HGPR	1	Diesel	514
HPGR Crushing Reclaim Feeder	–	HGPR	1	Diesel	257
Heating Solution Boiler	–	Stacking – Leaching	1	Diesel	714
Heap Feed Conveyor No. 1	–	Stacking – Leaching	1	Diesel	450
Portable Ramp Conveyor	–	Stacking – Leaching	4	Diesel	780
Mobile Grasshopper Conveyors Standard	–	Stacking – Leaching	15	Diesel	780
Mobile Grasshopper Conveyors Long Leg	–	Stacking – Leaching	1	Diesel	780

Type	Description	Area of Equipment within Project Boundary	Maximum Units Required	Engine Type	Engine Size (HP)
Transverse Conveyor	–	Stacking – Leaching	1	Diesel	780
Stacker Feed Conveyor	–	Stacking – Leaching	1	Diesel	780
Barren Solution Pump	–	Stacking – Leaching	3	Diesel	600
Variable Frequency Drive (Barren Solution Pump)	–	Stacking – Leaching	3	Diesel	600
Barren Heating Pump	–	Stacking – Leaching	2	Diesel	24
Motor (Barren Heating Pump)	–	Stacking – Leaching	2	Diesel	24
Barren Solution Pump To Recovery	–	Stacking – Leaching	1	Diesel	14
Motor (Barren Solution Pump to Recovery)	–	Stacking – Leaching	1	Diesel	14
Pregnant Solution Pump	–	Stacking – Leaching	3	Diesel	125
Motor (Pregnant Solution Pump)	–	Stacking – Leaching	3	Diesel	125
Event Solution Pump	–	Stacking – Leaching	2	Diesel	13
Motor (Event Solution Pump)	–	Stacking – Leaching	2	Diesel	13
Barren Transfer Pump Train #1	–	ADR	1	Diesel	125
Motor (Barren Transfer Pump Train #1)	–	ADR	1	Diesel	125
Barren Transfer Pump Train #2	–	ADR	1	Diesel	125
Motor (Barren Transfer Pump Train #2)	–	ADR	1	Diesel	125
Barren Transfer Pump Train #3	–	ADR	1	Diesel	125
Motor (Barren Transfer Pump Train #3)	–	ADR	1	Diesel	125
Carbon Safety Screen, Train #1	Sizetec DFS 410	ADR/Refinery	1	Diesel	20
Carbon Safety Screen, Train #2	Sizetec DFS 410	ADR/Refinery	1	Diesel	20
Carbon Safety Screen, Train #3	Sizetec DFS 410	ADR/Refinery	1	Diesel	20
Carbon Attritioning Agitator	–	ADR	1	Diesel	60
Solution Boiler	–	ADR	1	Diesel	209
Electrowinning Cell Exhaust Blower	–	ADR	2	Diesel	50
Air Compressor	–	ADR	1	Diesel	200
Carbon Regeneration Kiln	Lockhead Haggerty	ADR	1	Diesel	650
Carbon Fines Filter Feed Pump	–	ADR	1	Diesel	43
Motor (Carbon Fines Filter Feed Pump)	-	ADR	1	Diesel	43
Sludge Dryer	Grieve TBH-500	Refinery	1	Diesel	16

Type	Description	Area of Equipment within Project Boundary	Maximum Units Required	Engine Type	Engine Size (HP)
Cathode Pressure Washer	–	Refinery	1	Diesel	10
Slagjaw Crusher	–	Refinery	1	Diesel	40
Support Equipment [a]					
Wheel Loader	CAT 992G	Throughout	1	Diesel	800
Track Dozer	CAT D10	Throughout	1	Diesel	580
Track Dozer	CAT D8	Throughout	1	Diesel	310
Motor Grader	CAT 16H	Throughout	2	Diesel	265
Haul Truck (91t, 161 GVM)	CAT 777	Throughout	9	Diesel	1020
Water Truck, 14,000 gal	773	Throughout	1	Diesel	550
Ancillary Equipment [a]					
Backhoe	300P	Throughout	1	Diesel	270
Front End Loader	CAT 988	Throughout	1	Diesel	800
Fuel/Lube Truck, 3,600 Gal	Truck	Throughout	1	Diesel	500
Service Truck	Truck	Throughout	1	Diesel	400
Tire Manipulator	Support	Throughout	1	Diesel	400
Mobile Lighting Units	Support	Throughout	8	Diesel	11
Light Vehicles	3/4t	Throughout	16	Diesel	300
Mine Rescue Truck	3/4t	Throughout	1	Diesel	300
Other Equipment [a]					
Light Vehicles	3/4t	Throughout	3	Diesel	300
All Terrain Forklift	Manitou Mc	Throughout	1	Diesel	50
Warehouse Forklift	Manitou Mc	Throughout	1	Diesel	50
Plant Forklift	Manitou Mc	Throughout	2	Diesel	50
Backhoe/Loader: CAT 938G	Cat 93G	Throughout	1	Diesel	172
Bobcat Loader	Support	Throughout	1	Diesel	140
Flatbed Truck (Warehouse)	3/4t	Throughout	1	Diesel	215
Maintenance Vehicle	3/4t	Throughout	2	Diesel	300

NOTES:

[a] Equipment will be operating at full capacity during daytime (7:00 - 22:00), and at 25% during nighttime (22:00 - 7:00).

[b] Equipment will be operating continuously 24-hours a day.

– Not applicable.

2.5.3 Blasting Noise

Based on the 2010 Pre-Feasibility Study (SWRPA 2010), blasting will occur only in daylight hours and will be scheduled to take place once per day at a shift change or lunch break. Efforts will be made to minimize noise with the use of appropriate blasting delays and best industry practices.

It has been assumed that 75% of the drill holes will be dry and will use Fortan15 emulsion, while 25% are assumed wet and will use Fortis wet-hole product. A powder factor of 0.20 kg explosive per tonne of waste and a 0.23 kg explosive per tonne of mineralized material has been suggested. The annual explosive consumption for the duration of the Project is listed in Table 2.5-3 (based on SWRPA 2010).

To evaluate the worst case blasting scenario, the maximum annual explosive usage of 5,200 tonnes (in 2015) was used to calculated peak sound pressure levels at 500 m. This peak sound pressure level was then converted to peak sound power level based on recommended methods in Ontario MoE (1985) *Guidelines on Information Required for the Assessment of Blasting Noise and Vibration*. The calculated peak sound power level is 196 dB, which was applied in modelling to predict the peak sound pressure levels at receptors 1.5 km from the Project boundary.

Table 2.5-3: Explosive Consumption over the Project

Year	2013	2014	2015	2016	2017	2018	2019	2020
Explosive (tonnes)	2,300	3,600	5,200	4,200	5,000	4,200	3,100	2,800

Source: SWRPA 2010.

2.5.4 Project Decommissioning Noise Sources

Key Project decommissioning activities that will produce noise include the following:

- Plant and associated facility removal and site reclamation
- Onsite vehicular traffic.

