Noise and Vibration Analysis

Idaho Maryland Mine

Nevada County, California

BAC Job # 2018-203

Prepared For:

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Introduction

Rise Grass Valley Inc. (Rise) proposes to reinitiate underground mining and gold mineralization processing of the Idaho-Maryland Mine (project) in unincorporated Nevada County (County). The proposed facilities and operations will be located on two properties owned by Rise, the Brunswick Industrial Site and the Centennial Industrial Site, also referred to herein as Brunswick Site and Centennial Site.

The project site is located in western unincorporated Nevada County, California. The Brunswick Industrial Site is approximately 2 miles from the center of the city of Grass Valley and State Route 49. The Centennial Industrial Site is adjacent to the Grass Valley city limits. The Centennial Industrial Site is accessed from Whispering Pines Lane and the Brunswick Industrial Site is accessed from Brunswick Road or East Bennett Road.

Figure 1 shows the project location.

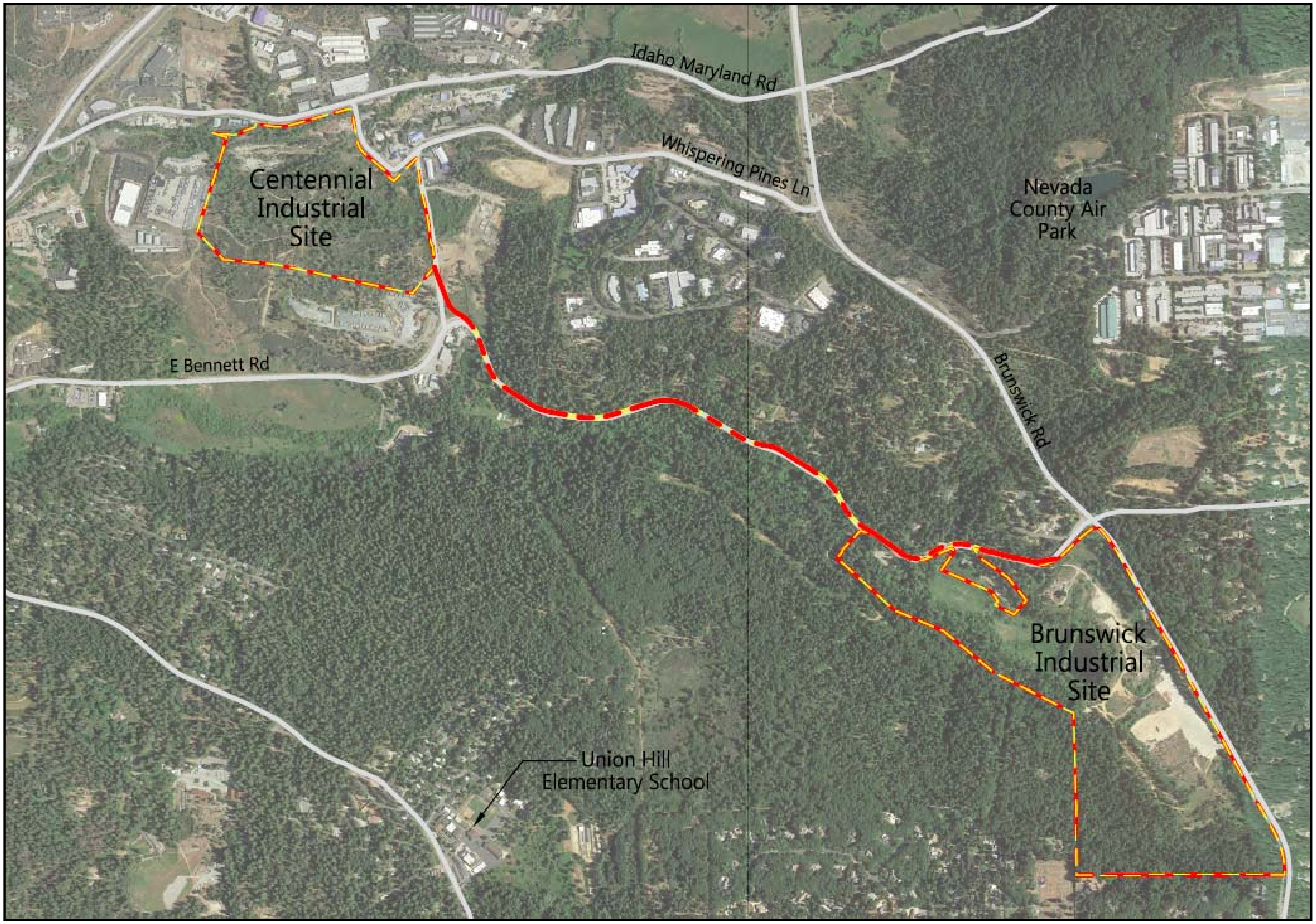
Bollard Acoustical Consultants, Inc. (BAC) has been retained by Rise to prepare this evaluation of potential noise and vibration impacts related to the proposed project. It should be noted that blasting vibration impacts were evaluated separately by IDC-PBS (Intercontinental Development Corporation – Precision Blasting Services, Inc.) in a report dated September 27, 2019. As a result, this analysis does not contain an evaluation of blasting vibration impacts. Blasting related noise impacts are evaluated in this analysis.

Objectives of this Analysis

The objectives of this analysis are as follows:

- To provide background information pertaining to the effects of noise and vibration.
- To identify existing sensitive land uses in the immediate project vicinity that may be affected by project related noise and vibration (referred to in this analysis as “receptors”.
- To quantify existing ambient noise and vibration levels at representative receptors nearest to the project sites and proposed haul routes.
- To identify California Environmental Quality Act (CEQA) standards of significance for this project.
- To predict project-related noise and vibration levels at the nearest receptor areas and to compare those levels against the project standards of significance.
- To evaluate mitigation measures where significant project-related noise or vibration impacts are identified.

Figure 1
Idaho-Maryland Mine Project Site Location
Nevada County, California



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Fundamentals and Terminology

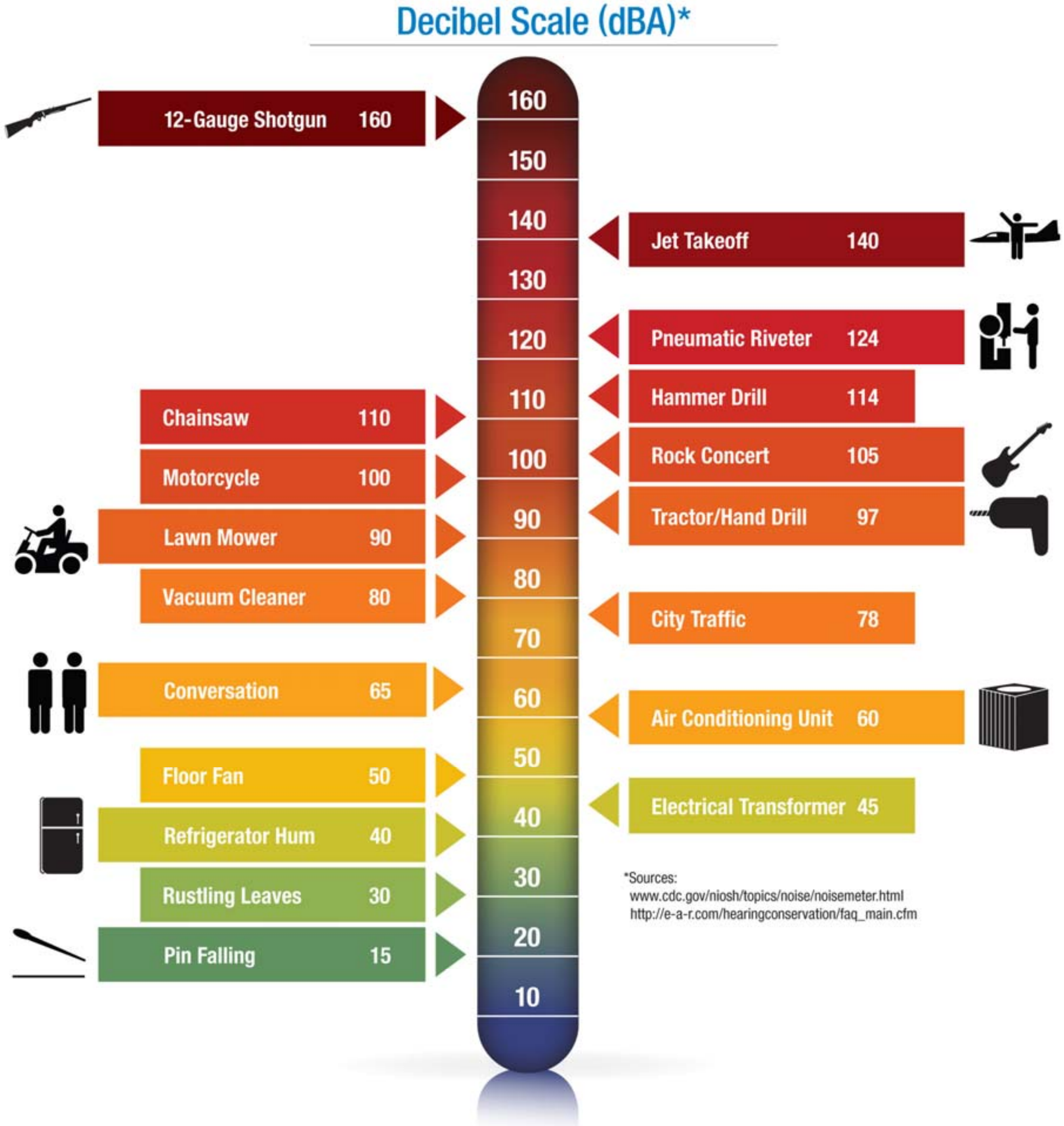
Noise Fundamentals

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and hence are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, called Hertz (Hz). See Appendix A for definitions of acoustical terminology used in this report.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighing network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels. Examples of common noise sources and corresponding noise levels are provided in Figure 2.

Figure 2
Noise Levels Associated with Common Noise Sources



Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The Leq is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The Day-night Average Level (Ldn) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment. L_{dn} based noise standards are commonly used to assess noise impacts associated with traffic, railroad and aircraft noise sources.

The Nevada County noise standards, which are discussed in detail later in this report, are expressed in terms of the hourly average and single-event maximum noise level performance standards. In addition to applying the County's noise standards to this Project, the California Environmental Quality Act (CEQA) requires that noise impacts be assessed relative to ambient noise levels that are present without the project. As a result, ambient noise surveys were conducted, and comparisons of Project to No-Project noise levels were used to assess noise impacts (in addition to comparison to Nevada County noise standards). Specifically, individual maximum (L_{max}) noise levels and hourly average (L_{eq}) noise levels, both with and without the project, were compared so that the assessment of noise impacts was not based solely on an assessment of project-generated noise in terms of 24-hour averages (L_{dn}), but also on short-term fluctuations in the ambient noise environment.

Audibility

Audibility is not a test of significance according to CEQA. If this were the case, any project which added any audible amount of noise to the environment would be considered significant according to CEQA. Because every physical process creates noise, and because audibility is variable, the use of audibility alone as significance criteria would be unworkable. CEQA requires a ***substantial*** increase in noise levels before noise impacts are identified, not simply an audible change. The discussion of what constitutes a substantial change in noise environments is provided in the Regulatory Setting section of this report.

Effects of Distance on Sound Propagation

As a general rule, sound from a localized source spreads out as it travels away from the source, and the sound pressure levels drop off with distance according to fundamental relationships. Sound from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (i.e., decreases) at a rate of 6 dB for each doubling of distance from a point source. For this project, on-site activities and processing equipment are treated as a point source in the noise propagation calculations. Off-site truck traffic is treated as a moving point source in the propagation calculations, with a sound level decay rate of 4.5 dB per doubling of distance from the noise source.

Atmospheric (Molecular) Absorption and Anomalous Excess Attenuation

Air absorbs sound energy. The amount of absorption is dependent on the temperature and humidity of the air, as well as the frequency of the sound. Families of curves have been developed which relate these variables to molecular absorption coefficients, frequently expressed in terms of dB per thousand feet. For standard day atmospheric conditions, defined as 59 degrees

Fahrenheit and 70% relative humidity, the molecular absorption coefficient at 1000 hertz is 1.5 dB per thousand feet. Molecular absorption is greater at higher frequencies, and reduced at lower frequencies. In addition, for drier conditions, the molecular absorption coefficients generally increase. Similarly, as temperature increases, molecular absorption coefficients typically increase as well.

Anomalous excess attenuation caused by variations in wind speed, wind direction, and thermal gradients in the air can typically be estimated using an attenuation rate of 1.5 dB per thousand feet for a noise source generating a 1000 hertz signal. As with molecular absorption, anomalous excess attenuation typically decrease with lower frequencies and increases with higher frequencies.

For a conservative assessment of sound propagation for this evaluation, a single attenuation factor of 1.5 dB per thousand feet of distance was used. Because noise generated by the proposed project is anticipated to contain the majority of sound energy in frequencies above 500 hertz, the 1.5 dB per thousand feet attenuation rate is considered appropriate for this assessment.

Effects of Barriers and Ground Cover

A noise barrier is any impediment which intercepts the path of sound as it travels from source to receiver. Such impediments can be natural, such as a hill or other naturally occurring topographic feature which blocks the receiver's view of the source. Impediments can also be vegetative, such as heavy tree cover which similarly blocks the source from view of the receiver. Finally, impediments can be man-made, such as a solid wall, earthen berm, or structure constructed between the noise source and receiver. Regardless of the type of impediment, the physical properties of sound are such that, at the point where the line-of-sight between the source and receiver is interrupted by a barrier, a 5 dB reduction in sound occurs.

The effectiveness of a barrier is a function of the difference in distance sound travels on a straight-line path from source to receiver versus the distance it must travel from source to barrier, then barrier to receiver. This difference is referred to as the "path length difference", and is used to calculate the Fresnel Number. A barrier's effectiveness is a function of the Fresnel number and frequency content of the source. In general, the more acute the angle of the sound path created by the introduction of a barrier, the greater the noise reduction provided by the barrier.

For this project, more distant receptors will be shielded from view of on-site activities, but closer receptors will not. Where such shielding would occur, the level of noise reaching the receiver would be lower than at unshielded receivers located the same distances from the source. Because shielding of the various components of the project varies both by source and receiver location, this analysis takes the conservative approach of not applying any downward adjustments to predicted noise levels generated by the project at any of the nearest receiver locations, regardless of whether or not those receivers would be shielded.

Attenuation by Buildings and Enclosures

When equipment or processes are located within a building or enclosure, the noise generation of that equipment and processes is attenuated by the building walls and ceiling. The specific degree of attenuation provided by a building will depend on the building materials and construction, as well as the number and size of openings in the building, such as may be required for ventilation. With the exception of on-site mobile equipment, the significant stationary noise sources associated with the project are proposed to be located within an insulated buildings. The noise attenuation provided by the proposed buildings will depend upon ultimate building design and construction, but is estimated to be a minimum of 20 dBA.

Vibration Fundamentals

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, while vibration is usually associated with transmission through the ground or structures. As with noise, vibration consists of an amplitude and frequency. A person's response to vibration will depend on their individual sensitivity as well as the amplitude and frequency of the source.

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities (PPV, inches/second), or Velocity Decibels in terms of root-mean-square levels (VdB RMS). Standards pertaining to perception as well as potential damage to structures have been developed for vibration in terms of peak particle velocity as well as root-mean-square.

As vibrations travel outward from the source, they excite the particles of rock and soil through which they pass and cause them to oscillate. Differences in subsurface geologic conditions and distance from the source of vibration will result in different vibration levels characterized by different frequencies and intensities. In all cases, vibration amplitudes will decrease with increasing distance. The maximum rate or velocity of particle movement is the commonly accepted descriptor of the vibration "strength."

Human response to vibration is highly subjective and difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does the frequency of occurrence of the vibration source. Generally, as the duration and vibration frequency of the events increase, the potential for adverse human response increases.

Blasting creates seismic waves that radiate along the surface of the earth and downward into the earth. If close enough to the blasting location, these surface waves can be felt as ground vibration. Ground vibration can result in effects ranging from annoyance of people to damage of structures. If a person is engaged in any type of physical activity, the vibration levels required for perception and annoyance is increased considerably.

Evaluation of Existing Ambient Noise Environment

Project Area Noise Environment

The existing ambient noise environment in the vicinity of the Brunswick and Centennial Sites is defined primarily by local and distant traffic, as is the noise environment along the proposed project haul routes.

Project Area Sensitive Receptors

The nearest sensitive receptors to the Brunswick and Centennial sites, and haul routes are residences, with the greatest number located to the north, east and south of the Brunswick site. Residences in the vicinity of the Centennial site are very limited, and are located to the north and northeast of that site.

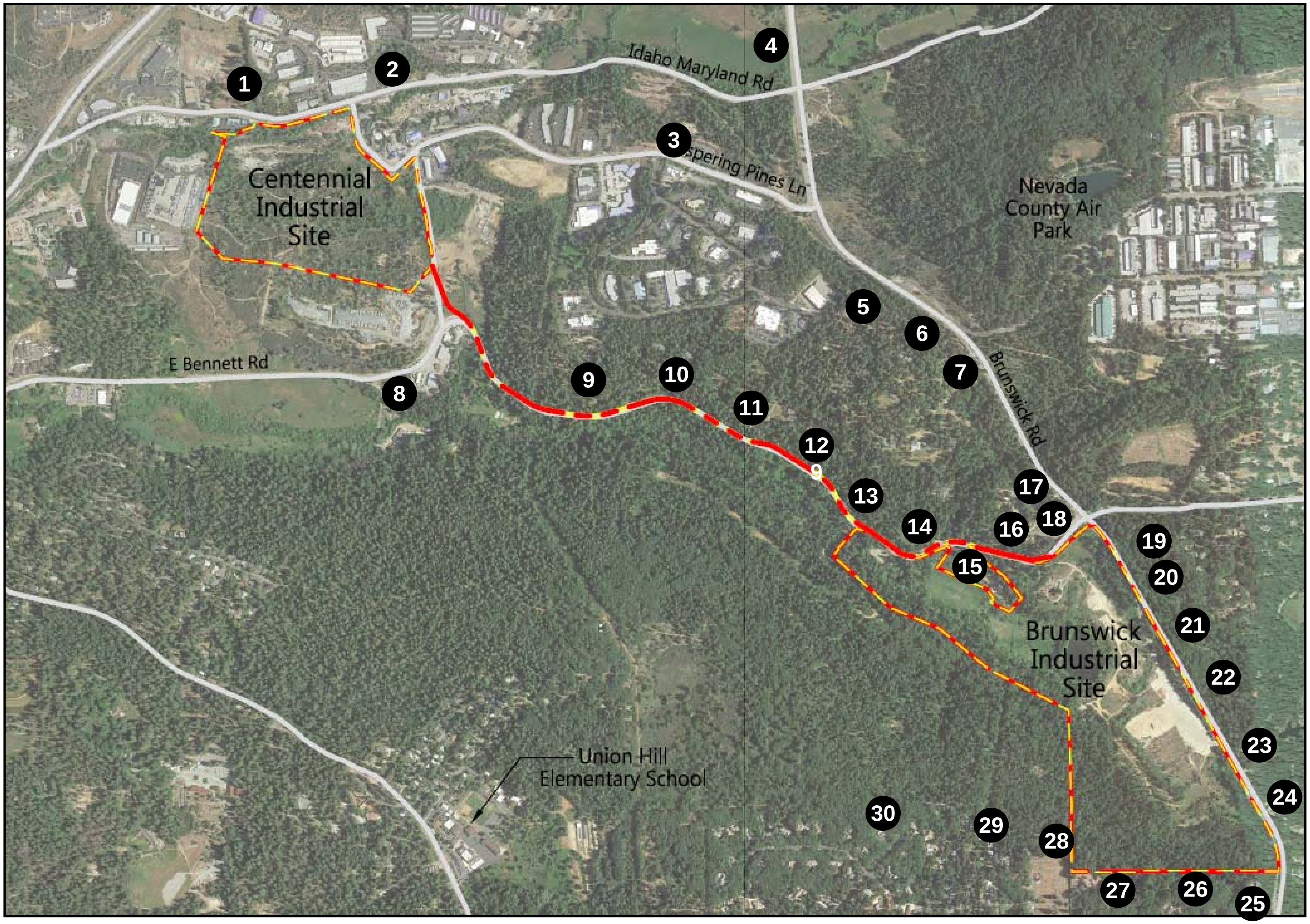
While it is recognized that there are several residences surrounding the Brunswick site, it is not necessary to assess potential project impacts at each and every individual residence. Rather, standard industry convention is to assess impacts at receptors which are representative of the nearest potentially affected residences to the project site (including residences located adjacent to project haul routes).

For this assessment, a total of 30 representative sensitive receptors were selected for analysis. Those receptors, which are illustrated on Figure 3, consist of the following locations:

- 17 residences surrounding the Brunswick site.
- 3 residences near the Centennial site.
- 1 residence along Whispering Pines Lane between Brunswick Road and Centennial Drive.
- 5 residences along Brunswick Road, north of East Bennett Road.
- 4 residences along East Bennett Road.

Not all project noise sources will affect each of the representative receptors selected for analysis. For example, at receptors 1 & 2, which are north of the Centennial site, noise generated at the Brunswick site is expected to be inaudible over background noise. As a result, receptors 1 & 2 were selected since they represent the nearest residences to the Centennial Industrial Site. Receptors 9-12 were selected to represent exposure of existing residences to noise generated during construction of the potable water pipeline along a portion of East Bennett Road. Receptors 3-7 were selected to represent residences exposed to project truck traffic noise, with receptor 4 representing future residences in the Loma Rica development. Receptors 13-30 were selected for analysis of on-site noise generation at the Brunswick site, with receptors 17-23 also used to assess potential truck traffic noise impacts.

Figure 3
Nearest Representative Sensitive Receptors
Idaho-Maryland Mine Project - Nevada County, California



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: Representative Sensitive Receptor Locations

Existing Ambient Noise Environment at Sensitive Receptors

The California Environmental Quality Act (CEQA) states that a project would result in a significant noise impact if it causes a substantial permanent or temporary increase in ambient noise levels. In order to determine the threshold at which a project would result in a substantial noise increase, the existing (pre-project) ambient conditions at potentially impacted noise-sensitive land uses must be established.

To quantify the existing ambient noise environment in the project vicinity continuous noise level measurements were conducted at 11 locations in the project vicinity. The noise measurement locations were selected to be representative of ambient noise conditions at receptors nearest to both the Brunswick and Centennial sites, at locations along East Bennett Road where the potable water system is to be installed, and at receptors along the proposed project haul routes. The ambient noise measurement locations are identified on Figure 4. That ambient noise data was supplemented with ambient noise level data collected by BAC in 2018 at the Loma Rica project site adjacent to Brunswick Road (Site 12).

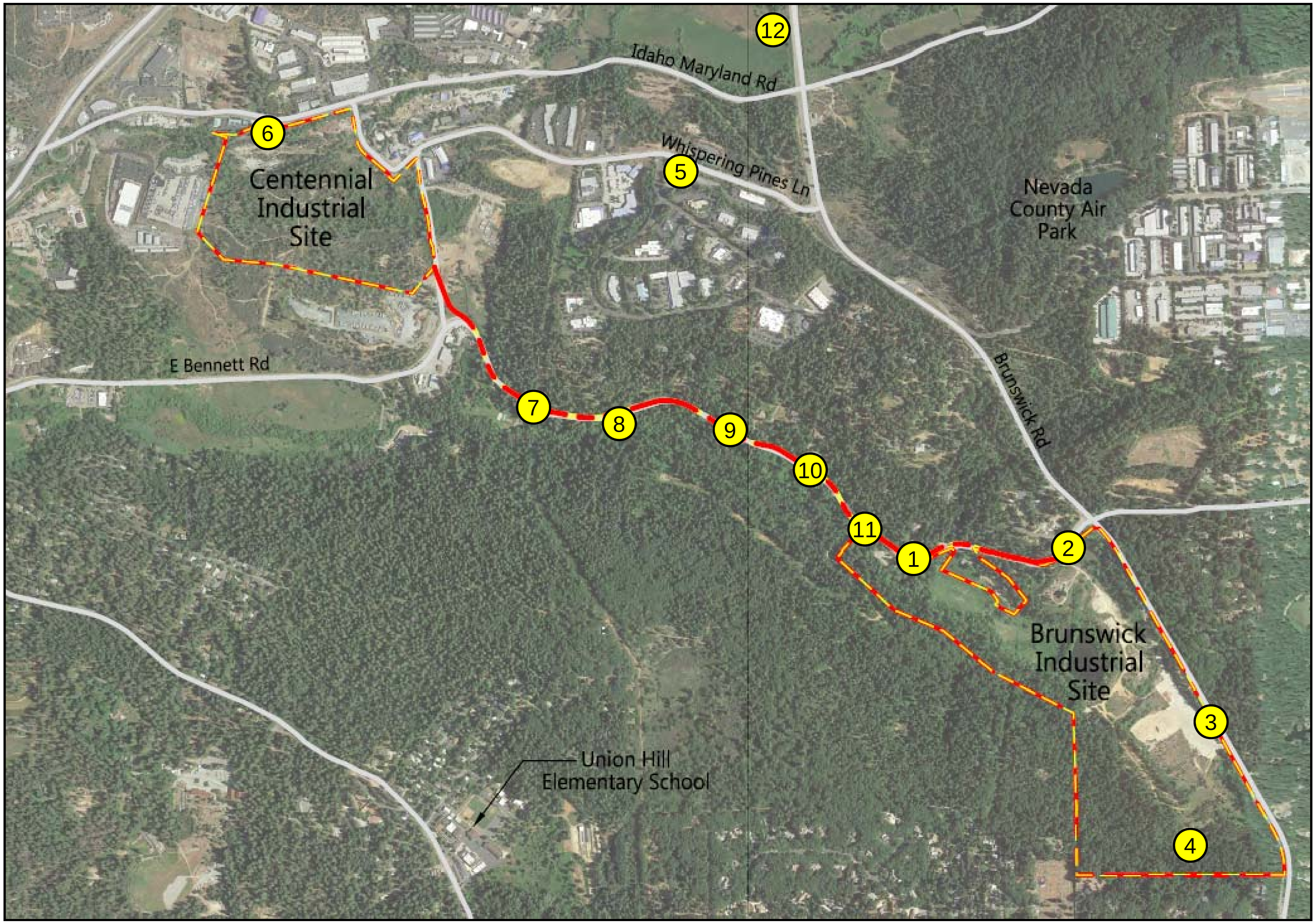
It is noted that continuous noise monitoring was not conducted at each of the 30 sensitive receptors evaluated in this study. Some of the monitoring locations are considered to be representative of ambient conditions at multiple receptor locations. For example, the data collected at monitoring site 3, which was located adjacent to Brunswick Road south of East Bennett Road, can be extrapolated to represent ambient noise conditions at receptors 19-25. Similarly, monitoring site 12 can be used to extrapolate ambient conditions at receptors adjacent to Brunswick Road north of East Bennett Road (receptors 4-7, 17 & 18).

