Environmental Noise & Vibration Assessment

George Reed Jackson Valley Quarry Extended Hours of Operation

Amador County, California

BAC Job # 2020-149

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Executive Summary

Bollard Acoustical Consultants, Inc. (BAC) was retained by George Reed, Inc., to evaluate potential noise and vibration impacts related to extended hours of operation at their Jackson Valley Quarry (JVQ) in Amador County, California. This report contains BAC's evaluation.

Specific noise sources evaluated included aggregate mining, processing, and loadout. This evaluation did not analyze noise or vibration generated by blasting operations, as no changes to current blasting operations are proposed as part of the project.

Noise and vibration measurements were conducted at six locations around the quarry boundaries to establish baseline conditions. Measured ambient noise levels were used to develop the project standards of significance in conjunction with adopted Amador County General Plan noise standards and California Environmental Quality Act (CEQA) guidelines.

This evaluation concludes that, without mitigation, noise generated during nighttime excavation, processing and load-out could exceed acceptable levels at certain discrete sensitive receptors in the project vicinity. Accordingly, site-specific noise mitigation measures are recommended for the project that include mining setbacks, processing area source noise control, and limitations on the number of nighttime truck load-out operations.

After implementation of the appropriate noise mitigation measures, this analysis concludes that impacts would be reduced to less than significant levels. Additional noise monitoring is recommended to ensure that the implemented noise control measures result in satisfaction of the applicable noise standards.

No adverse vibration impacts were identified for the proposed project. As a result, no vibration mitigation measures are warranted for the project.

Introduction

George Reed, Inc. (George Reed or applicant) operates the Jackson Valley Quarry on the south side of Highway 88, just east of the junction of Highway 88 and Jackson Valley Road in the Buena Vista / Ione area of Amador County, California. The proposed project is an amendment to the quarry use permit to allow material excavation, processing and loadout of aggregate materials during extended hours of operation. George Reed desires to implement appropriate noise mitigation measures to ensure that the extended hours of operation do not adversely affect sensitive receptors located in the quarry vicinity. Bollard Acoustical Consultants, Inc. (BAC) was retained to identify potential noise impacts associated with the proposed extended hours of operation and to assist with the development of appropriate noise mitigation measures.

The quarry site vicinity is shown on Figure 1. Figure 2 shows the current quarry aerial imagery, location of aggregate processing equipment and the extents of ultimate mining operations

Current Quarry Operations

The Quarry Use Permit (UP-06; 9-2) currently restricts hours of operation to the following:

- Site preparation activities[1]: 8AM – 5PM, Monday through Friday (COA 44.a)
- Operational / reclamation activities[2] (other than site preparation): 6AM – 6PM, Monday through Friday (COA 15)
- Maintenance and repair work: no restriction as long as activities do not exceed 45 dBA at the property line (COA 15)
- Blasting: 11:30AM – 2:30PM, Monday through Friday, unless conditions or circumstances require delay of the blast after 2:30 p.m. (COA 16)

The extraction and hauling of material from the quarry are limited to the maximum tonnages during the specified time periods, as follows:

- From the date of permit issuance of the amended use permit (Year 1) through the full sixth year from the date of issuance (Year 6): 1.2 million tons per year;
- From Year 7 (seventh year from the date of issuance) through Year 12 (twelfth year from the date of issuance): 1.6 million tons per year;
- From Year 13 (thirteenth year from the date of issuance) through the term of the use permit: 2.0 million tons per year.

[1] Site preparation was defined in the Quarry Use Permit Environmental Impact Report (EIR) to include the removal of vegetation, the removal of topsoil and overburden, grading.

[2] The EIR described operational/reclamation activities as those involving excavation, earth movement, and loading operations.

The Use Permit Conditions 44-49 pertain to the noise generation of the facility and require that noise levels not exceed specified limits at the project property lines. The noise standards applicable to the quarry operations are discussed later in this report.

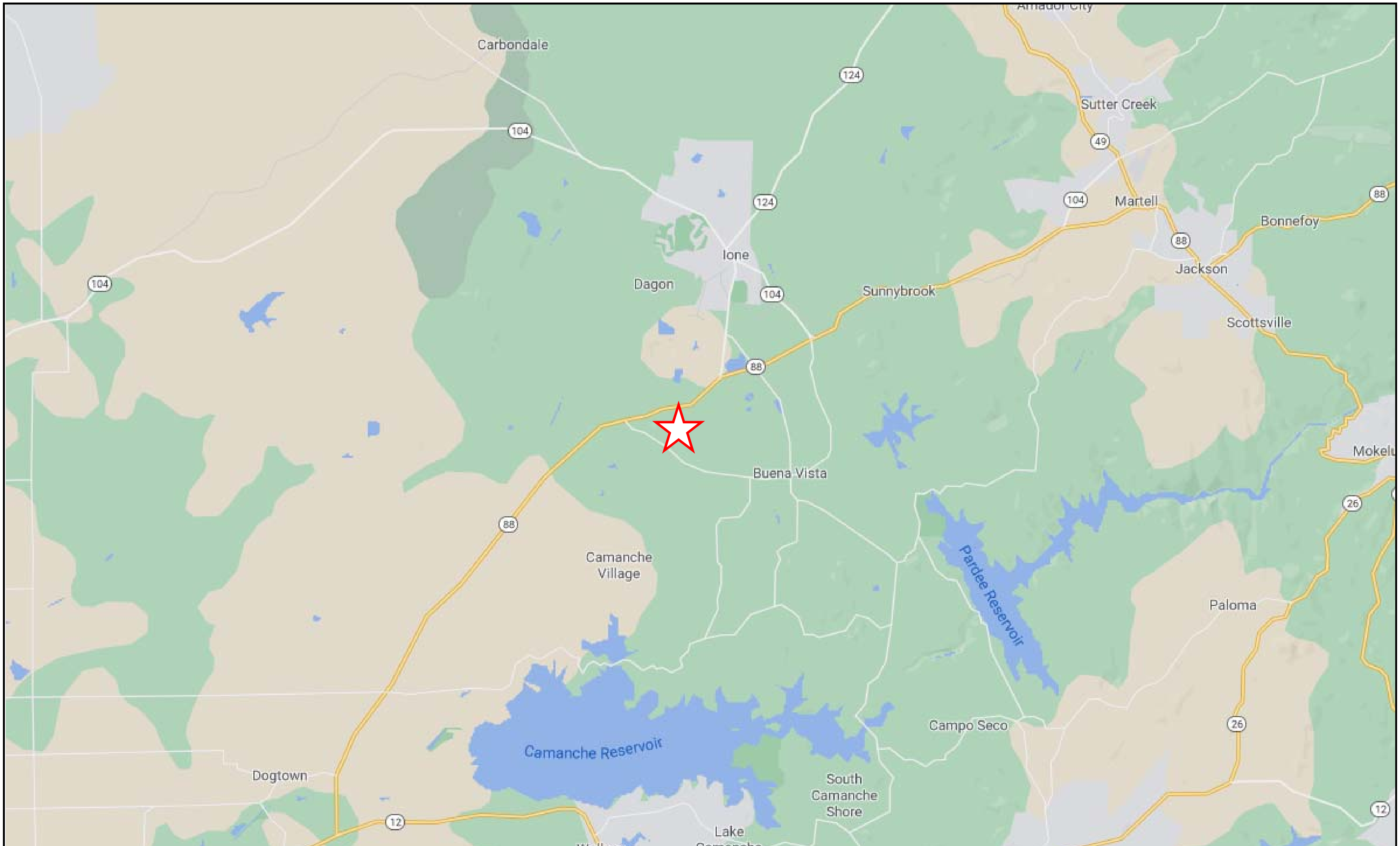
Proposed Quarry Operations

The proposed modifications to the Use Permit would allow for operational/reclamation activities (i.e., excavation, processing, load-out, and hauling) to occur during extended hours of operation (up to 24 hours per day), within parameters that would allow the operations to occur without resulting in significant noise or vibration impacts at nearby residences. Extended hours of operation will allow George Reed to serve regional construction projects that now routinely occur at night and optimize work hours in response to market demands. No change to the approved hours of operation for site preparation activities or blasting operations are proposed. Further, no change to mining methodologies, equipment types, mining area, or the production limits established in the current use permit are proposed.

Objectives of this Analysis

The objectives of this analysis are as follows:

- To provide background information pertaining to noise and vibration fundamentals and effects.
- To identify existing noise-sensitive land uses in the immediate project vicinity.
- To quantify existing ambient noise and vibration levels in the immediate project vicinity.
- To use the guidelines of the California Environmental Quality Act (CEQA), with local Amador County noise standards and measured existing noise and vibration levels to develop appropriate standards of significance for this project.
- To predict project-related noise and vibration levels at the nearest sensitive receptor areas and to compare those levels against the applicable standards of significance.
- Where significant project-related noise or vibration impacts are identified, to recommend and evaluate mitigation options that will reduce those impacts to a less than significant level.



Legend

☆ Jackson Valley Quarry Location

N

Scale (miles)

0 2 4

Jackson Valley Quarry

Amador County, CA

Project Site Vicinity

Figure 1

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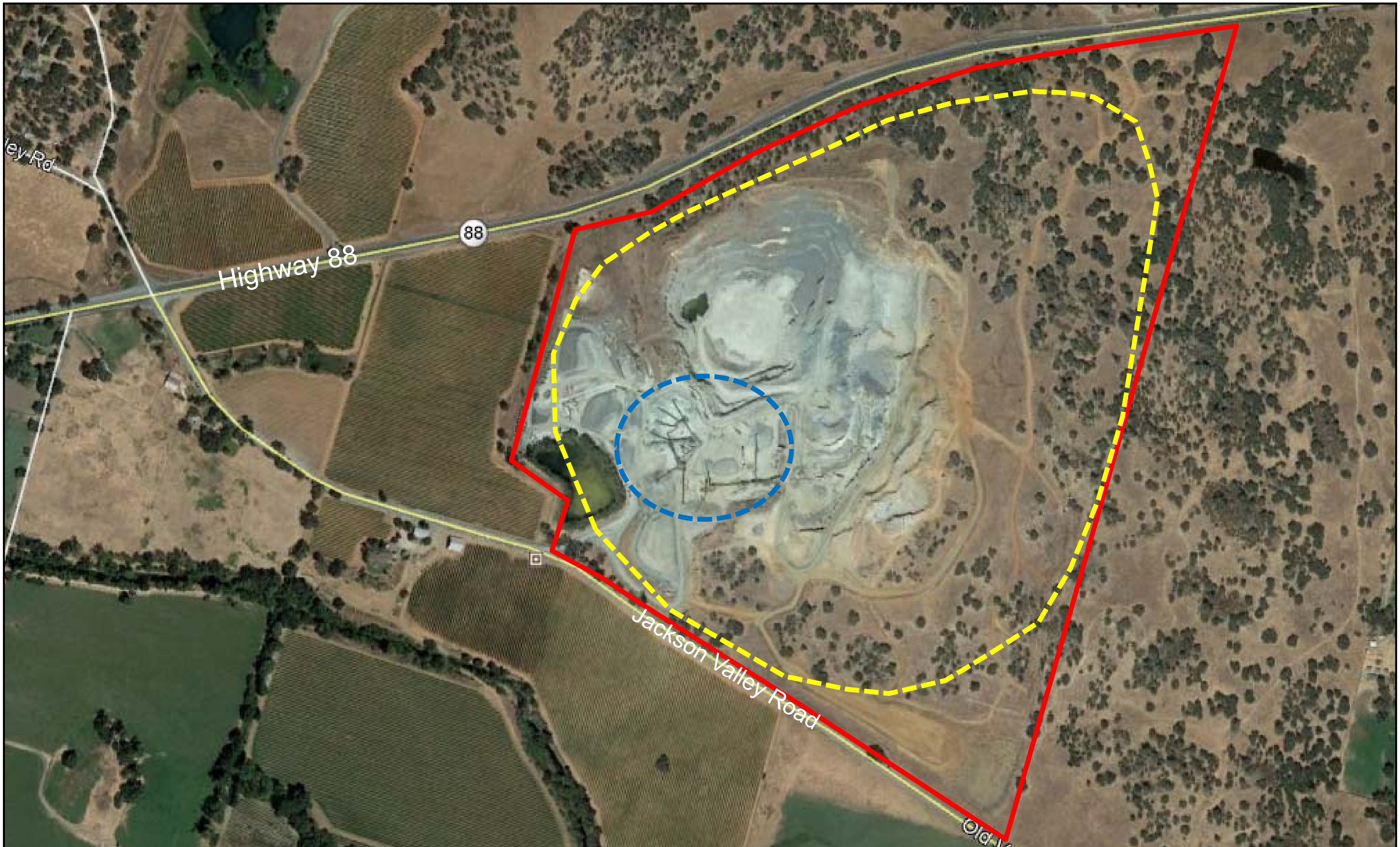

