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GRIP ROAD MINE

UPDATED NOISE AND VIBRATION STUDY

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1. INTRODUCTION

Miles Sand & Gravel Company (Miles) is proposing to mine gravel from a 68 acre parcel located in unincorporated Skagit County near Sedro Woolley, Washington. The mine is completely surrounded by Natural Resource designated land (NRL) and is situated near the north end of 726 acres of contiguously owned property. The site is currently forested, but some of the site is proposed to be logged. All material from the mine would be sold as pit run or transported to other facilities for processing.

The following report reviews noise terminology, regulatory criteria applicable to the project, and the methods and findings of the analysis.

2. TERMINOLOGY AND BACKGROUND

2.1 Noise Level Terminology and Human Hearing

The human ear responds to a very wide range of sound intensities. The decibel scale (dB) used to describe sound is a logarithmic rating system which accounts for the large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dB. Therefore, a 70-dB sound level will sound about twice as loud as a 60-dB sound level. People generally cannot detect differences of 1 dB; in ideal laboratory situations, differences of 2 or 3 dB can be detected by people, but such a change probably would not be detectable in an average outdoor environment. A 5-dB change would probably be perceived under normal listening conditions.

When addressing the effects of noise on people, it is useful to consider the frequency response of the human ear. Sound-measuring instruments are therefore often programmed to weight measured sounds based on the way people hear. The frequency-weighting most often used is A-weighting because it approximates the frequency response of human hearing and is highly correlated to the effects of noise on people. Measurements from instruments using this system are reported in "A-weighted decibels" or dBA. All sound levels in this evaluation are reported in A-weighted decibels.

Distance from the source, the frequency of the sound, the absorbency of the intervening ground, obstructions, and duration of the noise-producing event all affect the transmission and perception of noise. The degree of this effect also depends on who is listening and on existing sound levels.

2.2 Vibration Terminology

Vibration is an oscillatory motion that can be measured and characterized by the frequency and amplitude of waves of motion. Because it takes time for the human body to perceive and respond to vibration signals, vibration amplitude (i.e., the size of the wave of motion) is

usually characterized using a "smoothed" amplitude based on the root mean square (rms). Some methodologies used for assessing potential impacts from vibration consider vibration amplitude reported as rms velocity, converted to vibration decibel levels or VdB. The typical background level in residential areas is about 50 VdB, and most people generally cannot detect levels below about 65 VdB, and generally do not consider levels below 70 VdB to be of significance. However, the duration of a vibration event has an effect on human response. Generally, as the duration of a vibration event increases, the potential for adverse human response increases. Additionally, the rate of recurrence of events can also affect human response.

3. AFFECTED ENVIRONMENT

3.1 Skagit County Noise Regulations

The project site and surrounding properties are located in unincorporated Skagit County. Chapter 9.50 of the Skagit County Code (SCC 9.50) adopts regulations established in Chapter 173-60 of the Washington Administrative Code (WAC).

Chapter 173-60 of the WAC limits the levels and durations of noise crossing property boundaries ([Table 1](#)). Allowable "maximum permissible" sound levels depend on the Environmental Designation of Noise Abatement (EDNA) of the source of the noise and the EDNA of the receiving property. WAC 173-60-030 stipulates that EDNA land classification shall conform to land uses unless a local jurisdiction has adopted a program in which EDNA classifications are based on zoning. Generally, lands of residential use are considered Class A EDNAs, commercial properties are considered Class B EDNAs, and industrial areas are considered Class C EDNAs.

Table 1. WAC Maximum Permissible Sound Levels (dBA)

EDNA of Sound Source	EDNA of Receiving Property		
	Class A Day / Night	EDNA B	EDNA C
EDNA A	55 / 45	57	60
EDNA B	57 / 47	60	65
EDNA C	60 / 50	65	70

The limitations for noise received in a Class A EDNA are reduced by 10 dBA during nighttime hours, defined as between 10 PM and 7 AM.
 Source: WAC 173-60-040