The equipment list for Project decommissioning has been assumed to be the same as that applied for construction (refer to Table 2.5-1). This is a conservative assumption since the equipment levels and operating times used for decommissioning are expected to be less than during the construction phase. Therefore, no further assessment of the decommissioning phase of the Project was undertaken.

3 RESULTS

The following sections present the sound level modelling results for the cases investigated in the Project noise assessment. Results include predicted sound levels at four receptor locations (located at 1.5 km in all four cardinal directions from the Project), and a predicted maximum sound level that may occur anywhere along the 1.5 km boundary from the Project boundary. The modelling results are compared to the applicable PSLs and regulatory criteria.

3.1 Project Construction

The construction activities will be constantly carried out at full capacity 24 hours a day so the predicted sound levels will remain the same throughout daytime and nighttime. Since the EC (1989) nighttime limit of 55 dBA Leq(8) is the most stringent, if the project can meet this limit, it will comply with the daytime of 65 dBA and evening of 60 dBA criteria. Therefore, the following analysis focuses on the compliance with the EC (1989) nighttime limit.

Table 3.1-1 presents the predicted sound levels obtained through modelling for the Project construction case. At each of the receptor locations, the predicted sound levels from the Project alone are well below the nighttime of 55 dBA Leq(8) recommended by the EC (1989). The maximum predicted sound level at 1.5 km from the Project boundary is approximately 42 dBA Leq(8) from the Project alone. Figure 3.1-1 presents a noise contour map showing the predicted sound levels resulting from Project construction.

Table 3.1-1 also presents an assessment of low frequency noise associated with the Project, based on the modelling results. According to the BC OGC (2009) and ERCB (2007), if the difference between C-weighted (dBC) and A-weighted (dBA) modelling predictions is 20 dB or greater, low frequency noise can cause annoyance. The difference between dBC and dBA predictions for Project construction is less than 20 dB for all receptors at 1.5 km from the Project boundary. Therefore, low frequency noise is not expected to be of concern.

Table 3.1-2 presents the cumulative predicted sound levels associated with Project construction, including ambient baseline sound levels (as described to Section 2.2). At each of the receptor locations, the cumulative predicted sound levels are below the EC (1989) nighttime limit of 55 dBA Leq(8). Similarly, they are much lower than the limits of 65 dBA (daytime) and 60 dBA (evening). In several of the locations, there is no change from the ambient baseline level. The maximum cumulative nighttime sound level at 1.5 km from the Project boundary is approximately 43 dBA Leq(8).

Table 3.1-1: Predicted Sound Levels Associated with Project Construction during Nighttime

Receptor	ID	Predicted Sound Level (Leq(8))		
		A-weighted (dBA)	C-weighted (dBC)	dBA-dBC (dB)
R1	West	41	57	15
R2	North	28	44	16
R3	East	30	43	14
R4	South	22	38	15
Rmax	Max	42	57	15

NOTE:
All values are rounded to the nearest dB.

Table 3.1-2: Cumulative Predicted Sound Levels Associated with Project Construction during Nighttime, Including Ambient Baseline Sound Levels

Receptor	ID	Predicted Sound Level (dBA (Leq(8))			Nighttime Limit (dBA) [b]
		Nighttime	Ambient	Cumulative [a]	
R1	West	41	35	42	55 (60 – 65)
R2	North	28	35	36	55 (60 – 65)
R3	East	30	35	36	55 (60 – 65)
R4	South	22	35	35	55 (60 – 65)
Rmax	Max	42	35	43	55 (60 – 65)

NOTES:

[a] Cumulative values include predicted sound levels plus nighttime ambient sound level of 35 dBA, as described in Section 2.2.

[b] Environment Canada (1989) nighttime limit of 55 dBA Leq(8) (as described in Section 1.3.1). Values in brackets indicate for daytime (65 dBA) and evening (60 dBA) limits.

All values are rounded to the nearest dB.

3.2 Project Operations

Table 3.2-1 presents the predicted sound levels obtained through modelling for the Project operations case, for both daytime and nighttime periods. The maximum predicted daytime sound level at 1.5 km from the Project boundary is approximately 41 dBA Leq(15) from the Project alone (slightly less than that predicted during construction). The maximum predicted nighttime sound level at 1.5 km from the Project boundary is approximately 36 dBA Leq(9) from the Project alone. Figures 3.2-1 and 3.2-2 respectively present noise contour maps showing the predicted daytime and nighttime sound levels resulting from Project operations.

Table 3.2-1 also presents an assessment of low frequency noise associated with the Project, based on the modelling results. The difference between dBC and dBA predictions for Project construction is less than 20 dB for all receptors at 1.5 km from the Project boundary. Therefore, low frequency noise is not expected to be of concern.

Table 3.2-1: Predicted Sound Levels Associated with Project Operations during Day and Nighttime

Receptor	ID	Predicted Sound Level – Daytime (Leq(15))			Predicted Sound Level – Nighttime (Leq(9))		
		A-weighted (dBA)	C-weighted (dBC)	dBA-dBC (dB)	A-weighted (dBA)	C-weighted (dBC)	dBA-dBC (dB)
R1	West	41	57	16	36	54	18
R2	North	29	44	15	23	42	19
R3	East	29	43	14	22	38	16
R4	South	24	37	13	17	34	16
Rmax	Max	41	57	16	36	54	18

NOTE:

All values are rounded to the nearest dB.

Table 3.2-2 presents the cumulative predicted sound levels associated with Project operations during daytime, including ambient baseline sound levels (as described to Section 2.2). At each of the receptor locations, the cumulative predicted sound levels are below the daytime PSL of 50 dBA Leq(15), as recommended by the BC OGC (2009) and ERCB (2007). In several of the locations, there is no change from the ambient baseline level. The maximum cumulative daytime sound level at 1.5 km from the Project boundary is approximately 46 dBA Leq(15).

Table 3.2-3 presents the cumulative predicted sound levels associated with Project operations during nighttime, including ambient baseline sound levels (as described to Section 2.2). At each of the receptor locations, the cumulative predicted sound levels are below the nighttime PSL of 40 dBA Leq(9), as recommended by the BC OGC (2009) and ERCB (2007). In several of the locations, there is no change from the ambient baseline level. The maximum cumulative daytime sound level at 1.5 km from the Project boundary is approximately 39 dBA Leq(9).

Table 3.2-2: Cumulative Predicted Sound Levels Associated with Project Operations during Daytime, Including Ambient Baseline Sound Levels

Receptor	ID	Predicted Sound Level (dBA Leq(15))			Daytime Limit (dBA) [b]
		Daytime	Ambient	Cumulative [a]	
R1	West	41	45	46	50
R2	North	29	45	45	50
R3	East	29	45	45	50
R4	South	24	45	45	50
Rmax	Max	41	45	46	50

NOTES:
[a] Cumulative values include predicted sound levels plus daytime ambient sound level of 45 dBA, as described in Section 2.2.
[b] Daytime PSL of 50 dBA Leq(15) (as per Table 2.3-2).
All values are rounded to the nearest dB.