The measurements nearest to the Brunswick site (sites 1-4) were conducted in June of 2017 prior to drilling operations at the Brunswick site. As a result, those ambient noise measurements do not include noise associated with drilling operations. Other sites, which were sufficiently far from the Brunswick site so as not to be affected by test drilling operations, were monitored in 2018 and 2019.

Weather conditions present during the monitoring program were typical for the seasons during which they were conducted. There were no adverse or anomalous weather conditions which would have caused measured ambient noise levels to be atypical. Larson Davis Laboratories (LDL) Model 820, LxT and 831 precision integrating sound level meters were used for the noise level measurement survey. The meters were calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters.

Numerical summaries of the ambient noise level measurements are provided in Table 1. Table 1 also contains the arithmetic mean of the data collected on each day of the survey. Graphs of the individual hourly average (L_{eq}) and maximum (L_{max}) noise levels for each site and each day are presented in Appendix B.

Figure 4
Ambient Noise and Vibration Measurement Sites
Idaho-Maryland Mine Project Vicinity - Nevada County, California



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#: Ambient Noise and Vibration Monitoring Locations

Table 1
Summary of Long-term Noise Monitoring Results
Idaho Maryland Mine Project

Site[1]	Date	Ldn (dBA)	Average Measured Hourly Noise Levels (dBA)					
			Daytime[2]		Evening[3]		Nighttime[4]	
			Leq	Lmax	Leq	Lmax	Leq	Lmax
1	Tuesday, June 13, 2017	61	60	82	57	82	51	71
	Wednesday, June 14, 2017	61	61	83	59	85	52	75
	Thursday, June 15, 2017	61	59	80	57	79	52	76
	Friday, June 16, 2017	60	59	80	56	77	51	74
	Saturday, June 17, 2017	58	57	78	55	78	49	69
	Sunday, June 18, 2017	58	57	83	56	81	49	71
	Average	**60**	**59**	**81**	**57**	**80**	**51**	**73**
2	Tuesday, June 13, 2017	60	59	82	56	81	51	71
	Wednesday, June 14, 2017	60	59	82	56	83	51	73
	Thursday, June 15, 2017	60	59	81	56	79	51	73
	Friday, June 16, 2017	60	59	80	55	77	51	73
	Saturday, June 17, 2017	58	56	78	55	81	48	70
	Sunday, June 18, 2017	58	57	82	56	82	47	69
	Average	**59**	**58**	**81**	**56**	**81**	**50**	**72**
3	Tuesday, June 13, 2017	69	67	80	64	79	60	78
	Wednesday, June 14, 2017	68	67	81	64	84	59	77
	Thursday, June 15, 2017	68	67	82	64	81	59	79
	Friday, June 16, 2017	68	67	82	64	79	59	76
	Saturday, June 17, 2017	67	65	80	63	81	58	76
	Sunday, June 18, 2017	66	64	81	64	81	57	77
	Average	**68**	**66**	**81**	**64**	**81**	**59**	**77**
4	Tuesday, June 13, 2017	53	52	64	49	64	45	55
	Wednesday, June 14, 2017	52	51	64	49	61	44	56
	Thursday, June 15, 2017	53	51	62	50	65	45	57
	Friday, June 16, 2017	53	52	65	49	61	45	56
	Saturday, June 17, 2017	51	50	64	48	63	43	54
	Sunday, June 18, 2017	50	49	62	48	63	42	56
	Average	**52**	**51**	**64**	**49**	**63**	**44**	**56**
5	Tuesday, October 01, 2019	60	60	81	53	69	51	67
	Wednesday, October 02, 2019	60	61	82	52	73	51	70
	Average	**60**	**61**	**82**	**53**	**71**	**51**	**69**
6	Tuesday, October 01, 2019	66	65	80	60	76	59	73
	Wednesday, October 02, 2019	67	65	81	60	74	59	74
	Thursday, October 03, 2019	67	65	80	60	76	59	73
	Average	**63**	**63**	**81**	**56**	**73**	**55**	**71**
7	Friday, December 07, 2018	59	59	79	55	75	50	73
	Saturday, December 08, 2018	57	57	76	54	77	47	69
	Sunday, December 09, 2018	55	56	76	52	74	46	68
	Monday, December 10, 2018	57	58	77	53	74	48	69
	Average	**60**	**60**	**78**	**55**	**75**	**51**	**70**
8	Friday, December 07, 2018	57	57	76	54	73	47	70
	Saturday, December 08, 2018	55	55	74	54	77	45	67
	Sunday, December 09, 2018	54	54	74	51	72	44	65
	Monday, December 10, 2018	56	56	75	52	74	45	66
	Average	**56**	**57**	**76**	**53**	**74**	**47**	**68**
9	Friday, December 07, 2018	60	60	79	57	76	51	74
	Saturday, December 08, 2018	59	59	79	56	79	49	71
	Sunday, December 09, 2018	57	58	79	55	78	47	70

Table 1
Summary of Long-term Noise Monitoring Results
Idaho Maryland Mine Project

Site[1]	Date	Ldn (dBA)	Average Measured Hourly Noise Levels (dBA)					
			Daytime[2]		Evening[3]		Nighttime[4]	
			Leq	Lmax	Leq	Lmax	Leq	Lmax
	Monday, December 10, 2018	60	60	80	56	79	49	71
	Average	**58**	**58**	**78**	**55**	**77**	**48**	**70**
10	Friday, December 07, 2018	59	59	79	56	77	50	74
10	Saturday, December 08, 2018	58	57	79	55	78	48	72
10	Sunday, December 09, 2018	57	57	79	53	76	47	70
10	Monday, December 10, 2018	58	59	79	55	77	48	71
10	**Average**	**58**	**58**	**79**	**55**	**77**	**48**	**71**
11	Friday, December 07, 2018	59	59	77	56	75	50	73
11	Saturday, December 08, 2018	57	57	76	56	78	48	70
11	Sunday, December 09, 2018	56	57	78	53	75	47	70
11	Monday, December 10, 2018	58	58	77	55	76	49	71
11	**Average**	**58**	**58**	**78**	**55**	**76**	**48**	**71**
12	Thursday, July 26, 2018	63	55	72	53	65	56	70
12	**Average**	63	55	72	53	65	56	70

1. Ambient noise monitoring locations are shown on Figure 4.
2. Daytime = 7 am – 7 pm
3. Evening = 7 pm – 10 pm
4. Nighttime = 10 pm – 7 am

The Table 1 data indicate that ambient conditions vary depending primarily on the distance between the monitoring site and nearby roadways, with existing L_{dn} levels as high as 68 dBA near Brunswick Road (site 3) and as low as 52 dBA at locations removed from roadway noise sources (site 4). The ambient noise level data were used to develop thresholds for determining significant project-generated noise level increases for on-site noise sources and activities. Those thresholds are discussed later in this report.

Existing Traffic Noise Environment

As noted previously, the existing ambient noise environment in the project vicinity is defined primarily by existing traffic. To allow the evaluation of relative changes in off-site traffic noise levels which would result from the project, the existing traffic noise environment was quantified using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) with the Calveno vehicle noise emission curves.

Inputs to the FHWA Model include traffic volume, speed, truck usage percentages and distance from centerline to receptor. The FHWA Model predicted hourly average noise levels. To predict traffic noise levels in terms of day/night average noise levels (L_{dn}), the day/night distribution of traffic is required.

Existing and project-generated traffic data was provided by KD Anderson & Associates, Inc. Transportation Engineers. Truck usage percentages were obtained from BAC observations and published Caltrans traffic counts. Vehicle speeds were based on posted speed limits and BAC observations. The day/night distribution of traffic was obtained from the 24-hour ambient noise monitoring results described previously.

Table 2 shows the calculated existing traffic noise levels in terms of L_{dn} at the nearest representative residential receptors to each roadway segment. A complete listing of the FHWA Model input data for existing conditions are provided in Appendix C-1.

Table 2
Existing Traffic Noise Levels at Nearest Representative Residential Receptors
Idaho Maryland Mine Project Vicinity Roadways

#	Roadway	Segment	Distance (feet)	Ldn, dBA	60 dB Ldn Contour Distance (ft)
1	East Bennett Road	West of Brunswick Road	135	52.5	43
2	Brunswick Road	Brunswick Site Entrance to East Bennett Road	200	60.9	230
3	Brunswick Road	North of Whispering Pines Lane	100	66.6	275
4	Brunswick Road	South of Brunswick Site Entrance	150	62.8	230
5	Brunswick Road	Whispering Pines Lane to East Bennett Road	120	66.4	319
6	Empire Street	West of SR 174	50	59.8	49
7	Empire Street	East of South Auburn Street	50	61.1	59
8	Idaho Maryland Road	East of SR 49	90	61.5	113
9	State Route 174	West of Brunswick	50	67.8	166
10	Whispering Pines Lane	Crown Point Circle to Brunswick	70	57.8	50
11	Whispering Pines Lane	Centennial to Crown Point Circle	70	59.1	61

Source: FHWA-RD-77-108 with inputs provided by KD Anderson, BAC and Caltrans

Evaluation of Existing Ambient Vibration Environment

As with the local noise environment, the ambient vibration environment is defined primarily by traffic on the local roadway network. No other appreciable sources of vibration were identified during BAC field surveys of the area. To quantify baseline vibration levels at representative locations in the project vicinity, BAC conducted short-term vibration measurements at the same locations as the ambient noise monitoring locations.

The vibration measurements were conducted using a Larson-Davis Laboratories Model LxT sound level meter fitted with a BRC SEN_VEL Vibration Transducer (500 mV/ips). The test system is a Type I instrument designed for use in assessing vibration as perceived by humans, and meets the full requirements of ISO 8041:1990(E). A summary of the vibration measurement results is provided in Table 3.

Table 3
Summary of Short-term Vibration Results
Idaho Maryland Mine Project Vicinity

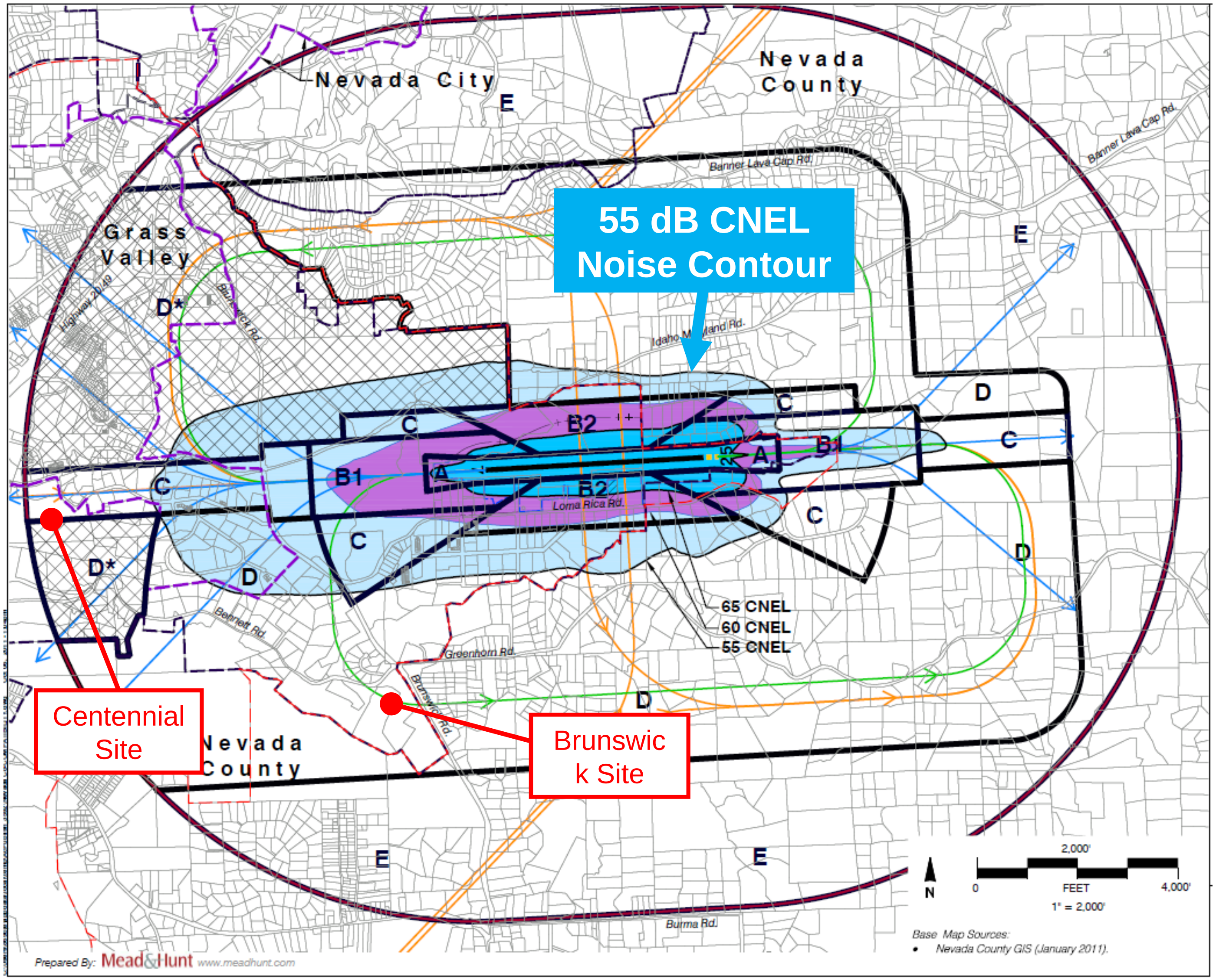
	Measured Vibration Levels, VdB rms		
Measurement Site[1]	**Min**	**Average**	**Max**
V1	31	41	64
V2	31	42	60
V3	31	47	60
V4	31	35	50
V5	31	34	48
V6	31	37	48
V7	31	38	54
V8	32	41	62
V9	31	39	54
V10	32	57	76
V11	31	46	66

1. Vibration measurement locations are shown on Figure 4.

Evaluation of Existing Aircraft Noise Environment

The Nevada County Airport is located approximately 4,000 feet northeast of the Brunswick site and approximately 7,500 feet east of the Centennial site. Exhibit 3-5 of the Nevada County Airport Land Use Compatibility Plan shows the location of the airports 55, 60, and 65 dB CNEL contours. That Figure, which has been reproduced as Figure 5 of this report, indicates that the Brunswick Industrial and Centennial Sites are both located beyond the 55 dB CNEL contour for the airport.

Figure 5
Nevada County Airport Noise Contours
Nevada County, California



Source: Nevada County Airport Land Use Compatibility Plan (2011)

Criteria for Acceptable Noise Exposure

The California Environmental Quality Act (CEQA) contains noise impact assessment guidelines. In addition, California cities and counties are required to adopt a Noise Element as part of the General Plan. Cities and counties typically also adopt a noise ordinance. The Project site is located in Nevada County, which has both a General Plan Noise Element and a County Code Noise Ordinance. In addition, the Whispering Pines Specific Plan contains development standards related to noise. Applicable CEQA Guidelines, Nevada County noise-level criteria, and appropriate criteria of other jurisdictions are discussed below.

California Environmental Quality Act (CEQA) Guidelines

The State of California has established regulatory criteria that are applicable to this assessment. Specifically, Appendix G of the CEQA Guidelines are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. According to the CEQA guidelines, the project would result in a significant noise or vibration impact if the following occur:

> Generation of substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or ~~in~~ other applicable ~~local, state, or federal~~ standards *of other agencies*?

A. Generation of substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable standards of other agencies?

B. Generation of excessive groundborne vibration or groundborne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

As noted in CEQA Criteria "A" above, a project's noise impacts must be evaluated relative to both the ***increase*** in noise level which would result from the project as well as compliance with standards established in the local general plan or noise ordinance.

The Nevada County General Plan Noise Element and Noise Ordinance do not have a specific policy or standard for assessing noise impacts associated with ***increases*** in off-site ambient noise levels resulting from project-generated traffic on public roadways. The County's General Plan and Ordinances do contain specific numeric standards for acceptable increases over ambient (5 dB per footnote D of Table 5 – discussed later in this section), but they do not contain numeric standards for ***increases*** in off-site traffic noise levels resulting from a project.

Because CEQA requires that the significance of noise impacts be evaluated relative to the ***increase*** in noise resulting from a project, where the local jurisdiction does not have such adopted thresholds, reasonable thresholds from other jurisdictions must be considered. As a result, the following section describes Federal thresholds for assessing the significance of project-related increases in off-site heavy truck traffic using federal research conducted by the Federal Interagency Commission on Noise (FICON).

Federal Criteria for Determination of a Significant Noise Increases

The Federal Interagency Commission on Noise (FICON) has developed a graduated scale for use in the assessment of project-related noise level increases. The criteria shown in Table 4 was developed by FICON as a means of developing thresholds for impact identification for project-related noise level increases. The FICON standards have been used extensively in recent years by the authors of this section in the preparation of the noise sections of Environmental Impact Reports that have been certified in many California cities and counties.

The use of the FICON standards are considered conservative relative to thresholds used by other agencies in the State of California. For example, the California Department of Transportation (Caltrans) requires a project-related traffic noise level increase of 12 dB for a finding of significance, and the California Energy Commission (CEC) considers project-related noise level increases between 5 to 10 dB significant, depending on local factors. Therefore, the use of the FICON standards, which set the threshold for finding of significant noise impacts as low as 1.5 dB, provides a very conservative approach to impact assessment for this project.

Table 4
Significance of Changes in Cumulative Noise Exposure

Ambient Noise Level Without Project (Ldn or CNEL)	Change in Ambient Noise Level Due to Project
<60 dB	+5.0 dB or more
60 to 65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON)

Based on the FICON research, as shown in Table 4, a 5 dB increase in noise levels due to a project is required for a finding of significant noise impact where ambient noise levels without the project are less than 60 dB. Where pre-project ambient conditions are between 60 and 65 dB, a 3 dB increase is applied as the standard of significance. Finally, in areas already exposed to higher noise levels, specifically pre-project noise levels in excess of 65 dB, a 1.5 dB increase is considered by FICON as the threshold of significance.

As noted previously, audibility is not a test of significance according to CEQA. If this were the case, any project which added any audible amount of noise to the environment would be considered significant according to CEQA. Because every physical process creates noise, whether by the addition of a single vehicle on a roadway, or a tractor in an agricultural field, the use of audibility alone as significance criteria would be unworkable. CEQA requires a substantial increase in ambient noise levels before noise impacts are identified, not simply an audible change.

Nevada County Regulations

Nevada County Noise Element

Chapter 9 of the Nevada County General Plan contains the County's Noise Element. The Noise Element contains adopted Goals, Objectives and Policies pertaining to noise. The Noise Element Policies which are pertinent to this project are reproduced below.

Policy 9.1.1 Determine the existing noise environment and continue to reassess this environment so that a realistic set of noise standards can be developed reflecting the varying nature of different land uses.

Policy 9.1.2 The following noise standards, contained in Table 5 below (General Plan Noise Element Table 9.1), as performance standards and land use compatibility standards, shall apply to all discretionary and ministerial projects excluding permitted residential (including tentative maps) land uses.

Table 5
Nevada County General Plan Noise Element Exterior Noise Limits

Land Use Category	Zoning Districts	Time Period	Noise Level, dBA Leq	Noise Level, dBA Lmax
Rural	"A1" "TPZ"	7 am - 7 pm	55	75
	"AE" "OS"	7 pm - 10 pm	50	65
	"FR" "IDR"	10 pm - 7 am	40	55
Residential and Public	"RA" "R2"	7 am - 7 pm	55	75
	"R1" "R3"	7 pm - 10 pm	50	65
	"P"	10 pm - 7 am	45	60
Commercial and Recreation	"C1" "CH" "CS"	7 am - 7 pm	70	90
	"C2" "C3" "OP" "REC"	7 pm - 7 am	65	75
Business Park	"BP"	7 am - 7 pm	65	85
		7 pm - 7 am	60	70
Industrial	"M1" "M2"	any time	80	90

A. Compliance with the above standards shall be determined by measuring the noise level based on the mean average of not less than three (3) 20 minute measurements for any given time period. Additional noise measurements may be necessary to ensure that the ambient noise level is adequately determined.

B. Where two different zoning districts abut, the standard applicable to the lower, or more restrictive, district plus 5 dBA shall apply.

C. The above standards shall be measured only on property containing a noise sensitive land use as defined in Policy 9.8 and may be measured anywhere on the property containing said land use. However, this measurement standard may be amended to provide for measurement at the boundary of a recorded noise easement or as determined in a recorded letter of agreement between all affected property owners and approved by the County.

D. If the measured ambient level exceeds that permitted, then the allowable noise exposure standard shall be set at 5 dBA above the ambient.

E. Because of the unique nature of sound, the County reserves the right to provide for a more restrictive standard than shown in the Exterior Noise Limits table contained in this policy. The maximum adjustment shall be limited to be not less than the current ambient noise levels and shall not exceed the standards of this policy or as they may be further adjusted by Policy 9.1.2.b. Imposition of a noise level adjustment shall only be considered if one or more of the following conditions are found to exist:

   1. Unique characteristics of the noise source:

      a. The noise contains a very high or low frequency, is of a pure tone (a steady, audible tone such as a whine, screech, or hum), or contains a wide divergence in frequency spectra between the noise source and ambient level.

      b. The noise is impulsive in nature (such as hammering, riveting, or explosions), or contains music or speech.

      c. The noise source is of a long duration.

   2. Unique characteristics of the noise receptor when the ambient noise level is determined to be 5 dBA or more below the Policy 9.1.2 standard for those projects requiring a General Plan amendment, rezoning, and/or conditional use permit. In such instances, the new standard shall not exceed 10 dBA above the ambient or the Policy 9.1.2 standard, whichever is more restrictive.

F. The above standards shall not apply to those activities associated with the actual construction of a project or to those projects associated with the provision of emergency services or functions.

G. The standards of this policy shall be enforced through compliance inspections and/or complaints.

H. Recognizing that this chapter must work toward the solution to existing noise problems, those land uses that are inconsistent with the above standards and are therefore non-conforming in nature, shall comply with said standards as these land uses are upgraded or intensified or after abandonment through the use permit or site plan process. Said standards shall apply only to that portion of the land use requiring approval. In any event, the use or portion subject to a land use permit must meet the standards in the Exterior Noise Limits table in this policy and cumulatively the noise generated from the entire site must be equal to or less than the pre-land use permit ambient noise level. All such projects will require a comprehensive noise analysis per Policy 9.1.12 and the Nevada County Noise Element Manual.

Policy 9.1.3 The Nevada County Planning Department shall be the lead agency responsible for coordination of all local noise control activities and intergovernmental group activities and subsequent enforcement efforts.

Policy 9.1.4 The County will continue an ongoing County-wide noise monitoring program. The purpose of this program is to assess the changing noise environment in the County in terms of the existing ambient noise level for typical rural, residential, commercial and industrial areas and to ensure that the Policy 9.1.1 standards realistically reflect the current needs of the County.

Policy 9.1.5 This chapter of the General Plan shall be implemented, in part, through the incorporation of the Policy 9.1.1 noise standards within the Land Use and Development Code and the adoption of the Noise Element Manual providing detailed direction and implementation measures. This Manual is adopted as a part of the Plan and can be found in Volume 2, Section 3-Noise Analysis, Appendix A.