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Processing Area

Ultimate Mine Disturbance Area

Site Boundary

N

Scale (Feet)

0 300 600

Jackson Valley Quarry

Amador County, CA

Figure 2

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Background on Noise and Vibration

Noise/Sound

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

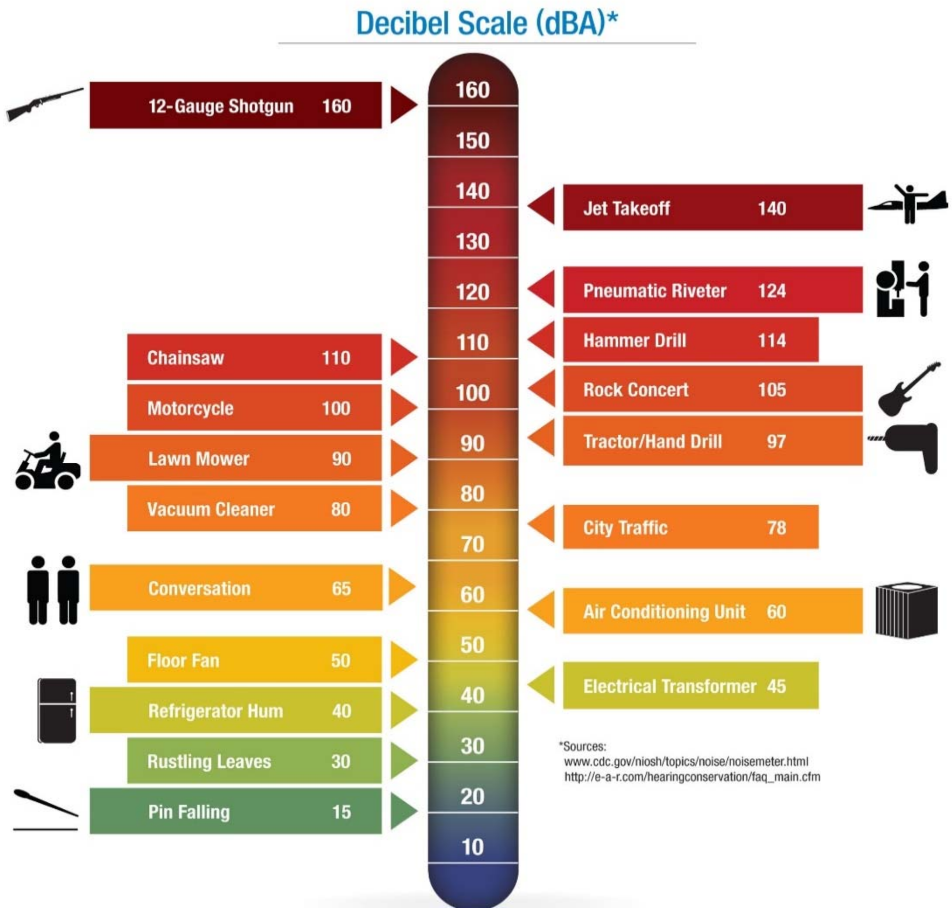
Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale utilizes the hearing threshold (20 micropascals of pressure) as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers within 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 decibel levels correspond closely to human perception of relative loudness. Figure 3 illustrates common noise levels associated with various sources.

The perceived loudness of sound 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 weighting the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. All noise levels reported in this section are A-weighted.

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}) over a given time period (usually one hour). The L_{eq} is the foundation of the Day-Night Average Level noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The Day-Night Average Level (L_{dn}) 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.

Figure 3 - Typical A-Weighted Sound Levels of Common Noise Sources



Noise Attenuation with Distance

Stationary “point” sources of noise, attenuate (lessen) at a rate of approximately 6 dBA per doubling of distance from the source, not accounting for environmental conditions (i.e., atmospheric conditions, noise barriers, ground type, vegetation, topography, etc.). Surface traffic (a “moving point” source), would typically attenuate at a lower rate, approximately 4.5 dBA per doubling distance from the source (also dependent upon environmental conditions).

Noise from aggregate excavation and processing sites (with heavy mobile and stationary equipment and trucks entering and exiting the site daily) would have characteristics of both “point” and “line” sources, so attenuation would generally range between 4.5 and 6 dBA per doubling of distance.

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 this analysis, the SoundPlan Version 8.2 noise prediction model was used to project noise generated at the project site to the nearest residences. International Standards Organization (ISO) 9613-2 was employed as the sound propagation methodology within SoundPlan. ISO 9613-2 applies appropriate octave-band offsets for atmospheric absorption for various combinations of temperature and relative humidity for each noise source associated with the project.

Effects of Topographic Shielding

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. In addition, 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, receptors to the east will typically be substantially shielded from view of most on-site activities, but receptors to the west will have less shielding by intervening topography. 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. To account for shielding of project noise sources by intervening topography, elevation data for the entire study area was input to the SoundPlan model to create a 3-dimensional base map. Noise source and receptor heights were input within the base map and the noise prediction model automatically computed the degree of acoustic shielding between each source and receptor.

Effects of Ground Cover

Ground cover also affects sound propagation. For example, soft ground is more acoustically absorptive than paved surfaces and vegetated ground is more absorptive still. For this analysis, it was assumed that the project site would essentially consist of acoustically hard surfaces with little sound absorption. Conversely, the area surrounding the project site is moderately vegetated, primarily with grass, vineyards and oak trees. Using aerial imagery and project site plans, the SoundPlan model inputs for both hard surfaces, soft surfaces, and vegetated areas were applied. The degree of sound absorption applied to each noise source at each receptor varies depending on the type of ground cover and distance between the noise sources and receptors. The greater the distance between the project site and the sensitive receptors, the greater the amount of intervening vegetation and the higher the degree of sound absorption. Where the ground between the noise source and receptor consists primarily of hardscape, the model applied positive offsets to account for reflections of sound from those surfaces.

Effects of Noise on People

The effects of noise on people can be divided into three categories:

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, and learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the third category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual’s past experiences with noise.

An important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment (or ambient noise) to which one has adapted. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur (Caltrans, 2013):

- It is widely accepted that the average healthy ear can barely perceive noise level changes of 3 dBA;
- A change in level of 5 dBA is a readily perceptible increase in noise level; and
- A 10-dBA change is recognized as twice as loud as the original source.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. Noise levels are measured on a logarithmic scale, instead of a linear scale. On a logarithmic scale, the sum of two noise sources of equal loudness is 3 dBA greater than the noise generated by only one of the noise sources (e.g., a noise source of 60 dBA plus another noise source of 60 dBA generate a composite noise level of 63 dBA). To apply this formula to a specific noise source, in areas where existing levels are dominated by traffic, a doubling in traffic volume will increase ambient noise levels by 3 dBA. Similarly, a doubling in heavy equipment use, such as the use of two pieces of equipment where one formerly was used, would also increase ambient noise levels by 3 dBA.

Audibility

It should be noted that 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, 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. A discussion of what constitutes a substantial change in noise environments is provided in the Criteria section of this report.

Single-Event Noise & Sleep Disturbance

A single event is an individual distinct loud activity, such as a blasting event at an aggregate quarry, an aircraft overflight, a train or truck passage, or any other brief and discrete noise-generating activity. Noise exposure quantified in terms of 24-hour-averaged descriptors, such as L_{dn} or CNEL, can mask the potential for annoyance or sleep disturbance associated with individual loud events due to the averaging process.

Extensive studies have been conducted regarding the effects of single-event noise on sleep disturbance, with the Sound Exposure Level (SEL) metric being a common metric used for such assessments. SEL represents the entire sound energy of a given single-event normalized into a one-second period regardless of event duration. As a result, the single-number SEL metric contains information pertaining to both event duration and intensity. Another descriptor utilized to assess single-event noise is the maximum, or L_{max}, noise level associated with the event. A problem with utilizing L_{max} to assess single events is that the duration of the event is not considered.

Due to the wide variation in test subjects' reactions to noises of various levels (some test subjects were awakened by indoor SEL values of 50 dB, whereas others slept through indoor SEL values exceeding 80 dB), no definitive consensus has been reached with respect to a universal criterion to apply to environmental noise assessments. The Federal Interagency Committee on Aviation Noise (FICAN) has provided estimates of the percentage of people expected to be awakened when exposed to specific SEL inside a home (FICAN 1997). According to the FICAN study, an estimated 5 to 10% of the population is affected when interior SEL noise levels are between 65 and 81 dB, and few sleep awakenings (less than 5%) are predicted if the interior SEL is less than 65 dB.

Baseline Noise and Vibration Environments

Identification of Existing Sensitive Receptors

The immediate project vicinity is rural in nature, containing agricultural, wineries, equestrian training and boarding facilities and residences on agriculturally designated lots. A total of 17 representative receptors were evaluated in this study. Those receptor locations are identified on Figure 4. With the exception of Receptor 9, which represents a winery, each of the receptors represents the location of the nearest residence or group of nearest residences to the quarry site.

While it is recognized that there are more than 17 residences in the general project vicinity, it is not necessary to assess project impacts at each and every individual residence. Rather, standard industry convention is to assess impacts at receptors which represent the nearest sensitive land uses to the project site (including residences located adjacent to project haul routes), groups of residences with similar exposure to the project site, and more distant receptors which may experience different topographic shielding of the project site (or lack thereof), than the nearest receptors.

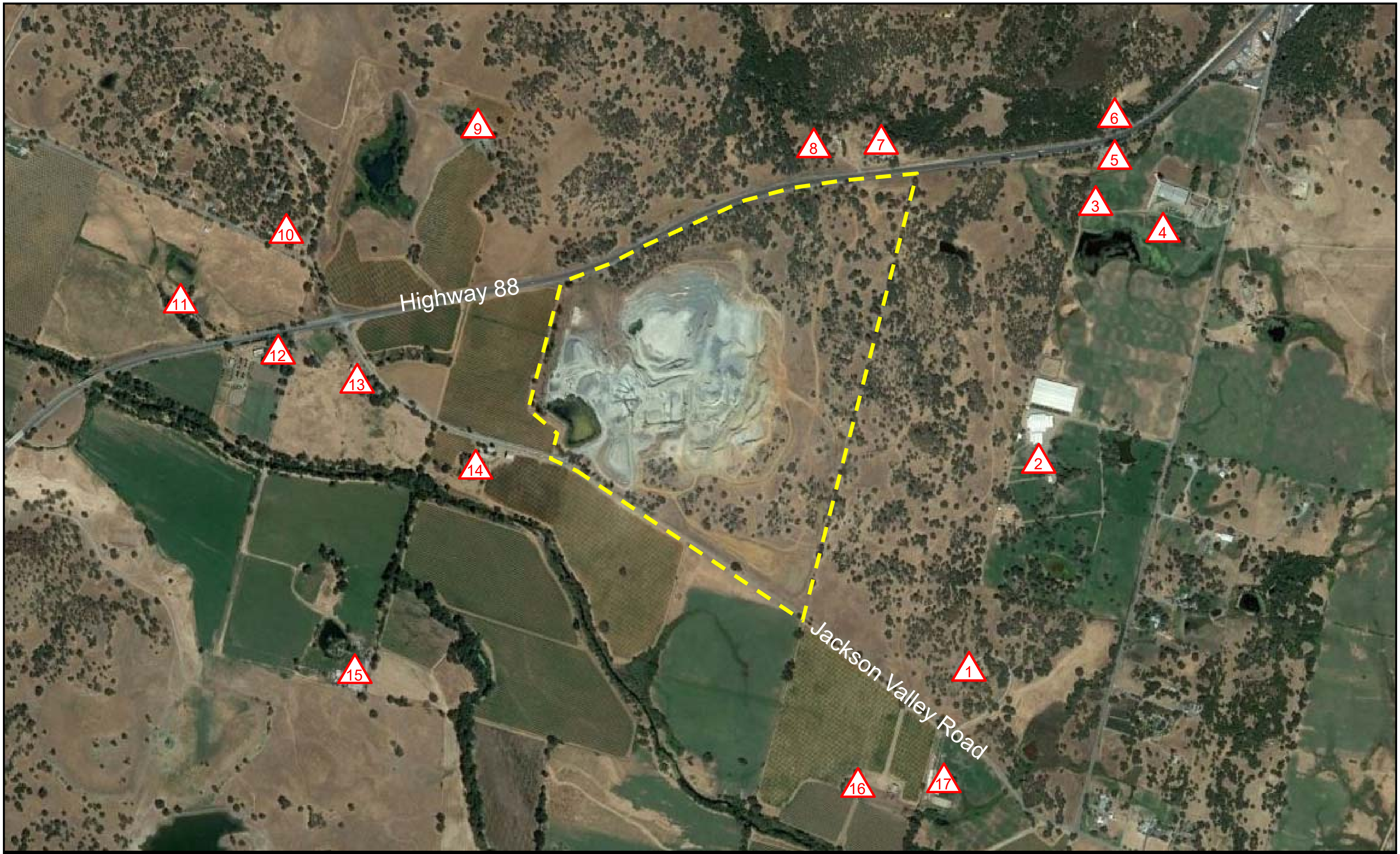
Existing Ambient Noise Environment at Sensitive Receptors

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

To quantify existing (baseline) ambient noise environment in the project vicinity, continuous noise level measurements were conducted at six (6) locations around the quarry site boundaries. The noise measurement locations are identified on Figure 5. Figure 5 also indicates the locations of short-term noise monitoring sites within the quarry which were used to establish reference noise levels for the quarry processing equipment (crushers, screens, conveyors, mobile equipment). The short-term, on-site, noise measurement results are discussed later in this report.