The "maximum permissible" environmental noise levels in [Table 1](#) may be exceeded for short periods as defined in WAC 173-60-040. The allowed short-term increases are as

follows: 5 dBA for no more than 15 minutes in any hour, or 10 dBA for no more than 5 minutes of any hour, or 15 dBA for no more than 1.5 minutes of any hour. These allowed short-term increases can be described in terms of noise "metrics" that represent the percentage of time certain levels are exceeded. For example, the hourly L25 metric represents the sound level that is exceeded 25 percent of the time, or 15 minutes in an hour. Similarly, the L8.3 and L2.5 are the sound levels exceeded 5 and 1.5 minutes in an hour, respectively. The maximum permissible levels are not to be exceeded by more than 15 dBA at any time, and this limit is represented by the Lmax noise metric.

The Washington Administrative Code (173-60-050) identifies a number of noise sources or activities that are exempt from the maximum permissible sound levels. The following sources are among those exempt:

- Sounds created by motor vehicles on public roads when individual vehicles are subject to performance standards regulated by WAC 173-62 (motor vehicle fleet performance standards)
- Sounds caused by motor vehicles, licensed or unlicensed, when operated off public highways, except when such sounds are received in Class A EDNAs; and
- Sounds created by warning devices not operating continuously for more than five minutes (such as back-up alarms on vehicles).

3.2 FTA Vibration Impact Criteria

There are currently no applicable vibration limits or regulations established by Skagit County. Therefore, we are applying Federal Transit Administration (FTA) vibration impact criteria in this assessment to gauge the potential for vibration impacts from the proposed mining and material transport activities.

FTA vibration impact criteria vary depending on the type of receiver and the frequency of occurrence of vibration events. FTA categorizes receiving properties as Category 1 (e.g., most sensitive, such as research facilities with vibration sensitive equipment), Category 2 (e.g., residences), and Category 3 (e.g., institutional uses such as schools, churches, etc.). For this project, groundborne vibration would have the potential to primarily affect residences (Category 2 receiving properties), and these types of properties are the focus of this assessment. The FTA vibration impact criteria for Category 2 receivers are shown in [Table 2](#).¹

¹ Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006. FTA-VA-90-1003-06.

Table 2. FTA Vibration Impact Criteria

Land Use Category	Frequent Events	Occasional Events	Infrequent Events
Category 2 - Residential	72 VdB	75 VdB	80 VdB
"Frequent Events" is defined as more than 70 vibration events of the same source per day. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. FTA, 2006.			

3.3 Land Uses and Zoning

The proposed mining area and surrounding properties are zoned RRV and RRC-NRL (Rural Reserve and Rural Resource, respectively). Skagit County does not specifically assign an EDNA based on zoning designations, so the EDNA classification of the site and surrounding properties are based on the uses of the properties. Mining uses are typically classified as Class C EDNA noise sources and residential uses are classified as Class A EDNAs.

The applicable noise limits for a Class C EDNA noise source affecting a Class A receiver are 60 dBA during daytime hours (7 AM to 10 PM) and 50 dBA during nighttime hours (10 PM to 7 AM). Allowable short-term increases to the above levels are as described previously. Operation of the mine is generally expected to occur between 7 AM and 5 PM, Monday through Friday, but the mine could potentially operate during weekends or at night, on occasion. The applicable noise limits at the nearby receivers from mining activities would be 60 dBA during standard daytime operation and 50 dBA during potential nighttime operation.

3.4 Existing Sound Levels

In January 2018, Ramboll measured day-long sound levels at three locations representative of residences nearest the proposed mining area and access drive. The measurements were taken using Larson Davis Class 1 sound level meters (Model LxT). The meters had been factory certified within the previous 12 months and were field calibrated immediately prior to the measurements. The microphones of the meters were fitted with wind screens and set approximately 5 feet above the ground (at a typical listening height).

The sound level measurements were taken at the following locations:

- **SLM1** –onsite near northern property boundary
- **SLM2** – near the southern property boundary at the entrance of the mine site, approximately 50 feet from Grip Road
- **SLM3** –approximately 0.3 miles northwest of the site along Wildlife Acres Lane

The measured sound levels are summarized in [Table 3](#), and the sound level measurement locations are depicted in [Figure 1](#). Details of hourly sound level measurements can be found in Appendix A.