Policy 9.1.6 Encourage public awareness of noise and its hazards and means to minimize its existing and future impacts.

Policy 9.1.7 Encourage heavy truck traffic to those routes outside residential areas.

Policy 9.1.8 Encourage cities within Nevada County to adopt noise control programs compatible with County efforts.

Policy 9.1.9 Develop a realistic policy framework designed to function as a guide to planning for appropriate land uses in relation to hazardous and annoying noise.

Policy 9.1.10 Strongly discourage those General Plan amendments and zone changes that would likely create land use conflicts relative to noise.

Policy 9.1.11 Strongly encourage future noise sensitive land uses, including residences, schools, hospitals, nursing homes, churches, and libraries, to those location of the County where the impact of noise generators is limited so that compliance with standards found in Policy 9.1.2 will be maintained. This policy shall apply to the approval of all tentative maps for residentially zoned parcels.

Policy 9.1.12 Limit future noise generating land use to those location of the County where their impacts on noise sensitive land uses will be minimized, consistent with the standards found in Program 9.1.

Policy 9.1.13 Require the preparation of a comprehensive noise study for all land use projects determined to have a potential to create noise levels inconsistent with those standards found in Program 9.1, and in accordance with the methodology identified in the Noise Element Manual contained in General Plan Volume 2, Section 3 - Noise Analysis Appendix A.

Policy 9.1.14 Provide for adequate design controls to assist in mitigating on-site the significant adverse impacts of future noise generating land uses through increased setbacks, landscaping, earthen berms, and solid fencing.

Policy 9.1.15 Strictly enforce the noise insulation standards for new construction as required by Title 24 of the California Administrative Code.

Policy 9.1.16 Minimize the noise impact from automobiles, trucks, motorcycles, and off-road vehicles by continuing to request enforcement of those sections of the California Vehicle Code relative to vehicle exhaust system maintenance by the County Sheriff and State Highway Patrol.

Policy 9.1.17 Where realistically possible, encourage noise sensitive land uses away from railroad operations.

Policy 9.1.18 The routing and design of new or expanded transportation facilities by the County shall incorporate feasible measures necessary to mitigate increases in noise levels.

Policy 9.1.19 Encourage the minimization of noise emission from all County-controlled activities consistent with Policy 9.1.1 standards.

Policy 9.1.20 Protect the safety and general welfare of people in the vicinity of the Nevada County Airport and the Truckee Tahoe Airport port by implementing the appropriate noise compatibility policies to avoid the establishment of noise-sensitive land uses in the portion of the airport environs that are exposed to significant levels of aircraft noise.

Policy 9.1.21 Ensure the development of compatible land uses adjacent to the Nevada County Airport by enforcing the noise criteria as found in the Nevada County Airport Land Use Compatibility Plan as adopted by the Nevada County Airport Land Use Commission on September 21, 2011, as those standards are in effect and may be hereafter amended. (See Figure 9.1 of the General Plan Noise Element – Incorporated by reference).

Policy 9.1.22 Ensure the development of compatible land uses adjacent to the Truckee Tahoe Airport by implementing the noise criteria as found in the Truckee Tahoe Airport Land Use Compatibility Plan as adopted by the Truckee Tahoe Airport Land Use Commission on October 19, 2010, as those standards are in effect and may be hereafter amended.

Policy 9.1.23 The County shall continue to enforce noise criteria standards consistent with the airport noise policies adopted by the Nevada County Airport Land Use Commission and the Truckee Tahoe Airport Land use Commission based on the considerations of the following factors:

a. Established federal and state regulations and guidelines.
b. The ambient noise levels in the community. Ambient noise levels influence the potential intrusiveness of aircraft noise upon a particular land use and vary greatly between Community Regions and Rural Regions.
c. The extent to which noise would intrude upon and interrupt the activity associated with a particular use.
d. The extent to which the activity itself generates noise.
e. The extent which the activity itself generates itself generates noise.
f. The extent of outdoor activity associated with a particular land use.

e. The extent to which indoor uses associated with a particular land use may be made compatible with application of sound attenuation in accordance with the policies set forth for maximum acceptable interior noise levels.

Whispering Pines Corporate Community Specific Plan

The Whispering Pines Corporate Community Specific Plan and Master Environmental Impact Report (February of 1984) contains the following policies with respect to noise:

E.2 Noise

a. Noise environments within the Specific Plan boundaries shall be maintained at the following levels: 70 dB CNEL for industrial areas (outdoor) 65 dB CNEL for residential areas (outdoor) and 45 dB CNEL for residential areas (indoor).

b. Activities which may emit continuous noise levels in excess of standards outlined in a. shall be required to mitigate noise levels to acceptable standards.

c. Activities located adjacent to existing residences shall demonstrate that noise levels will not adversely affect the adjacent neighborhood.

The policies shown above are consistent with the Nevada County General Plan Noise Element Policies. As a result, satisfaction with the County noise policies within the Whispering Pines Specific Plan Area will ensure compliance with the Specific Plan noise policies.

Nevada County Zoning Ordinance

Section L-22 4.1.7 of the Nevada County Land Use and Development Code (LUDC) pertains to noise. The adopted noise standards contained in Table L-II 4.1.7 (Exterior Noise Limits) are identical to those contained in the General Plan Noise Element (reproduced above in Table 5). Because the specific noise standards are identical, the Zoning Ordinance standards are not reproduced below. However, Section L-II 4.1.7.D.8 of the County Zoning Ordinance States the following with respect to construction noise:

L-II 4.1.7.D.8 The above standards shall not apply to those activities associated with the actual construction of a project or to those projects associated with the provision of emergency services or functions.

The provision above exempts construction noise from the Table 5 noise standards. An evaluation of construction noise is provided later in this analysis despite this exemption.

Adjustments to Nevada County Noise Standards for On-Site Noise Sources

As noted above in the footnotes to Table 5, there are various adjustments to the County's noise limits which are to be applied if certain conditions are satisfied. The footnotes most applicable to this project are A, B, D and E. Adjustments to the County's noise standards shown in Table 5 for each of that table's footnotes are described below:

Footnote A Footnote A provides the methodology by which ambient conditions are established. Specifically, Footnote A states that compliance with the Table 5 standards shall be determined by measuring the noise level based on the ***mean average*** (emphasis added) of not less than three (3) 20 minute measurements for any given time period. Additional noise measurements may be necessary to ensure that the ambient noise level is adequately determined.

For this project, ambient noise monitoring periods ranged from 24-hours to 6 consecutive days. As a result, the requirements of Footnote A were satisfied.

Footnote B Footnote B states that where two different zoning districts abut, the standard applicable to the lower, or more restrictive, district plus 5 dBA shall apply.

Because the Brunswick site is zoned Industrial and the neighboring properties containing residences are zoned Residential, a 5 dB upward adjustment to the residential noise standards shown in Table 5 would be required for the residences nearest to the Brunswick Site.

At the Centennial site, the nearest residences (receptors 1, 2 & 8 on Figure 3) are located within an M1 zoning district. However, because these receptors are residences, this analysis conservatively applies the County's Residential district noise standards shown in Table 5 to these receptors. However, because the project site is located within the Nevada County M1 zoning district, which applies different standards than the Residential district, the residential standards of Table 5 are increased by 5 dB at receptors 1, 2 and 8, pursuant to Footnote "B".

Footnote D Footnote D of Table 5 states that if the measured ambient level exceeds that permitted in Table 5, then the allowable noise exposure standard shall be set at 5 dBA above the ambient. Because the ambient conditions vary throughout the project area, the application of the Footnote D offset is very complicated for this evaluation.

At ambient noise monitoring locations which correspond directly to the representative receptors analyzed in this study, no offsets to the ambient noise measurement results were required to establish ambient conditions at those receptors. However, at the other receptors, the ambient noise level data collected at the nearest monitoring sites was extrapolated to establish ambient conditions at the individual receptor location. For example, if a receptor is located 100 feet from a roadway which defines ambient conditions for that receptor, but the nearest noise monitoring site was located 50 feet from that same roadway, the measured ambient noise levels at that nearest monitoring site would be reduced by 5 dB to establish ambient conditions at the receptor. This process was performed for each representative receptor in the project vicinity evaluated for this study. Appropriate offsets were applied on a receptor-by-receptor basis pursuant to the Footnote "D" requirements, and those offsets are described following the discussion of the Footnote “E” adjustments.

Footnote E Footnote E states that the County reserves the right to provide for a more restrictive standard under certain conditions. However, the standard cannot be set below current ambient noise levels. Imposition of a noise level adjustment is only considered if one or more of the following conditions are found to exist:

- *The noise source contains a very high or low frequency, is of a pure tone (a steady, audible tone such as a whine, screech, or hum), or contains a wide divergence in frequency spectra between the noise source and ambient level.*

  With the exception of warning devices on mobile equipment (back-up beepers), the project does not propose any sources of noise which contain pure tones. Additional support for this assertion in the form of frequency spectra for both off-site heavy truck traffic and on-site processing operations is provided later in this report. As a result, the noise standard applicable to emergency warning devices was set 5 dB below applicable noise standard at each receptor after adjustment of that standard for ambient conditions pursuant to Footnote D. However, in no case was the standard for the warning devices set below existing ambient conditions at any receptor.

- *The noise is impulsive in nature (such as hammering, riveting, or explosions), or contains music or speech.*
  With the exception of periodic blasting activities which will occur below ground, the project does not propose any sources of noise which would be considered impulsive. In addition, no sources of noise containing speech or music are proposed. However, blasting vibration impacts were evaluated in a separate study prepared by IDC-PBS. As a result, vibration impacts related to blasting are not addressed in this evaluation. However, the impulsive nature of blasting noise would fall under this category.

- *The noise source is of a long duration.*

  At both the Brunswick and Centennial sites, operations will be fairly constant during the proposed hours of operations. As a result, the noise standard applicable to on-site activities is set at 5 dB below the Table 5 standards after adjustment of those standards for both differing zoning (Footnote B) and elevated ambient conditions (Footnote D), but not below baseline ambient conditions.

- *Unique characteristics of the noise receptor when the ambient noise level is determined to be 5 dBA or more below the Policy 9.1 standard for those projects requiring a General Plan amendment, rezoning, and/or conditional use permit. In such instances, the new standard shall not exceed 10 dBA above the ambient or the Policy 9.1 standard, whichever is more restrictive.*

In cases were baseline ambient noise levels at the representative receptors were 5 dB or more below the Table 5 standards after increasing those standards by 5 dB per the Footnote B provision, the standard was set at the baseline ambient level +5 dB. If baseline ambient levels were less than 5 dB below the Table 5 standards (after the +5 dB adjustment for Footnote B), no additional adjustment was applied.

Summary of Footnote A, B, D & E Adjustments to the Table 5 Standards

As noted above, a +5 dB adjustment to the Table 5 standards would be applicable at all residential receptors due to the differing zoning districts per Footnote B. However, that +5 dB adjustment would be negated by a -5 dB adjustment to the Table 5 standards due to the project noise sources either consisting of tonal components (intermittent mobile equipment), or occurring for long durations (processing activities will be continuous during the proposed hours of operation). As a result, the only offsets applied to the Table 5 standards were based on ambient conditions.

Pursuant to Footnote D, application of standards 5 dB above the ambient are required where baseline ambient conditions currently *exceed* the Table 5 standards. Conversely, where baseline ambient levels are more than 5 dB *below* the Table 5 standards, the standard has been set at the baseline ambient level plus 5 dB. Finally, where ambient conditions are less than 5 dB below the Table 5 standards, no adjustment for ambient conditions is applied in this analysis. Table 6 shows the baseline ambient conditions at each representative receptor extrapolated from the ambient noise survey results and the corresponding maximum and average, daytime, evening, and nighttime noise level standards applicable at each representative receptor location after the appropriate adjustments to the Table 5 standards have been applied to account for the ambient conditions.

Table 6
Baseline Ambient Conditions and Adjusted Nevada County Noise Standards by Receptor
Idaho Maryland Mine Project – Nevada County, California

	Baseline Ambient Conditions[1]						Applicable Standards After Adjustment for Ambient					
	Daytime[3]		Evening[3]		Nighttime[3]		Daytime		Evening		Nighttime	
Receptor[2]	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
1	58	76	51	68	50	66	63	81	56	73	55	71
2	63	81	56	73	55	71	68	86	61	78	60	76
3	61	82	53	71	51	69	66	87	58	76	56	74
4	55	72	53	65	56	70	60	75	58	70	61	75
5	49	66	47	59	50	64	54	71	50	64	55	69
6	50	67	48	60	51	65	55	72	50	65	56	70
7	49	66	47	59	50	64	54	71	50	64	55	69
8	54	72	49	69	45	65	55	75	50	74	45	70
9	48	66	43	63	39	59	53	71	48	65	44	60
10	47	66	43	64	37	58	52	71	48	65	42	60
11	47	67	43	65	37	59	52	72	48	70	42	60
12	49	69	45	67	39	62	54	74	50	72	44	67
13	51	70	48	69	41	64	55	75	50	74	45	69
14	50	72	48	72	42	64	55	75	50	77	45	69
15	51	73	49	72	43	65	55	75	50	77	45	70
16	48	71	46	71	40	62	53	75	50	76	45	67
17	56	73	54	66	57	71	61	75	59	71	62	76
18	52	69	50	62	53	67	55	74	50	65	58	72
19	54	69	51	68	46	65	55	74	56	73	51	70
20	57	72	55	72	50	68	62	75	60	77	55	73
21	55	70	53	70	48	66	60	75	58	75	53	71
22	56	71	53	70	48	67	61	75	58	75	53	72
23	58	73	56	73	51	69	63	75	61	78	56	74
24	60	75	58	75	53	71	65	80	63	80	58	76
25	60	75	57	74	52	71	65	75	62	79	57	76
26	51	64	49	63	44	56	55	69	50	65	45	60
27	51	64	49	63	44	56	55	69	50	65	45	60
28	51	64	49	63	44	56	55	69	50	65	45	60
29	51	64	49	63	44	56	55	69	50	65	45	60
30	51	64	49	63	44	56	55	69	50	65	45	60

1. Baseline ambient conditions at each representative receptor were established through extrapolating the Table 1 data closest to each receptor using a 4.5 dB per doubling of distance decay rate.
2. Receptor locations are indicated on Figure 3
3. Daytime = 7 am – 7 pm. Evening = 7 pm – 10 pm. Nighttime = 10 pm – 7 am

City of Grass Valley

The project is located within Nevada County but the Centennial site borders the City of Grass Valley. The City of Grass Valley noise level standards are identical to the Nevada County noise standards during daytime hours, and are 5 dB less restrictive than the Nevada County General Plan noise standards during nighttime hours. Because operations at the Centennial site are proposed to occur during daytime hours, the City and County noise standards are identical.

Noise Standards of Other Jurisdictions

Appendix G of the CEQA Guidelines, Section XII (Noise) states that a project would result in a significant noise impact if it resulted in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

As noted previously, Nevada County has adopted both a Noise Element and Noise Ordinance. The Noise Element contains reasonable numeric standards for the assessment of noise impacts, and the Noise Ordinance standards are consistent with the Noise Element. Because the County's noise standards have been developed specifically for Nevada County, and because those standards provide thresholds in terms of hourly average, and single-event maximum noise levels, they are also comprehensive. As a result, the use of standards developed for other jurisdictions in lieu of the adopted Nevada County noise standards is unnecessary.

Three areas where consideration of noise standards beyond those adopted by Nevada is warranted are with respect to project-related noise level increases, vibration impact assessment, and sleep disturbance. Recommendations for appropriate thresholds for evaluation of increases in off-site traffic noise levels have been discussed previously in this section (Table 4). Discussions of standards relative to vibration impact assessment and sleep disturbance follow.

Criteria for Acceptable Vibration Exposure

The California Environmental Quality Act (CEQA) contains vibration impact assessment guidelines. The Nevada County Noise Element and Noise Ordinance do not contain criteria for acceptable vibration exposure applicable to this project. However, the Federal Transit Administration (FTA) and the California Department of Transportation (Caltrans) provide such criteria. Those criteria are discussed in the sections that follow.

Federal Transit Authority Criteria for Acceptable Vibration Levels

Table 12-3 of the Federal Transit Administration (FTA) Noise and Vibration Manual, reproduced as Table 7 below, provides vibration levels at which damage to structures could occur. As shown in Table 7, a vibration level of 90 VdB is the minimum at which the onset of damage to extremely susceptible buildings could occur. As a result, this level was considered to be a conservative benchmark against which project-generated vibration levels were evaluated in this analysis.

Table 7
FTA Criteria for Assessing Damage to Structures

Building Category	Level, VdB[1]
I. Reinforced-concrete, steel or timber (no plaster)	102
II. Engineered concrete and masonry (no plaster)	98
III. Non-engineered timber and masonry buildings	94
IV. Buildings extremely susceptible to vibration damage	90

[1]. RMS velocity in decibels (VdB) re 1 micro-inch/second

In addition to providing guidance with respect to vibration levels which would cause damage to structures, the FTA guidelines also provide criteria for assessing the potential for annoyance related to vibration. Table 8-1 of the FTA Noise and Vibration Manual, reproduced in Table 8 below, provides vibration criteria for general assessment of impacts.

Table 8
Groundborne Vibration Impact Criteria for General Assessment

Land Use Category	Impact Levels (VdB)		
	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior ops.	65[d]	65[d]	65[d]
Category 2: Residences and buildings where people normally sleep	72	75	80
Category 3: Institutional land uses with primarily daytime uses	75	78	83

Source: Federal Transit Administration, Transit Noise Impact and Vibration Assessment, May 2006.
Vibration levels are measured in or near the vibration-sensitive use.
a. "Frequent Events" is defined as more than 70 vibration events of the same source per day.
b. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
c. "Infrequent Events" is defined as fewer than 30 vibration events of the same source per day.
d. This criterion limit is based on levels that are acceptable for most moderately-sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels.

According to Table 8, the general assessment impact level for frequent events applicable at residential uses is 72 VdB. Where vibration levels exceed this threshold, a detailed vibration assessment is recommended. Because project operations would essentially occur continuously during the proposed business hours, the FTA criteria applicable to "Frequent Events" is applied to this analysis of potential annoyance resulting from project activities. As noted previously, vibration impacts related to project blasting operations are evaluated in a separate study. This analysis analyzes the potential vibration impacts associated with the use of mobile equipment.

Project Description

Overview

The proposed use permit and reclamation plan proposes to allow the following:

- Operation of pumps and a water treatment facility to dewater the underground workings.
- Construction of a water pipeline to transport treated water to an outfall located in South Fork Wolf Creek.
- Construction of the necessary aboveground facilities at the Brunswick Industrial Site (e.g., headframes and hoists, surface structures, a mineral processing plant) to support underground mining and mineral processing.
- Construction of a new service shaft and ventilation shaft from the underground mine to surface at the Brunswick Industrial Site.
- Underground mining, including drilling, blasting, and gold mineralization removal.
- Gold mineralization and rock processing at the Brunswick Industrial Site and off-site transport of gold concentrate.
- Transport of engineered fill from the Brunswick Industrial Site and placement at the Centennial Industrial Site.
- Transport of engineered fill from the Brunswick Industrial Site to off-site customers.
- Placement of engineered fill at the Brunswick Industrial Site.
- Construction of a potable water pipeline to residences along a portion of East Bennett Road.

The majority of aboveground facilities, the access to the underground mining, the treated-water pipeline and outfall structure, and a portion of the engineered fill will be located on the Brunswick Industrial Site. Engineered fill will also be placed on the Centennial Industrial Site. Of the total 175 acres in surface land holdings, approximately 104 acres will be disturbed as a result of construction of the facilities proposed to support dewatering, mining, and processing at the Idaho-Maryland Mine. In addition, Rise owns approximately 2,585 acres of subsurface rights that encompass the historic Idaho-Maryland Mine workings and Idaho-Maryland Gold Project. Once the necessary aboveground facilities are constructed, Rise will begin dewatering the mine, performing advanced exploration, and mining the underground workings.

Surrounding Land Uses

The Brunswick site is surrounded by residential land uses and undeveloped open space. The Centennial site is surrounded by commercial and industrial uses, with few residences to the north and northeast of the site.

The proposed haul route between the Brunswick and Centennial sites will include a portion of East Bennett Road from the northern site access to Brunswick Road; Brunswick Road from East Bennett Road to Whispering Pines Lane; and Whispering Pines Lane from Brunswick Road to Centennial Site access (before Centennial Drive). Noise-sensitive receptors located along these roadways consist of several residences adjacent to Brunswick Road and a single residence on

Whispering Pines Lane. Figure 3 shows the locations of the sensitive receptors along the Centennial haul route.

Once hauling to the Centennial site has been completed, engineered fill material will be hauled to off-site vendors via the same route, except that Brunswick Road will be used between East Bennett Road and Highway 49, and Whispering Pines Lane will no longer be used. Land uses along Brunswick Road between Whispering Pines Lane and Highway 49 currently consist of primarily open space and commercial uses with a few residences located approximately 400 feet or more from the roadway centerline. When the Loma Rica project is developed, additional residential land uses will be located adjacent to Brunswick Road.

Operations at the Brunswick Site

The project site plan for the Brunswick Industrial Site comprises five areas: aboveground site facilities, underground mining, treated and potable water pipelines, the Brunswick engineered fill area, and outfall for the treated water to South Fork Wolf Creek. Figure 6 shows the proposed Brunswick Site Plan.

To support dewatering and underground mining, aboveground structures and processing facilities will need to be constructed and installed. Approximately 15 acres of previously disturbed land on the northeast side of the Brunswick Industrial Site will be graded to construct the ventilation system, headframe and hoist, water treatment plant, collar replacement, mineral processing plant, service shaft, various buildings, internal roads, and parking areas.

Noise will be generated at the Brunswick site during project construction, by aboveground processing equipment, by heavy equipment used to transfer the engineered fill to the storage area, by a surface ventilation fan which will be used until the service shaft is complete and the permanent underground ventilation fan can be installed, and by the water treatment equipment.

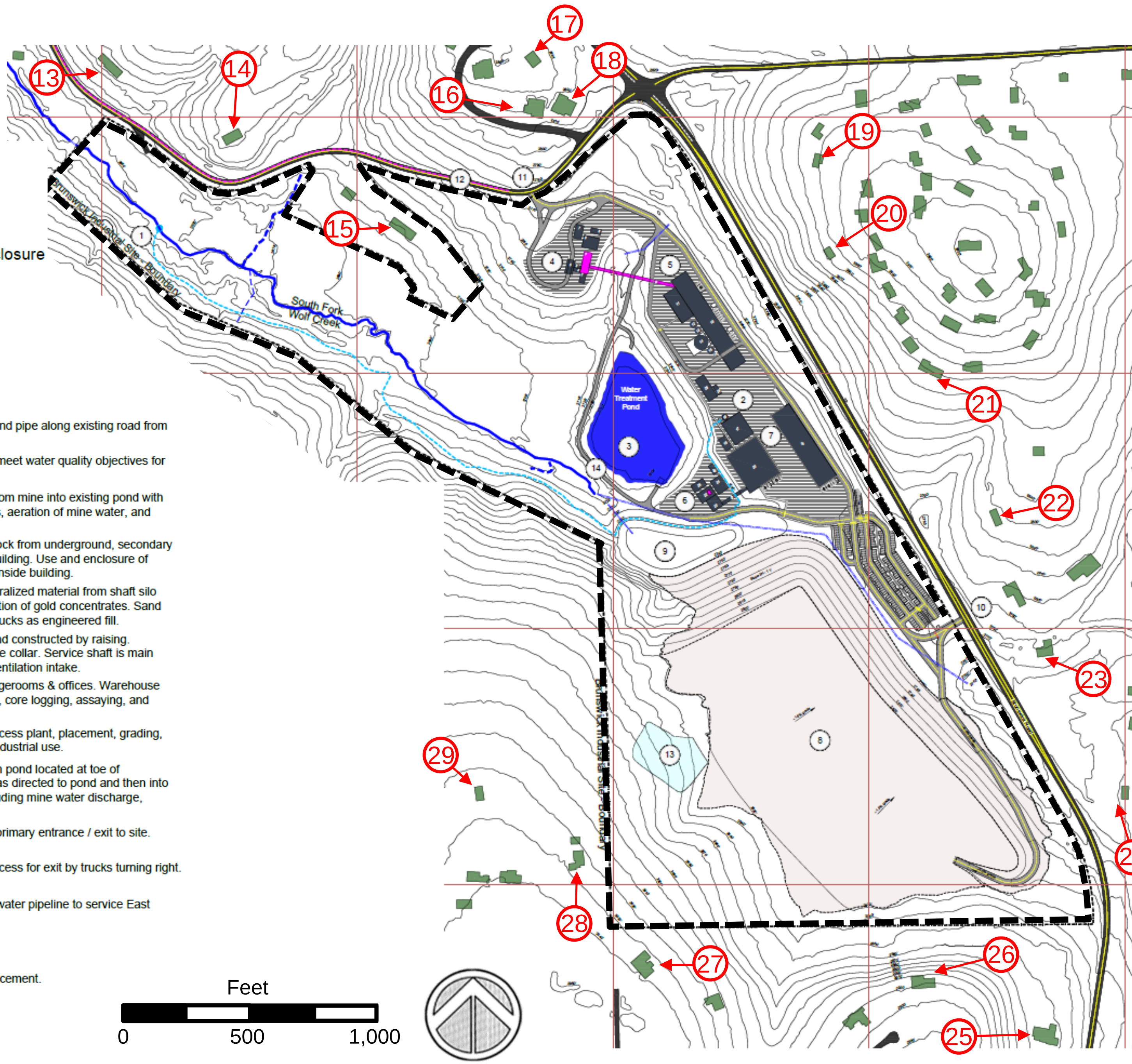
<u>Dewatering</u>

The existing Brunswick shaft located on the northeast side of the Brunswick Industrial Site will provide access to the underground workings for dewatering. Currently, groundwater has filled the underground workings to approximately 260 feet below ground surface, measured at the Brunswick Shaft. The groundwater will need to be removed to access the underground workings for mining.