Table 3.2-3: Cumulative Predicted Sound Levels Associated with Project Operations during Nighttime, Including Ambient Baseline Sound Levels

Receptor	ID	Predicted Sound Level (dBA Leq(9))			Nighttime Limit (dBA) [b]
		Nighttime	Ambient	Cumulative [a]	
R1	West	36	35	39	40
R2	North	23	35	35	40
R3	East	22	35	35	40
R4	South	17	35	35	40
Rmax	Max	36	35	39	40

NOTES:
[a] Cumulative values include predicted sound levels plus nighttime ambient sound level of 35 dBA, as described in Section 2.2.
[b] Nighttime PSL of 40 dBA Leq(9) (as per Table 2.3-2).
All values are rounded to the nearest dB.

3.3 Blasting

The results for noise associated with Project blasting are presented in Table 3.3-1. All predicted peak sound levels at receptors located 1.5 km from the Project boundary are well below the cautionary limit of 120 dB, as specified by the Ontario MoE (1978) *NPC-119*. The maximum predicted daytime peak sound level at 1.5 km from the Project boundary is approximately 104 dBA. Figure 3.3-1 presents a noise contour map showing the predicted sound levels resulting from Project blasting.

Table 3.3-1: Predicted Peak Sound Pressure Levels Associated with Project Blasting

Receptor	ID	Predicted Peak Sound Level (dB)	Cautionary Limit (dB) [a]
		Daytime	
R1	West	103	120
R2	North	92	120
R3	East	85	120
R4	South	82	120
Rmax	Max	104	120

NOTES:
[a] Ontario MoE (1978) *NPC-119*.
All values are rounded to the nearest dB.

3.4 Project Decommissioning

The noise predictions for Project decommissioning are expected to be less than those predicted for the construction phase (refer to Section 2.5.4). Therefore, Project decommissioning noise levels are predicted to be less than the applicable regulatory criteria.

3.5 Model Prediction Confidence

Overall sound level model prediction accuracy depends on two factors: the accuracy of the acoustical source data and the accuracy of the sound propagation model. The sound power level data used in this assessment were based on representative sound level data for the Project and were obtained from published literature and product manufacturers, which are assumed to be conservative. The ISO *9613* (1993; 1996) sound propagation algorithms have a published accuracy of +/-3 dB over source receiver distances between 100 and 1,000 m. A similar degree of accuracy would be expected over the distances considered in this assessment. This is considered an excellent degree of accuracy for an environmental noise model over such a large distance. A 3 dB increase or decrease in sound pressure levels would generally be imperceptible to the typical human ear. Additionally, the ISO *9613* (1993; 1996) model also produces results representative of meteorological conditions favoring sound propagation (e.g. downwind or temperature inversion conditions). These conditions do not occur all the time, therefore the model predictions are expected to be conservative, and actual sound levels at the 1.5 km boundary from the Project boundary are expected to be less than predicted for much of the time. Based on these factors, confidence is high that the model has not under-predicted the noise effects.

4 MONITORING AND MITIGATION

4.1 Follow-up and Monitoring

VIT is committed to managing noise issues and to promptly responding to any reasonable noise complaint. Requirements for post-construction sound level monitoring in the regulatory guidance is complaint driven (BC OGC 2009; ERCB 2007). No follow-up 24-hour sound level monitoring is required after construction of the Project, unless noise complaints are received. Any follow-up 24-hour sound level monitoring that might be necessary will be addressed at that time.

4.2 Standard Mitigation

A number of standard mitigation measures have been incorporated into the Project design to minimize Project noise effects. These measures will be included within a noise abatement plan that will be developed for the Project as an Environmental Management Plan. Generally, these mitigations will include the following:

- Minimize effect of blasting noise on the people and applying British Columbia Occupational Health and Safety Regulations Parts 7 (Government of British Columbia 2005) for employees and restrict public access to the mine site
- Limit noisy activities (including blasting) to the least noise-sensitive times of day (between 7:00am and 10:00pm)
- Locate all stationary construction or mining equipment (i.e., crushers, compressors, and generators) as far as practicable within the Project boundary
- Locate major crushing equipment and other noise-generating equipment (e.g., blowers and air compressors, etc.) inside buildings wherever possible
- Perform regular inspection and maintenance of vehicles and equipment to ensure that they have high quality mufflers installed and worn parts replaced
- Follow posted vehicle speed limits
- Maintain Project roads to minimize vehicle noise associated with vibration
- Turn off equipment when not in use and practical to do so
- Ensure, by restricting access to the mine site, that recreational land users are not present in the vicinity of the mine during blasting operations.

5 SUMMARY AND CONCLUSIONS

This assessment has been conducted to predict the noise effects associated with the proposed Eagle Gold Project. As there are no permanent dwellings in close proximity to the Project, noise effects have been assessed at a distance of 1.5 km from the Project boundary based on Project engineering details and sound level modelling using internationally accepted sound propagation algorithms included in ISO *9613* (1993; 1996).

The key findings of the noise assessment are:

- During Project construction and decommissioning, the maximum predicted nighttime sound level associated with the Project alone is 42 dBA Leq(8). The maximum cumulative predicted sound level, including ambient baseline sound levels, is 43 dBA Leq(8). This is less than the EC (1989) nighttime limit of 55 dBA Leq(8). Therefore these components of the Project comply with EC (1989).
- The calculated daytime permissible sound levels (PSLs) according to regulatory guidance are 50 dBA Leq(15) and 40 dBA Leq(9) for daytime and nighttime during Project operations, respectively.
- During Project operations, the maximum predicted daytime sound level associated with the Project alone is 41 dBA Leq(15). The maximum cumulative predicted daytime sound level, including ambient baseline sound levels, is 46 dBA Leq(15). This is less than the daytime PSL of 50 dBA Leq(15). Therefore this component of the Project complies with BC OGC (2009) and ERCB (2007).
- During Project operations, the maximum predicted nighttime sound level associated with the Project alone is 36 dBA Leq(9). The maximum cumulative predicted nighttime sound level, including ambient baseline sound levels, is 39 dBA Leq(9). This is less than the nighttime PSL of 40 dBA Leq(9). Therefore this component of the Project complies with BC OGC (2009) and ERCB (2007).
- The maximum predicted daytime peak sound level at 1.5 km from the Project boundary during blasting is approximately 104 dBA. All predicted peak sound levels at receptors located 1.5 km from the Project boundary are well below the cautionary limit of 120 dB, as specified by the Ontario MoE (1978) *NPC-119*.

Based on the results of this assessment, sound levels within the vicinity of the Project during construction, operations, blasting, and decommissioning are expected to remain within acceptable limits according to the applicable regulatory criteria for ambient sound quality.