Table 3. Measured Existing Sound Levels (dBA)

Location	Time of Day ^(a)	Range of Hourly Sound Levels (dBA) ^(b)				
		Leq	L25	L8.3	L2.5	Lmax
SLM1	Day	32-46	32-47	33-50	33-55	40-73
	Night	33-41	32-41	35-44	37-47	47-63
	7 AM - 5 PM	32-46	32-47	33-50	33-55	40-73
SLM2	Day	46-56	32-52	37-61	52-66	71-79 ^(c)
	Night	43-55	31-49	33-58	41-65	70-78 ^(c)
	7 AM - 5 PM	52-56	36-52	52-59	59-66	72-79 ^(c)
SLM3	Day	32-55	32-55	34-59	37-61	45-86 ^(d)
	Night	31-47	31-40	33-44	35-52	42-77 ^(d)
	7 AM - 5 PM	32-55	32-55	34-59	37-61	49-86 ^(d)

- ^(a) "Day" refers to the hours between 7 AM and 10 PM and "Night" to the hours between 10 PM and 7 AM. 7 AM to 5 PM is the standard hours of operation.
- ^(b) The Leq is the "energy-averaged" sound level. The Lmax is the-highest measured sound level. The L2.5, L8.3, and L25 levels are defined previously in this report in the discussion of the regulatory noise limits.
- ^(c) Although the meter was not staffed during the entire measurement event, elevated Lmax levels are likely due to truck passbys on Grip Road or wildlife (e.g., birdcalls) very near the microphone.
- ^(d) Although the meter was not staffed during the entire measurement event, elevated Lmax levels are likely due to nearby human activity, although wildlife activity (e.g., birdcalls) very near the microphone could also result in elevated levels.