Initial dewatering of the underground workings will be accomplished using submersible and staged centrifugal pumps. Approximately 2,500 acre-feet of groundwater will be pumped from the underground workings over an approximately 6-month period. The groundwater will be pumped via a pipeline to an existing clay-lined settling pond for water treatment. The headframe and hoist at the Brunswick shaft will be installed before initial dewatering begins.

Figure 6
Brunswick Site Plan
Idaho Maryland Mine Project

- Engineered Fill
- Water Treatment Pond
- Structure - Planned & ID number Remain onsite after mine closure
- Structure - Planned & ID number Reclaimed and removed after mine closure
- Structure - Industrial / Commercial
- Structure - Residential
- (#) Receptor ID (See Figure 3)



1. South Fork Wolf Creek Discharge Point - Above ground pipe along existing road from Water Treatment Plant to discharge point.
2. Water Treatment Plant - Treatment of mine water to meet water quality objectives for discharge.
3. Water Treatment Pond - Discharge of groundwater from mine into existing pond with ~30 acre-feet working capacity for settlement of solids, aeration of mine water, and surge capacity.
4. Brunswick Shaft - Existing shaft utilized for hoisting rock from underground, secondary escape, and exhaust ventilation. New headframe & building. Use and enclosure of existing concrete silo. Barren rock loaded into trucks inside building.
5. Process Facility - Covered conveyor to transfer mineralized material from shaft silo into grinding section of process plant building. Production of gold concentrates. Sand tailings used as underground backfill or loaded into trucks as engineered fill.
6. Service Shaft & Headframe - New shaft to underground constructed by raising. Excavation to solid bedrock and installation of concrete collar. Service shaft is main entry to mine for personnel, materials, and fresh air ventilation intake.
7. Building Complex - New buildings for employee changerooms & offices. Warehouse with 8 bays for various uses, including supply storage, core logging, assaying, and equipment maintenance.
8. Engineered Fill - Transport of engineered fill from process plant, placement, grading, and compaction in lifts to create new area for future industrial use.
9. Storm Water Detention Pond - Storm water detention pond located at toe of engineered fill pile. Run-off from site and upslope areas directed to pond and then into South Fork Wolf Creek. Post project storm flows, including mine water discharge, mitigated to less than pre-project storm flows.
10. Brunswick Road Access - Use of existing access as primary entrance / exit to site. Controlled access by security fencing and gate.
11. East Bennett Road Access - Use of existing gated access for exit by trucks turning right. Controlled access by security fencing and gate.
12. Potable Water Extension - Extension of NID potable water pipeline to service East Bennett Road residential area.
13. Onsite septic field location for domestic water only.
14. Repair of southwest pond berm. Excavation and replacement.

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Ventilation Fan

Ventilation will be provided with a fan located on the surface and ducting into the Brunswick shaft until the service shaft is complete and the permanent underground ventilation fan can be installed. Aboveground facilities necessary to support pumping of fresh air underground include a primary ventilation fan and duct work. The primary ventilation fan will have housing on its sides and a silencer to reduce noise levels. The front of the ventilation fan will have a vent connected to duct work that will carry air underground. In addition, secondary fans will be installed underground to promote air circulation. The ventilation system will be electric.

Hoist and Headframe

Installation of a new hoist and headframe is necessary to support the transport of employees, supplies, barren rock, and mineralized rock to the surface once the underground workings have been dewatered. The headframe and silo will be enclosed inside a pre-engineered metal building and the hoist will be housed in a separate pre-engineered building.

Rock Bin Conveyors and Barren Rock Loading Area

The existing concrete rock silo will be reused. A chute and conveyor system will transfer barren rock from the silo into trucks for transport as engineered fill. The conveyor system and truck loading area will be inside a building adjacent to the headframe. A chute and covered conveyor system, approximately 335 feet long, will transfer gold mineralization from the silo to the process plant.

Underground Mining

Exploration and mining of the underground workings will begin once dewatering is complete. Because the equipment and processes will be located far underground, with the exception of blasting, the transmission of noise from the underground operations is not expected to be audible at the surface. As a result, this evaluation focuses on the noise-generation of aboveground equipment and activities, and underground blasting activities. As noted previously, blasting vibration impacts were evaluated in a separate study prepared by IDC-PBS.

Process Plant

Gold mineralization hoisted from the Brunswick shaft will be placed in the existing concrete silo located on the Brunswick property before processing begins. Gold material will be transported from the concrete silo using chutes and conveyors to a fully enclosed process plant. A covered conveyor system, approximately 335 feet long, will transfer mineralized rock from the silo to the process plant. Mineralized rock is conveyed from the silo to inside the processing plant and grinding mill where water is added and the rock is ground to size before the gold is recovered.

The slurry of crushed mineralized rock and water that results from this process is pumped to a second gold recovery system. The gold concentrate will be dewatered using thickeners and filter

presses before it is bagged for off-site shipment. Approximately 20 tons of gold concentrate will be produced and bagged on-site per day.
Sand tailings (waste) from the gold recovery process will be dewatered and used for either backfill for the underground mine or stockpiled for transport and use as engineered fill. Sand tailings during backfilling will be transferred to the paste backfill plant, where the particles will be dewatered and mixed with cement into a paste. The paste will be pumped back underground and used to backfill mining voids. Sand tailings not used for backfill will be either directly loaded into trucks in the process plant or stockpiled inside the building. Stockpiled sand tailings will be loaded into transport trucks with a front-end loader during daytime hours. Sand tailings not used as underground backfill will be transported for use as engineered fill.

The process plant will be contained in a single building, with dimensions of approximately 425 by 70 by 65 feet (length by width by height). A thickener tank and paste feed tank, several water tanks, and cement silo will be located outside and behind the plant building and masked from view of Brunswick Road.

Engineered Fill Transport

Barren rock hoisted from the Brunswick shaft will be placed in the existing concrete silo located on the Brunswick Industrial Site. The barren rock will be transported from the concrete silo using a series of chutes and conveyors to a fully enclosed truck loading area. Barren rock, if necessary, will be mixed with sands from the gold processing system or other waste rock to create an engineered fill that meets appropriate geotechnical specifications for construction of the development pad(s).

Engineered fill will initially be placed at the Brunswick and Centennial sites. For Centennial site fill operations, trucks will transport barren rock from the Brunswick Site to the Centennial Site. Transport of barren rock to the Centennial Industrial Site will occur 16 hours per day, 7 days per week. An approximately 44-acre area of the 56-acre Centennial Industrial Site will be filled using engineered fill from the Brunswick Industrial Site over approximately 5 years.

At the Brunswick Site, engineered fill will be transported from the truck loading area to an approximately 31-acre portion of the Brunswick Industrial Site (see Sheet 1). It will take approximately 6 years to fill the Brunswick Industrial Site fill area to design elevations. After fill activities are complete at both the Centennial and Brunswick Industrial site, the engineered fill produced will be utilized in the local and regional construction markets.

Parking

A total of 217 parking spaces will be provided at the Brunswick Industrial Site.

Operations at the Centennial Site

Rise will use the engineered fill generated as waste by-product of the gold mining process described above to fill and grade the Centennial Industrial Site. The fill and grading activities will disturb approximately 44 of the 56-acre Centennial Industrial Site. Figure 7 shows the Centennial site plan.

The engineered fill will be transported from the Brunswick Industrial Site to the Centennial Industrial Site using haul trucks. Approximately 1.6 million tons of engineered fill over a 5-year period will be trucked from the Brunswick Industrial Site to the Centennial Industrial Site for placement and compaction. The average daily transport of engineered fill will be 1,000 tons per day or 365,000 tons per year. A maximum transport rate of up to 2,000 tons of engineered fill per day is required to make up for periodic weather or operational delays. Truck payloads will be approximately 20 tons per truck and therefore will require up to 100 trips per day as a maximum and an average of 50 trips per day. Engineered fill from the Brunswick Industrial Site will be placed, graded, and compacted.

Potable Water Pipeline

A buried potable water pipeline will be added to provide water to residences along a portion of East Bennett Road. The existing NID potable water pipeline will be extended on East Bennett Road to provide potable water service to residences currently on wells that may be affected by the project.

An approximately 1¼-mile-long by 2 feet-wide stretch of East Bennett Road will be temporarily disturbed to bury the potable water pipeline. Installation of the buried potable water pipeline will generally involve trenching, pipe placement, backfill, and cover replacement. Upon completion of trenching in a specific section of the route, the 8-inch pipeline will be installed.

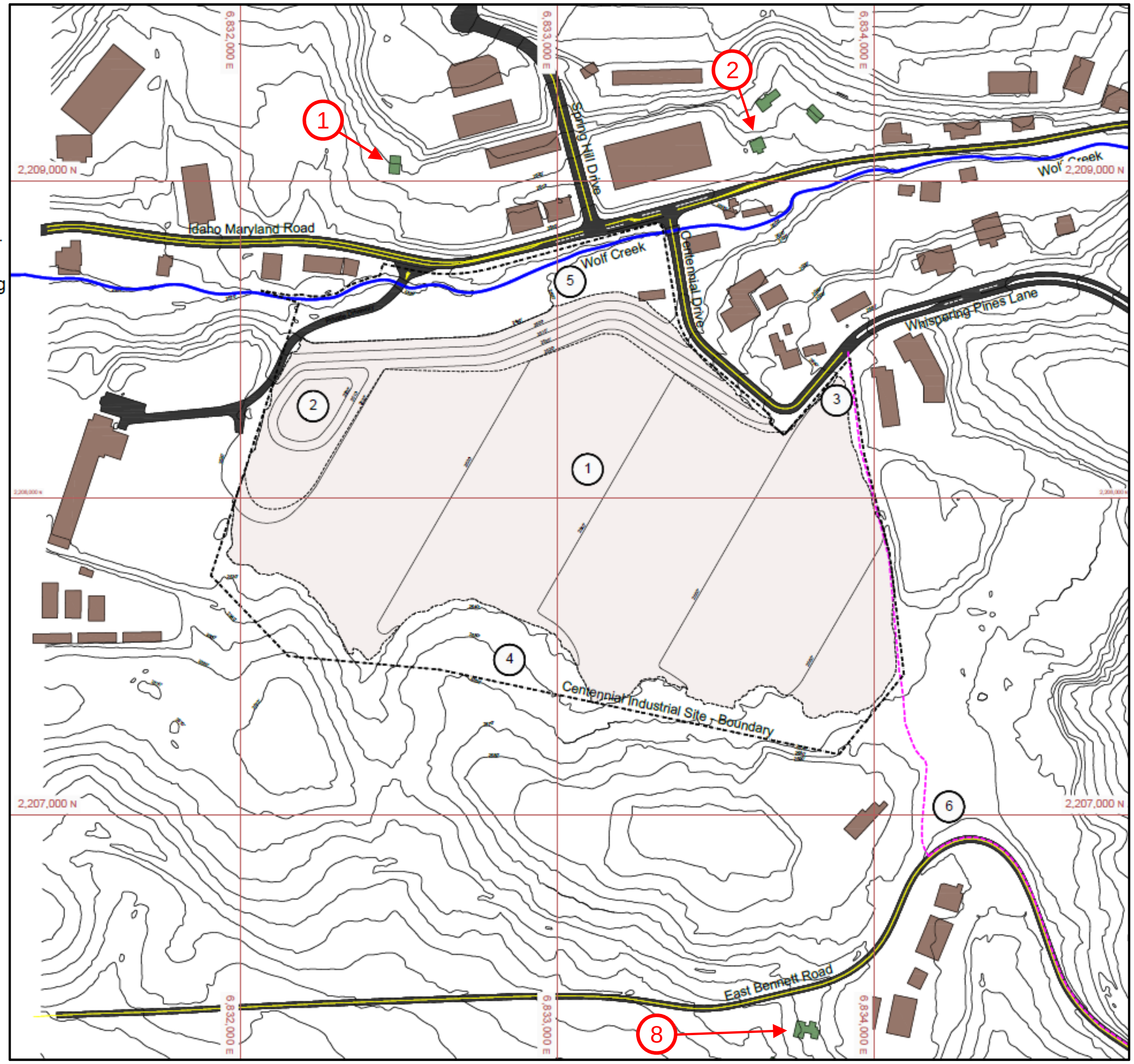
Residences on the streets of Cordell Court, Miskin Court, Amethyst Court, Emerald Court, Diamond Court, and Old Mine Road and several private driveways will be offered the opportunity to connect to this new potable water line. Residential connection to this new potable water line will be voluntary and at the property owner's discretion.

The pipeline will be installed within the County right-of-way in the streets named and stubbed at the property owner's property boundary in a location designated by the County. If the property owner decides to connect to the potable water line, Rise will fund the permitting and construction costs.

Figure 7
Centennial Site Plan
Idaho Maryland Mine Project

1. Engineered Fill - Transport of engineered fill from Brunswick Site, placement, grading, and compaction in lifts to create new area for future industrial use.
2. Detention Pond - Construction of new storm water detention pond. Run-off directed to existing discharge point.
3. Site Access - Installation of new left turn lane on Whispering Pines Lane to access site.
4. Open space for special-status plant species.
5. Open space for Wolf Creek and 100 foot setback.
6. Potable water extension - Extension of NID potable water pipeline to service East Bennett Road residential area.

- Engineered Fill
- Structure - Industrial / Commercial
- Structure - Residential
- Paved Road - Existing
- Elevation Contour Line - 10 foot intervals
- Creek
- Centennial Industrial Site - Boundary
- Proposed NID potable water pipe extension
- # Receptor ID (See Figure 3)



Feet
0 500 1,000

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Hours of Operation

Hours of operation will vary based on the project element. Table 9, "Hours of Operation," provides the hours of operation and approximate duration.

Table 9
Hours of Operation
Idaho Maryland Mine Project – Nevada County

Project Element	Hours of Operation	Duration[1]
Initial dewatering	24 hours a day, 7 days a week	6 months
Aboveground facility outside construction	7:00 a.m.–7:00 p.m., Monday–Saturday	18 months
Aboveground facility inside construction	24 hours a day, 7 days a week	18 months
Aboveground facility operations—gold mineralization processing	24 hours a day, 7 days a week	80 years
Underground exploration/mining	24 hours a day, 7 days a week	80 years
Off-site hauling—gold concentrate	6:00 am-10:00 pm, 7 days a week	80 years
Off-site hauling—engineered fill	6:00 am-10:00 pm, 7 days a week	80 years
Outside truck loading by loader	7:00 a.m.–1:00 p.m., Monday–Saturday	80 years
Placement, grading, and compaction of engineered fill at Centennial Industrial Site	7:00 a.m.–3:30 p.m., 7 days a week	5 years
Placement, grading, and compaction of engineered fill at Brunswick Industrial Site	7:00 a.m.–3:30 p.m., Monday–Friday	6 years

Notes: [1] Durations are approximate and dependent on factors such as equipment and personnel availability, fluctuations in the economy, and technical details.

Equipment

Expected equipment associated with underground mining, water treatment, gold mineralization processing, and engineered fill activities is provided in Table 10, "Typical Equipment." The type of vehicles used will vary somewhat over time depending on availability and the introduction of new models to suit different conditions.

Table 10
Typical Equipment
Idaho Maryland Mine – Nevada County

Equipment[1]	Uses
UNDERGROUND MINING OPERATIONS	
Jaw crusher	Primary crushing of gold mineralization and barren rock before hoisting to the surface
Drills	Drill holes for explosives placement and core drilling. Electric-Hydraulic and pneumatic.
Jumbo drill carriages	Wheeled carriers and hydraulic lifts for jumbo drills
Load/haul/dump vehicles and rail cars	Load barren and mineralized rock. Move mined barren and mineralized rock to rock bins
Personnel vehicles	Small wheeled vehicles for person transport.
Headframes, hoists, and skips	Hoist barren and mineralized rock to the surface and deposit in concrete silo. Hoist people, materials, and equipment from underground to surface.
Water pumps	Pump water from underground workings to surface for dewatering
Ventilation fans	Maintain air circulation in the underground workings
Alimak	Lift for drilling and placing explosives to create raises
Shotcrete machine	Spray concrete into the walls of the galleries to prevent rockfall
Explosives loader	Transport and load explosives
Compressor	Provides compressed air to underground mine
WATER TREATMENT PLANT	
Pressure Vessels	Manganese Dioxide filtration and activated carbon
Pumps	Transfer of water for treatment and discharge
Turbine Aerator	Aeration of water in treatment pond
MINERAL PROCESSING OPERATIONS	
Conveyor belts	Convey gold mineralization from the concrete storage silo to the gold recovery processing plant. Convey barren rock into truck loading building
SAG mill (16'x8', 1250hp)	Primary grinding of gold mineralization
Ball mill (11'x18', 1250hp)	Secondary grinding of gold mineralization
Gravity gold concentrator	Initial removal of gold from mineralized rock
Gold Recovery	Shaking tables and doré furnace
Sulfide flotation cell	Secondary removal of gold from mineralized rock
Cyclone and screens	Classification of materials by size
Thickeners	Settling of solids and removal of water.
Filter Presses	Dewatering of concentrate and sand tailings
Paste backfill plant	Dewater fines and combine with cement for backfill in abandoned underground workings
Pumps	Various slurry pumps to transfer material between processes
Compressor	Provides compressed air for process plant
ENGINEERING FILL OPERATIONS	
Dozer (CAT D8 or similar)	Move, grade, and compact engineered fill
Grader (CAT 140H or similar)	
Excavator (CAT 385 or similar)	
Roller compactor	
Haul trucks (20 ton)	Haul and dump engineered fill
Water truck	Water haul roads and fill areas
Front-end loader (CAT 980 or similar)	Mix barren rock and sand into engineered fill and load engineered fill into haul trucks for off-site transport
Mobile auger blending plant	Mobile plant for blending rock and sand

Table 10
Typical Equipment
Idaho Maryland Mine – Nevada County

Equipment[1]	Uses
Mobile tire washing plant	Washing of truck tires leaving non paved sites
BRUNSWICK SURFACE MISCELLANEOUS	
Pick-up trucks	Transport materials and people
Service truck (mechanical)	Service mobile and stationary equipment
Skid steer/forklift	Move smaller material
Manlift	Elevate workers
Grove rough terrain crane	Pick-and-carry operations and off-road and "rough terrain" applications
Portable generator	Provide backup electricity and
Welder	For repairs to machinery

Notes:
1 Equipment will be purchased at the time it is needed and may differ from equipment listed.

Project Truck Trip Generation

Access to the Brunswick Industrial Site is provided by gated entrances on both East Bennett Road and Brunswick Road. The primary entrance/exit for employees, vendors, and haul trucks will be from Brunswick Road. The East Bennett Road entrance will be used as an exit for haul trucks and large delivery trucks turning right onto East Bennett Road, for emergency personnel and, as necessary, for equipment movement.

Access to the Centennial Industrial Site is located at Whispering Pines Lane. Only employees and haul trucks will use this entrance. Engineered fill from the Brunswick Industrial Site will be hauled to the Centennial Industrial Site via Brunswick Road and Whispering Pines Lane. Engineered fill from the Brunswick Industrial Site to other customers will be hauled using Brunswick Road to State Route 20/49. Off-site haul of gold concentrate will average one truck trip per a day using Brunswick Road to State Route 20/49. Table 11 shows the projected truck trip generation estimates in terms of round trips. It should be noted that each round trip results in 2 individual one-way trips. For purposes of the traffic noise impact assessment the number of round trips was doubled so that each individual truck passby on the local roadway network was analyzed.

Table 11
Project Truck Trip Generation Estimates
Idaho Maryland Mine – Nevada County

Uses	Axles	Average Daily Round Trips	Max Daily Round Trips	Am Peak Hour Round Trips		Pm Peak Hour Round Trips	
				Entering	Exiting	Entering	Exiting
Haul trucks with engineered fill[1]	5	50	100	8	8	8	8
Haul truck with gold concentrate	5	1	5	0	0	0	0
Fuel trucks[2]	5	1	2	0	0	0	0
Freight Trucks	5	1	3	0	0	0	0
Outside services[3]	2	3	4	0	0	0	0

Notes:

[1] Based on estimate of maximum 2,000 tons per day of engineered fill and off-site transport using 20-ton highway haul trucks (or approximately 100 trips per day).

[2] Fuel consumption is estimated at maximum 12,000 gallons per day, which, using a 7,500-gallon tanker, equals 11.2 trips per week, or approximately 2 trips per day and none during peak hours. This is a worst-case scenario that assumes operations need to rely on generator power for a period of time.

[3] Outside services includes vendors, deliveries, and other ancillary vehicle traffic to support operations

[4] Each round trip generates 2 one-way trips.

Evaluation of Project Noise Impacts

The major noise producing components of the project evaluated in this study are as follows:

- Construction (on-site facilities and off-site potable water pipeline construction).
- Off-site haul truck traffic / engineered fill transport.
- Engineered fill placement and compaction.
- Dewatering & mineral processing.
- Shaft ventilation fan.
- Wastewater treatment plant.

The noise generation of each of these noise sources is evaluated in the following sections. Noise levels are predicted at the nearest representative receptors to each source and the resulting noise levels are compared against the appropriate project noise standards. In addition to evaluating the potential noise impacts of the project, this analysis also evaluates the potential impacts of the local aircraft noise environment upon the project site.

Impact Evaluation 1: Project Construction Noise

Site preparation activities at both the Brunswick and Centennial sites will include site clearing, grading, paving, and building construction. In addition, construction of the potable water pipeline along East Bennett Road will include trenching, pipeline installation, and compaction activities.

Table 12 provides maximum noise levels for equipment commonly used in general construction projects at full-power operation at a distance of 50 feet. Not all of these construction activities would be required of this project.

Table 12
Typical Construction Equipment Noise

Equipment Description	Maximum Noise Level at 50 Feet, dBA
Auger drill rig	85
Backhoe	80
Compactor (ground)	80
Compressor (air)	80
Concrete batch plant	83
Concrete mixer truck	85
Concrete pump truck	82
Concrete saw	90
Crane (mobile or stationary)	85
Dozer	85
Dump truck	84
Excavator	85
Front end loader	80
Generator (more than 25 kVA)	82
Grader	85
Jackhammer	85
Mounted impact hammer	90
Paver	85
Pumps	77
Rock drill	85
Scraper	85
Soil mix rig	80

Source: Federal Highway Administration (FHWA)

As noted in the project criteria section, construction noise is exempt from the Nevada County noise standards. In addition, project construction activities are proposed only during daytime hours and construction in any given area would be temporary. As a result, no significant construction noise impacts are identified for this project. Nonetheless, a comparison of predicted construction noise levels against the project standards of significance is provided in the following sections to determine if consideration of construction noise abatement measures may be warranted to reduce the potential for annoyance associated with project construction.

Centennial Site Construction Activities

The nearest sensitive receptors (residences) to the Centennial site are receptors 1, 2 & 8. Those receptors are located approximately 500 to 1,000 feet from locations on the project site where site preparation (construction) activities would take place. Based on maximum and average construction noise levels of 85 dBA L_{max} and 75 dBA L_{eq} at a reference distance of 50 feet, average and maximum noise levels were computed at the nearest receptors. Table 13 shows the predicted construction noise levels at each representative receptor.

Table 13
Predicted Construction Noise Levels at Nearest Receptors
Centennial Site Construction Activities

Receptor	Distance	Predicted Noise Level		Daytime[1] Noise Criteria		Criteria[2] Exceeded?		Impact?
		Leq	Lmax	Leq	Lmax	Leq	Lmax	
1	500	54	64	63	81	no	no	no
2	600	53	63	68	86	no	no	no
8	1000	47	57	55	75	no	no	no

1. As noted in Table 9 aboveground project construction activities would be limited to daytime hours. As a result, only the daytime criteria are utilized for the assessment of potential noise impacts for this activity.
2. Because the Nevada County Zoning Ordinance exempts construction activities from the Table 5 noise standards, these criteria are not applicable to this component of the project. They are provided to give an indication as to whether or not construction noise would be substantial relative to existing ambient conditions at these nearest receptors.
Source: FHWA Roadway Construction Noise Model (RCNM) reference maximum levels.

As indicated in Table 13, Centennial site construction noise levels are predicted to be below the Nevada County noise criteria at each of the nearest receptors even though those criteria are not applicable to construction activities. As a result, consideration of additional construction noise abatement measures would not be warranted for this aspect of the project.