6 CLOSURE

Stantec has prepared this report for the sole benefit of VIT in support of the Project environmental assessment under the Yukon Territory *Environmental and Socio Economic Assessment Act*. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and VIT. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties.

The information provided in this report was compiled from existing documents and data provided by VIT, spectral sound power level data compiled and calculated by Stantec, and by applying currently accepted industry practice and modelling methods. This report represents the best professional judgment of our personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

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8 FIGURES

Please see the following pages.

Data Sources; Government of Canada, Victoria Gold Corp.

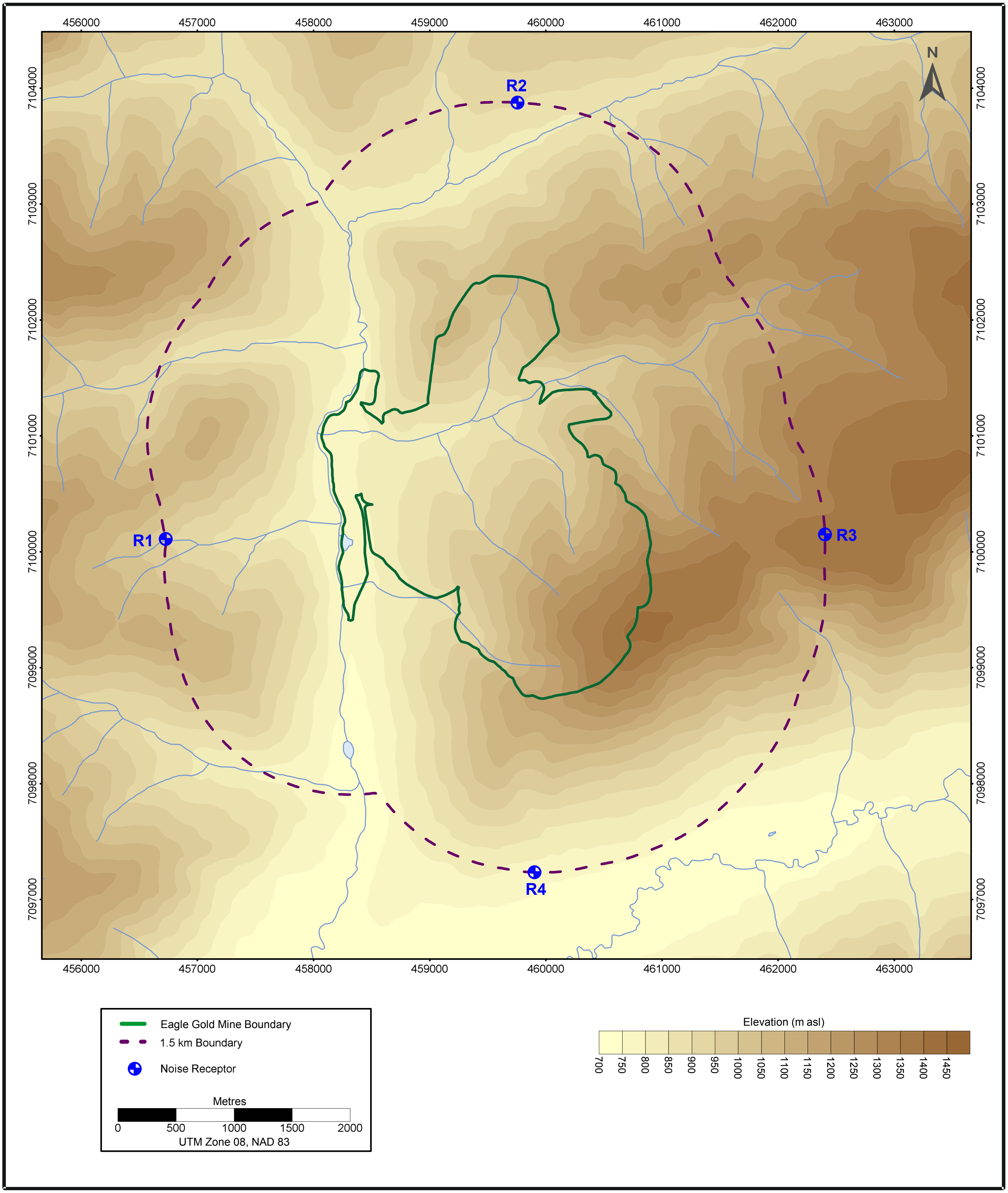
Stantec
4370 Dominion Street
Burnaby, British Columbia
V5G 4L7
Tel. (604) 436 3014
Fax. (604) 436 3752