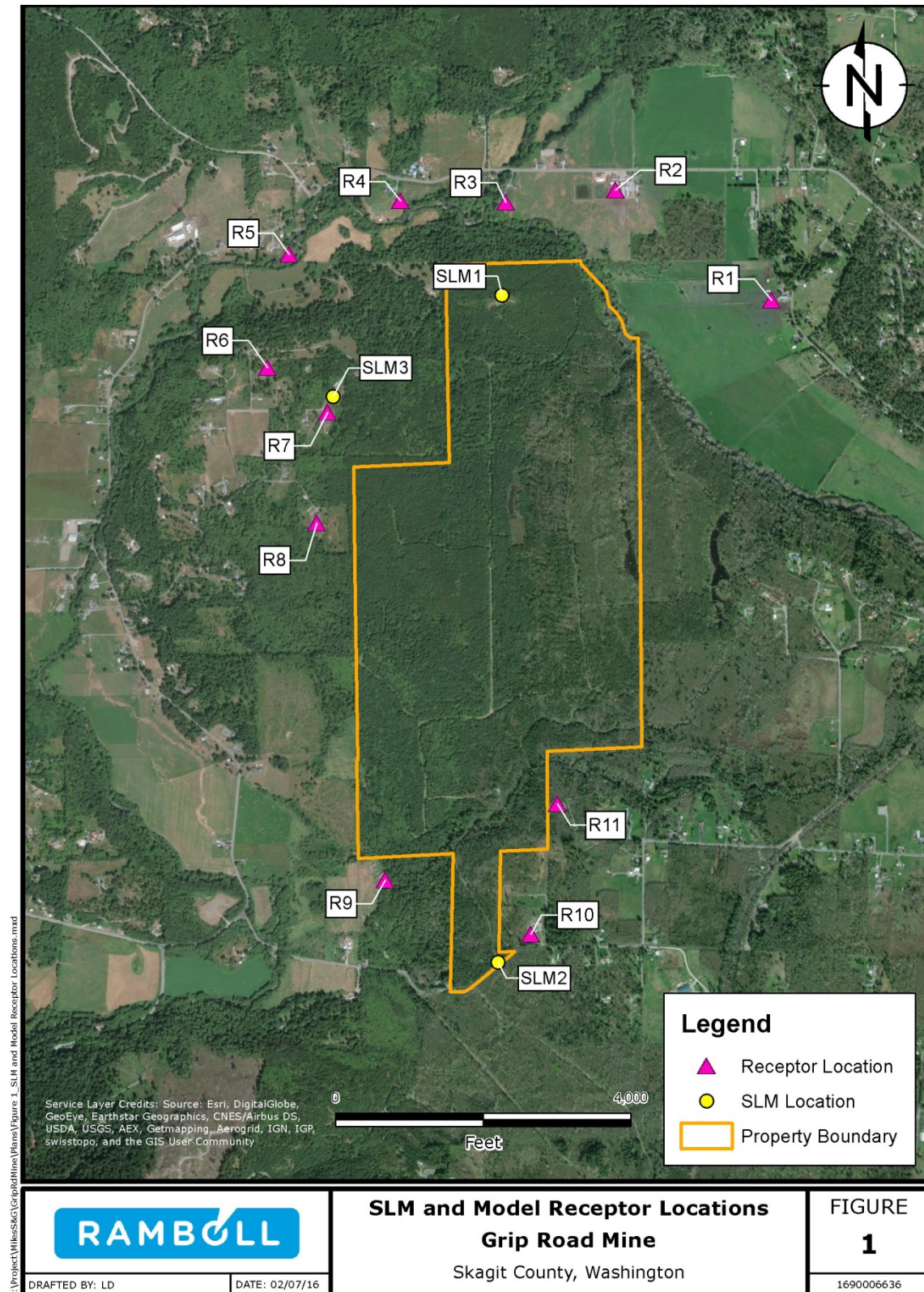


Figure 1. Sound Level Measurement and Model Receptor Locations

4. OPERATIONAL NOISE IMPACT

4.1 Noise Sources

The primary noise sources introduced by the proposal would be a front-end loader, a dozer, and/or an excavator used to excavate material from the floor of the pit in the expansion area and haul/dump trucks used to export the pit run. No crushing or processing is proposed on the site. Trucks would travel on an on-site road south to Grip Road to exit the site.

4.2 Noise Model Used

Noise modeling of on-site sources was completed using the CadnaA noise model. CadnaA is a computer tool that calculates sound levels after considering the noise reductions or enhancements caused by distance, topography, varying ground surfaces, atmospheric absorption, and meteorological conditions. For the loader and truck in the mine, the model uses algorithms that comply with the international standards in ISO-9613-2:1996.

The modeling process includes the following steps: (1) characterizing the noise sources, (2) creating 3-dimensional maps of the site and vicinity to enable the model to evaluate effects of distance and topography on noise attenuation, and (3) assigning equipment and activity sound levels to appropriate locations on the site. CadnaA then constructs topographic cross sections to calculate sound levels in the vicinity of a project site.

4.3 Modeling Assumptions

The following assumptions were used in our assessment:

- A front-end loader, dozer, and excavator were assumed to operate concurrently in the mine, with haul/dump trucks. Long-term, concurrent operation of the loader, dozer, and excavator may occur occasionally and is representative of a conservative scenario.
- When excavating the southern half of the site, the equipment was assumed to be operating at existing elevation. This is likely to occur only at the beginning of mining, after which the equipment would be expected to work at a lower excavation, with the slopes of the mine acting somewhat as a noise barrier. Therefore, this is a conservative assumption.
- When excavating the northern half of the site, the dozer was assumed to be operating on the mining slope while the loader, excavator, and trucks were assumed to be operating on the floor of the mine.
- All equipment was assumed to work continuously in the same general area for a one-hour period, with equipment locations assumed to be in the southwest, southeast, northwest, and northeast quadrants of the mine. The worst-case southern location and worst-case northern location for each receptor location were used to assess compliance and potential noise impacts.