Brunswick Site Construction Activities

As indicated in Figure 3, there are multiple sensitive receptors located around the perimeter of the Brunswick site. The distances from those receptors to the nearest onsite construction areas range from 350 to 1,800 feet. Based on maximum and average construction noise levels of 85 dBA L_{max} and 75 dBA L_{eq} at a reference distance of 50 feet, average and maximum noise levels were computed at the nearest receptors to the Brunswick site. Table 14 shows the predicted noise levels at each representative receptor.

Table 14
Predicted Construction Noise Levels at Nearest Receptors
Brunswick Site Construction Activities

		Predicted Noise Level		Daytime[1] Noise Criteria[2]		Criteria Exceeded?		
Receptor	**Minimum Distance**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Impact?**
15	500	54	64	55	75	no	no	no
16	400	56	66	53	75	yes	no	no
18	350	58	68	55	74	yes	no	no
19	600	53	63	55	74	no	no	no
20	400	56	66	62	75	no	no	no
21	450	55	65	60	75	no	no	no
22	350	58	68	61	75	no	no	no
23	350	58	68	63	75	no	no	no
24	350	58	68	65	80	no	no	no
25	650	52	62	65	75	no	no	no
26	300	59	69	55	69	Yes	no	no
27	600	53	63	55	69	no	no	no
28	500	54	64	55	69	no	no	no
29	1200	46	56	55	69	no	no	no
30	1800	41	51	55	69	no	no	no

1. As noted in Table 9 aboveground project construction activities would be limited to daytime hours. As a result, only the daytime criteria are utilized for the assessment of potential noise impacts for this activity.
2. Because the Nevada County Zoning Ordinance exempts construction activities from the Table 5 noise standards, these criteria are not applicable to this component of the project. They are provided to give an indication as to whether or not construction noise would be substantial relative to existing ambient conditions at these nearest receptors.
Source: FHWA Roadway Construction Noise Model (RCNM) reference maximum levels.

As indicated in Table 14, Brunswick site construction noise levels are predicted to be below the Nevada County noise criteria at 12 of the nearest 15 receptors even though those criteria are not applicable to construction activities. At receptors 16, 18 and 26, project construction noise levels could exceed the County criteria if those criteria were applicable to construction activities. As noted in the project criteria section, however, construction noise is exempt from the Nevada County noise standards. In addition, project construction activities are proposed only during daytime hours and construction in any given area would be temporary. As a result, elevated noise levels would only occur in relatively close proximity to these receptors for a limited duration. Furthermore, the predicted increase over the criteria (3-4 dB) is relatively minor. Therefore, no significant construction noise impacts are identified for this project.

Potable Water Pipeline Construction Along East Bennett Road

As indicated in Figure 3, five representative sensitive receptors were evaluated along the segment of East Bennett Road where the new water pipeline is proposed. The distances from those receptors to the nearest pipeline construction areas along East Bennett Road range from 125 to 250 feet. Based on maximum and average construction noise levels of 85 dBA L_{max} and 75 dBA L_{eq} at a reference distance of 50 feet, average and maximum noise levels were computed at the nearest receptors to the Brunswick site. Table 15 shows the predicted noise levels at each representative receptor.

Table 15
Predicted Construction Noise Levels at Nearest Receptors
Potable Water Pipeline Construction Along East Bennett Road

		Predicted Construction Noise Level		Daytime[1] Noise Criteria[2]		Criteria Exceeded?		
Receptor	**Distance**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Impact?**
9	250	61	71	53	71	yes	no	no
10	180	64	74	52	71	yes	yes	no
11	230	61	71	52	72	yes	no	no
12	180	64	74	54	74	yes	no	no
13	125	67	77	55	75	yes	yes	no

1. As noted in Table 9 aboveground project construction activities would be limited to daytime hours. As a result, only the daytime criteria are utilized for the assessment of potential noise impacts for this activity.
2. Because the Nevada County Zoning Ordinance exempts construction activities from the Table 5 noise standards, these criteria are not applicable to this component of the project. They are provided to give an indication as to whether or not construction noise would be substantial relative to existing ambient conditions at these nearest receptors.
Source: FHWA Roadway Construction Noise Model (RCNM) reference maximum levels.

The Table 15 data indicate that pipeline construction activities would result in a substantial temporary increase in average ambient noise levels at the nearest residences to the proposed pipeline construction. Construction activities in close proximity to the nearest residences along East Bennett Road will be of a short duration with the equipment present only for the duration required to dig the trench, install the pipeline, and refill the trench. As with the other construction activities, the pipeline construction would only occur during daytime hours and would be exempt from the County noise standards. As a result, this impact is considered ***less than significant***.

Because pipeline construction is predicted to result in short-term noise level increases at the nearest residences along East Brunswick Road, the following options could be implemented to reduce the potential for annoyance during pipeline construction, but would not technically be required:

Pipeline Construction Noise Abatement Options:

- Provide advanced notification of pipeline construction dates and durations to each of the residences located along the construction corridor.
- Ensure that all equipment utilizing internal combustion engines are fitted with working mufflers in good repair.

- Utilize the quietest equipment capable of performing the required construction.
- Locate construction staging areas as far as possible from existing residences.
- If portable generators or air compressors are to be used, locate that equipment as far as feasibly possible from existing residences and, if possible, shield it from view of those residences using intervening topography or vehicles.

Impact Evaluation 2: Off-Site Truck Traffic

To quantitatively assess traffic noise levels associated with the Project, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The Model is based on the Calveno reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. Project generated traffic inputs to the FWWA Model were obtained from the Table 11 data and the project traffic impact analysis prepared by KD Anderson & Associates, Inc. Transportation Engineers.

Maximum project heavy truck traffic noise levels were assessed for the delivery of engineered fill material to the Centennial site as well as to off-site vendors via Highway 20/49. Specifically, this analysis assumed 200 heavy truck trips per day (100 round trips), for the maximum production level rather than the 100 truck trips per day under the average condition (50 round trips). The FHWA Model input data for each of the project scenarios is provided in Appendix E.

Tables 16 and 17 show the predicted existing no-project and existing plus-project traffic noise levels at the nearest residences to each roadway segment, the project-related increase in traffic noise levels, the impact assessment threshold for each roadway segment (based on the Table 4 criteria), and determinations as to whether or not the project-related increases are substantial or result in noise impacts.

Table 16
Traffic Noise Levels (Ldn, dB) at Nearest Residences along Haul Routes used for Fill Placement Activities at Centennial
Idaho Maryland Mine Project – Nevada County, CA

#	Roadway	Description	Baseline	Baseline Plus Project	Increase	Significance Threshold	Substantial Increase?	Impact?
1	Bennett Road	West of Brunswick	52.5	54.8	2.3	5.0	no	no
2	Brunswick Road	Project Site Entrance to Bennett	60.9	61.1	0.2	3.0	no	no
3	Brunswick Road	North of Whispering Pines	66.6	66.6	0.0	1.5	no	no
4	Brunswick Road	South of Project Site Entrance	62.8	62.8	0.0	3.0	no	no
5	Brunswick Road	Whispering Pines to Bennett	66.4	66.6	0.3	1.5	no	no
6	Empire Street	West of SR 174	59.8	60.0	0.1	5.0	no	no
7	Empire Street	East of Auburn	61.1	61.2	0.1	3.0	no	no
8	Idaho Maryland Road	East of SR 49	61.5	61.5	0.0	3.0	no	no
9	State Route 174	West of Brunswick	67.8	67.8	0.0	1.5	no	no
10	Whispering Pines Lane	Crown Point to Brunswick	57.8	60.4	2.6	5.0	no	no
11	Whispering Pines Lane	Centennial to Crown Point	59.1	61.1	2.1	5.0	no	no

Source: FHWA-RD-77-108 with inputs from KD Anderson, Bollard Acoustical Consultants, Inc. (BAC), and Caltrans

Table 17
Traffic Noise Levels (Ldn, dB) at Nearest Residences along Haul Routes used for Offsite Hauling of Fill Via Highway 20/49
Idaho Maryland Mine Project – Nevada County, CA

#	Roadway	Description	Baseline	Baseline Plus Project	Increase	Significance Threshold	Substantial Increase?	Impact?
1	Bennett Road	West of Brunswick	52.5	54.8	2.3	5.0	no	no
2	Brunswick Road	Project Site Entrance to Bennett	60.9	61.1	0.2	3.0	no	no
3	Brunswick Road	North of Whispering Pines	66.6	66.9	0.3	1.5	no	no
4	Brunswick Road	South of Project Site Entrance	62.8	62.8	0.0	3.0	no	no
5	Brunswick Road	Whispering Pines to Bennett	66.4	66.6	0.3	1.5	no	no
6	Empire Street	West of SR 174	59.8	60.0	0.1	5.0	no	no
7	Empire Street	East of Auburn	61.1	61.2	0.1	3.0	no	no
8	Idaho Maryland Road	East of SR 49	61.5	61.5	0.0	3.0	no	no
9	State Route 174	West of Brunswick	67.8	67.8	0.0	1.5	no	no
10	Whispering Pines Lane	Crown Point to Brunswick	57.8	57.8	0.0	5.0	no	no
11	Whispering Pines Lane	Centennial to Crown Point	59.1	59.1	0.0	5.0	no	no

Source: FHWA-RD-77-108 with inputs from KDAnderson, Bollard Acoustical Consultants, Inc. (BAC), and Caltrans

The Table 16 and 17 data indicate that the project related traffic noise level increases on each roadway segment would be below the applicable threshold for a finding of a significant noise impact. In addition, hourly average heavy truck traffic noise levels are also predicted to be below baseline ambient conditions at the sensitive receptors located along the project haul routes. As a result, off-site traffic noise increases resulting from project heavy truck traffic are predicted to be ***less than significant.***

Future traffic volumes on the project area roadways evaluated in Table16 and 17 will increase over time relative to existing levels due to general growth of the region. However, the project-generated truck traffic will remain constant, not increasing over time. As a result, the incremental increase in overall traffic noise levels resulting from the project will decrease relative to the increases shown in Tables 16 and 17 over time. Because the future project-related traffic noise level increases would remain below the project's thresholds, this impact is also considered to be ***less than significant*** relative to future (cumulative) traffic conditions.

Impact Evaluation 3: Engineered Fill Placement and Compaction

Engineered fill placement and compaction activities at both the Brunswick Industrial and Centennial Industrial sites will utilize heavy earthmoving equipment similar to that used to evaluate project site construction noise levels. As noted in Table 10 the following equipment will be utilized for the engineered fill activities:

- Bulldozer
- Motor Grader
- Excavator
- Compactor
- Haul Trucks
- Water Truck
- Front-end Loader
- Mobile Auger Blending Plant
- Mobile Tire Washing Plant

The Table 12 data were utilized to assess maximum noise levels for equipment proposed for use at the engineered fill locations. From that data, it was assumed that maximum and average noise levels of 85 dBA L_{max} and 75 dBA L_{eq} could typically be expected at a position 50 feet from the engineered fill equipment operations.

<u>Centennial Site Engineered Fill Placement Activities</u>

The nearest sensitive receptors (residences) to the Centennial site are receptors 1, 2 & 8. Those receptors are located approximately 500 to 1,000 feet from locations on the project site where the engineered fill activities would take place. Based on maximum and average construction noise levels of 85 dBA L_{max} and 75 dBA L_{eq} at a reference distance of 50 feet, average and maximum noise levels were computed at the nearest receptors. Table 18 shows the predicted engineered fill activity noise levels at each representative receptor.

Table 18
Predicted Engineered Fill Activity Noise Levels at Nearest Receptors
Centennial Site Operations

		Predicted Noise Level		Daytime[1] Noise Criteria[2]		Criteria Exceeded?		
Receptor	**Minimum Distance**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Impact?**
1	500	54	64	63	81	no	no	no
2	600	53	63	68	86	no	no	no
8	1000	47	57	55	75	no	no	no

1. As noted in Table 9 engineered fill placement, grading and compaction activities would be limited to daytime hours. As a result, only the daytime criteria are utilized for the assessment of potential noise impacts for this activity.
Source: FHWA Roadway Construction Noise Model (RCNM) reference maximum levels.

As indicated in Table 18, engineered fill placement and compaction activities at the Centennial site are predicted to generate noise levels below the noise criteria applicable to each of the nearest receptors. As a result, this impact is considered ***less than significant***.

Brunswick Site Engineered Fill Placement Activities

As indicated in Figure 3, there are multiple sensitive receptors located around the perimeter of the Brunswick site. The distances from those receptors to the nearest onsite engineered fill placement area range from 400 to 1,800 feet. Based on maximum and average construction noise levels of 85 dBA L_{max} and 75 dBA L_{eq} at a reference distance of 50 feet, average and maximum noise levels were computed at the nearest receptors to the Brunswick Industrial site. Table 19 shows the predicted noise levels at each representative receptor.

Table 19
Predicted Engineered Fill Activity Noise Levels at Nearest Receptors
Brunswick Site Operations

		Predicted Noise Level		Daytime[1] Noise Criteria[2]		Criteria Exceeded?		
Receptor	Minimum Distance	Leq	Lmax	Leq	Lmax	Leq	Lmax	Impact?
15	1400	44	54	55	75	no	no	No
16	1600	42	52	53	75	no	no	No
18	1600	42	52	55	74	no	no	No
19	1300	45	55	55	74	no	no	no
20	1000	47	57	62	75	no	no	no
21	700	51	61	60	75	no	no	no
22	500	54	64	61	75	no	no	no
23	400	56	66	63	75	no	no	no
24	350	58	68	65	80	no	no	no
25	650	52	62	65	75	no	no	no
26	300	59	69	55	69	Yes	no	no
27	600	53	63	55	69	no	no	no
28	500	54	64	55	69	no	no	no
29	1200	46	56	55	69	no	no	no
30	1800	41	51	55	69	no	no	no

1. As noted in Table 9, engineered fill placement, grading and compaction activities would be limited to daytime hours. As a result, only the daytime criteria are utilized for the assessment of potential noise impacts for this activity.
Source: Bollard Acoustical Consultants, Inc. (BAC)

The Table 19 data indicate that the placement, grading and compaction of engineered fill at the Brunswick Industrial site would generate noise levels below the project's standards of significance at each of the nearest sensitive receptor locations with the exception of receptor 26.

Engineered fill placement and compaction at the southern end of the Brunswick site would occur approximately 300 feet from receptor 26 at the closest fill location. The predicted worst-case noise level of 59 dB Leq at this location would potentially exceed the daytime criteria at this receptor by 4 dBA. However the predicted noise level of 59 dB Leq does not include consideration of additional attenuation caused by intervening vegetation. Because there would be approximately 300 feet of intervening vegetation between receptor 26 and the closest fill locations at the Brunswick site, actual levels are expected to be lower than those predicted in Table 19 by approximately 5 dBA. The resulting noise level at receptor 26 would be below the project criteria. As a result, this impact is considered ***less than significant***.

Impact Evaluation 4: Mineral Processing

As noted in the project description section, the project processing equipment located within the processing building will consist of the SAG mill (primary grinding), ball mill (secondary grinding), concentrator, cyclones and screens, and filter presses. The noise generation of this equipment is predicted to be 90 dBA L_{eq} at a distance of 50 feet from the operating equipment, with maximum noise levels of 95 dBA.

The processing and dewatering equipment will be located within engineered, insulated metal buildings. The noise attenuation provided by conventional metal buildings is estimated to be a minimum of 20 dB. In addition, the metal building housing the processing equipment will have double doors (airlock) to prevent sound escaping when one set of exterior doors are open. The reference noise level cited above were adjusted to account for the attenuation provided by the proposed equipment buildings and projected to the nearest representative receptors to the Brunswick site. The results of those calculations are provided in Table 20. Because these processes will occur 24/7, the most restrictive noise criteria (nighttime) were applied to this impact evaluation.

Table 20
Predicted Mineral Processing Noise Levels at Nearest Receptors
Idaho Maryland Mine – Nevada County, CA

		Predicted Noise Level		Daytime[1] Noise Criteria[2]		Criteria Exceeded?		
Receptor	**Minimum Distance**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Impact?**
15	1000	42	47	45	70	no	no	no
16	800	45	50	45	67	no	no	no
18	800	45	50	58	72	no	no	no
19	650	47	52	51	70	no	no	no
20	500	49	54	55	73	no	no	no
21	700	46	51	53	71	no	no	no
22	1100	42	47	53	72	no	no	no
23	1600	37	42	56	74	no	no	no
24	2200	34	39	58	76	no	no	no
25	2850	31	36	57	76	no	no	no
26	2500	32	37	45	60	no	no	no
27	2300	33	38	45	60	no	no	no
28	2000	35	40	45	60	no	no	no
29	2350	33	38	45	60	no	no	no
30	2700	31	36	45	60	no	no	no

1. As noted in Table 9, processing operations would occur 24-hours per day. As a result, the most restrictive nighttime criteria were utilized for the assessment of potential noise impacts for this activity.
Source: Bollard Acoustical Consultants, Inc. (BAC)

The Table 20 data indicate that the mineral processing operations are predicted to generate noise levels below the project's nighttime standards of significance at each of the nearest sensitive receptor locations. As a result, this impact is considered ***less than significant***.

Impact Evaluation 5: Shaft Ventilation Fan Noise

As noted in the project description, a surface ventilation fan will be used to ventilate the shaft until the service shaft is complete and the permanent underground ventilation fan can be installed. Aboveground facilities necessary to support pumping of fresh air underground include a primary ventilation fan and duct work. The primary ventilation fan will have housing on its sides and a silencer to reduce noise levels. The front of the ventilation fan will have a vent connected to duct work that will carry air underground. In addition, secondary fans will be installed underground to promote air circulation. The ventilation system will be electric.

The sound level generated by the ventilation fans depends primarily on the fan input power and type. The shaft ventilation fan proposed for use at the Brunswick site will be centrifugal type rated at 275 hp (205 kW). At a distance of 5 feet, the sound pressure level (SPL) as a function of fan power (kW) is approximated by:

SPL = 90 + 10 x Log (fan kW)[1]

Based on the fan power rating and the above formula, plus a sound level decay rate of 6 dB per doubling of distance, the sound pressure level for the proposed ventilation fan computes to 93 dBA at 50 feet. This reference noise level was projected to the nearest representative receptors to the Brunswick site, including a minimum predicted 20 dBA of attenuation provided by the proposed fan housings and silencer. The results of those calculations are provided in Table 21. Because the fan will operate continuously, the most restrictive noise criteria (nighttime) were applied to this impact evaluation. Due to the steady-state nature of the fan operations, maximum noise levels are predicted to be equivalent to average sound levels for this fan.

Table 21
Predicted Ventilation Fan Noise Levels at Nearest Receptors
Idaho Maryland Mine – Nevada County, CA

		Predicted Noise Level		Nighttime[1] Noise Criteria[2]		Criteria Exceeded?		
Receptor	**Distance**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Impact?**
15	650	50	50	45	70	Yes	no	Yes
16	600	51	51	45	67	Yes	no	Yes
18	600	51	51	58	72	no	no	no
19	950	46	46	51	70	no	no	no
20	950	46	46	55	73	no	no	no
21	1400	42	42	53	71	no	no	no
22	1850	39	39	53	72	no	no	no
23	2350	36	36	56	74	no	no	no
24	2950	33	33	58	76	no	no	no
25	3450	31	31	57	76	no	no	no
26	3100	33	33	45	60	no	no	no
27	2700	34	34	45	60	no	no	no
28	2300	36	36	45	60	no	no	no
29	2300	36	36	45	60	no	no	no
30	2600	35	35	45	60	no	no	no

1. As noted in Table 9, processing operations would occur 24-hours per day. As a result, the most restrictive nighttime criteria were utilized for the assessment of potential noise impacts for this activity.
Source: Bollard Acoustical Consultants, Inc. (BAC)

1 Howes, M.J. "Ventilation and Cooling Design for Long Declines (Auxiliary Fans)." Proceedings of the 8th International Mine Ventilation Congress, AusIMM, Brisbane, QLD, Australia, 2005.

The Table 21 data indicate that the shaft ventilation fan is predicted to generate noise levels below the project's nighttime standards of significance at each of the nearest sensitive receptor locations with the exception of receptors 15 and 16. As a result, this impact is considered ***potentially significant***.

Mitigation for Impact 6: Shaft Ventilation Fan Noise
The proposed shaft ventilation fan housing and silencer shall be engineered to reduce ventilation fan noise to 45 dBA or less at receptors 15 and 16.

Significance after Mitigation: *Less than Significant*

Impact Evaluation 6: Exterior Pumps

Several tanks are located outside adjacent to process plant buildings. The tanks are shielded by the 65 ft high process plant building to the northeast and by the 25 ft high addition building to the northwest. The clean and process water tanks would have electric centrifugal pumps located at the bottom of the tanks. The thickener tank and paste filter feed tanks would have peristaltic hose pumps mounted on the bottom of the tanks. The cement silo would transfer cement into the plant with a mechanical auger. The thickener tank would have a rotating rake and the paste filter feed tank would have a rotating impeller, both of which are within the fluid of the tank.

The equipment used in the outside tanks are reportedly very low noise emissions. The horsepower of the exterior pumps will range from 15-30 hp. Based on this range of pump horsepower, combined pump noise levels are predicted to be 65 dBA at a reference distance of 50 feet. The nearest receptor to the exterior pump area is receptor 20, located 550 feet to the east. At that distance, pump noise would be reduced to 44 dBA by distance alone. The intervening 25-foot high process building will serve as an intervening barrier, thereby further reducing pump noise at the nearest receptors by a minimum of 15 dBA. Resulting pump noise levels at the nearest receptors are predicted to be less than 30 dBA. Because the predicted pump noise levels are well below even the most restrictive nighttime noise criteria at the nearest receptors this impact is considered ***less than significant***.

Impact Evaluation 7: Water Treatment Plant

The project proposes a water treatment plant at the location indicated on Figure 6. The primary noise source associated with the water treatment plant will be the pumps and turbine aerator. The aerator is located inside the building. Several pumps are located outside adjacent to the building and at the pump platform on the water treatment pond. The distance from the water treatment plant and the nearest residence (receptor 20) is approximately 900 feet.

Noise level measurements conducted by BAC at the Auburn California wastewater treatment plant indicate that average noise levels of approximately 50 dBA were recorded at a distance of 500 feet from the plant. That noise was generated primarily by pumps and the aeration system. As noted above, however, the aeration system will be located inside a building. As a result, the water treatment plant pump noise is predicted to be approximately 45 dBA or less at a distance of 500 feet.

At the nearest residences located 700 feet away, noise exposure from normal operations at the on-site water treatment facility are predicted to be approximately 40 dB L_{eq}. This predicted level is well below the daytime, evening, and nighttime thresholds of 62, 60, and 55 dB L_{eq} applicable at this nearest residence. As a result, this impact is considered to be ***less than significant***.

Impact Evaluation 8: Backup Generators

The project proposes to have four diesel generators inside of a building adjacent to the water treatment plant. The generators would be used for power generation during power interruptions to line power from PG&E. Noise levels from manufacture data indicates that the generators would produce a combined sound pressure level of approximately 100 dBA at a reference distance of 25 feet from the generators. The nearest receptors to the generator building (receptors 20 and 21), are located 700-800 feet to the east. At that distance, operation of the emergency generators would produce a sound level of approximately 70 dBA not including shielding by the proposed generator building.

The project applicants have stated that the buildings will be designed as necessary to reduce sound levels from equipment located within the building to acceptable levels at the nearest residences. Although receptors 20 and 21 are the closest to the generator building, they experience higher existing ambient noise levels than receptors 15 and 16, which are approximately 400 feet farther away. As a result, receptors 15 and 16 have lower noise level criteria than receptors 20 and 21, and are considered the critical receptors for this aspect of the project. With nighttime criteria of 45 dBA Leq at receptors 15 and 16, the generator building would need to be constructed to provide at least 25 dBA of noise attenuation to achieve satisfaction with the nighttime noise standards. Provided the generator building provides a minimum generator noise reduction of 25 dBA this impact would be considered ***less than significant***.