The continuous noise survey period extended from Thursday, October 8th to Tuesday October 13th, 2020, for a continuous period of 144 hours of monitoring at each location.

It is noted that continuous noise monitoring was not conducted at each of the 17 sensitive receptors evaluated in this study. However, the data collected at each site was used to project ambient conditions at the nearest receptors to each monitoring site.



Legend

Noise Sensitive Receptors

Note: All receptors except #9 represent residences.
Receptor 9 represents a Winery.

N

Scale (Feet)

0 500 1000

Jackson Valley Quarry

Amador County, CA

Nearest Noise Sensitive Receptors

Figure 4

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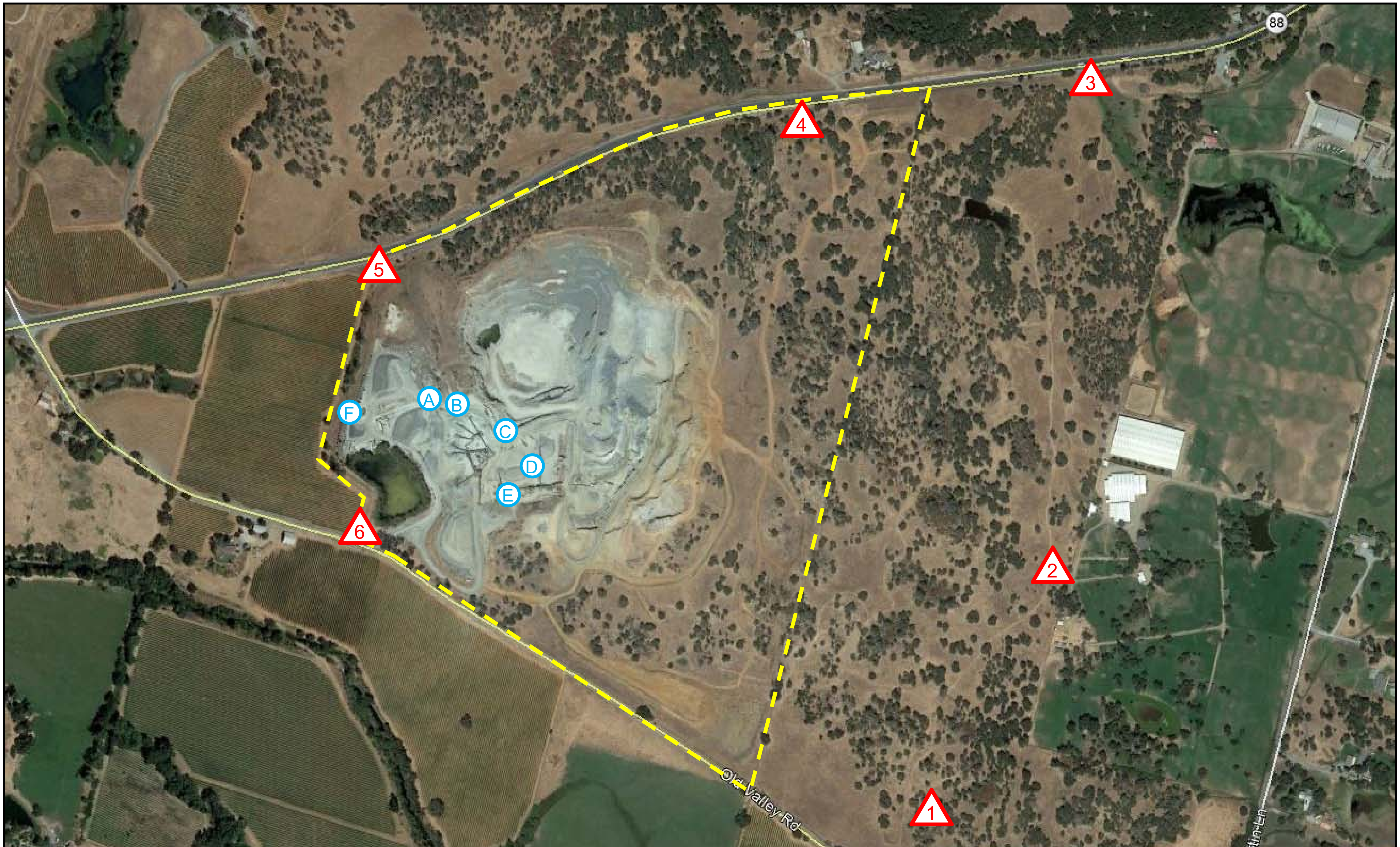
Larson Davis Laboratories (LDL) Model 820 and 831 precision integrating sound level meters were used by BAC to conduct the noise level surveys. The meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4). Appendix B shows photographs of each of the continuous noise monitoring sites.

Weather conditions present during the monitoring program were typical for the season during which they were conducted. There were no adverse or anomalous weather conditions which would have caused measured ambient noise levels to be atypical.

Numerical summaries of the ambient noise level measurements are provided in Table 1. Table 1 also contains the arithmetic mean of the average (L_{eq}) and maximum (L_{max}) 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 C.



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Short-Term Noise Measurement Locations (Site D also used for short-term vibration survey)

Long-Term Noise Measurement Locations & Short-Term Vibration Measurement Locations

Site Boundary

N

Scale (Feet)

0 300 600

Jackson Valley Quarry

Amador County, CA

Noise & Vibration Measurement Locations

Figure 5

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Table 1 - Long-Term Ambient Noise Survey Results
Jackson Valley Quarry – Amador County, California

		Daytime (7 am – 10 pm)		Nighttime (10 pm – 7 am)		
Site	**Date**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Ldn/ CNEL**
1	Thursday, October 8, 2020	53	66	43	57	53
	Friday, October 9, 2020	53	65	42	58	53
	Saturday, October 10, 2020	49	64	44	61	51
	Sunday, October 11, 2020	49	62	42	57	50
	Monday, October 12, 2020	50	62	46	59	53
	Tuesday, October 13, 2020	46	63	49	59	55
	Weekday Average	**50**	**64**	**45**	**58**	**53**
	Weekend Average	**49**	**63**	**43**	**59**	**51**
	Overall Average	**50**	**64**	**44**	**58**	**53**
2	Thursday, October 8, 2020	43	57	42	55	48
	Friday, October 9, 2020	43	61	40	55	47
	Saturday, October 10, 2020	43	60	38	53	46
	Sunday, October 11, 2020	44	60	36	51	45
	Monday, October 12, 2020	47	63	41	55	49
	Tuesday, October 13, 2020	45	62	41	54	48
	Weekday Average	**44**	**61**	**41**	**55**	**48**
	Weekend Average	**43**	**60**	**37**	**52**	**45**
	Overall Average	**44**	**60**	**40**	**54**	**47**
3	Thursday, October 8, 2020	62	76	59	75	66
	Friday, October 9, 2020	62	78	59	74	66
	Saturday, October 10, 2020	61	77	57	75	64
	Sunday, October 11, 2020	61	74	56	74	63
	Monday, October 12, 2020	60	75	58	74	65
	Tuesday, October 13, 2020	61	75	58	74	65
	Weekday Average	**61**	**76**	**58**	**75**	**65**
	Weekend Average	**61**	**75**	**56**	**75**	**64**
	Overall Average	**61**	**76**	**58**	**75**	**65**
4	Thursday, October 8, 2020	61	77	58	74	65
	Friday, October 9, 2020	62	79	58	76	65
	Saturday, October 10, 2020	61	77	57	75	64
	Sunday, October 11, 2020	62	75	56	74	64
	Monday, October 12, 2020	61	77	58	75	65
	Tuesday, October 13, 2020	61	77	58	75	65
	Weekday Average	**62**	**77**	**58**	**75**	**65**
	Weekend Average	**61**	**76**	**56**	**74**	**64**
	Overall Average	**62**	**77**	**58**	**75**	**65**
5	Thursday, October 8, 2020	60	77	57	75	64
	Friday, October 9, 2020	61	80	57	75	65
	Saturday, October 10, 2020	60	79	56	75	64
	Sunday, October 11, 2020	61	76	55	74	63
	Monday, October 12, 2020	61	78	58	75	65
	Tuesday, October 13, 2020	61	78	58	75	65
	Weekday Average	**61**	**78**	**58**	**75**	**65**
	Weekend Average	**60**	**78**	**56**	**75**	**63**
	Overall Average	**61**	**78**	**57**	**75**	**64**

Table 1 - Long-Term Ambient Noise Survey Results
Jackson Valley Quarry – Amador County, California

		Daytime (7 am – 10 pm)		Nighttime (10 pm – 7 am)		
Site	**Date**	**Leq**	**Lmax**	**Leq**	**Lmax**	**Ldn/ CNEL**
6	Thursday, October 8, 2020	60	78	55	73	62
	Friday, October 9, 2020	59	78	54	73	62
	Saturday, October 10, 2020	58	78	54	75	61
	Sunday, October 11, 2020	56	77	52	72	60
	Monday, October 12, 2020	59	76	54	73	62
	Tuesday, October 13, 2020	59	79	54	71	61
	Weekday Average	**59**	**77**	**54**	**73**	**62**
	Weekend Average	**57**	**77**	**53**	**74**	**60**
	Overall Average	**58**	**77**	**54**	**73**	**61**

Source: Bollard Acoustical Consultants, Inc. (BAC), 2020

Inspection of the Table 1 noise level data indicates there was not an appreciable difference in measured noise levels between the *weekday* periods when the plant was operating versus the *weekend* period when the facility was not operating. This is due to the considerable shielding of the facility from view of the nearest residences by intervening topography as well as elevated background noise levels at some of the measurement sites due to traffic on Highway 88.

As expected, Sites 3, 4 and 5 logged the highest ambient noise levels due to their proximity to Highway 88. Similarly, monitoring Sites 1 and 2 exhibited the lowest ambient noise levels due to those sites being located considerable distances away from Highway 88 and being substantially shielded from view of the roadway by intervening topography.

During the nighttime hours of the survey, it is not surprising that there was effectively no difference in measured noise levels between weekday and weekend periods as the facility does not currently operate at night (i.e., past 6:00 p.m., other than maintenance and repair work).

The nighttime periods of the survey are most germane to this evaluation as the applicant is proposing extended hours of operation up to 24 hours per day for operational/reclamation activities. As a result, the nighttime ambient noise measurement results were used to establish baseline conditions for the assessment of project noise impacts whereas the daytime levels measured during periods when the facility was operating were used to calibrate the noise prediction model.