- A truck would arrive in proximity to the loader and wait to be loaded. A waiting truck was assumed to be present continuously over the hour.
- The sound levels of the loader, excavator, and dozer were assumed to be 75, 75, and 76 dBA, respectively, at a distance of 100 feet. The sound level of the waiting truck was assumed to be 60 dBA at 100 feet.
- In addition to the waiting trucks, we considered noise from 12 trucks per hour traveling on the on-site access road to and from the mine. This estimated number of hourly trucks was based on the estimated average number of 8 trucks, with an additional 50% increase to ensure a conservative noise estimate. Trucks traveling on the onsite road were modeled using the TNM module of CadnaA.²
- The proposed mine site and contiguous property surrounding the mine had been logged. Although there are plans to log some of the site, there are currently no plans to log the entire site, so this is a conservative assumption.
- The model-calculated sound levels represent hourly Leqs. For most mining operations, the Leqs are very similar to the L25s. Therefore, the modeled hourly Leqs are used to assess compliance with the State's L25 noise limit.

4.4 Noise Modeling Results

4.4.1 Compliance Assessment

As part of the noise assessment, Ramboll first considered the potential for onsite noise to comply with the applicable WAC noise limits. For this assessment, Ramboll considered the potential sound levels from two working scenarios; 1) equipment operating at existing grade in the southern half of the site, and 2) equipment operating on the mine slope and mine floor in the northern half of the site. The resulting model-calculated sound levels for each scenario were compared to the applicable noise limits to assess potential compliance with the WAC noise limits.

The resulting model-calculated sound levels are displayed in [Table 4](#). As can be seen by the values in [Table 4](#), sound levels from the Grip Road Mine are expected to easily comply with the State's daytime noise limit during excavation. In addition, if mining activities were to occur at night, they would be expected to easily comply with the stricter nighttime limit.

² The CadnaA noise model includes a module that applies the FHWA's Traffic Noise Model (TNM) traffic noise emission levels and noise attenuation algorithms.

Table 4. Model-Calculated Sound Levels (Leq/L25, dBA)

Model Receptor	Southern Scenario	Northern Scenario	Daytime/Nighttime Noise Limit^a
R1	42	40	60/50
R2	45	42	60/50
R3	40	41	60/50
R4	40	41	60/50
R5	39	43	60/50
R6	40	41	60/50
R7	36	37	60/50
R8	34	36	60/50
R9	36	36	60/50
R10	40	39	60/50
R11	41	41	60/50

^a Daytime refers to the hours between 7 AM and 10 PM. Nighttime refers to the hours between 10 PM and 7 AM.

Source: Ramboll

4.4.2 Increases Over Existing Noise Levels From Project Sources

In addition to evaluating the potential compliance of onsite sources, Ramboll considered potential noise impacts caused by project-related increases over existing background sound levels. For the existing background sound level, we used the period Leq (energy-average sound level) between 7 AM and 5 PM to represent the existing baseline sound levels, since this represents the typical hours of operation.

Table 5. Calculated Increases over Existing Levels (Leq, dBA)

Receptor	Existing ^(a)	Southern Scenario			Northern Scenario		
		Project	Cumulative ^(b)	Increase	Project	Cumulative ^(b)	Increase
R1	43	42	46	3	40	45	2
R2	43	45	47	4	42	45	2
R3	43	40	45	2	41	45	2
R4	43	40	45	2	41	45	2
R5	43	39	45	1	43	46	3
R6	49	40	49	1	41	49	1
R7	49	36	49	0	37	49	0
R8	49	34	49	0	36	49	0
R9	54	36	54	0	36	54	0
R10	54	40	54	0	39	54	0
R11	54	41	54	0	41	54	0

Notes:

(a) The existing sound level shown is the period Leq between 7 AM and 5 PM. When identifying existing sound levels, the sound levels measured at SLM1 were assumed to represent receptors R1-R5, the levels at SLM3 represent R6-R8, and the levels at SLM2 represent R9-R11.

(b) Cumulative levels represent the existing measured sound levels + the modeled project-related sound levels.

Source: Ramboll

As can be seen in [Table 5](#), the model-calculated sound levels of all equipment operating at the existing grade in the southern half of the mine site increase by 0 to 4 dBA at the nearest residential receivers to the site. Increases of 0-2 dBA would generally be not perceptible or barely perceptible. Increases of 3 to 4 dBA may be readily perceptible but would not be characterized as a substantial increase. Also, it should be noted that these levels were modeled using conservative assumptions that all equipment would be operating concurrently for at least an hour and would be operating at the existing grade. Soon after mining begins, the equipment would be working below the existing grade in a pit, and the walls of the mine would begin to act as a noise barrier to residences north of the site. This would reduce potential increases over existing sound levels.