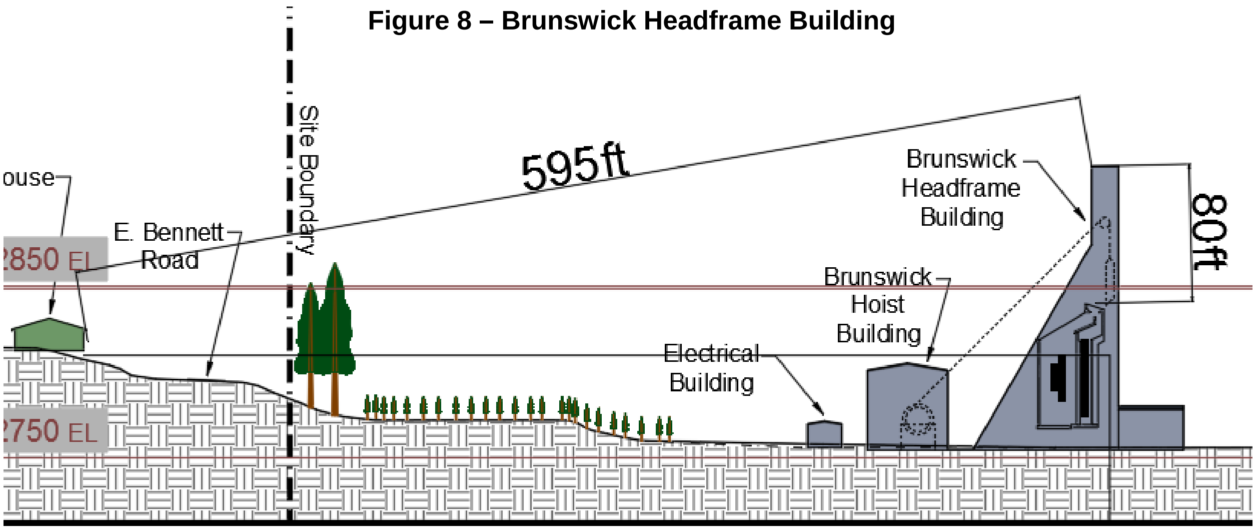
Impact Evaluation 9: Mine Compressor

The mine air compressor would be located inside a building adjacent to the Brunswick Shaft and have a rated capacity of 4,000 cfm at 800 hp. The noise generation of this compressor is estimated to be approximately 110 dBA at a reference distance of 3 feet. At the nearest receptor located 450 feet from the compressor building (receptors 16 and 18), the compressor sound levels would be reduced to 65 dBA due to distance alone. After accounting for the noise reduction of the compressor building, which is predicted to be a minimum of 20 dBA, compressor sound levels at the nearest receptors would be 45 dBA or less. Because this level would satisfy the nighttime noise level criteria of 45 dBA at these nearest receptors, this impact is considered ***less than significant.***

Impact Evaluation 10: Brunswick Shaft Skipping

Rock would be hoisted up the Brunswick shaft in skips and dropped into the concrete silo. The headframe and headframe building cladding surrounds shaft silo. The top of the headframe building at is approximately 165 ft above ground is open and skips would drop rock into the silo chute at a height of approximately 85 feet above ground. As a result, the headframe building is predicted to substantially reduce noise generated by the shaft skipping operations at the nearest residences. The orientation of the Brunswick shaft headframe relative to the nearest residence is illustrated in Figure 8 below.

Figure 8 – Brunswick Headframe Building



Rock hoisted into the headframe building will drop approximately 2 feet onto a steel chute located within the concrete sleeve of the silo where it will slide until falling onto the surge pile of rock. The falling rock is predicted to generate a maximum noise level of approximately 120 dBA within the headframe building. Shielding provided by the concrete sleeve of the silo and the headframe building itself is predicted to reduce maximum noise levels by at least 30 dBA. At the nearest residence located 595 feet to the north (receptor 16), the resulting maximum noise level computes to less than 50 dBA Lmax. The nighttime noise level criteria applicable at this receptor is 67 dBA Lmax. Because the maximum noise generation of the shaft skipping operations would be below that maximum noise level, this impact is considered ***less than significant.***

Impact Evaluation 11: Parking Lot Noise

During the busiest shift change (7 am), approximately 107 employee vehicles are forecast to arrive at the site and 67 employee vehicles would depart the site for a total of 174 parking lot movements. As a means of determining noise generation related to parking lot activities, a series of individual noise measurements were conducted of multiple vehicle types arriving and departing a typical parking area, including engines starting and stopping, car doors opening and closing, and persons conversing as they entered and exited the vehicles. The results of those measurements revealed that individual parking lot movements generated mean sound exposure levels of 70 dB SEL at a reference distance of 50 feet. The maximum noise level associated with parking lot activity typically did not exceed 65 dB L_{max} at the same reference distance. Parking area noise exposure was determined using the following equation:

$$\text{Peak Hour } L_{eq} = 70+10*\log (N) - 35.6$$

Where 70 is the SEL for a single automobile parking operation at a reference distance of 50 feet, N is the number of parking area operations in a peak hour (174), and 35.6 is 10 times the logarithm of the number of seconds in an hour. The resulting parking lot noise level at a reference distance of 50 feet computes to 57 dBA Leq and 65 dB Lmax.

The nearest receptor to the parking area is located approximately 300 feet to the east (between receptors 22 and 23). At this distance, parking lot generated noise computes to 41 dBA Leq and 49 dBA Lmax. The nighttime noise level criteria applicable at this receptor is 53 dB Leq and 72 dBA dBA Lmax. Because the average and maximum noise generation of the employee parking lot activities would be below those average and maximum noise criteria, this impact is considered ***less than significant.***

Evaluation of Aircraft Noise Impacts

Impact Evaluation 12: Aircraft Noise Impacts upon the Project

Because the project does not proposed the development of noise-sensitive land uses assessing aircraft noise impacts for this project may not be required. Nonetheless, Figure 5 shows that both the Brunswick and Centennial sites are located outside of the future 55 dB CNEL noise contour for the Nevada County Airport. This level is well below the County's 75 dB CNEL level considered normally acceptable for industrial uses. As a result, the project site and the proposed operations will not be adversely affected by aircraft noise and this impact is **considered less than significant.**

Evaluation of Blasting Noise Impacts

Impact Evaluation 13: Blasting

A blasting analysis was prepared for this project by IDC-PBS. That study, which is incorporated by reference, focused primarily on assessing vibration impacts associated with project blasting activities. That analysis concluded that vibration impacts associated with underground blasting activities at the project site would be negligible, and in almost all situations will be unnoticeable and undetectable. The IDC-PBS study did not, however, assess noise impacts related to project blasting.

To assess the potential for noise impacts associated with project blasting activities, BAC utilized long-term blasting noise level data collected by BAC over the course of 30 days of operations at the Sutter Gold underground gold mine in Amador County, California in 2013. During that survey, noise monitoring was conducted at 5 locations concurrently with the nearest being 220 feet from the main mine portal. Over the course of the survey, 62 blasting events were captured at that nearest location. The average noise level computed from the 62 blast events was 75 dBA Lmax at the location 200 feet from the mine portal.

There will be two entrances to the vertical mine shafts at the Brunswick site. The main shaft is at the northern portion of the site approximately 550 feet from the nearest receptor (receptor 16). The service shaft is located more centrally at the Brunswick site approximately 1,000 feet from the nearest receptor (receptor 21). Because the Idaho Maryland Mine (IMM) is a vertical shaft mine whereas the portal to the Sutter Gold mine where the noise monitoring was performed was accessed via a horizontal portal, and because the IMM portals are smaller than the Sutter Gold portal, blasting noise levels at the IMM are expected to be considerably lower than those measured at the Sutter Gold site. The difference in maximum noise levels at the two sites is estimated to be at least 20 dB.

If the 75 dBA Lmax level collected at Sutter Gold is conservatively reduced by 20 dB to assess blasting noise impacts at the Brunswick site, worst-case maximum noise levels at the nearest receptors would range from 52 to 57 dBA Lmax on average. This range of predicted worst-case blasting noise levels of 52-57 dBA Lmax are below the daytime 75 dBA Lmax criteria at the nearest receptors, as well as below the evening and nighttime noise criteria.

Although the blasting report prepared by IDC-PBS was not tasked with predicting blasting related noise levels on the surface, page 27 of the report states the following:

> “Air overpressure is caused by numerous factors including the explosive detonation, movement, and collapse of a mine face which are in open air. In underground mining, especially the type proposed at the Idaho-Maryland Mine, there would be no air overpressure produced on the surface. The blast would not cause this pressure wave to form or an audible sound produced. ***The air overpressure from the underground blasting at the proposed mine would be zero***.”

In light of the blasting report’s conclusions regarding air overpressures and audible sound at the mine surface, and the considerably more conservative use of data collected the Sutter Gold site, this impact is considered ***less than significant***.

Evaluation of Project Vibration Impacts

Impact Evaluation 14: Construction Vibration Impacts

Table 22 shows reference peak particle velocity (PPV) and VdB (rms) vibration levels for the types of heavy earthmoving equipment which will be utilized for the project. The Table 22 data is provided in terms of both peak particle velocity and VdB at a reference distance of 25 feet.

Table 22
Vibration Levels of Heavy Earthmoving Equipment – 25 Foot Reference Distance

Source	Peak Particle Velocity (PPV) inches/second	RMS Velocity in Decibels (VdB)
Water Trucks	0.001	57
Scraper	0.002	58
Bulldozer - Small	0.003	58
Backhoe	0.051	82
Excavator	0.051	82
Grader	0.051	82
Loader	0.051	82
Loaded Trucks	0.076	86
Bulldozer - Large	0.089	87

Source: FTA and FHWA

The nearest receptor to either the Centennial or Brunswick site is approximately 350 feet from the locations where the most significant vibration would be generated. To project the vibration levels from the reference distance of 25 feet shown in Table 22 to the nearest receptor, the following formula is applied:

$$PPV = PPV\ ref * (25 / D)^n \text{ (inches/second)}$$

Where:

PPV = Desired vibration level at receptor located D feet from the vibration source
D = Distance from vibration source to sensitive receptor (feet)
n = Vibration attenuation rate through ground.

According to Chapter 12 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (Federal Transit Administration, 2006) manual, an “n” value of 1.5 is recommended to calculate vibration propagation through typical soil conditions.

Using the formula provided above, the vibration level at the nearest sensitive receptor located 350 feet from the project area vibration generation computes to 0.002 inches/second ppv, or approximately 58 VdB. Because this level is well below the threshold of perception, and below measured existing maximum vibration levels at several of the ambient vibration monitoring sites, this impact is considered ***less than significant***.

Cumulative Noise Impacts from all Sources

Impact Evaluation 15: Cumulative Noise From all Sources

The extent by which noise sources related to project operations will combine to result in higher noise levels than those predicted for the noise sources individually depends on the relative locations of the noise sources and their individual magnitude. For example, due to the considerable distance and topographic shielding between the Centennial and Brunswick sites, noise sources present at one site would not result in any additive change in the noise environment at the other site. However, at the Brunswick site there are several noise sources which, when combined, would result in higher noise levels at the nearest receptors than the individual sources alone.

With the exception of engineered fill activities, the vast majority of the noise sources at the Brunswick site will be housed within buildings and enclosures. With the exception of the generator building where 25 dB of noise attenuation was determined to be necessary to avoid significant noise impacts, this analysis has concluded that a noise reduction of 20 dB for the other project buildings would be adequate to avoid significant noise impacts at the nearest receptors.

When 3 noise sources of equal magnitude are combined the resulting increase in noise levels is 5 dB (4.77 dB). Because all of the on-site noise sources generate differing noise levels from different locations, the combined noise exposure of all onsite noise sources would not likely reach 5 dBA. Nonetheless, to ensure that combined noise sources do not result in exceedance of the projects noise criteria at the nearby receptors, a building noise reduction of 5 dB higher than that assumed for the individual sources would be required.

Specifically, a building noise reduction of 30 dB would be required for the generator building and a building noise reduction of 25 dB would be required for the other equipment buildings. If such building noise reduction can be achieved then the cumulative noise generation of the on-site noise sources at the Brunswick Site is predicted to remain within compliance with the noise criteria and this impact would be ***less than significant***.

Appendix A

Acoustical Terminology

Acoustics — The science of sound.

Ambient Noise — The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.

Attenuation — The reduction of an acoustic signal.

A-Weighting — A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.

Decibel or dB — Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.

CNEL — Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.

Frequency — The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.

Ldn — Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.

Leq — Equivalent or energy-averaged sound level.

Lmax — The highest root-mean-square (RMS) sound level measured over a given period of time.

Loudness — A subjective term for the sensation of the magnitude of sound.

Masking — The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.

Noise — Unwanted sound.

Peak Noise — The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.

RT_{60} — The time it takes reverberant sound to decay by 60 dB once the source has been removed.

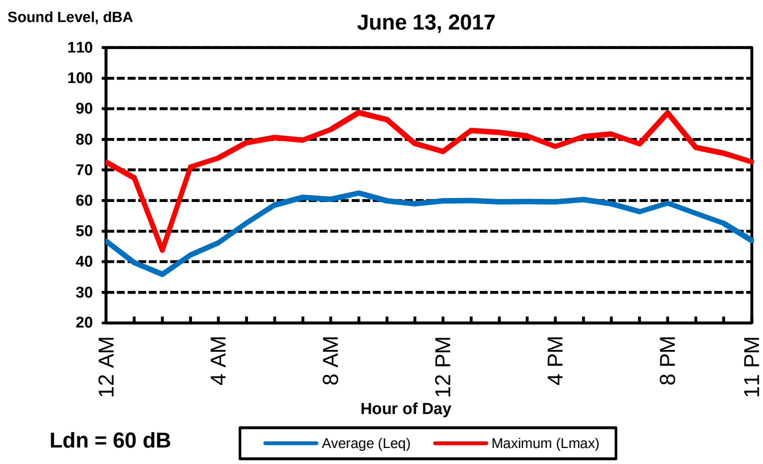
Sabin — The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.

SEL — A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.

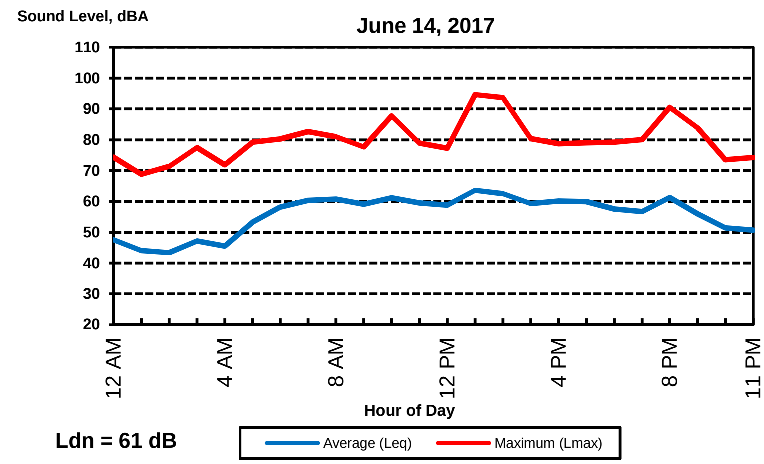
Threshold of Hearing — The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.

Threshold of Pain — Approximately 120 dB above the threshold of hearing.

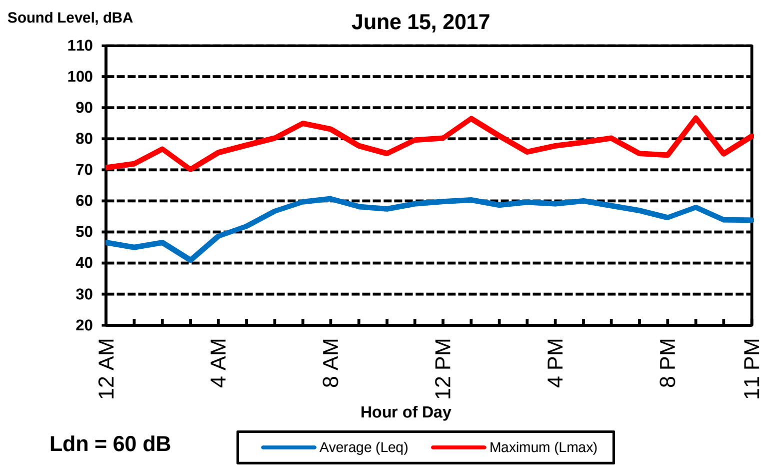
Appendix B-1
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 1: June 13, 2017 - June 16, 2017



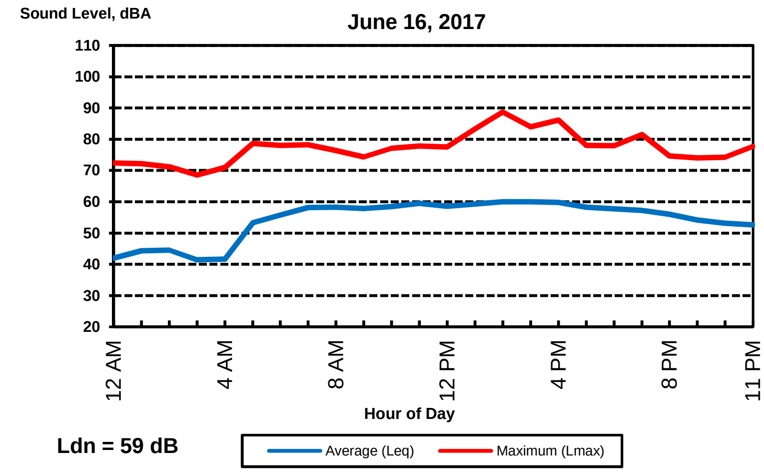
Ldn = 60 dB



Ldn = 61 dB



Ldn = 60 dB



Ldn = 59 dB

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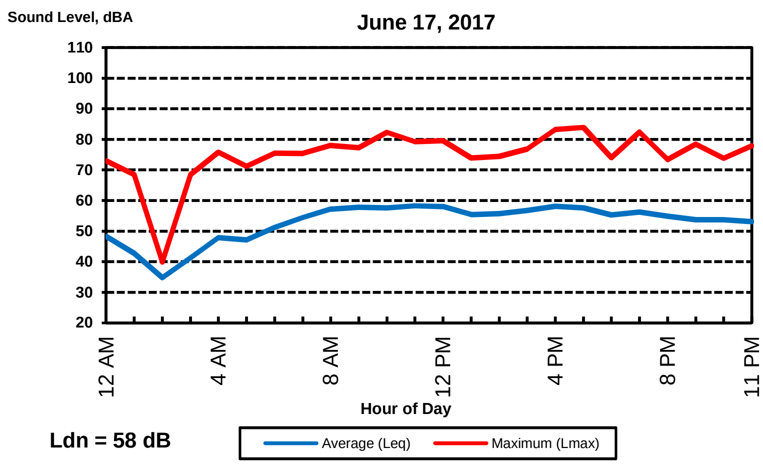
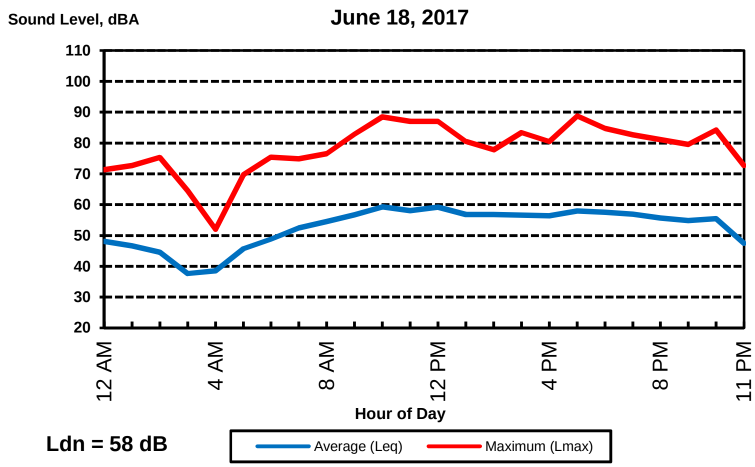
Appendix B-2
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 1: June 17, 2017 - June 18, 2017





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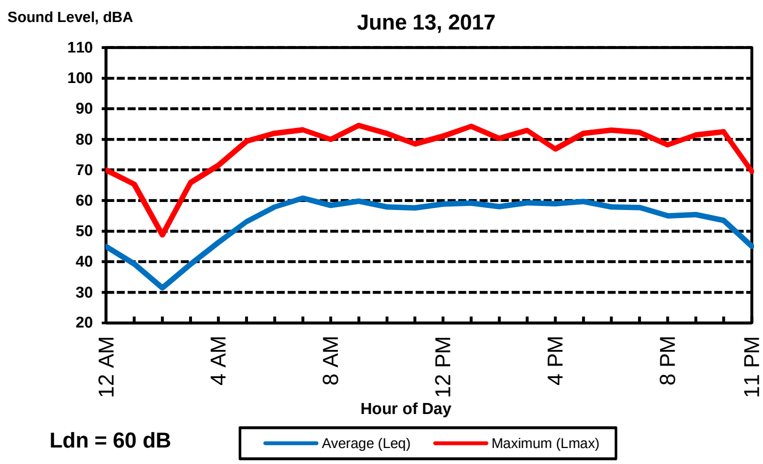
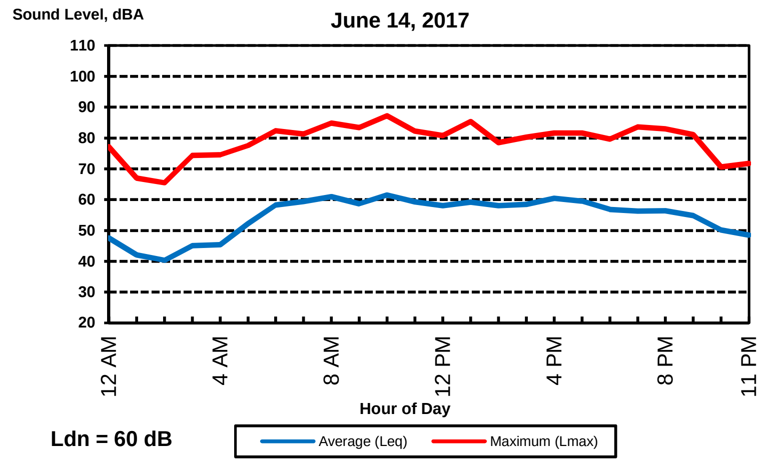
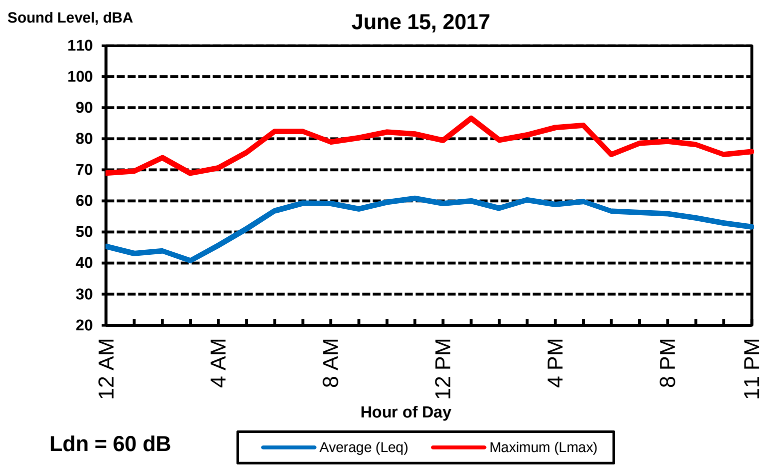
Appendix B-3
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 2: June 13, 2017 - June 16, 2017



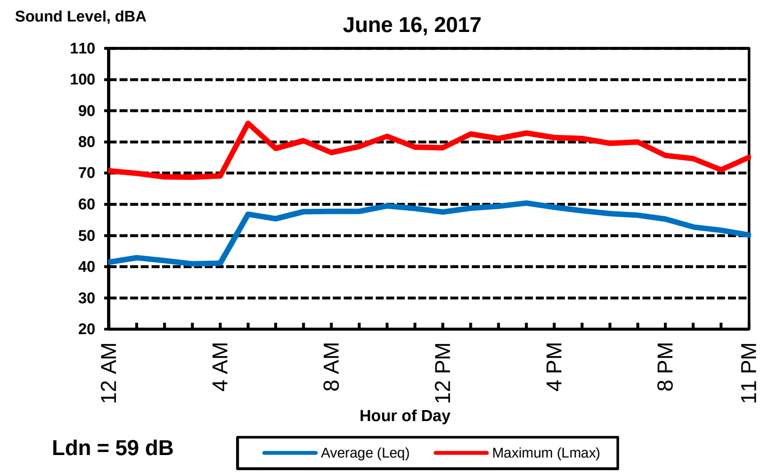
Ldn = 60 dB



Ldn = 60 dB



Ldn = 60 dB



Ldn = 59 dB

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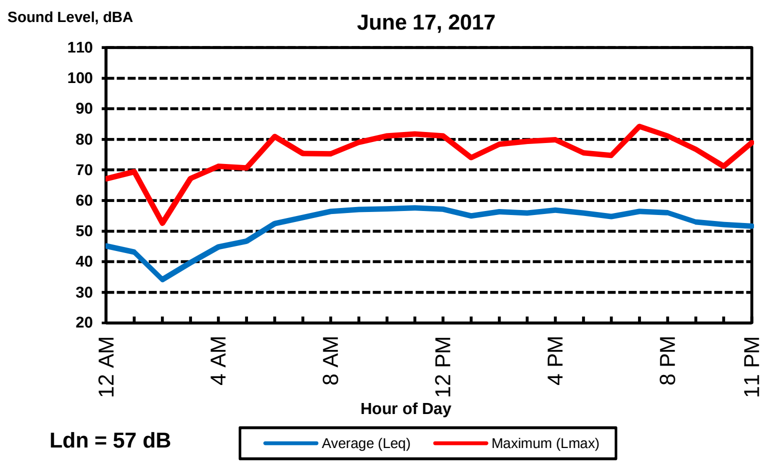
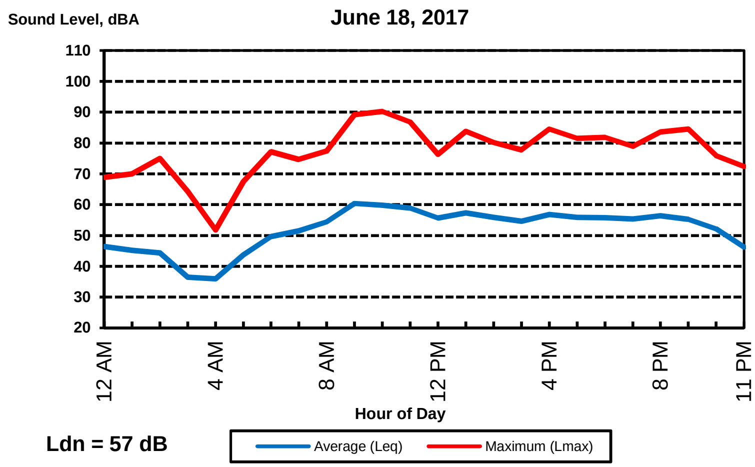
Appendix B-4
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 2: June 17, 2017 - June 18, 2017