The Table 1 data was projected to the 17 sensitive receptors based on the relative distances between the most significant noise sources (roadways or JVQ plant operations), the noise monitoring sites, and the distances to the receptors. For example, Receptor 3 is located approximately 485 feet from Highway 88 and noise monitoring Site 3 was located 140 feet from that roadway. The computed decrease in Highway 88 traffic noise between the measurement site and receptor is 8.1 dBA (based on a 4.5 dB decrease per doubling of distance from the roadway). As a result, an offset of -8.1 dB was applied to the ambient noise levels measured at

Site 3 to adjust those levels to be more representative of the ambient conditions at Receptor 3. Where the primary noise source affecting the receptor was considered to be existing Jackson Valley Quarry operations, the relative distances between the quarry and receptor were used to develop the appropriate offsets. Table 2 shows the projected baseline nighttime ambient conditions at each of the 17 receptors after application of the appropriate offsets to the ambient noise conditions measured at Sites 1-6.

Table 2 - Projected Baseline Ambient Noise Levels
Nearest Receptors to Jackson Valley Quarry – Amador County, California

		Projected Nighttime Baseline		
Receiver	**Main Source**	**Average (Leq)**	**Maximum (Lmax)**	**Projected Baseline Ldn/CNEL**
1	Jackson Valley Rd / Plant	44	57	52
2	Distant Hwy 88 / Plant	40	54	47
3	Hwy 88	50	67	57
4	Hwy 88	46	62	53
5	Hwy 88	59	75	66
6	Hwy 88	62	78	69
7	Hwy 88	59	76	66
8	Hwy 88	55	72	62
9	Hwy 88	45	61	52
10	Hwy 88 / Plant	47	64	54
11	Hwy 88	53	70	60
12	Hwy 88	58	75	65
13	Hwy 88 / Jackson Valley Rd	54	73	62
14	Jackson Valley Rd	50	68	57
15	Jackson Valley Rd	35	53	42
16	Plant	43	56	52
17	Plant	42	55	51

Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

The projected nighttime ambient noise levels at the nearest sensitive receptors shown in Table 2 are used in a later section of this report to establish the project standards of significance relative to baseline conditions.

Existing Ambient Vibration Environment at Sensitive Receptors

Vibration generated by heavy equipment associated with the aggregate industry dissipates rapidly with distance. During BAC field visits, no discernible vibration was detected at off-site locations. Nonetheless, to quantify the baseline vibration environment in the immediate project vicinity, BAC conducted short-term vibration monitoring on the afternoon of October 14, 2020 when the facility was in normal operation. With the exception of monitoring Site 3, which was inaccessible during the short-term vibration monitoring period, the monitoring was at the same 6 locations where the long-term ambient noise surveys were conducted.

An additional on-site, short-term vibration measurement was conducted in the middle of the processing area approximately 100 feet from the primary (jaw) crusher near short-term monitoring Site D (see Figure 5), to quantify the vibration generation of the processing equipment for subsequent analysis.

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). The vibration measurement system was calibrated in the field prior to use to ensure the accuracy of the measurements. A summary of the vibration measurement results is provided in Table 3 with the graphical results provided in Appendix D.

Table 3 - Summary of Short-Term Vibration Results
Jackson Valley Quarry – Amador County, California

	Measured Vibration Levels, VdB rms		
Measurement Site[1]	**Min**	**Average**	**Max**
1	31	32	57
2	31	32	57
4	31	32	58
5	33	35	58
6	40	42	59
Processing Area (D)	51	54	77

1. Short-term vibration measurement locations are identified on Figure 5.

As expected, the highest measured vibration levels occurred within the processing area where the registered maximum level was 77 VdB. At the perimeter of the site, the measured vibration levels averaged between 32 and 42 V dB, which is below the threshold of perception. At the nearest sensitive receptors to the project site, baseline vibration levels are predicted to be approximately 35 VdB or less.

Criteria for Acceptable Noise & Vibration 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 Amador County, which has both a General Plan Noise Element and a County Code Noise Ordinance. Applicable CEQA Guidelines, Amador 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:

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 levels which would result from the project as well as compliance with standards established in the local general plan or noise ordinance.

The Amador 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. However, the Amador County General Plan Noise Element identifies a 5 dB change in noise levels as being "clearly noticeable" and a 3 dB change as being the threshold of perceptibility.

As noted previously, audibility and perceptibility are not tests of significance according to CEQA. If this were the case, any project which added any audible/perceptible amount of noise to the environment would be considered significant according to CEQA. CEQA requires a ***substantial*** increase in ambient noise levels before noise impacts are identified, not simply an audible or perceptible change. As a result, this analysis utilizes a 5 dB threshold for evaluating the significance of project-related noise level increases.

Amador County Noise Regulations

As stated previously, Amador County has both an adopted General Plan Noise Element and a Noise Ordinance. While the Noise Element contains specific numerical standards, the Noise Ordinance does not. As a result, this evaluation focuses on achieving compliance with the County's General Plan Noise Element. The Noise Element policies and standards which would be applicable to this project are presented below.

Amador County Noise-Standards Applicable to Off-Site Traffic

County General Plan Table N-3 establishes land use compatibility standards for a variety of uses. The standards are presented in terms of CNEL and, for residential uses, are applicable at outdoor activity areas. CNEL represents the 24-hour weighted average noise level with penalties applied to noise generated during evening and nighttime periods. For residential uses, the applicable noise standard is 60 dB CNEL. However, this standard would not be applicable to project-generated off-site traffic as the project is not proposing new residential development. Rather, impacts associated with off-site traffic noise level increases are evaluated using a 5 dB significance criteria based on the County's General Plan Noise Element conclusions that a 5 dB increase is a clearly noticeable change.

Amador County Noise-Standards Applicable to On-Site Quarry Operations

County General Plan Table N-4 establishes noise level performance standards for non-transportation noise sources. These standards would be applicable to all noise sources located within the quarry, including on-site excavation, processing and on-site truck circulation. The standards are presented in terms of daytime and nighttime average (L_{eq}) and maximum (L_{max}) noise level descriptors. Although not specifically stated, the standards are considered to be applicable to all noise-sensitive land uses. The nighttime average and maximum noise level standards shown in General Plan Noise Element Table N-4 are 45 dB L_{eq} and 65 dB L_{max}.

Although not specifically stated, in cases where baseline ambient noise levels currently exceed the County's noise standards shown in General Plan Table N-4, it is assumed that the applicable noise standard would be increased to equal the baseline level plus 5 dB. Where baseline noise levels are below the GP Table N-4 standards, the standards are applied without adjustment.

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, Amador County has adopted both a Noise Element and Noise Ordinance. The Noise Element contains reasonable numeric standards for the assessment of noise impacts. Because the County's noise standards have been developed specifically for Amador 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 Amador County noise standards for on-site noise sources is not warranted.

The areas where consideration of noise standards beyond those adopted by Amador County is warranted are with respect to vibration impact assessment and sleep disturbance. Criteria for vibration exposure and recommendations for appropriate thresholds for sleep disturbance follow.

Sleep Disturbance Criteria

Since a court case in Berkeley, California (*Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners of the City of Oakland* (2001) 91 Cal.App.4th 1344), which pertained to increased aircraft overflights of the City of Berkeley, there has been increased attention to the evaluation of single-event noise levels during the preparation of noise analyses. The Berkeley case ruling required that single-event noise be considered, but it did not recommend an appropriate single event noise level standard.

The Federal Interagency Committee on Aviation Noise (FICAN) has provided estimates of the percentage of people expected to be awakened when exposed to specific SELs inside a home (FICAN 1997). However, FICAN did not recommend a threshold of significance based on the percent of people awakened. According to the FICAN study, 10% of the population is estimated to be awakened when the SEL interior noise level exceeds 81 dBA. An estimated 5 to 10 percent of the population is affected when the SEL interior noise level is between 65 and 81 dBA, and few sleep awakenings (less than 5 percent) are predicted if the interior SEL is less than 65 dBA.

The threshold for sleep disturbance is not absolute because there is a high degree of variability from one person to another. Thus, the means of applying such research to land use decisions is not yet clear. As a result, no government agency has suggested what frequencies of awakenings are acceptable (California Division of Aeronautics 2002). For these reasons, the Federal Interagency Committee on Noise (FICON) and the California Airport and Land Use Planning Handbook continue to use CNEL as the primary tool for the purpose of land use compatibility planning (California Division of Aeronautics 2002). Note that CNEL and L_{dn} are often used interchangeably, as there is only a subtle difference in noise level penalties between the two metrics during evening hours. In fact, the L_{dn} represents the cumulative exposure to all single events; that is, the exposure of all SELs taken together, weighed to add penalties for nighttime occurrences, and averaged over a 24-hour period. Thus, it can be argued that the L_{dn}-based standards already account for the individual impacts associated with the SELs.

This analysis conservatively utilizes a criteria of 65 dB SEL within residences as the threshold at which sleep disturbance impacts could occur. Based on the FICAN test results on aviation noise, less than 5% of the population experiences sleep disturbance if interior noise is less than 65 dB SEL.

For this analysis, noise from nighttime truck passages on Jackson Valley Road would be considered significant if it exceeds 65 dB SEL at the interior of the two residences located on Jackson Valley Road (Receptors 13 & 14). Because Highway 88 currently carries considerably higher traffic volumes than Jackson Valley Road, including nighttime heavy truck traffic, the project would not be introducing a new nighttime traffic noise source onto that roadway. Therefore, the assessment of sleep disturbance impacts is limited to residences located adjacent to Jackson Valley Road.

Noise Impact Assessment Criteria Applied to this Project

As indicated in Table 2, baseline nighttime ambient conditions exceeded the 45 dB L_{eq} and 65 dB L_{max} Amador County nighttime noise level standards at 8 of the 17 receptors analyzed in this evaluation. As a result, the noise standards applicable at those receptors would be the measured baseline noise levels plus 5 dB. Where existing baseline noise levels are below the County's 45 dB L_{eq} and 65 dB L_{max} nighttime noise level limits (General Plan Table N-4), those standards are applied without adjustment. Table 4 shows the nighttime noise level standards applicable to the project at each of the 17 receptor locations after adjustment for baseline ambient conditions where appropriate.

Table 4 - Applicable Noise Level Limits After Adjustment for Baseline Ambient Conditions
Nearest Receptors to Jackson Valley Quarry – Amador County, California

	Noise Level Criteria, dBA		
Receptor	**Average (Leq)**	**Maximum (Lmax)**	**Ldn/CNEL**
1	45	65	60
2	45	65	60
3	55	72	60
4	51	65	60
5	64	80	71
6	67	83	74
7	64	81	71
8	60	77	67
9	50	65	60
10	52	65	60
11	58	75	65
12	63	80	70
13	59	78	67
14	55	73	60
15	45	65	60
16	45	65	60
17	45	65	60

Note: The criteria are based on the computed baseline ambient conditions at each receptor location (see Table 2), with a 5 dB offset applied to baseline ambient conditions which currently exceed the County's 45 dB Leq or 65 dB Lmax nighttime standards, or 60 dB Ldn standard. Where ambient conditions do not currently exceed the County standards, those standards are applied without adjustment.
Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

Vibration Criteria

The California Environmental Quality Act (CEQA) contains vibration impact assessment guidelines. The Amador 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 5 below, provides vibration levels at which damage to structures could occur. As shown in Table 5, 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 5 - FTA Criteria for Assessing Vibration 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

As indicated in Table 5, vibration levels exceeding 90 VdB would be required prior to the onset of damage to buildings which are extremely susceptible. 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 6 below, provides vibration criteria for general assessment of impacts.

Table 6 - Groundborne Vibration Impact Criteria for General Assessment

	Impact Levels (VdB)		
Land Use Category	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 6, 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 operations would essentially occur continuously during the proposed extended hours, the FTA criteria applicable to "Frequent Events" is applied to this analysis of potential annoyance resulting from project activities.

Project Vibration Generation

Vibration generated during nighttime aggregate excavation, processing and load-out operations would be similar to that which currently occurs during daytime hours. This is because no changes in overall plant equipment, production or heavy truck trip generation are proposed as part of the project. Rather, the proposed project would allow shifting of production, processing and load-out to nighttime hours when desired, but no increases in production are proposed. As noted previously, blasting would continue to occur during daytime hours pursuant to the current use permit requirements, so no nighttime blasting operations would result from this project.