When mining in the northern half of the site, the estimated increases over existing levels range from 0 to 3 dBA. An increase of 3 dBA may be perceptible but would not be characterized as a substantial increase. Furthermore, the analysis was based upon the conservative assumption that all equipment (loader, excavator, dozer, and haul trucks)

would operate concurrently and continuously over an hour, which is only expected to occur occasionally. Therefore, any impacts due to increases over existing levels would be slight.

5. OPERATIONAL VIBRATION IMPACT

Although most gravel mining operations do not typically result in perceptible vibrations at offsite locations (unless blasting is required), vibration was mentioned as a source of concern by residents in the project vicinity. Therefore, Ramboll evaluated the potential for vibration impacts from the project. The proposed onsite mining operations and haul road would be located more than 500 feet (and generally much farther) from the nearest residential structures, and there is no potential for impacts from groundborne vibration due to these onsite activities. Therefore, this assessment focused on the potential for vibration impacts from trucks traveling between the site and Old Highway 99 via Grip Road and Prairie Road. For this assessment, we used FTA vibration assessment methods in conjunction with the FTA vibration impact criteria identified earlier in this report.

1.1 FTA Vibration Screening Procedure

FTA guidance includes a screening procedure to identify locations where there is little possibility of vibration impacts related to facility operations. Based on specific screening distances for various types of sources, the screening review applies the principle that if no sensitive receivers are identified within the screening distance, no vibration impacts would be expected, and no further assessment is necessary. Ramboll employed this screening procedure as the first step in the review of ground-borne vibration related to the Project. As per FTA guidance, the screening distance for rubber-tired vehicles affecting residences is 50 feet. Therefore, any residential structures farther than 50 feet from Grip Road or Prairie Road are not expected to be affected by vibration from trucks traveling to and from the site.

Ramboll identified all residential structures located within 50 feet of the nearest and farthest lanes of Grip Road and Prairie Road, west of the mine entrance. The following two residences were identified for additional consideration:

- A residential property to the west of the mine entrance along Grip Road, approximately 48 feet from the westbound lanes of the road
- A residential property along Prairie Road, approximately 41 feet from the westbound lanes of the road

1.2 FTA General Vibration Assessment

Based on the findings of the FTA vibration impact screening procedure it was necessary to conduct a more detailed "general vibration assessment" for the two residential properties identified. Ramboll conducted a general vibration assessment as described below.

The FTA guidance manual includes a chart used to estimate potential vibration levels (VdB) based on a reference travel speed, a general transit vehicle type (e.g., rubber-tired vehicles), and distance from the lane of travel. Using these reference vibration levels, adjustments can be made to account for variations in speed. Using this method, Ramboll estimated the future vibration levels at each of the two locations, as detailed below.

Residential Property Along Grip Road – There is a single residential structure that is approximately 48 feet from the westbound travel lane of Grip Road. (The eastbound lane is more than 50 feet from the residence, is beyond the screening distance, and is not considered further.) The reference vibration level for a rubber-tired vehicle traveling 30 mph at a distance of 48 feet is 64 VdB, and this reference vibration level was adjusted by +2.5 VdB to account for the higher posted speed limit of 40 mph on this section of Grip Road. With the speed adjustment, the estimated vibration level at the residential structure along Grip Road is approximately 67 VdB. The FTA impact criterion for frequent events (i.e., more than 70 events per day) affecting residential structures is 72 Vdb, and no vibration impacts are anticipated. It should be noted that the number of trucks per day traveling in the westbound lane is expected to be less than 70.

Residential Property Along Prairie Road – There is a single residential structure that is approximately 41 feet from the westbound travel lane of Prairie Road. (The eastbound lane is more than 50 feet from the residence, is beyond the screening distance, and is not considered further.) The reference vibration level for a rubber-tired vehicle traveling 30 mph at a distance of 41 feet is 65 VdB, and this reference vibration level was adjusted by +4.4 VdB to account for the higher posted speed limit of 50 mph on this section of Prairie Road. With the speed adjustment, the estimated vibration level at the residential structure along Prairie Road is approximately 69 VdB. The FTA impact criterion for frequent events (i.e., more than 70 events per day) affecting residential structures is 72 Vdb, and no vibration impacts are anticipated. As noted above, the number of trucks per day traveling in the westbound lane is expected to be less than 70.