Ldn = 57 dB



Ldn = 57 dB

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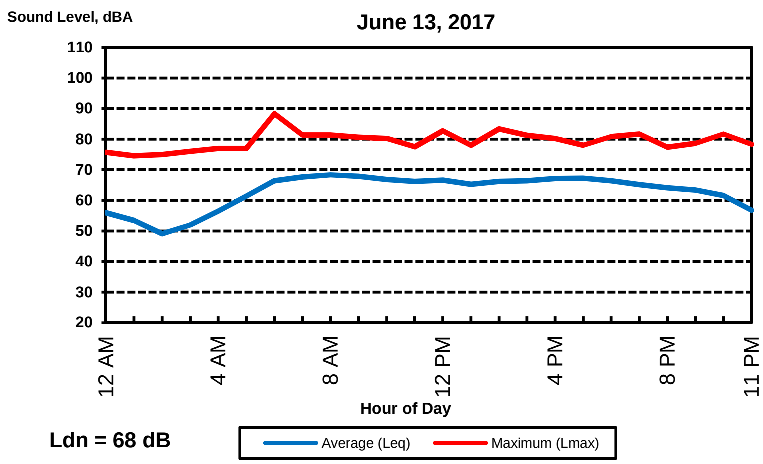
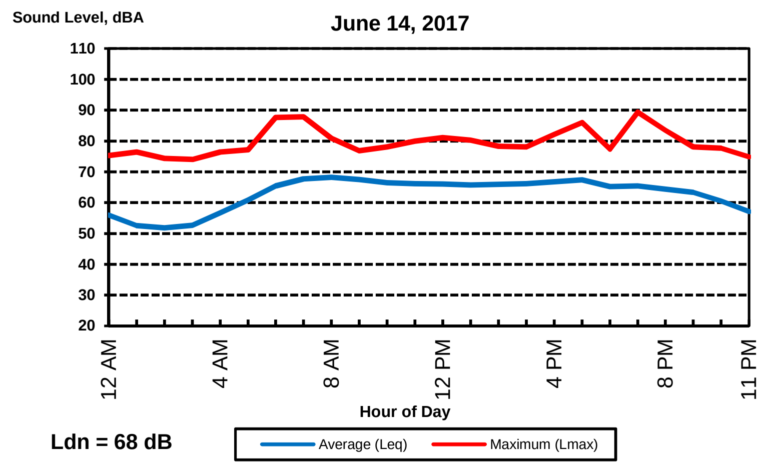
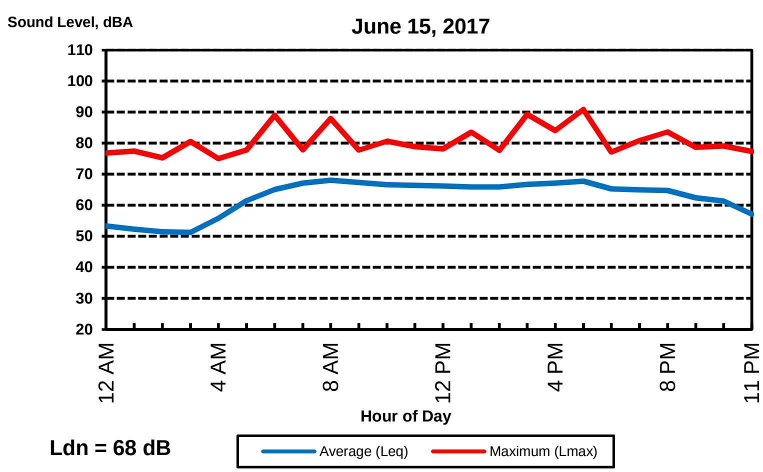
Appendix B-5
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 3: June 13, 2017 - June 16, 2017



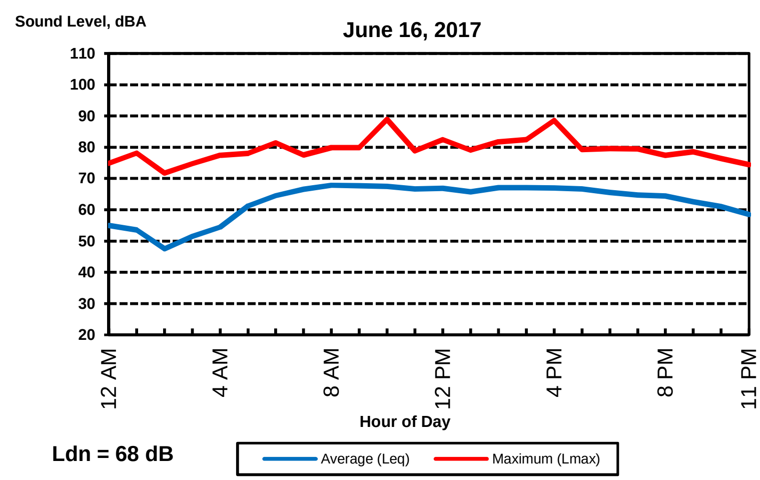
Ldn = 68 dB



Ldn = 68 dB



Ldn = 68 dB



Ldn = 68 dB

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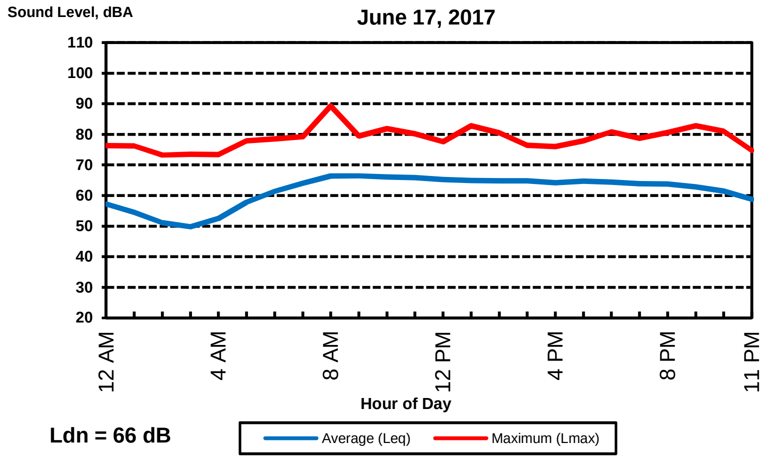
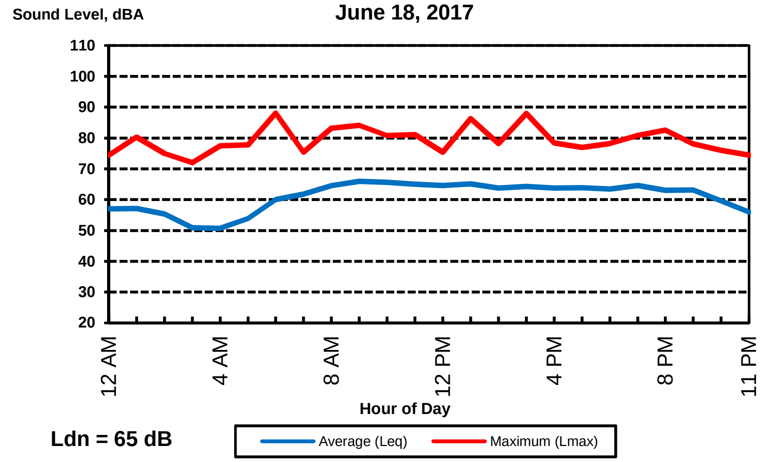
Appendix B-6
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 3: June 17, 2017 - June 18, 2017



Ldn = 66 dB



Ldn = 65 dB

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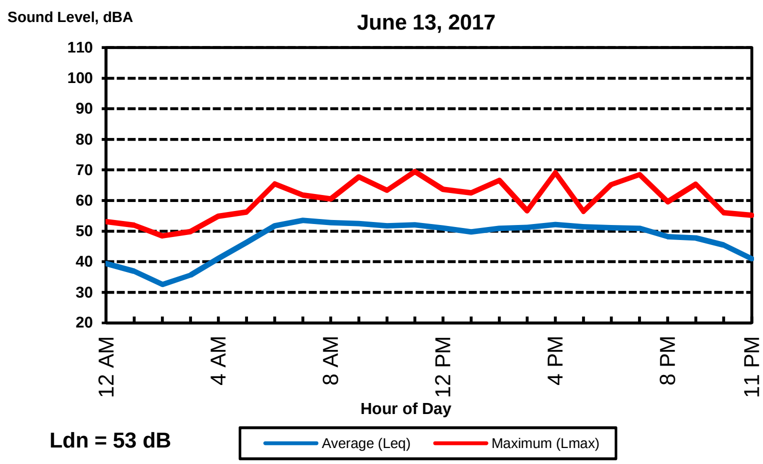
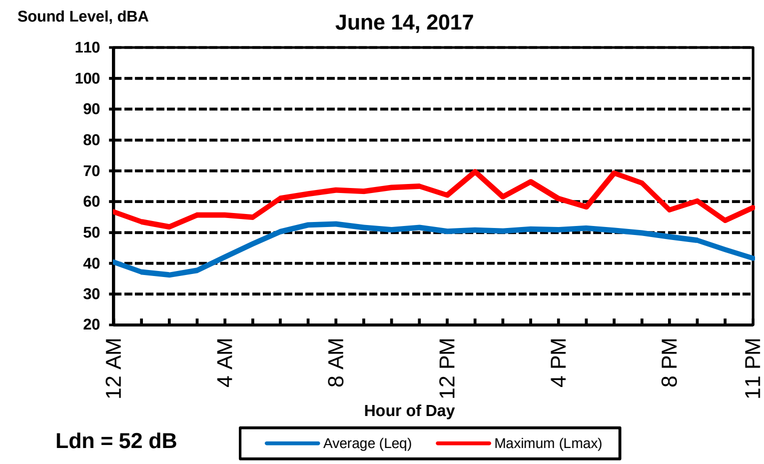
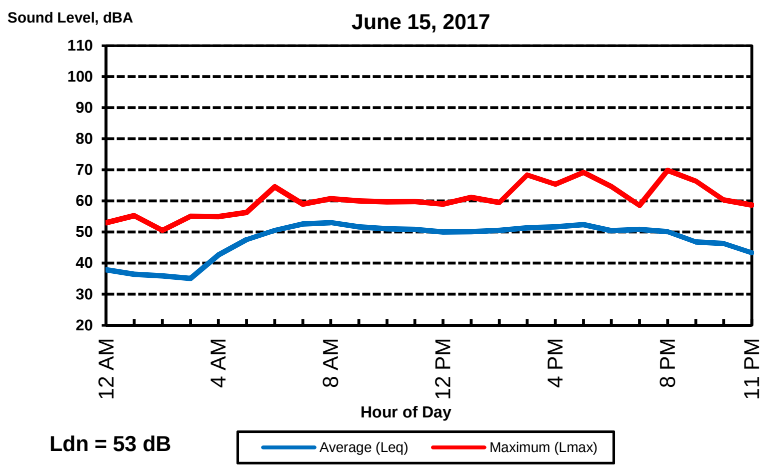
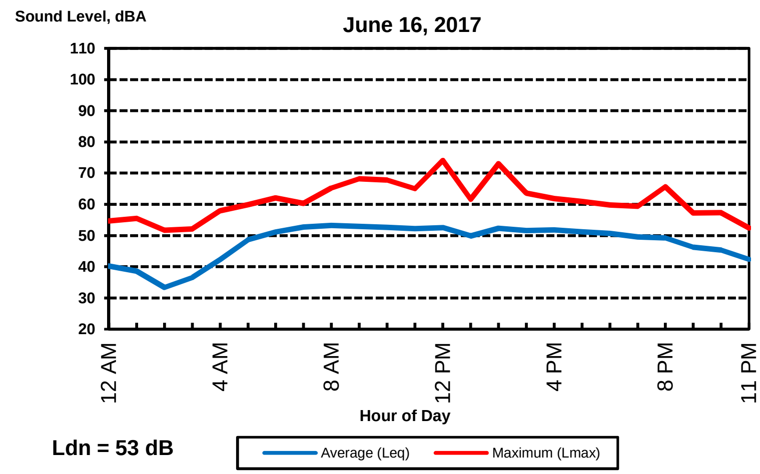
Appendix B-7
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 4: June 13, 2017 - June 16, 2017









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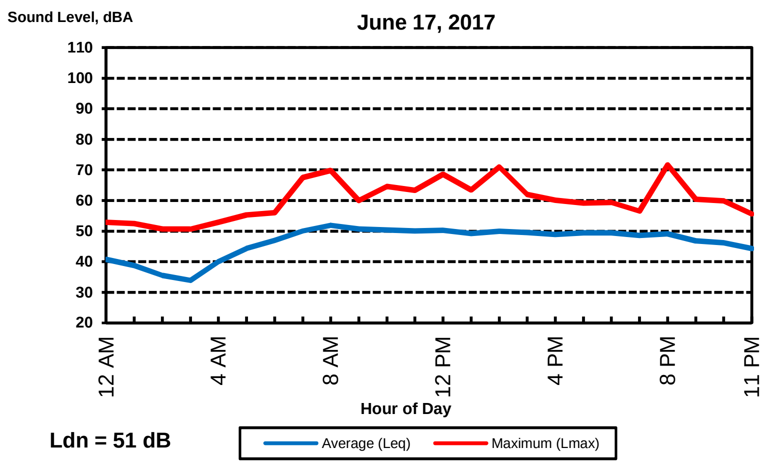
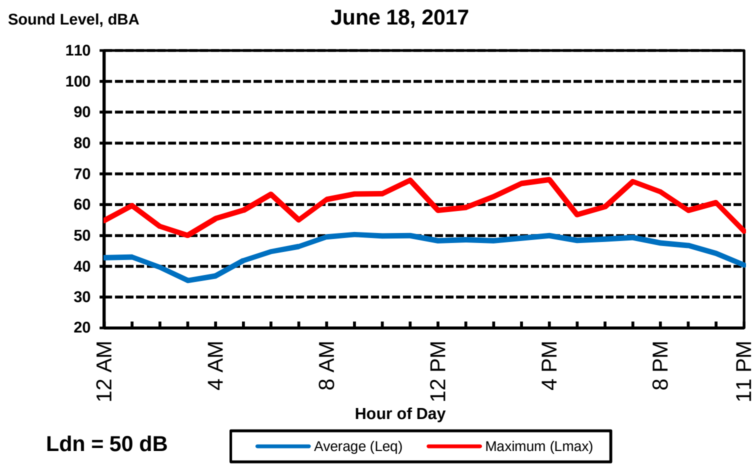
Appendix B-8
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 4: June 17, 2017 - June 18, 2017





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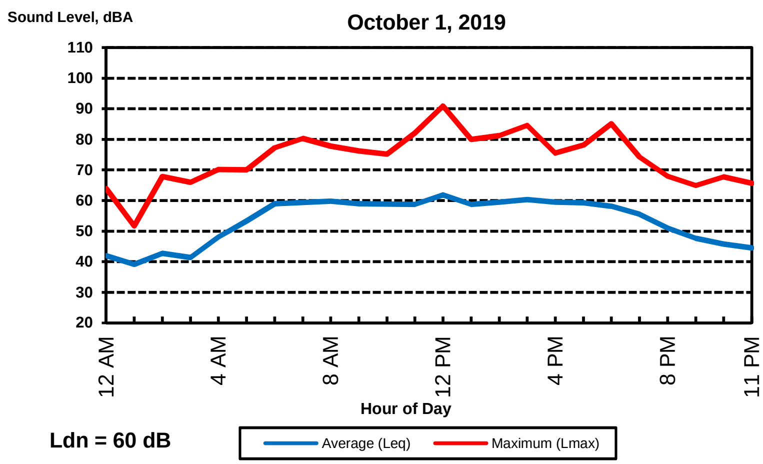
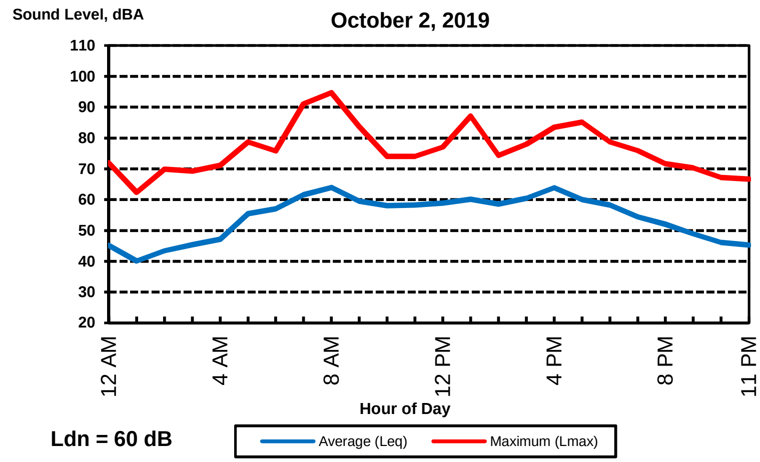
Appendix B-9
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 5: October 1, 2019 - October 2, 2019



Ldn = 60 dB



Ldn = 60 dB

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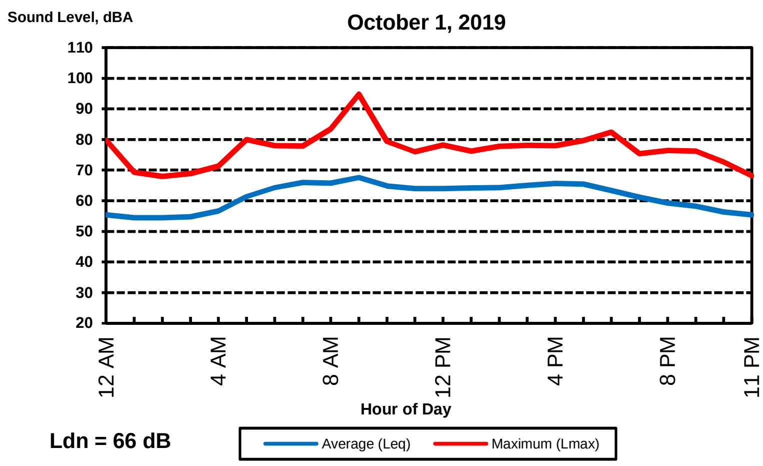
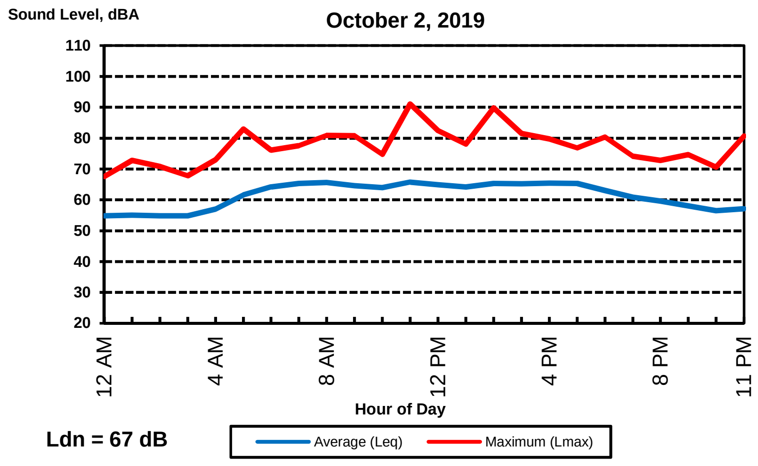
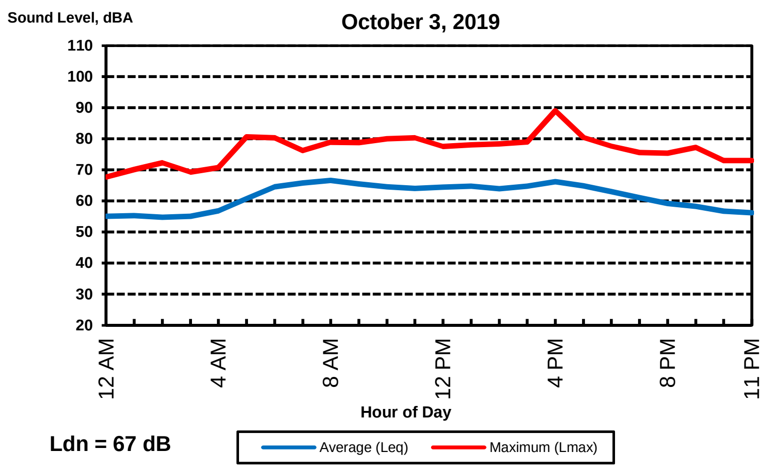
Appendix B-10
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 6: October 1, 2019 - October 3, 2019



Ldn = 66 dB



Ldn = 67 dB



Ldn = 67 dB

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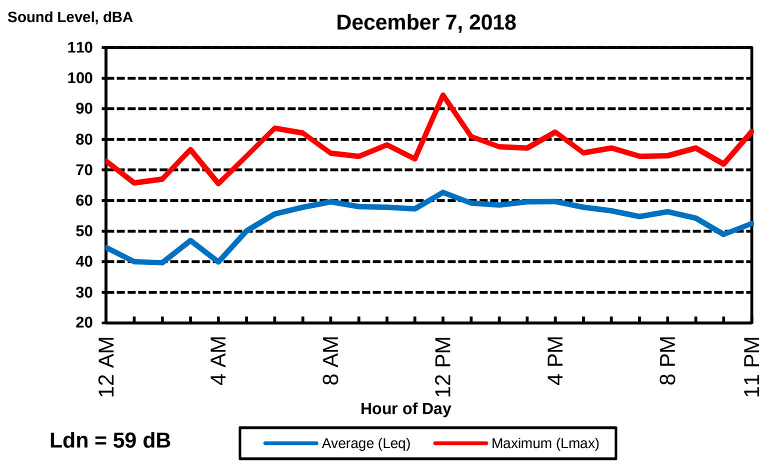
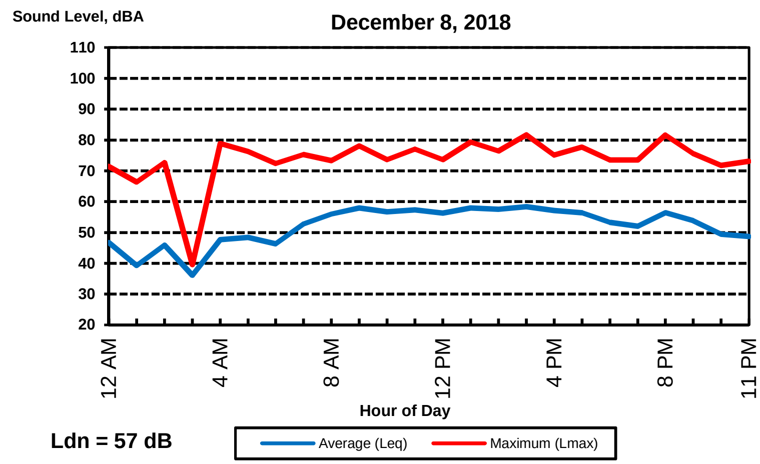
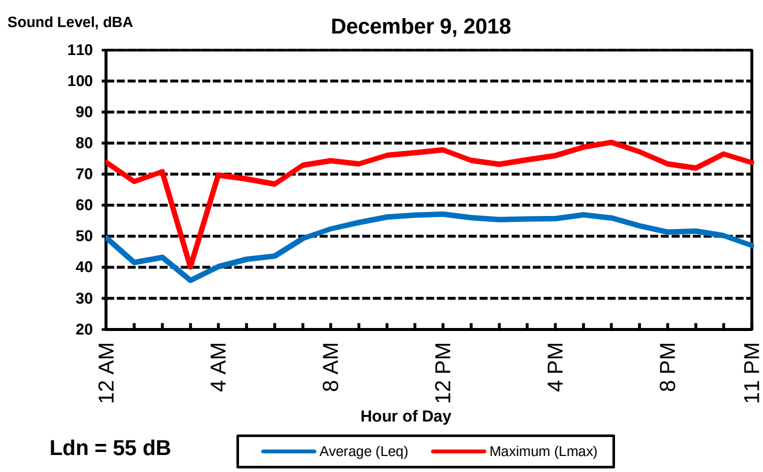
Appendix B-11
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 7: December 7, 2018 - December 10, 2018