As noted in Table 3, measured maximum existing project vibration levels at the quarry boundaries ranged from 57 to 59 VdB, with averages ranging from 32 to 42 VdB. These levels would not increase as a result of nighttime operations as the processes and equipment used during nighttime operations would be identical to those present during the vibration measurements. Vibration levels at the more distant sensitive receptors would be even lower than those measured at the quarry boundaries. As a result, maximum project vibration levels at the nearest receptors are predicted to be below 59 VdB. As noted in Table 5, a vibration level of at least 90 VdB would be required for the onset of damage to extremely susceptible structures. Table 6 indicates that vibration levels of 72 VdB or more would be required for annoyance impacts to occur at residences. Because existing and project-generated vibration levels are well below those thresholds, no vibration-related impacts are identified for this project.

Project Noise Generation

As stated previously, noise generated during nighttime aggregate excavation, processing and load-out operations would be similar to that which currently occurs during daytime hours. This is because no changes in overall plant equipment, production or heavy truck trip generation are proposed as part of the project. Rather, the proposed project would allow shifting of production, processing and load-out to nighttime hours, with no increases in overall production. The shift in hours of operation will provide George Reed the ability to serve regional construction projects that now routinely occur at night and optimize work hours in response to market demands. As noted previously, blasting would continue to occur during daytime hours pursuant to the current use permit requirements, so no nighttime blasting operations would result from this project. The following evaluation assumes noise would be generated during nighttime hours by excavation, processing and load-out. Each of these sources is evaluated separately and cumulatively below.

Existing Project Noise Mitigation Requirements

It should be noted that the current use permit for the Jackson Valley Quarry includes conditions of approval related to noise mitigation. The current Quarry Conditions of Approval which pertain to noise (#44-49), are reproduced below:

44. The operator/permittee shall ensure project activities adhere to/comply with the following operational conditions:

a. Site preparation activities shall be limited to the daytime hours of 6AM - 5PM, Monday through Friday.

b. All equipment, fixed or mobile shall be outfitted with properly operating and maintained exhaust and intake mufflers, consistent with manufacturers' standards.

c. Impact tools (e.g. jackhammers, pavement breakers, rock drills), shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used. External jackets on the tools themselves shall be used where feasible. Quieter tools, such as the use of drills, rather than impact tools, shall be used whenever feasible.

d. Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, shall incorporate insulation barriers, or other measures to the extent feasible.

e. Prior to issuance of the Amended Use Permit signs shall be posted at the Quarry site entrance and in the area of the quarry expansion for the purpose of informing all quarry workers, contractors, subcontractors, their employees and agents, materials haulers of the basic requirements of Conditions 44 a. through d. above.

f. Prior to issuance of the Amended Use Permit signs shall be posted at the Quarry site that include permitted days and hours for site preparation and for Quarry operations, a day and evening contact number for the Quarry site, and a contact number in the event of problems.

g. An onsite complaint and enforcement manager shall respond to and track complaints and questions related to noise.

45. The operator/permittee shall construct along that portion of the northern property line of the Quarry site an approximately seven (7) foot high earthen noise and visual attenuation berm necessary to block the line of site from the nearest residence to the north to the noise sources and to the traveling public. This berm may be developed from overburden or aggregate material and shall be landscaped for erosion control. The location of this berm shall be approximately as shown on Sheets 2 and 3 of the Reclamation Plan. This berm shall remain in perpetuity, unless otherwise advised by the County upon reclamation.

46. The operator/permittee shall adhere to the following:

a. On-site equipment shall be outfitted at all times with noise attenuation devices. Haul trucks shall not exceed the standards for maximum permitted noise established in Article 2.5 of Chapter 5 of Division 12 of the California Vehicle Code. (former COA 17).

b. The following noise standards shall not be exceeded at the property lines:

Time Period	Noise Standard
6AM-6PM	65 decibels (A-weighting)

c. The above standards shall not be exceeded except by the following A-weighting allowed decibels for the duration of time set forth below:

Cumulative Duration of the Intrusive Sound (Cumulative period of minutes In hour)	Allowance Decibels (A-weighting)
a. 30 minutes In hour	0
b. 15 minutes In hour	+5
c. 5 minutes In hour	+10
d. 1 minute In hour	+15
e. Level not to be exceed at any time	+20

Said noise level requirements shall be cumulative and apply to all equipment on the project site (except blasting), including, but not limited to, the crushing/screening equipment, trucks and other equipment that may be owned by the operator/permittee or any other person. The use of loud sound signals shall be avoided in favor of visual (flashing light) warnings except for those loud signals required by safety laws for the protection of personnel.

d. Upon the request of Amador County, the operator/permittee shall provide for the measurement of decibels at the Quarry property lines.

e. If these off-site noise standards cannot be maintained, operator/permittee shall employ muffling, noise attenuation berms, noise deflection walls, or enclose equipment within (temporary) structures.

47. The operator/permittee shall not allow the use of jake brakes on Jackson Valley Road by trucks entering or exiting the Quarry site. Operator/permittee shall ensure that signs remain on the Quarry site and on Jackson Valley Road, at a location conspicuous to truck traffic, stating that "the use of jake brakes is prohibited on Jackson Valley Road".

48. The operator/permittee shall install low berms (minimum five feet in height) and trees in low topographic areas (designated on Figure 7, attached) along the Project's eastern property line to aid in screening eastward-blowing dust and aid in the deflection of potential noise from the eastward expansion of the Quarry operations to 4121 Jackson Valley Road (May property). Berms shall be constructed when overburden material becomes available with the first eastward expansion of the Quarry. Priority for berm construction shall be as indicated on Figure 7, with the intent to deflect dust and noise from the initial expansion and continue in successive expansions. The first berm shall be constructed within three months of commencing overburden removal within the expansion area. The two additional berms shall be constructed with each successive annual expansion of the Quarry eastward. All berms shall be constructed no later than 3 years from the commencement of operations within the expansion area. Trees shall be planted on the berms within three months of completion of each of the berms and shall be a maximum 24-inch box size, of a mix of at least two evergreen species native to the area, such as: Coulter pine (Pinus coulteri), Jeffrey pine (Pinus jeffreyi), Incense cedar (Calacedrus decurrens), and Interior live oak (Quercus wislizenii).

The operator/permittee shall maintain the trees until established (a maximum of 7 years from each initial planting) and shall replace any which die within that 7 -year period.

49. Quarry and rock processing employees shall not be exposed to noise levels higher than those established by California OSHA and the Federal Mine Safety and Health Administration (MSHA).

The Quarry operator is currently in compliance with these mitigation measures and they would remain in effect under the currently proposed project operations.

Processing Area Noise Generation

On-site processing activities are located within the processing area identified on Figure 2. The primary noise sources associated with the quarry processing operations consist of crushers, screens, mobile equipment (front loaders, water truck, etc.), and heavy truck circulation related to load out.

To quantify the noise generation of the processing area operations BAC utilized the long-term ambient noise monitoring data during periods when the facility was in operation as well as short-term reference noise level measurements conducted on October 7, 2020. The short-term noise measurements were conducted at Sites A-F on Figure 5. The short-term surveys were utilized to quantify both noise level and frequency content of the processing area operations, including noise from all sources.

A Larson Davis Laboratories (LDL) Model 831 precision integrating sound level meter was used by BAC to conduct the short-term processing area noise level surveys. The meter was calibrated before and after 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 (ANSI S1.4). Appendix E shows representative photographs of the short-term noise monitoring sites.

From the short-term processing area noise level measurements it was concluded that the average and maximum noise levels for typical processing operations were approximately 81 dB L_{eq} and 84 dB L_{max} at a reference distance of 150 feet from the effective noise center of the processing area. The frequency content of the processing area noise was centered at 800 Hertz but no particularly tonal components were identified. The results of the short-term noise measurements conducted at Sites A-E are provided in Appendix F.

The reference noise level data cited above for the processing area were used as inputs to the SoundPlan model to project processing operations noise to the nearest receptors. The results of those calculations are provided in Table 7. Table 7 also compares the predicted levels against the project standards of significance. Figure 6 illustrates the average (L_{eq}) noise contours in the project vicinity resulting from the processing operations.

As indicated in Table 7, average hourly (L_{eq}) processing area noise generation is predicted to be acceptable relative to the nighttime average noise standards applicable at each receptor. Maximum (L_{max}) processing noise generation is also predicted to be acceptable relative to the nighttime maximum noise standards at all receptors.

Although average (L_{eq}) processing area noise generation is predicted to be satisfactory relative to the applicable nighttime noise exposure criteria at all receptors in the immediate project vicinity, at receptor 14 the predicted level is right at the standard with no margin of safety. At receptor 15 the standard would be satisfied but with only a 2 dB margin of safety.

In addition to noise generated by processing area equipment and processes, noise would also be generated during nighttime hours by excavation and off-site heavy truck trips. When the noise generation of those sources is combined with processing area noise generation, combined noise exposure from all nighttime sources which would result from the project is expected to exceed the project noise standards of significance (an evaluation of combined noise levels from all project noise sources follows in a later section of this report). As a result, BAC recommends implementation of noise mitigation measures to further reduce processing area operations noise generation during nighttime hours. A discussion of processing area noise mitigation options is provided in the following section.

Table 7 - Predicted Current (Unmitigated) Processing Area Noise Levels
Nearest Receptors to Jackson Valley Quarry – Amador County, California

Receiver	Predicted Leq	Leq Standard	Exceedance?	Predicted Lmax	Lmax Standard	Exceedance
1	32	45	No	35	65	No
2	30	45	No	33	65	No
3	37	53	No	40	71	No
4	37	45	No	40	65	No
5	37	62	No	40	80	No
6	36	65	No	39	83	No
7	40	62	No	43	80	No
8	32	58	No	35	76	No
9	40	45	No	43	65	No
10	44	50	No	47	65	No
11	44	56	No	47	74	No
12	47	61	No	50	79	No
13	50	59	No	53	79	No
14	55	55	No	58	75	No
15	43	45	No	46	65	No
16	40	45	No	43	65	No
17	40	45	No	43	65	No

Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

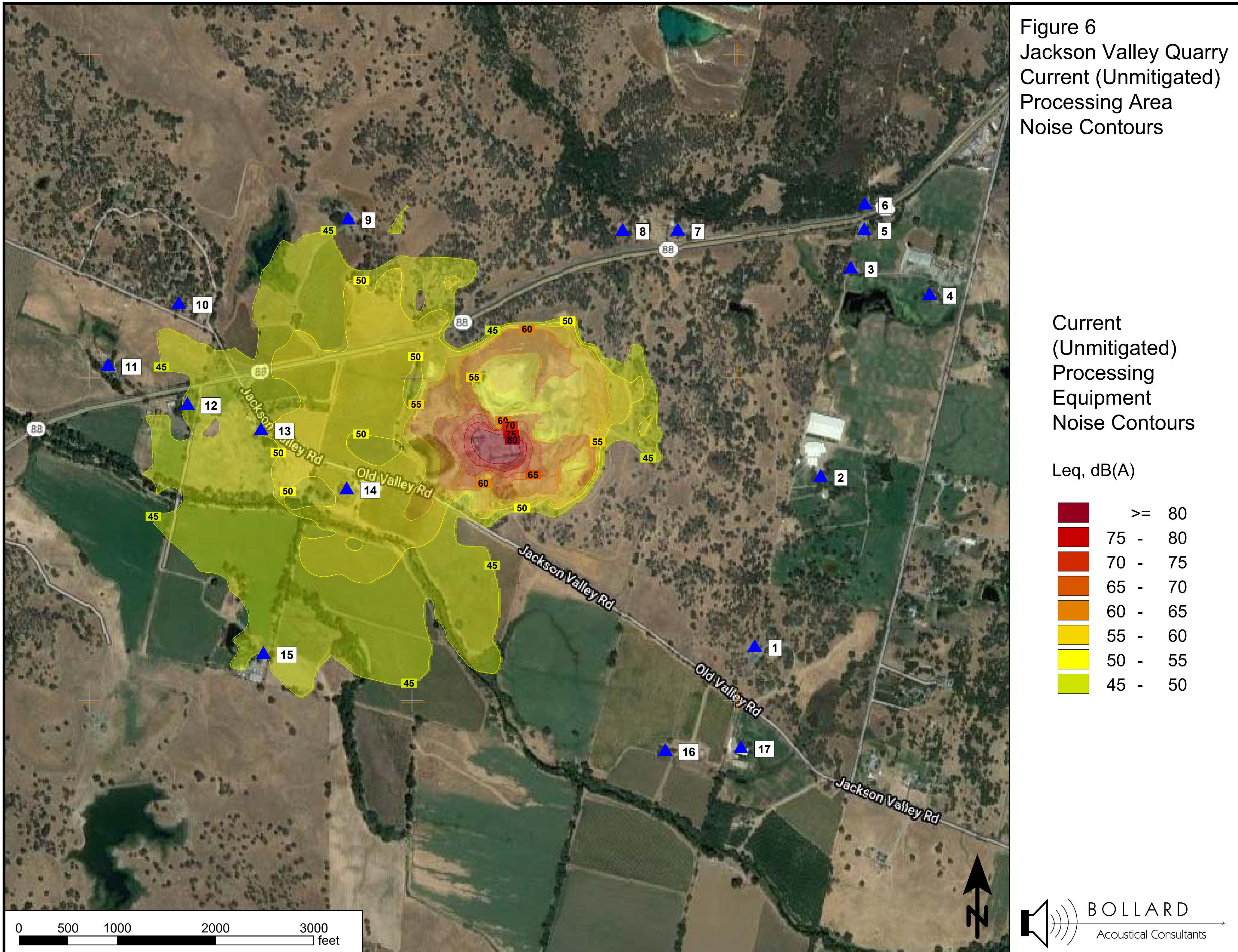


Figure 6
Jackson Valley Quarry
Current (Unmitigated)
Processing Area
Noise Contours