Victoria GOLD CORP

GENERAL LOCATION MAP

EAGLE GOLD PROPERTY
YUKON TERRITORY

PROJECTION	DRAWN BY
UTM - ZONE 8	LS
DATUM	CHECKED BY
NAD 83	RS
DATE	FIGURE NO.
8-November-2010	1.1-1



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Stantec

VICTORIA GOLD CORPORATION EAGLE GOLD PROJECT

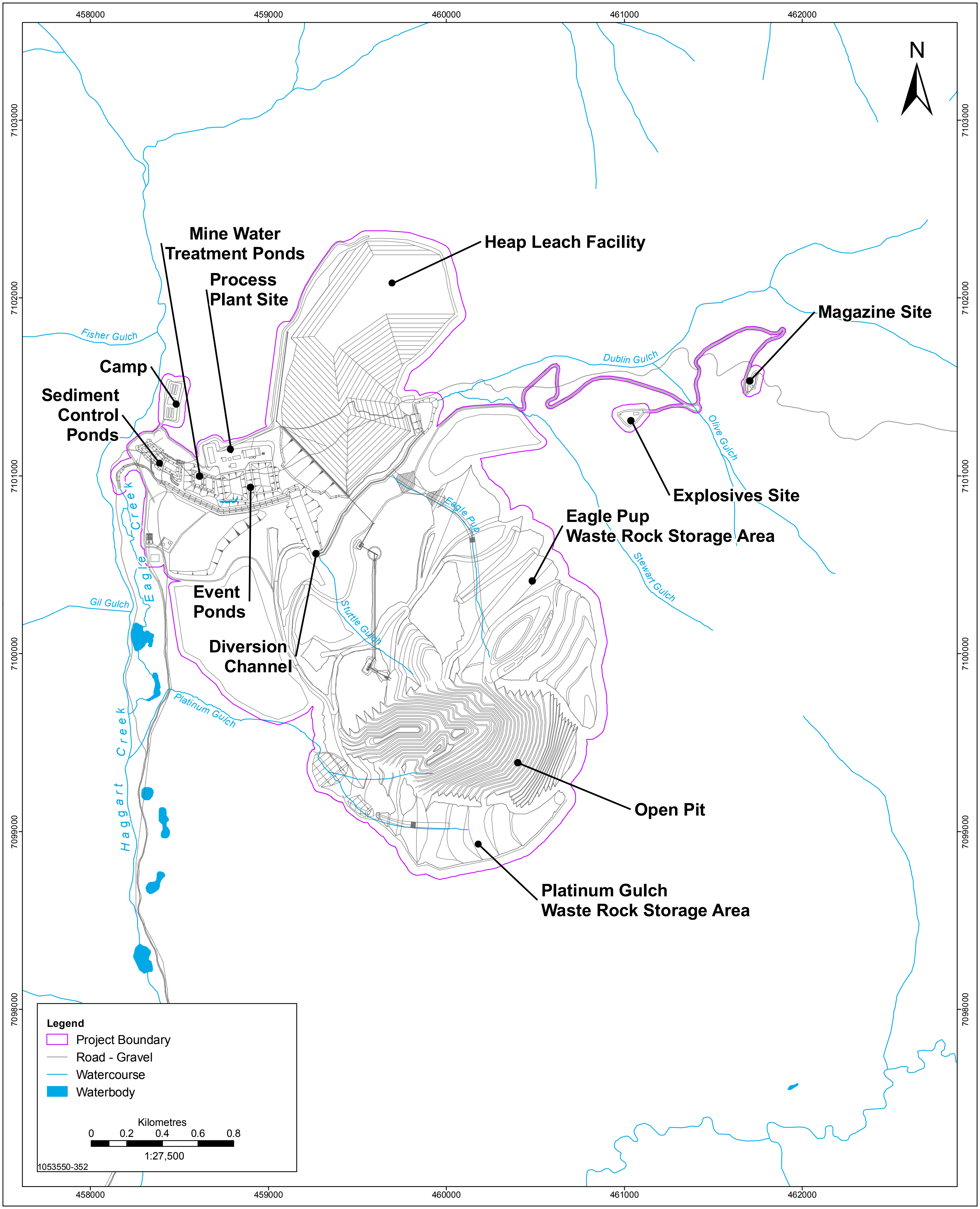
DRAFT DATE 09/17/10

REVISION DATE 09/20/10

FIGURE NO. **2.1-1**

Noise Assessment Study Area

PREPARED FOR Victoria GOLD CORP



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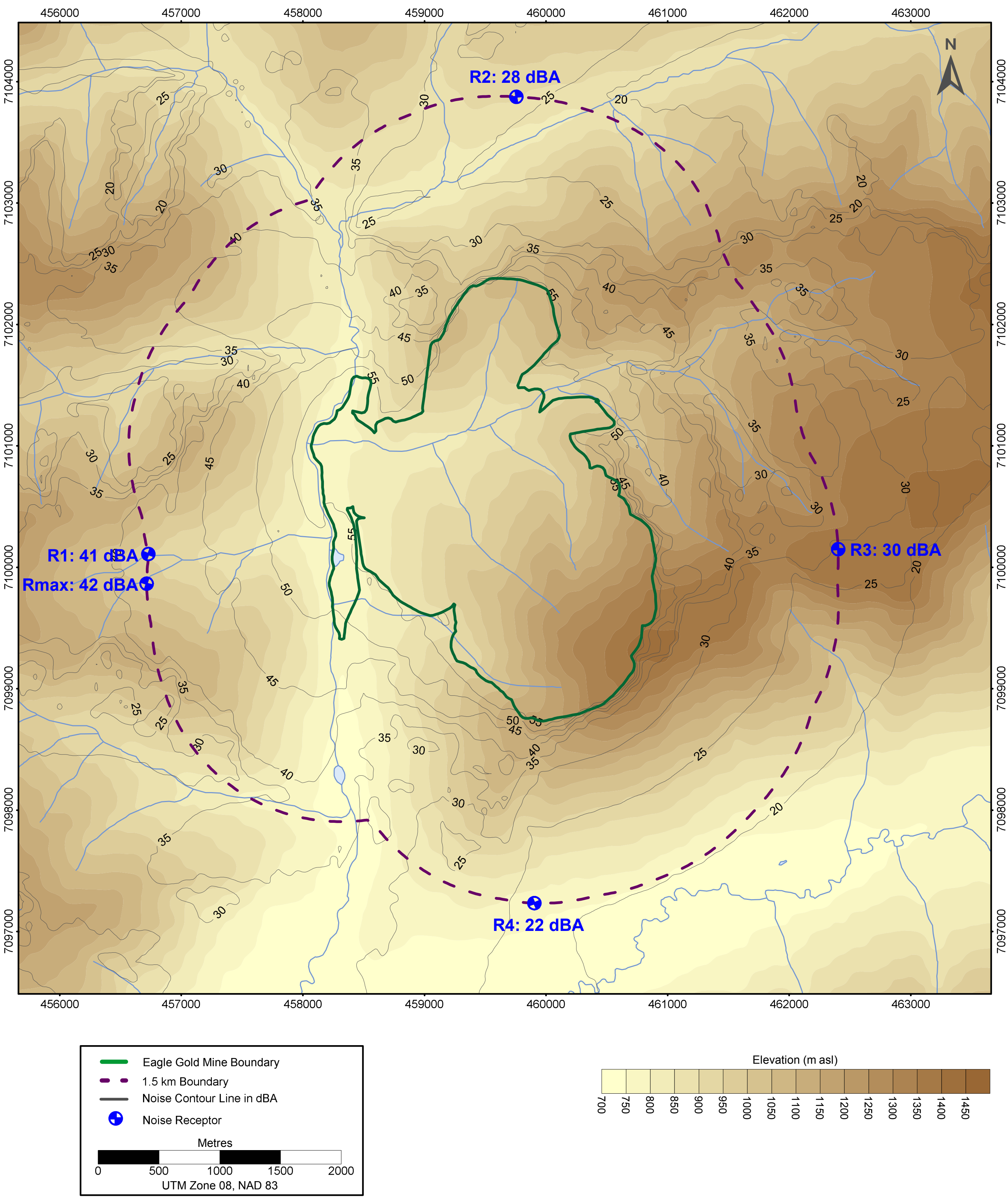
Stantec
4370 Dominion Street
Burnaby, British Columbia
V5G 4L7
Tel. (604) 436 3014
Fax. (604) 436 3752

Victoria Gold Corp

PROJECT FOOTPRINT AND FEATURES

EAGLE GOLD PROPERTY
YUKON TERRITORY

PROJECTION: UTM - ZONE 8	DRAWN BY: LS
DATUM: NAD 83	CHECKED BY: RS
DATE: 8-November-2010	FIGURE NO. 1.1-2



N:/1_Projects/149010002-123_EagleGold Noise/Figures/Eagle Gold - Construction.srf