6. CONCLUSION

Model-calculated sound levels from onsite mining equipment and haul trucks are well below both the daytime noise limit of 60 dBA (applicable between 7 AM and 10 PM) and the nighttime limit of 50 dBA (applicable between 10 PM and 7 AM). Therefore, the mine is expected to easily comply with the applicable noise limits. Furthermore, estimated increases over existing levels range from 0 to 4 dBA and would be less than 3 dBA during the vast majority of mining activities. Therefore, noise impacts from onsite mining operations would be slight.

In addition to noise impacts, the potential for vibration impacts from haul trucks traveling along Grip Road and Prairie Road were considered. Using FTA vibration impact methods and criteria, we found that there would be no impacts to residences from trucks traveling to and from the site on these roads.

APPENDIX A: SOUND LEVEL MEASUREMENT DATA

Table A- 1. Measured Sound Levels at SLM1 (dBA)

Date	Time	Leq	Lmax	L2.5	L8.3	L25	L90
22/01/2018	13:00:00	32.9	48.6	37.0	34.3	32.7	31.4
22/01/2018	14:00:00	31.8	40.1	33.0	32.5	32.0	31.3
22/01/2018	15:00:00	32.6	52.9	34.3	33.4	32.6	31.4
22/01/2018	16:00:00	42.2	71.4	48.7	38.8	34.5	32.0
22/01/2018	17:00:00	35.6	45.3	39.0	37.8	36.3	33.2
22/01/2018	18:00:00	36.3	47.7	40.8	39.1	36.9	33.2
22/01/2018	19:00:00	35.5	49.2	41.4	38.4	35.6	32.0
22/01/2018	20:00:00	34.6	47.5	40.3	37.3	34.7	31.7
22/01/2018	21:00:00	33.8	50.2	38.5	36.0	33.8	31.6
22/01/2018	22:00:00	33.2	46.8	37.3	34.8	33.3	31.4
22/01/2018	23:00:00	33.0	48.4	37.2	34.7	32.9	31.4
23/01/2018	00:00:00	33.4	51.1	38.7	35.5	33.1	31.2
23/01/2018	01:00:00	34.1	51.0	41.0	36.0	32.4	31.2
23/01/2018	02:00:00	34.5	48.1	40.2	37.3	34.3	31.6
23/01/2018	03:00:00	37.0	55.8	44.0	42.3	35.7	31.7
23/01/2018	04:00:00	35.0	50.4	39.8	37.7	35.5	32.4
23/01/2018	05:00:00	37.5	58.0	43.4	40.2	36.9	33.2
23/01/2018	06:00:00	41.2	63.3	47.1	43.6	40.9	36.6
23/01/2018	07:00:00	46.2	67.9	54.5	50.3	44.6	36.7
23/01/2018	08:00:00	45.8	63.7	51.4	49.2	46.5	38.9
23/01/2018	09:00:00	45.8	64.6	52.2	48.6	45.4	40.7
23/01/2018	10:00:00	44.9	69.9	52.3	47.5	43.1	37.8
23/01/2018	11:00:00	43.0	72.9	48.0	45.0	42.9	38.4
23/01/2018	12:00:00	42.4	64.4	48.0	44.8	42.0	37.4

Table A- 2. Measured Sound Levels at SLM2 (dBA)