Processing Equipment Noise Mitigation Measures

As noted above, although processing operations are predicted to be satisfactory relative to the project standards of significance, there is little or no margin of safety at the nearest residences and combined noise from all components of the project is predicted to exceed the project standards of significance (combined project noise generation is discussed later in this report). To reduce processing noise at the nearest sensitive receptors, the following noise mitigation measures are recommended:

1. Suspend acoustic curtains around the processing plant crushers and screen decks (i.e., the loudest components of the processing plant).

2. Ensure that all processing area conveyors are properly lubricated at all times.

3. Following implementation of the noise mitigation measures identified above, periodic noise monitoring should be conducted to confirm effectiveness of the mitigation measures and compliance with the applicable noise standards.

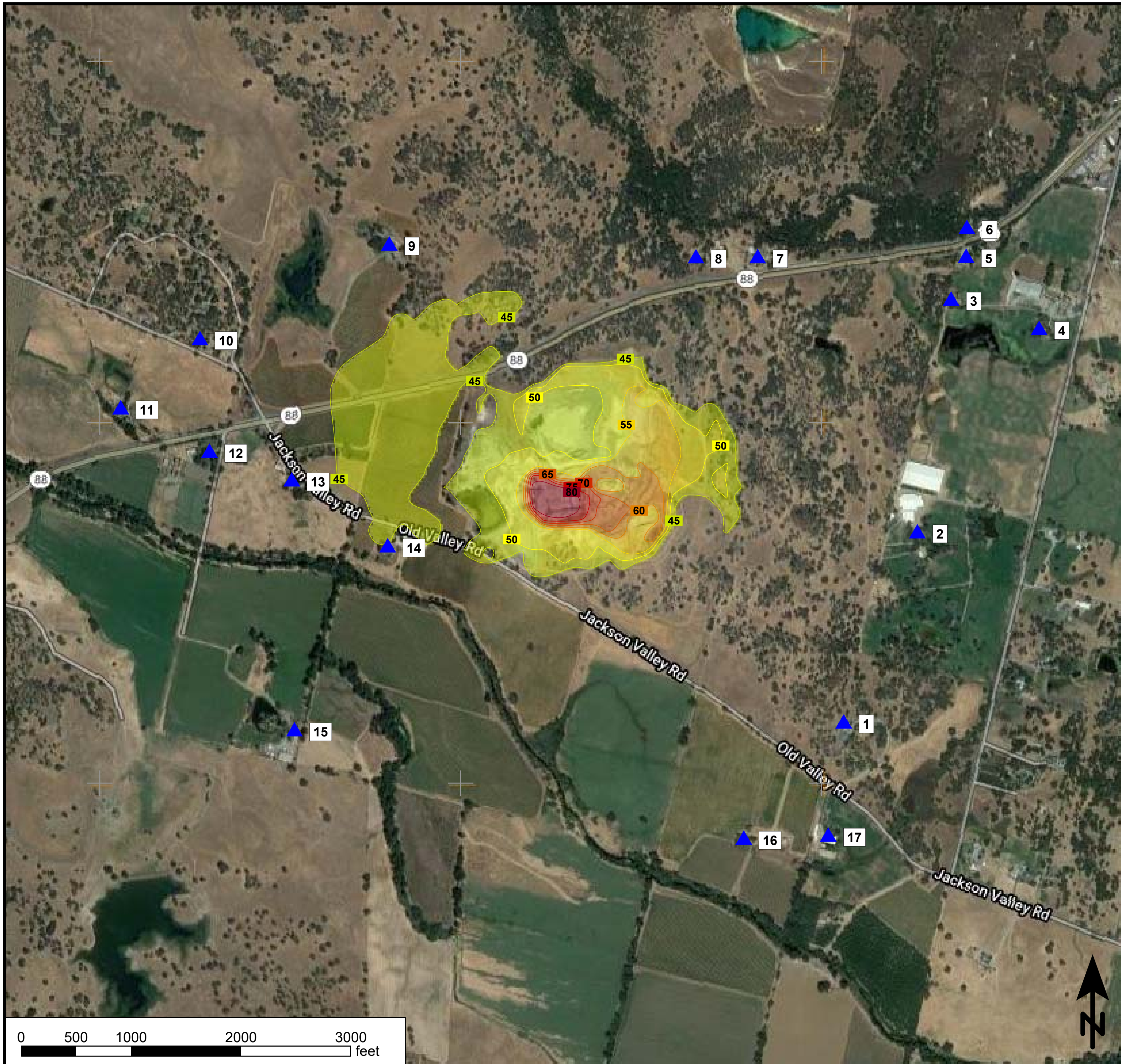
Implementation of the above described mitigation measures, in conjunction with the ongoing application of the current project conditions of approval which pertain to noise, are projected to reduce nighttime processing noise to levels at least 8 dB below the project standards of significance shown in Table 4. Table 8 shows the processing area noise levels at the nearby sensitive receptors following implementation of the recommended noise control measures. Figure 7 illustrates the processing area noise mitigation measures following implementation of noise control measures at the project site.

Table 8 - Predicted Processing Area Noise Levels after Implementation of Processing Area Noise Control Measures
Nearest Receptors to Jackson Valley Quarry – Amador County, California

Receiver	Predicted Leq	Leq Standard	Leq Exceedance?	Predicted Lmax	Lmax Standard	Lmax Exceedance?
1	29	45	No	32	65	No
2	32	45	No	35	65	No
3	38	53	No	41	71	No
4	37	45	No	40	65	No
5	37	62	No	40	80	No
6	36	65	No	39	83	No
7	38	62	No	41	80	No
8	31	58	No	34	76	No
9	32	45	No	35	65	No
10	40	50	No	43	65	No
11	40	56	No	43	74	No
12	42	61	No	45	79	No
13	44	59	No	47	79	No
14	45	55	No	48	75	No
15	30	45	No	33	65	No
16	38	45	No	41	65	No
17	38	45	No	41	65	No

Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

Figure 7
Jackson Valley Quarry
Mitigated Processing
Area Equipment
Noise Contours



Excavation Noise Generation

As indicated on Figure 2, the approved mine disturbance area is large. As a result, the distance from the mobile excavation equipment (i.e., loader, dozer, excavator, haul trucks, water truck, etc.) to the nearest sensitive receptors will vary depending on where excavation activities are occurring within the pit. In addition, the degree of topographic shielding between the excavation equipment and nearest receptors will vary depending on the depth of the excavation operations within the pit. In general, excavation operations are progressing in an easterly direction.

The Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) was used to quantify the noise generation of typical excavation equipment and operations at the quarry. Typical excavation operations would involve a bulldozer, excavator, front-end loader, haul trucks, and a water truck. The combined noise generation of the mobile equipment would be approximately 80 dB L_{eq} and L_{max} at a reference distance of 100 feet from the effective noise center of the excavation operations, although such equipment is typically somewhat spread out within an excavation area.

The reference noise level data cited above for the excavation equipment were propagated from the nearest point of excavation to the project vicinity receptors assuming standard spherical spreading of sound (6 dB decrease per doubling of distance) and an attenuation rate of 1.5 dB per thousand feet for atmospheric absorption and excess ground attenuation. For a very conservative assessment of excavation noise generation, it was assumed that all excavation equipment was operating at existing grade, without the benefit of shielding by the pit walls. As excavation progresses deeper into the pit, considerable shielding would be realized. The results of the excavation calculations are provided in Table 9. Table 9 also compares the predicted levels against the project standards of significance.

As indicated in Table 9, worst-case (unshielded) excavation noise levels would exceed the project noise standards at 9 of the 17 receptors evaluated in this study. Predicted maximum (L_{max}) excavation noise generation is predicted to be acceptable relative to the nighttime maximum noise standards at all receptors.

As previously stated, the Table 9 noise levels assume no shielding by intervening topography at the nearby receptors. In actuality, most of the receptors would be partially or significantly shielded even during initial excavation operations in a previously undisturbed area. Nonetheless, the predicted magnitude of exceedance of the project noise standards ranges from 2 to 9 dB. Once the excavation operations have progressed into the pit and the pit walls are providing complete visual screening of those operations at the nearby receptors, noise levels will decrease significantly.

Because worst-case, unshielded, excavation operations would generate noise levels predicted to exceed the applicable nighttime noise exposure criteria at some nearby receptors, implementation of noise mitigation measures would be warranted for the excavation operations during extended hours. A discussion of excavation area noise mitigation options is provided in the following section.

Table 9 - Predicted Worst-Case (Unmitigated) Excavation Noise Levels
Nearest Receptors to Jackson Valley Quarry – Amador County, California

Receiver	Predicted Leq	Leq Standard	Leq Exceedance?	Predicted Lmax	Lmax Standard	Lmax Exceedance?
1	51	45	Yes	54	65	No
2	54	45	Yes	57	65	No
3	51	53	No	54	71	No
4	47	45	Yes	50	65	No
5	49	62	No	52	80	No
6	49	65	No	52	83	No
7	62	62	No	65	80	No
8	64	58	Yes	67	76	No
9	52	45	Yes	55	65	No
10	48	50	No	51	65	No
11	45	56	No	48	74	No
12	48	61	No	51	79	No
13	52	59	No	55	79	No
14	57	54	Yes	60	75	No
15	47	45	Yes	50	65	No
16	49	45	Yes	52	65	No
17	47	45	Yes	50	65	No

Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

Excavation Equipment Noise Mitigation Measures

As noted above, worst-case (unshielded) excavation operations could exceed the project standards of significance by 2 to 9 dB during nighttime operations at the nearest receptors when those operations are occurring at the nearest locations to each receptor and at existing grade (prior to depressing into the pit). To reduce excavation noise to a state of compliance with the project thresholds of significance, the following noise mitigation measures are recommended:

1. Limit excavation activities to the currently permitted hours of operations (i.e., 6:00 a.m. to 6:00 p.m.) until the excavation equipment has progressed sufficiently into the pit (i.e., 20 feet below existing grade) to be shielded by surrounding topography. Figure 8 shows the locations where excavation activities should be limited to currently permitted hours of operation until that equipment is depressed at least 20 feet below existing grade.

2. Following implementation of the recommended noise control measures identified above, periodic noise monitoring should be conducted to confirm effectiveness of the control measures and compliance with the applicable noise standards.

Because the identified exceedances of the significance criteria are relatively minor (2-9 dB), implementation of the above-described mitigation measures, in conjunction with the ongoing application of the current project conditions of approval which pertain to noise, would be feasible to reduce nighttime excavation impacts to a less than significant level. Figure 9 shows the predicted excavation noise contours once the excavation equipment has depressed into the pit. Table 10 shows the mitigated excavation noise levels at the nearest potentially affected sensitive receptors.

In addition to the noise contours shown in Figure 9 which illustrate the reduction in overall mining noise levels once the excavation equipment has recessed into the pit, Figure 10 shows a noise contour cross-section between the recessed excavation equipment and nearby Receptors 1 & 2. Similar shielding would occur at the other receptors as excavation activities recess below the edges of the pit walls.