Stantec

VICTORIA GOLD CORPORATION EAGLE GOLD PROJECT

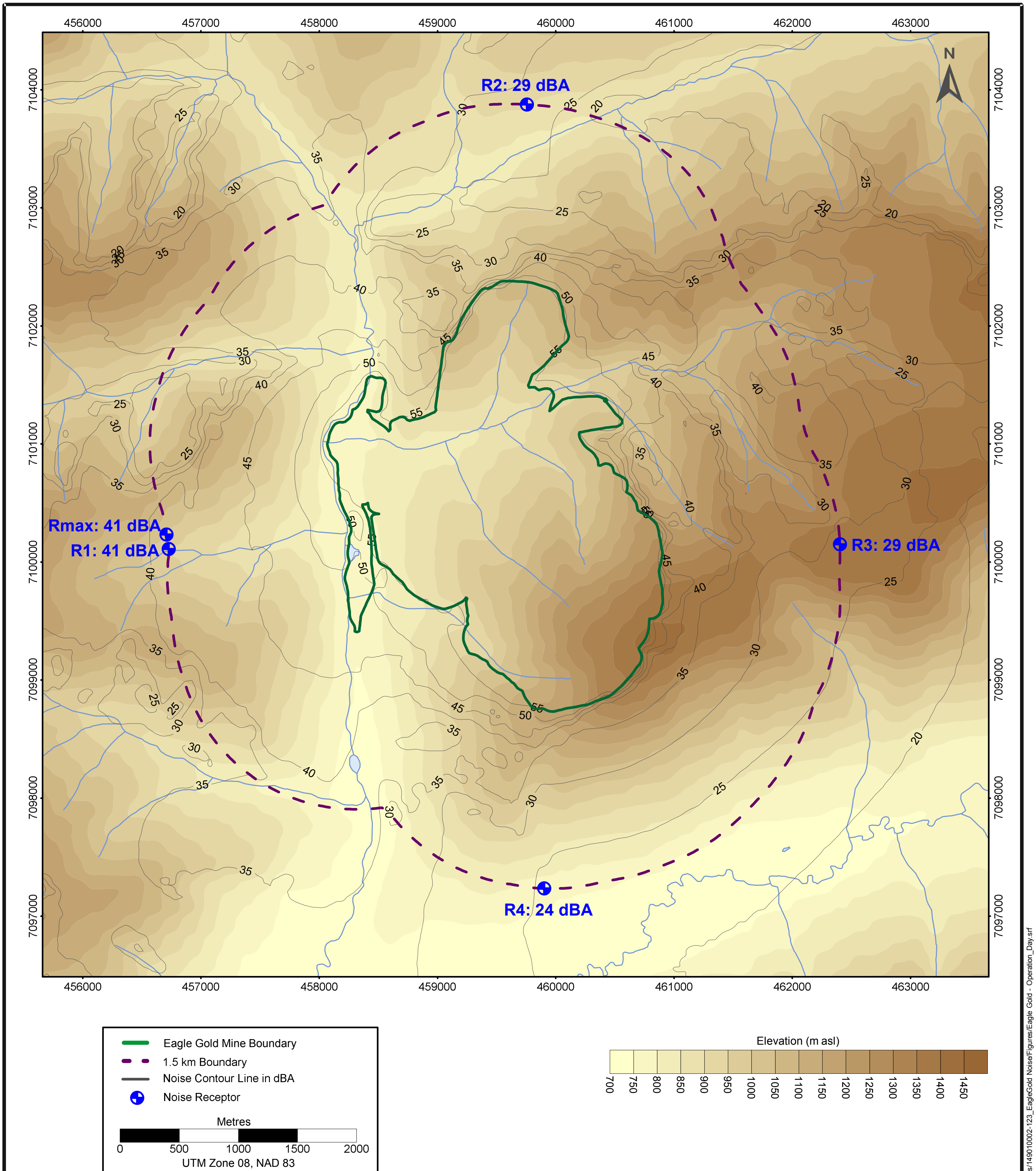
DRAFT DATE 09/17/10

REVISION DATE 09/20/10

FIGURE NO. **3.1-1**

Contours of Predicted Noise Levels Associated with Project Construction

PREPARED FOR Victoria Gold Corp



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VICTORIA GOLD CORPORATION EAGLE GOLD PROJECT

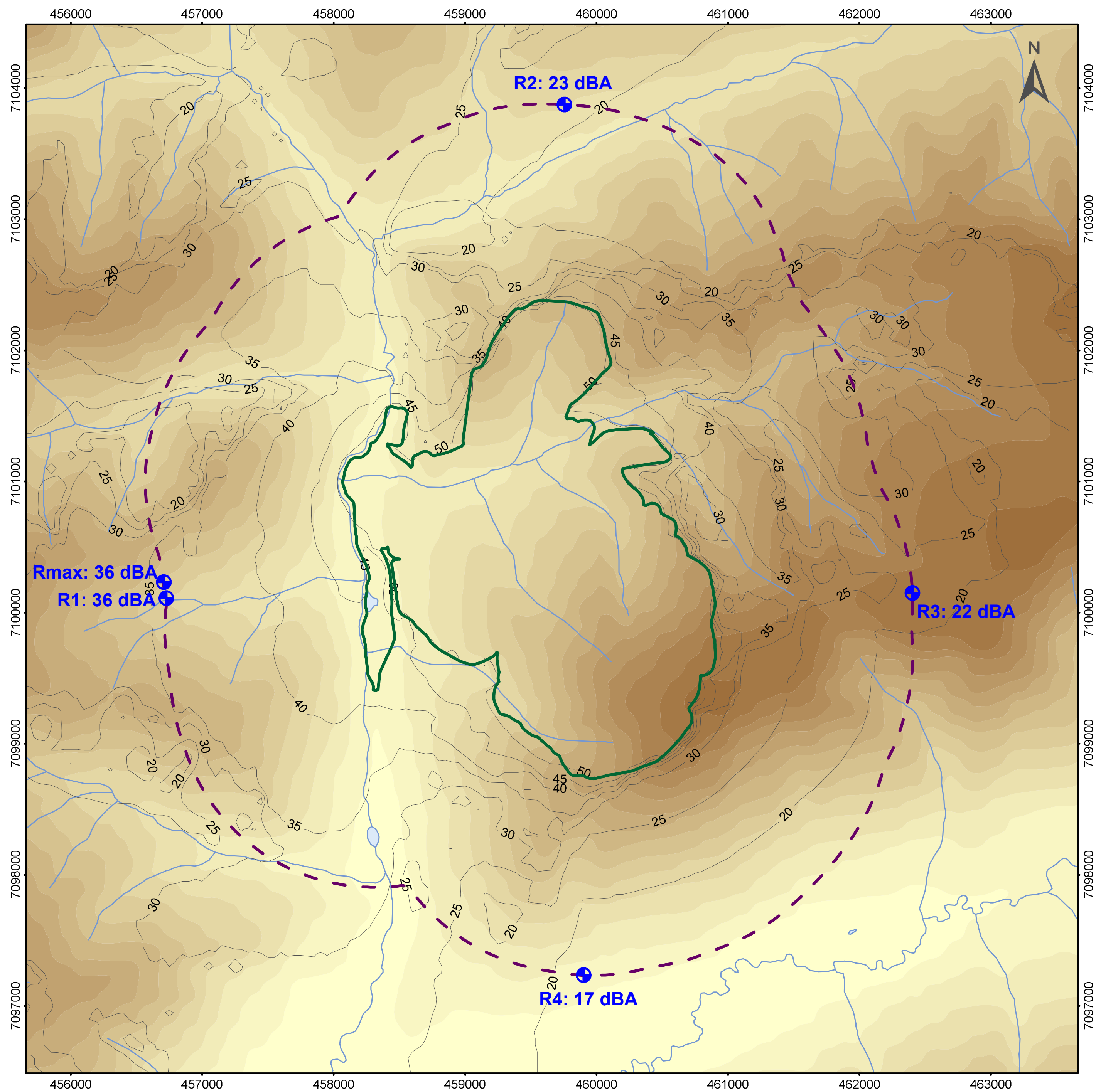
DRAFT DATE 09/20/10

REVISION DATE 09/30/10

FIGURE NO. **3.2-1**

Contours of Predicted Noise Levels Associated with Project Operations (Daytime)

PREPARED FOR Victoria Gold Corp



- Eagle Gold Mine Boundary
- 1.5 km Boundary
- Noise Contour Line in dBA
- Noise Receptor

Metres

0 500 1000 1500 2000

UTM Zone 08, NAD 83

Elevation (m asl)

700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450