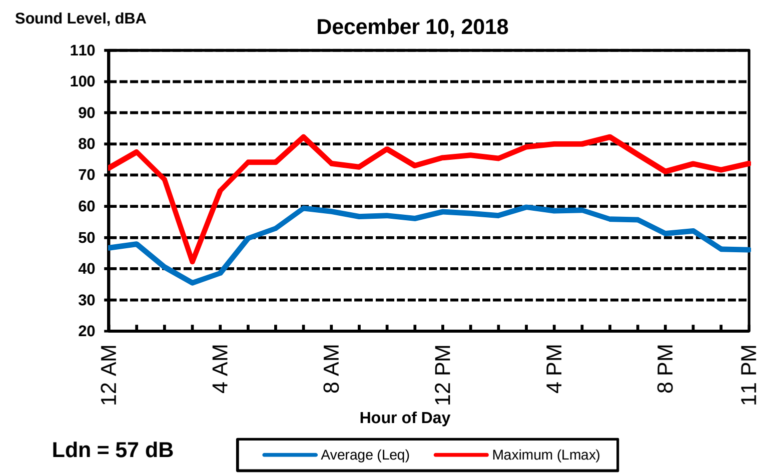
Ldn = 59 dB



Ldn = 57 dB



Ldn = 55 dB



Ldn = 57 dB

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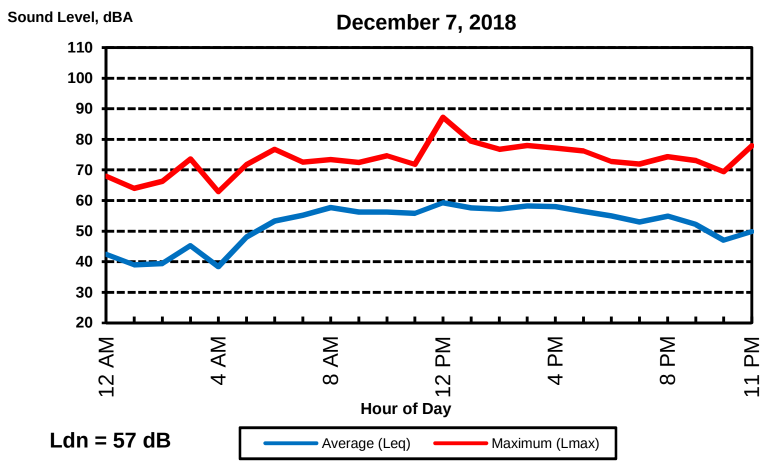
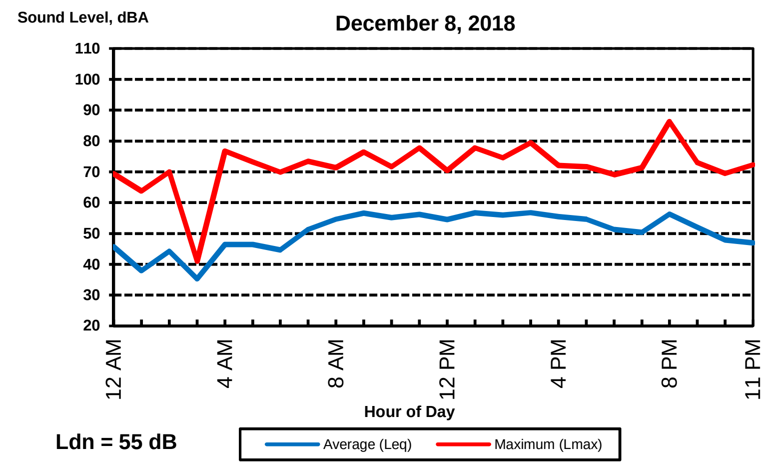
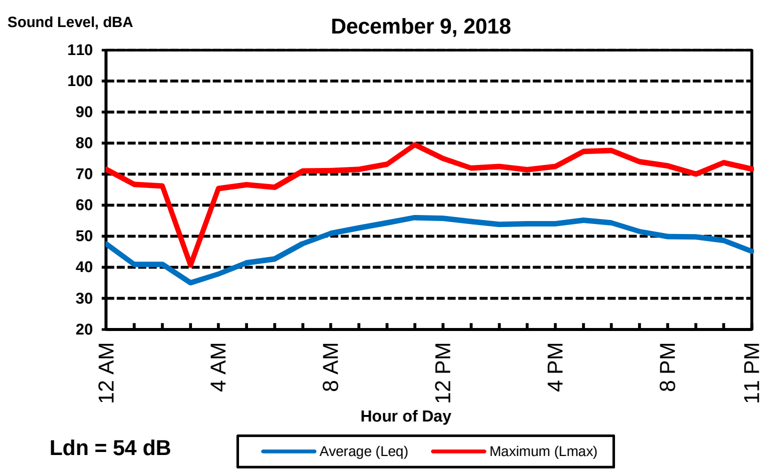
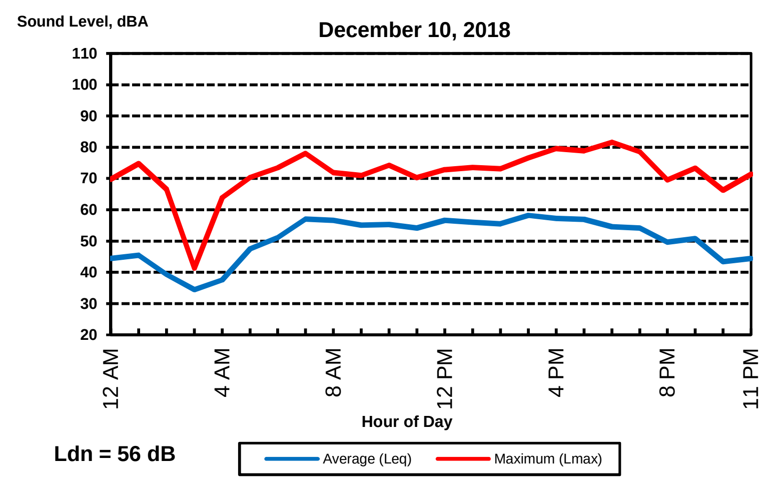
Appendix B-12
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 8: December 7, 2018 - December 10, 2018









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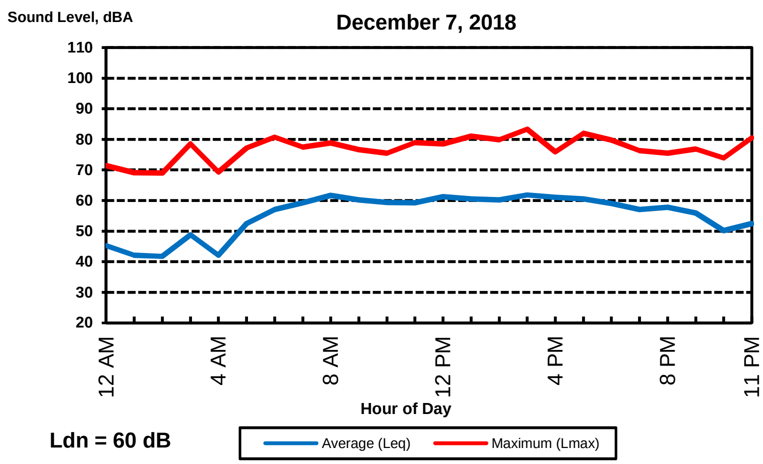
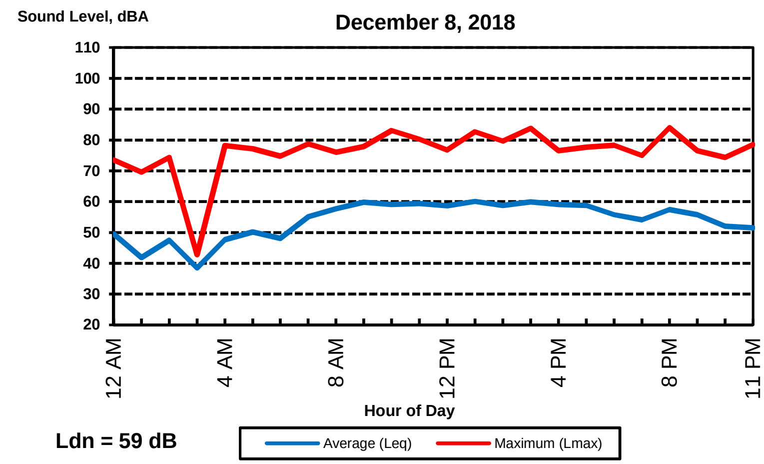
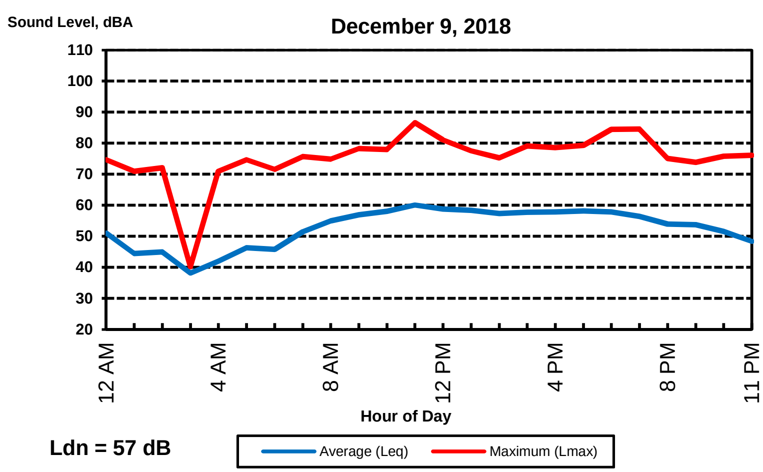
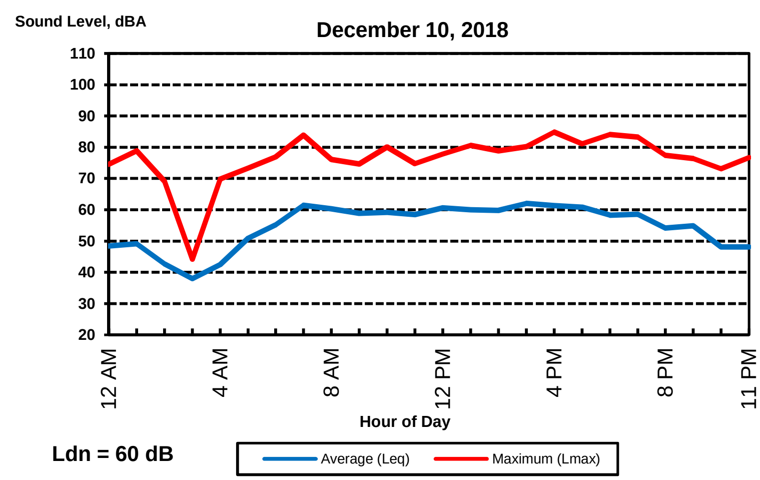
Appendix B-13
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 9: December 7, 2018 - December 10, 2018









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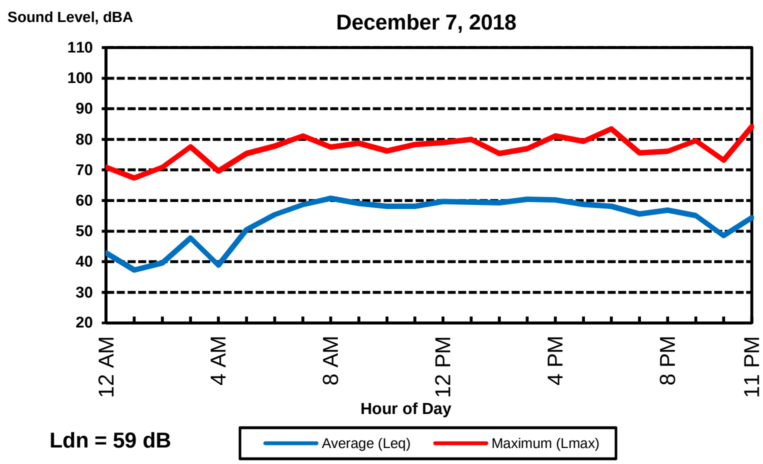
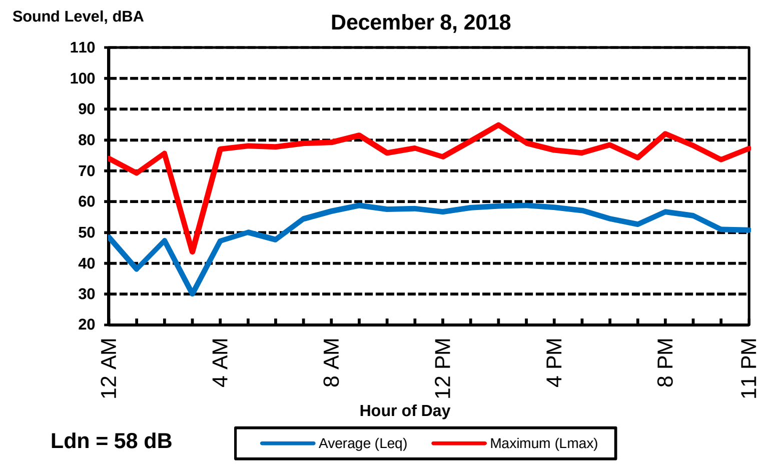
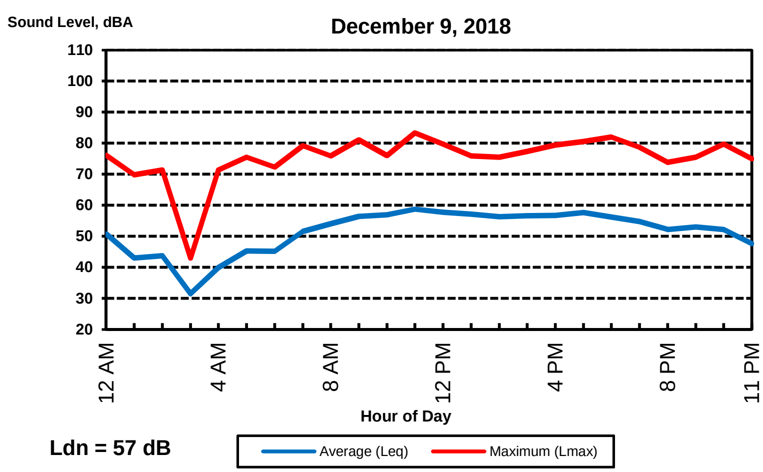
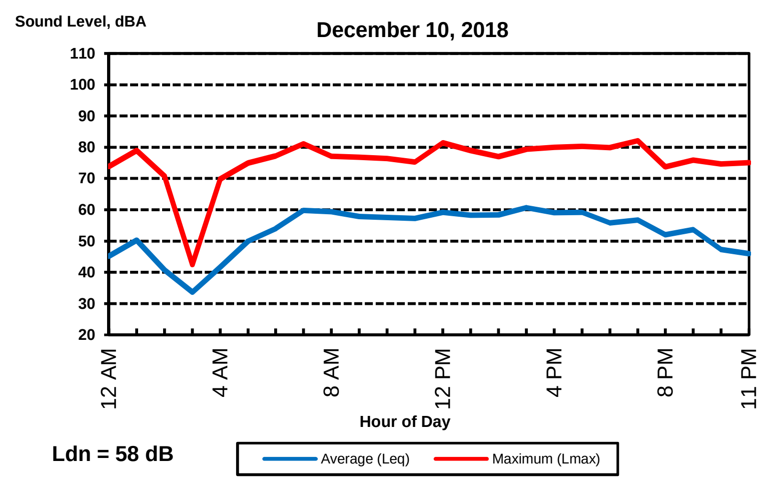
Appendix B-14
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 10: December 7, 2018 - December 10, 2018









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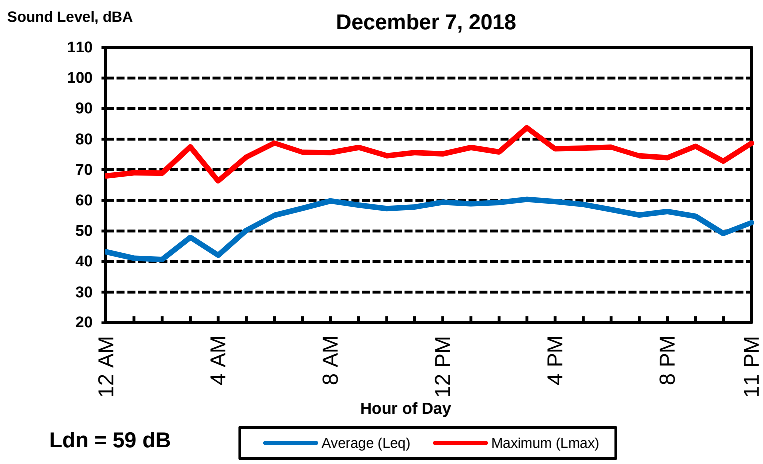
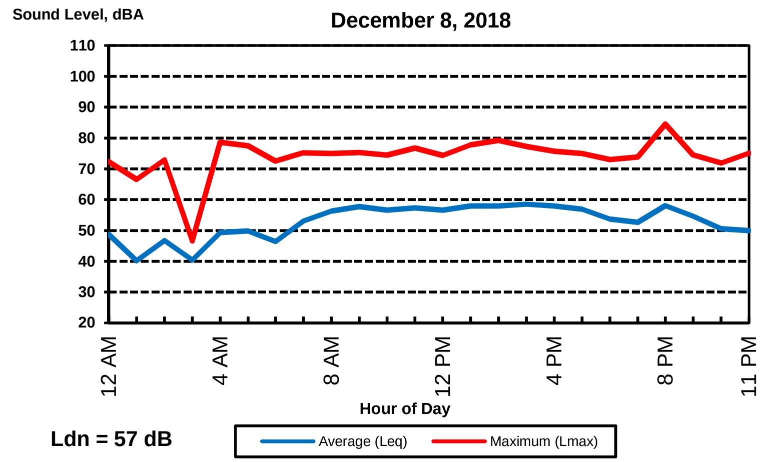
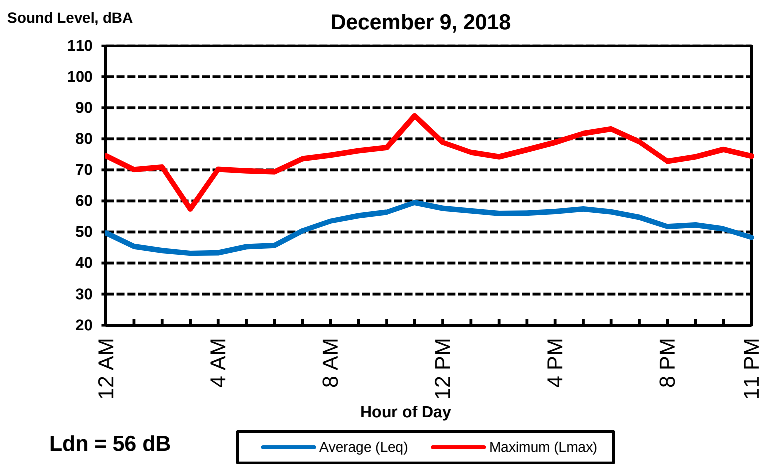
Appendix B-15
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 11: December 7, 2018 - December 10, 2018



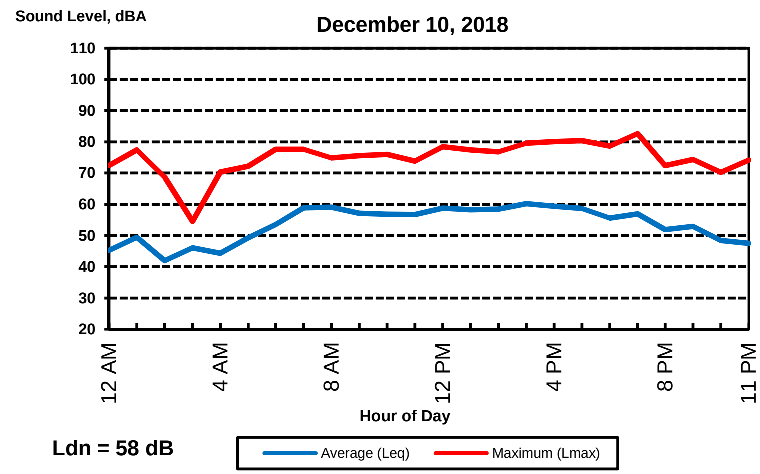
Ldn = 59 dB



Ldn = 57 dB



Ldn = 56 dB



Ldn = 58 dB

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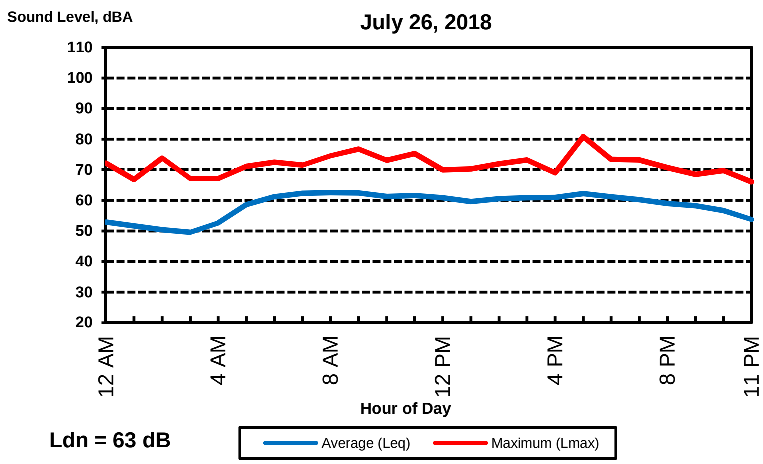
Appendix B-16
Ambient Noise Monitoring Results
Idaho Maryland Mine Project
Site 12: July 26, 2018



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Appendix C-1
FHWA Highway Traffic Noise Prediction Model Inputs
Idaho Maryland Mine Project
File Name: FHWA - Existing.xlsx

#	Roadway	Segment	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Bennett Road	West of Brunswick	1,486	85	15	2	1	45	135
2	Brunswick Road	Project Site Entrance to Bennet	9,436	85	15	2	3	55	200
3	Brunswick Road	North of Whispering Pines	12,294	85	15	2	3	55	100
4	Brunswick Road	South of Project Site Entrance	9,418	85	15	2	3	55	150
5	Brunswick Road	Whispering Pines to Bennet	15,366	85	15	2	3	55	120
6	Empire Street	West of SR 174	4,225	85	15	2	1	30	50
7	Empire Street	East of Auburn	5,635	85	15	2	1	30	50
8	Idaho Maryland Road	East of SR 49	7,348	85	15	2	2	40	90
9	State Route 174	West of Brunswick	8,292	85	15	2	6	40	50
10	Whispering Pines Lane	Crown Point to Brunswick	2,515	85	15	2	1	40	70

Appendix C-2
FHWA Highway Traffic Noise Prediction Model Inputs
Idaho Maryland Mine Project
File Name: FHWA - Project Trucks - Centennial.xlsx

#	Roadway	Segment	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Bennett Road	West of Brunswick	111	93.8	6.3	0.0	100.0	30	135
2	Brunswick Road	Project Site Entrance to Bennet	111	93.8	6.3	0.0	100.0	40	200
3	Brunswick Road	North of Whispering Pines	24	93.8	6.3	0.0	100.0	40	100
4	Brunswick Road	South of Project Site Entrance	12	93.8	6.3	0.0	100.0	45	150
5	Brunswick Road	Whispering Pines to Bennet	222	93.8	6.3	0.0	100.0	40	120
6	Empire Street	West of SR 174	6	93.8	6.3	0.0	100.0	30	50
7	Empire Street	East of Auburn	6	93.8	6.3	0.0	100.0	30	50
8	Idaho Maryland Road	East of SR 49	0	93.8	6.3	0.0	100.0	40	90
9	State Route 174	West of Brunswick	0	93.8	6.3	0.0	100.0	40	50
10	Whispering Pines Lane	Crown Point to Brunswick	202	93.8	6.3	0.0	100.0	35	70

Appendix C-3
FHWA Highway Traffic Noise Prediction Model Inputs
Idaho Maryland Mine Project
File Name: FHWA - Project Trucks - Highway 49.xlsx

#	Roadway	Segment	ADT	Day %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance
1	Bennett Road	West of Brunswick	111	93.8	6.3	0.0	100.0	30	135
2	Brunswick Road	Project Site Entrance to Bennet	111	93.8	6.3	0.0	100.0	40	200
3	Brunswick Road	North of Whispering Pines	222	93.8	6.3	0.0	100.0	40	100
4	Brunswick Road	South of Project Site Entrance	12	93.8	6.3	0.0	100.0	45	150
5	Brunswick Road	Whispering Pines to Bennet	222	93.8	6.3	0.0	100.0	40	120
6	Empire Street	West of SR 174	6	93.8	6.3	0.0	100.0	30	50
7	Empire Street	East of Auburn	6	93.8	6.3	0.0	100.0	30	50
8	Idaho Maryland Road	East of SR 49	0	93.8	6.3	0.0	100.0	40	90
9	State Route 174	West of Brunswick	0	93.8	6.3	0.0	100.0	40	50
10	Whispering Pines Lane	Crown Point to Brunswick	0	93.8	6.3	0.0	100.0	35	70