Legend

Required Nighttime Excavation Setbacks Until Equipment is 20 feet Below Existing Grade

Extents of Mining

Site Boundary

N

Scale (Feet)

0 300 600

Required Mine Setbacks for Nighttime Excavation Until 20 Feet Below Existing Grade

Jackson Valley Quarry - Amador County, CA

Figure 8

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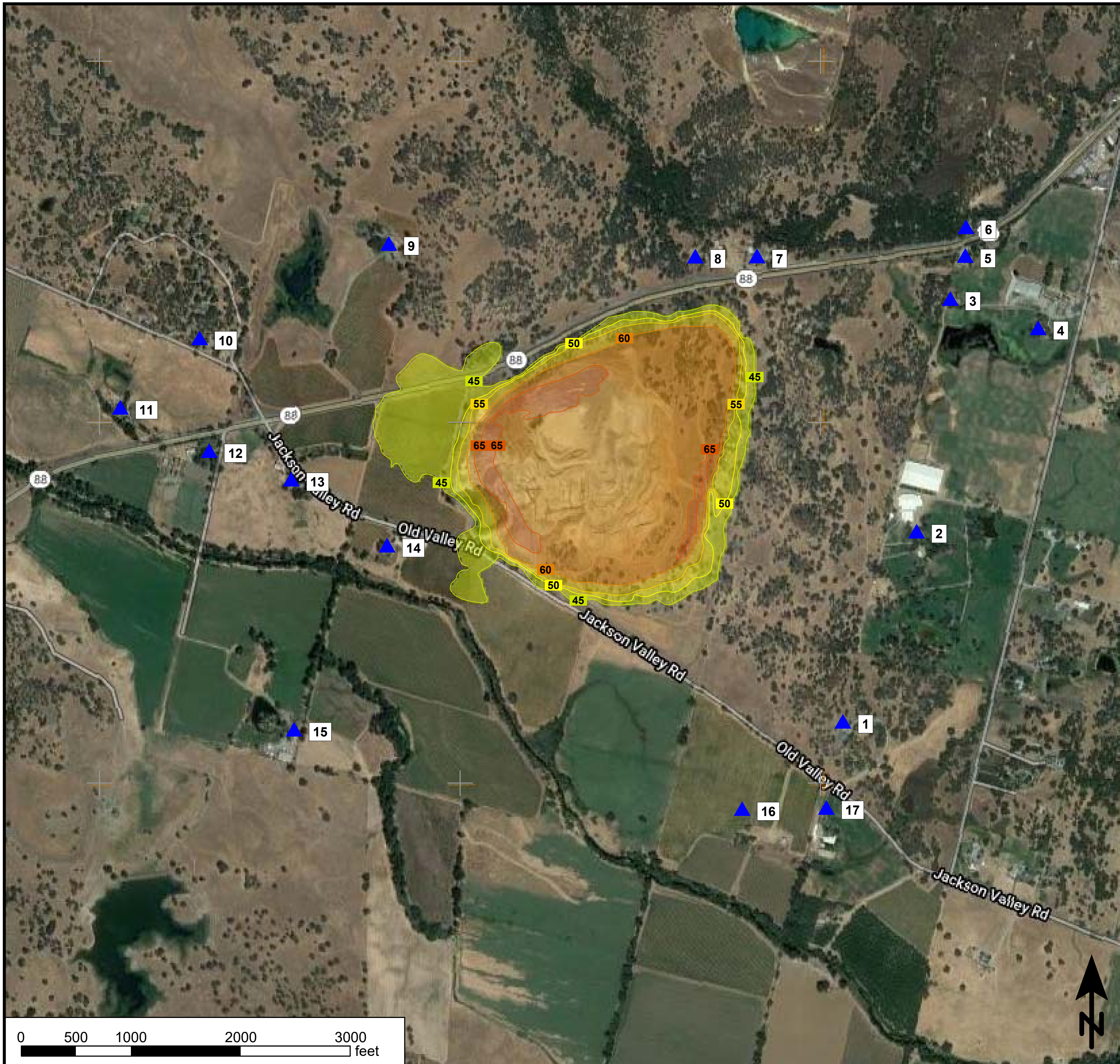
Figure 9
Jackson Valley Quarry
Excavation Noise
Noise Contours
with Equipment
Depressed in Pit



Mitigated
Excavation
Equipment
Noise Contours

Leq, dB(A)

	>= 80
	75 - 80
	70 - 75
	65 - 70
	60 - 65
	55 - 60
	50 - 55
	45 - 50

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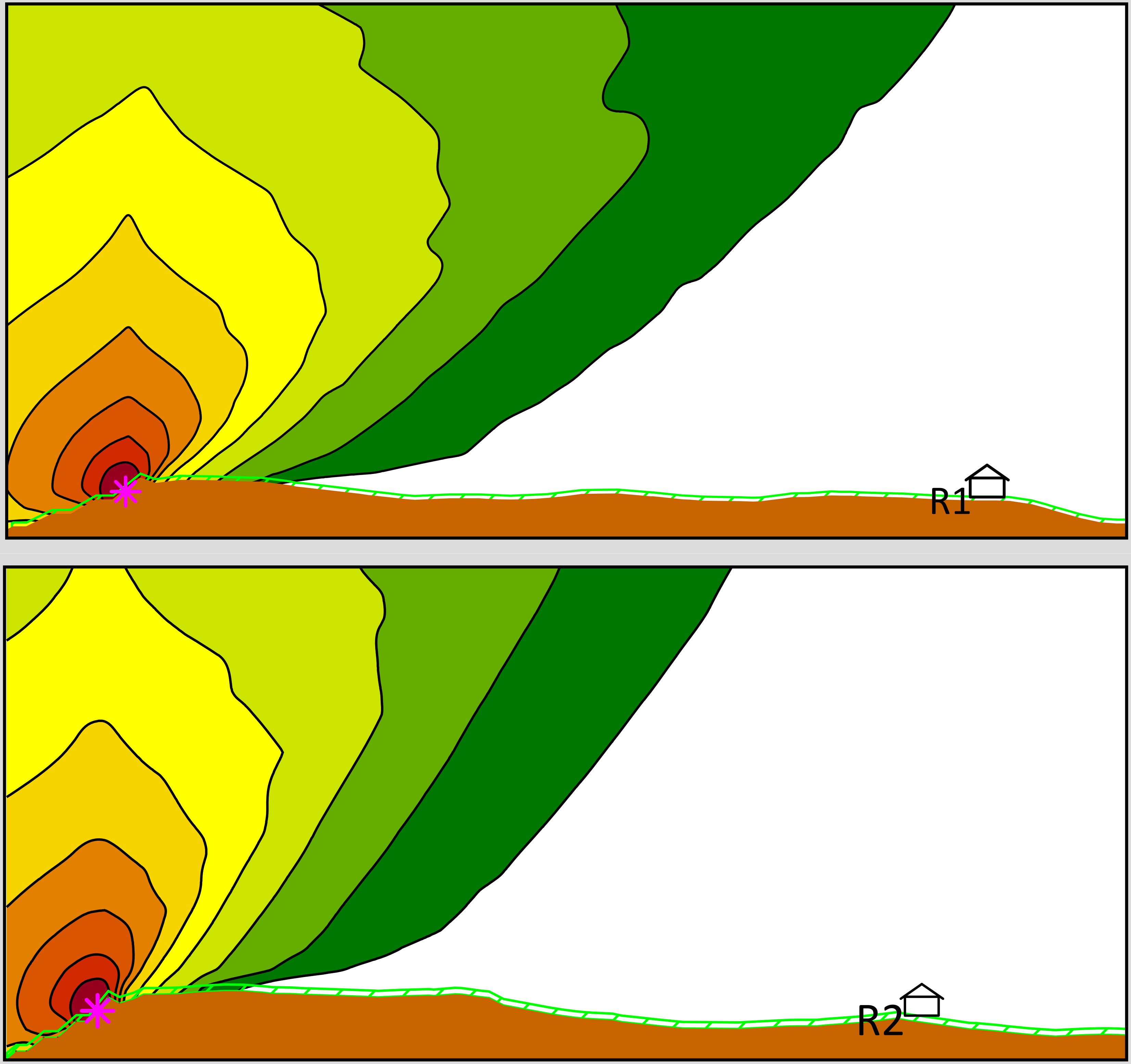

Figure 10
Jackson Valley Quarry

Representative Excavation Noise Noise Contour Cross-Sections with Equipment Depressed in Pit

Excavation Equipment Noise Contours - Receptors 1 & 2

Leq, dB(A)

>=		80
75	-	80
70	-	75
65	-	70
60	-	65
55	-	60
50	-	55
45	-	50
40	-	45

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Table 10 - Predicted Mitigated Excavation Noise Levels (excavation equipment depressed below pit walls)
Nearest Receptors to Jackson Valley Quarry – Amador County, California

Receiver	Predicted Leq	Leq Standard	Leq Exceedance?	Predicted Lmax	Lmax Standard	Lmax Exceedance?
1	32	45	No	37	65	No
2	28	45	No	33	65	No
3	37	53	No	42	71	No
4	35	45	No	40	65	No
5	36	62	No	41	80	No
6	35	65	No	40	83	No
7	41	62	No	46	80	No
8	42	58	No	47	76	No
9	33	45	No	38	65	No
10	37	50	No	42	65	No
11	37	56	No	42	74	No
12	39	61	No	44	79	No
13	42	59	No	47	79	No
14	44	54	No	49	75	No
15	38	45	No	43	65	No
16	38	45	No	43	65	No
17	36	45	No	41	65	No

Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

Off-Site, Nighttime, Heavy Truck Traffic Noise Levels

To quantify the single-event, hourly average, and 24-hour average noise generation of project traffic, BAC utilized noise level data collected at the Jackson Valley Quarry entrance, the Federal Highway Administration Traffic Noise Prediction Model and BAC file data for aggregate haul truck noise emissions. The following section describes the nighttime noise generation of the off-site heavy truck traffic on Jackson Valley Road and Highway 88.

Jackson Valley Road Receptors:

BAC file data for the noise emissions of a 1990 Kenworth T800 with a Cummins 88NT350 Diesel engine with an 18-speed gear box was used to establish reference noise levels for truck passbys on Jackson Valley Road. That data was supplemented with additional heavy truck noise level data collected at various locations in recent years.

Given the relatively short length of the segment of that roadway between Highway 88 and the quarry site (approximately 2,000 feet), haul truck speeds on Jackson Valley Road are relatively low (approximately 25-30 mph). BAC's file data for aggregate truck passbys indicates maximum noise levels of approximately 70 dB L_{max} at the reference distance of 100 feet from the passby route. The computed average SEL from the truck passby tests was 75 dB SEL. To compute hourly noise levels associated with project heavy truck passbys, the following formula is used:

$$Leq(h) = SEL + 10*Log (N) – 10*Log(3600), where…$$

Leq(h):	Hourly average noise level resulting from all truck passbys.
SEL:	Mean Sound Exposure Level of an individual truck passby.
N:	The number of truck passbys which occur in a given hour.
3600:	The number of seconds in an hour.

According to George Reed, Inc., data logs for the period when the ambient noise surveys were being conducted, the facility generated as many as 35 hourly truck loads (70 trips) during a busy hour with an average of approximately 25 loads (50 trips) per hour. For purposes of this evaluation, BAC assumed up to 35 loads (70 passbys) of project heavy trucks on Jackson Valley Road during a busy hour. For the evaluation of day/night average levels at the residences primarily exposed to Jackson Valley Road traffic noise, this analysis conservatively assumed 9 continuous nighttime hours at 70 heavy truck passbys (trips) per hour. Using this operational data with the heavy truck reference noise data cited above, the resulting day/night average level at a reference distance of 100 feet from the centerline of Jackson Valley Road computes to 64 dB L_{dn}. The computed project traffic noise exposure at the residences where the primary noise exposure is due to Jackson Valley Road is presented in Table 11.