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VICTORIA GOLD CORPORATION EAGLE GOLD PROJECT

DRAFT DATE	09/20/10
REVISION DATE	09/30/10

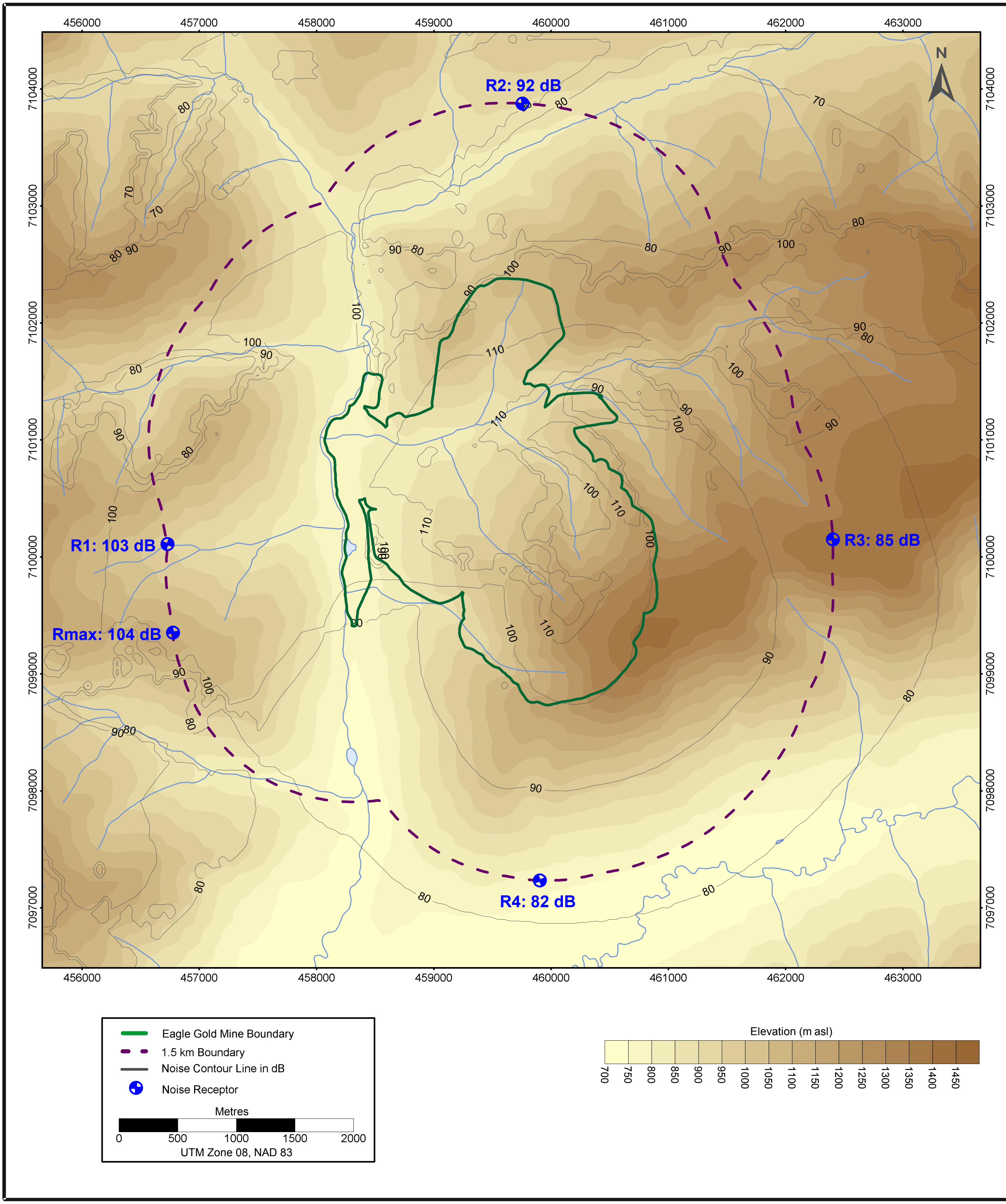
FIGURE NO.

3.2-2

Contours of Predicted Noise Levels Associated with Project Operations (Nighttime)

PREPARED FOR

Victoria GOLD CORP



N:\1_Projects\149010002-123_EagleGold Noise\Figures\Eagle Gold - Blasting.srf

Stantec

VICTORIA GOLD CORPORATION EAGLE GOLD PROJECT

DRAFT DATE 09/22/10

REVISION DATE 09/22/10

FIGURE NO. **3.3-1**

Contours of Predicted Noise Levels Associated with Project Blasting

PREPARED FOR Victoria Gold Corp

APPENDIX A

Sound Power Levels for Project Noise Sources

Table A-1: Estimated Sound Levels for Project Construction and Decommissioning Noise Sources