Date	Time	Leq	Lmax	L2.5	L8.3	L25	L90
22/01/2018	13:00:00	52.8	72.5	63.6	54.6	39.5	30.6
22/01/2018	14:00:00	51.8	74.4	62.1	52.3	35.7	30.7
22/01/2018	15:00:00	53.0	71.5	64.0	56.2	40.8	30.5
22/01/2018	16:00:00	55.5	73.7	66.2	59.3	46.8	31.2
22/01/2018	17:00:00	55.9	74.2	66.4	60.8	47.9	31.0
22/01/2018	18:00:00	54.2	77.1	64.7	56.8	39.6	30.2
22/01/2018	19:00:00	51.5	73.4	61.7	51.0	33.0	29.9
22/01/2018	20:00:00	51.2	74.0	60.5	47.1	33.2	30.1
22/01/2018	21:00:00	45.9	71.0	52.0	37.3	32.0	29.8
22/01/2018	22:00:00	45.8	70.4	52.5	37.3	32.2	29.8
22/01/2018	23:00:00	45.3	73.8	46.5	34.7	31.4	29.7
23/01/2018	00:00:00	44.7	72.0	45.6	34.4	31.1	29.4
23/01/2018	01:00:00	46.9	76.8	40.6	32.6	32.0	29.9
23/01/2018	02:00:00	43.5	70.3	41.3	34.8	32.5	30.3
23/01/2018	03:00:00	43.1	71.5	46.7	44.1	38.0	32.2
23/01/2018	04:00:00	47.4	71.9	54.1	43.2	39.9	34.5
23/01/2018	05:00:00	53.7	78.1	62.8	53.9	45.7	37.8
23/01/2018	06:00:00	55.0	74.4	65.2	58.3	49.4	40.8
23/01/2018	07:00:00	54.4	76.7	64.6	57.0	49.0	39.9
23/01/2018	08:00:00	56.0	79.2	65.4	58.6	52.0	43.1
23/01/2018	09:00:00	54.7	74.4	63.4	56.9	51.6	44.3
23/01/2018	10:00:00	51.9	72.5	59.4	53.8	50.0	42.1
23/01/2018	11:00:00	52.1	72.0	60.7	53.2	48.8	41.5
23/01/2018	12:00:00	53.1	74.9	62.4	54.0	46.7	41.0

Table A- 3. Measured Sound Levels at SLM3 (dBA)

Date	Time	Leq	Lmax	L2.5	L8.3	L25	L90
22/01/2018	13:00:00	34.3	55.0	40.5	37.3	33.8	30.2
22/01/2018	14:00:00	32.5	48.8	37.0	33.8	32.3	30.3
22/01/2018	15:00:00	38.3	52.7	47.2	43.9	34.6	30.5
22/01/2018	16:00:00	43.6	69.9	49.7	46.8	42.6	31.2
22/01/2018	17:00:00	33.6	47.9	37.5	35.1	33.6	31.7
22/01/2018	18:00:00	33.1	46.6	36.8	34.6	33.2	31.3
22/01/2018	19:00:00	33.4	44.5	36.8	35.2	33.8	31.5
22/01/2018	20:00:00	33.6	49.9	38.0	35.9	33.9	31.4
22/01/2018	21:00:00	33.3	48.6	37.9	35.0	33.3	31.1
22/01/2018	22:00:00	32.4	46.7	36.4	34.3	32.4	30.5
22/01/2018	23:00:00	32.3	46.9	36.9	33.9	32.3	30.3
23/01/2018	00:00:00	32.3	46.5	36.4	34.7	32.7	30.0
23/01/2018	01:00:00	31.0	42.1	34.8	32.7	30.8	29.8
23/01/2018	02:00:00	31.8	47.1	35.3	33.4	31.8	29.9
23/01/2018	03:00:00	36.4	63.8	43.1	40.5	32.7	30.3
23/01/2018	04:00:00	35.0	66.7	38.5	35.6	33.7	31.3
23/01/2018	05:00:00	36.5	63.0	40.8	38.0	36.1	32.2
23/01/2018	06:00:00	47.4	77.4	51.9	44.0	40.4	35.9
23/01/2018	07:00:00	48.4	77.9	51.5	47.2	43.4	36.5
23/01/2018	08:00:00	54.5	83.1	61.4	58.6	54.6	42.6
23/01/2018	09:00:00	48.7	76.2	54.3	49.8	46.0	40.3
23/01/2018	10:00:00	46.4	72.7	52.1	47.2	42.9	38.0
23/01/2018	11:00:00	52.7	86.2	53.9	50.5	47.1	38.8
23/01/2018	12:00:00	46.6	65.4	54.2	51.5	46.9	37.5