Type	Description	Maximum Units Required	Engine Size (HP)	Estimated SPL (dBA)	Estimated PWL with Maximum Units (dBA)	References
Support Equipment (Mainly for Stockpiles, Conveyors)						
Feller/Buncher	541	1	305	88	120	b
Log Skidder	324D-FM	1	200	86	118	b
HIAB Flat Bed Utility Truck	3/4t	1	200	84	116	b
Track Dozer	D5N/D8T	2	310	87	122	a
Backhoe/Loader	CAT 93G	1	300	86	118	b
Tandem Dump Truck	Various	4	300	66	104	a
Wheel Loader	992G	1	800	90	122	b
Mobile Crusher	HX	1	420	93	125	a
Motor Grader	CAT 16H	1	265	84	116	b
Wheel Tractor Scraper	CAT 613G	1	193	84	116	b
Fork Lift	Manitou Mc	1	50	88	120	a
Concrete Mixing Trucks	Various	2	200	84	119	b
Mobile Crane	Terex	1	300	87	119	b
Major Equipment						
Sandvik DX800 Drill	DX800	1	225	96	128	b
Excavator	CAT 365	3	400	86	122	b
Haul Truck	Art6x6	10	400	87	129	b
Track Dozer	CAT D10	1	580	87	119	a
Track Dozer	CAT D8	2	310	87	122	a
Motor Grader	CAT 16H	1	265	84	116	b
Light Vehicles	3/4t	20	300	66	111	a
Support Equipment (Mainly for Roads, ADR, Waste Dumps)						
Wheel Loader	992G	1	800	90	122	b
Track Dozer	D5N/D8T	1	310	87	119	a
Excavator	Hitachi EX1900-6	2	1,087	92	127	b
Personnel Carrier	3/4T	2	300	86	121	b
Compactor	CS-573E	1	150	85	117	a
Motor Grader	CAT16H	1	265	84	116	b

Type	Description	Maximum Units Required	Engine Size (HP)	Estimated SPL (dBA)	Estimated PWL with Maximum Units (dBA)	References
Secondary Support Equipment						
Personnel Carrier	3/4t	2	300	86	121	b
Flatbed Truck	3/4t	1	215	84	116	b
Water Truck, 14,000 gal	773	1	550	89	121	b
CAT 0.5 MW Generator (Plant Area)	–	1	–	–	99	c
Portable CAT 0.25 MW Generator (Pit Development)	–	1	–	–	96	c
Portable CAT 10 kW Generator (Construction Area)	–	10	–	–	92	c
Estimated Total PWL :134 dBA						

NOTES:
Reference a – Jacques Whitford AXYS Ltd. (2008).
Reference b – Miller (1981). Values are estimated sound power levels at 50 feet.
Reference c – Bies and Hansen (2003).
SPL – Sound pressure level.
PWL – Sound power level.

Table A-2: Sound Power Level at Octave Band Center Frequency for Project Construction Noise Sources

Description	Sound Power Level (dB) at Octave Band Center Frequency (Hz)									Total PWL (dBA)
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Construction	130	130	131	133	131	129	128	118	114	134

NOTES:
PWL – Sound power level.
Source: Miller (1981).

Table A-3: Sound Power Level at Octave Band Center Frequency for Project Operation Noise Sources

Area	Equipment Description	Sound Power Level (dB) at Octave Band Center Frequency (Hz)									Total PWL (dBA)
		31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Pit Area (daytime) [a]	Reichdrill C-700-D	107	115	125	129	130	125	122	117	115	131
	Sandvik DX800	99	107	117	121	122	117	114	109	107	123
	Excavator	102	110	120	124	125	120	117	112	110	126
Pit Area (nighttime) [a]	Drill and Excavator	105	113	123	127	128	123	120	115	113	129
Primary Crashing	Primary Crushing Building	109	109	109	105	103	100	98	94	85	106
	Rock Breaker	83	91	101	105	106	101	98	93	91	107
Secondary Crushing [a]	Secondary Crushing Building	112	112	112	108	106	103	101	97	88	109
HPGR Crushing [a]	HPGR Crushing (all operation)	121	121	121	117	115	112	110	106	97	118
Conveyors [a]	All conveyers	109	109	109	107	105	104	102	96	89	109
Stacking - Leaching [b]	Barren Solution Pump	82	83	84	86	86	89	86	82	76	93
	Barren Heating Pump	82	83	84	86	86	89	86	82	76	92
	Barren Solution Pump To Recovery	78	79	80	82	82	85	82	78	72	89
	Pregnant Solution Pump	82	83	84	86	86	89	86	82	76	93
	Event Solution Pump	78	79	80	82	82	85	82	78	72	89
	Motor Barren Solution Pump	83	85	87	87	87	87	87	84	77	83
	Motor Barren Heating Pump	80	80	83	85	88	88	87	82	74	80
	Motor Barren Solution Pump To Recovery	79	79	82	84	87	87	86	81	73	79
	Motor Pregnant Solution Pump	80	80	83	85	88	88	87	82	74	80
	Motor Event Solution Pump	77	77	80	82	85	85	84	79	71	77
	Heating Solution Boiler	100	100	99	97	94	91	88	85	82	97
ADR Area [b]	Barren Solution Pump	80	81	82	84	84	87	84	80	74	91
	Barren Transfer Pump Train #1	80	81	82	84	84	87	84	80	74	91
	Barren Transfer Pump Train #2	80	81	82	84	84	87	84	80	74	91

Area	Equipment Description	Sound Power Level (dB) at Octave Band Center Frequency (Hz)									Total PWL (dBA)
		31.5	63	125	250	500	1,000	2,000	4,000	8,000	
	Barren Transfer Pump Train #3	80	81	82	84	84	87	84	80	74	91
	Carbon Fines Filter Feed Pump	80	81	82	84	84	87	84	80	74	91
	Motor Barren Solution Pump	83	85	87	87	87	87	87	84	77	93
	Motor (Barren Transfer Pump Train #1)	79	79	82	84	87	87	86	81	73	92
	Motor (Barren Transfer Pump Train #2)	79	79	82	84	87	87	86	81	73	92
	Motor (Barren Transfer Pump Train #3)	79	79	82	84	87	87	86	81	73	92
	Carbon Attritioning Agitator	79	79	82	84	87	87	86	81	73	92
	Motor (Carbon Fines Filter Feed Pump)	79	79	82	84	87	87	86	81	73	92
	Sludge Dryer	69	69	72	74	77	77	76	71	63	82
	Cathode Pressure Washer	67	67	70	72	75	75	74	69	61	80
	Carbon Safety Screen, Train #1	69	69	72	74	77	77	76	71	63	82
	Carbon Safety Screen, Train #2	69	69	72	74	77	77	76	71	63	82
	Carbon Safety Screen, Train #3	69	69	72	74	77	77	76	71	63	82
	Solution Boiler	98	98	97	95	92	89	86	83	80	95
	Electrowinning Cell Exhaust Blower	102	102	95	95	92	92	87	85	84	96
	Carbon Generateration Kiln	91	94	95	95	95	93	91	88	83	99
	Slagjaw Crusher	98	98	98	94	92	89	87	83	74	95
	Air Compressor	82	82	82	83	84	86	88	85	81	93
Power Substation [b]	Transformer	82	88	90	85	85	79	74	69	62	85
Camp Area [a]	HVAC Unit for Camp Building	81	84	85	85	84	82	78	74	68	86
Support Equipment [c]	Total (day time)	129	129	130	131	128	126	124	116	114	131
	Total (night time)	123	123	124	125	122	120	118	110	108	125

NOTES:

[a] Miller (1981).

[b] Bies and Hansen (2003).

[c] Table A-1 and A-2.