With respect to the issue of sleep disturbance at the nearest potentially-affected receptors on Jackson Valley Road, (Receptors 13 and 14), during nighttime material load-out operations, the exterior sound exposure levels (SEL) were computed to range from 70 to 75 dB at the exterior of those residences. With windows in the closed position, interior noise levels would be approximately 25 dB below exterior noise levels, thereby resulting in an interior SELs of 45-50 dB. (Footnote 2 of General Plan Table N-3 states that interior noise standards shall be satisfied with windows in the closed position). Because single-event noise associated with nighttime heavy truck passbys on Jackson Valley Road would be 15-20 dB below the 65 dB SEL noise threshold within the interior of those residences with windows closed, this condition is considered to be satisfied.

Highway 88 Receptors:

To predict project traffic noise levels for the receptors with Highway 88 exposure, the FHWA Traffic Noise Prediction Model was used. The nighttime heavy truck traffic volume was assumed to be 630 nightly trips (70 trips/hr * 9 hours). Project heavy truck trip distribution was reported to be approximately 75% on Highway 88 west of the intersection of Jackson Valley Road and 25% 25% on Highway 88 east of Jackson Valley Road. Vehicle speeds were based on BAC observations and posted speed limits. Table 11 shows the project traffic noise exposure for the receptors with both Jackson Valley Road and Highway 88 traffic noise exposure. Table 11 also shows the applicable L_{dn} standards at each receptor based on the County's General Plan standards and measured ambient conditions.

Table 11 - Predicted Worst-Case Heavy Truck Passby Noise Levels
Nearest Receptors to Jackson Valley Road and Highway 88 – Amador County, California

Receiver	Predicted Ldn	Ldn Standard	Ldn Exceedance?
1	38	60	No
2	41	60	No
3	52	60	No
4	48	60	No
5	61	71	No
6	64	74	No
7	61	71	No
8	57	67	No
9	46	60	No
10	53	60	No
11	59	65	No
12	64	70	No
13	64	67	No
14	59	60	No
15	44	60	No
16	40	60	No
17	39	60	No

Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

Summary of Off-Site Traffic Noise Impacts

The Table 11 data indicate that nighttime project heavy truck trip generation is not predicted to exceed the Amador County General Plan noise standards after adjustment of those standards to reflect elevated ambient conditions at some receptors. In addition, single-event noise levels generated by project heavy trucks on Jackson Valley Road during nighttime hours are not predicted to exceed criterial for sleep disturbance within the two residences located adjacent to that roadway. As a result, off-site heavy truck traffic noise impacts are not considered significant.

To assist George Reed in determining the maximum number of hourly and nighttime heavy truck passbys which could occur on the local roadway network without resulting in exceedance of the project's standards of significance, BAC conducted an iterative analysis using the methodologies cited above. The results of that analysis indicate the following:

1. To not exceed the day/night average (Ldn) noise thresholds at the nearest residences in the project vicinity the maximum number of loads generated by the facility should not exceed 385 between the hours of 10 pm and 7 am (770 trips/passbys).

2. To not exceed the hourly average (Leq) noise thresholds at the nearest residences in the project vicinity the maximum number of loads generated by the facility should not exceed 45 loads during any nighttime hour (90 trips).

Combined Noise from All Project Sources

The noise generation of each component of the project (processing, excavation, and hauling) has been evaluated separately above. Because the Amador County General Plan applies different noise standards to noise generated by on-site operations (excavation, processing and on-site circulation) and off-site heavy truck traffic on public roadways, the noise generation of the on-site, "stationary" noise sources and off-site traffic noise sources cannot practically be combined. To provide an evaluation of each project noise source operating concurrently using a single noise descriptor (Leq), off-site heavy truck traffic noise levels were predicted in terms of hourly averages (L_{eq}) for addition to noise generated by on-site activities which is also described in terms of Leq.

The analysis of unmitigated, combined noise levels from all 3 components indicates the project would result in an exceedance of the project standards of significance at nearby noise-sensitive receptors during nighttime hours. However, implementation of the noise mitigation measures described previously in this assessment would provide sufficient noise attenuation to reduce combined noise generation from all three project components to a state of compliance with the applicable standards of significance. Table 12 shows the combined noise levels of all three project noise sources in terms of hourly average noise levels (Leq) following implementation of the recommended noise mitigation measures.

The Table 12 data indicate that, following implementation of the noise mitigation measures cited herein, the combined noise generation of each major noise-generating component of the project is predicted to be satisfactory relative to the project standards of significance. As a result, the noise mitigation control measures developed in this evaluation should be implemented to ensure compliance with the project standards of significance. Nonetheless, as noted previously, a follow-up noise monitoring program should be implemented upon completion of noise mitigation implementation and commencement of nighttime operations to confirm the assumptions and conclusions of this analysis.

Table 12 - Combined Mitigated Nighttime Noise Exposure From All Sources
Nearest Receptors to Jackson Valley Quarry – Amador County, California

	Predicted Average Noise Level (Leq) After Mitigation					
Receiver	**Processing**	**Excavation**	**Off-Site Traffic**	**Combined**	**Leq Standard**	**Exceedance?**
1	29	32	34	37	45	No
2	32	28	37	38	45	No
3	38	37	47	48	53	No
4	37	35	43	44	45	No
5	37	36	57	57	62	No
6	36	35	59	59	65	No
7	38	41	56	56	62	No
8	31	42	52	53	58	No
9	32	33	42	43	45	No
10	40	37	48	49	50	No
11	40	37	54	54	56	No
12	42	39	59	59	61	No
13	44	42	59	59	59	No
14	45	44	54	54	54	No
15	30	38	39	42	45	No
16	38	38	36	42	45	No
17	36	36	35	40	45	No

Source: Bollard Acoustical Consultants, Inc. (BAC) 2020

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.
IIC	Impact Insulation Class (IIC): A single-number representation of a floor/ceiling partition's impact generated noise insulation performance. The field-measured version of this number is the FIIC.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	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.
STC	Sound Transmission Class (STC): A single-number representation of a partition's noise insulation performance. This number is based on laboratory-measured, 16-band (1/3-octave) transmission loss (TL) data of the subject partition. The field-measured version of this number is the FSTC.

Jackson Valley Quarry

Amador County, CA

Noise Measurement Site Photos

Site 1

Appendix B-1

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Jackson Valley Quarry

Amador County, CA

Noise Measurement Site Photos

Site 2

Appendix B-2

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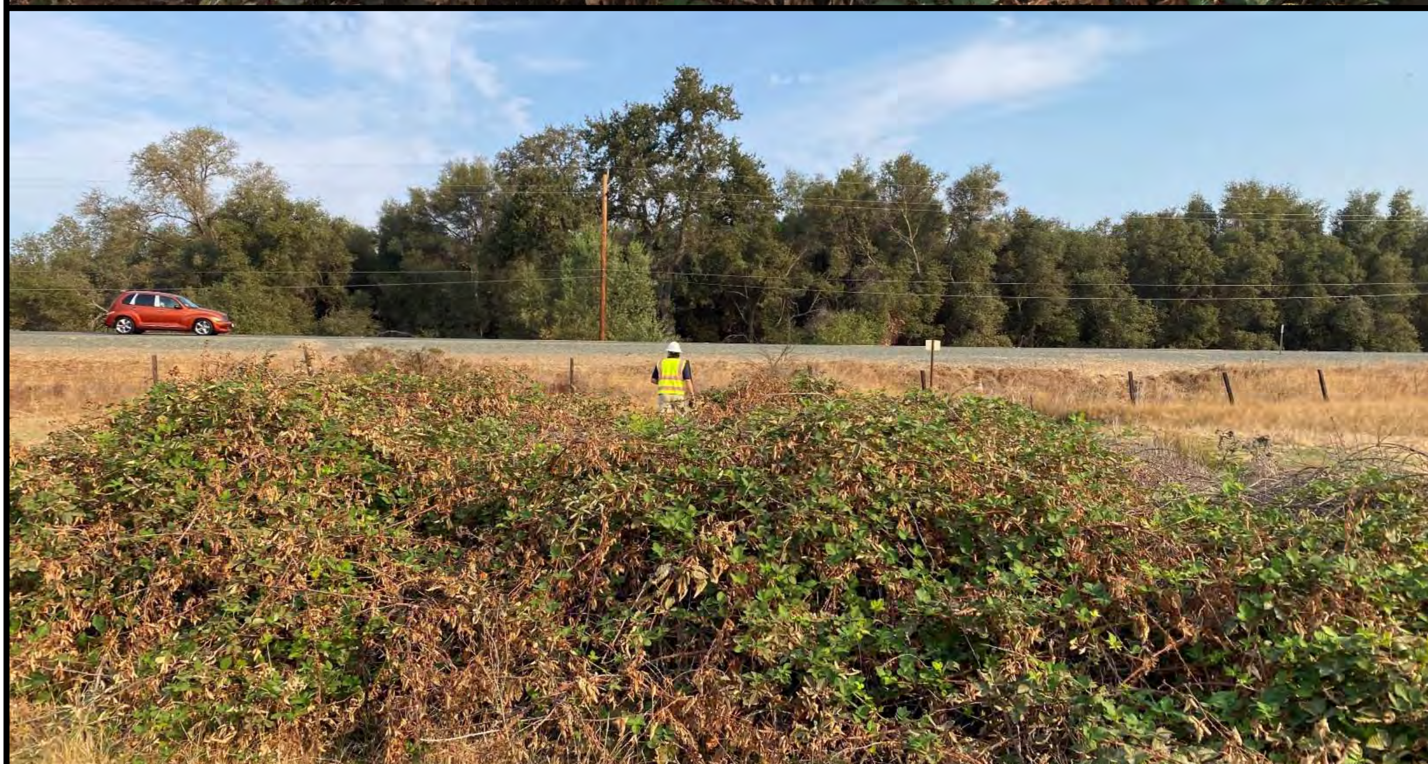

Jackson Valley Quarry

Amador County, CA

Noise Measurement Site Photos

Site 3

Appendix B-3

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Jackson Valley Quarry

Amador County, CA

Noise Measurement Site Photos

Site 4

Appendix B-4

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Jackson Valley Quarry

Amador County, CA

Noise Measurement Site Photos

Site 5

Appendix B-5

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Jackson Valley Quarry

Amador County, CA

Noise Measurement Site Photos

Site 6

Appendix B-6

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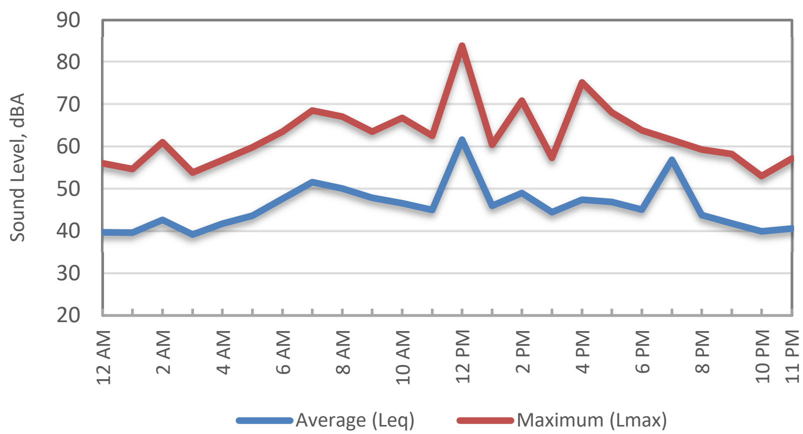
Appendix C - 1
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 1

Thursday, October 08, 2020



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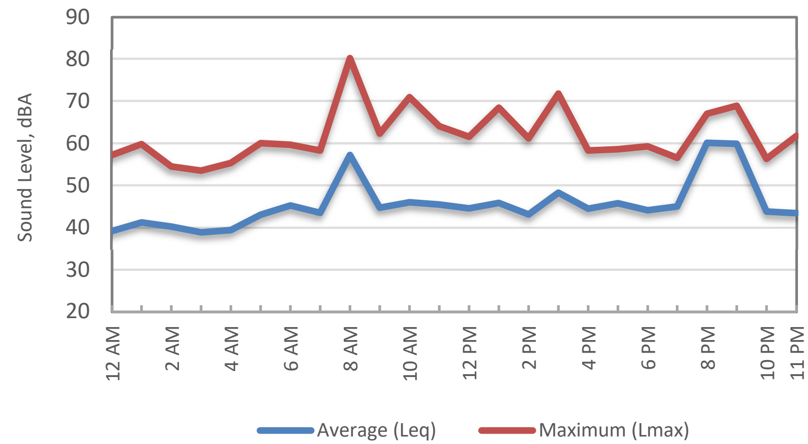

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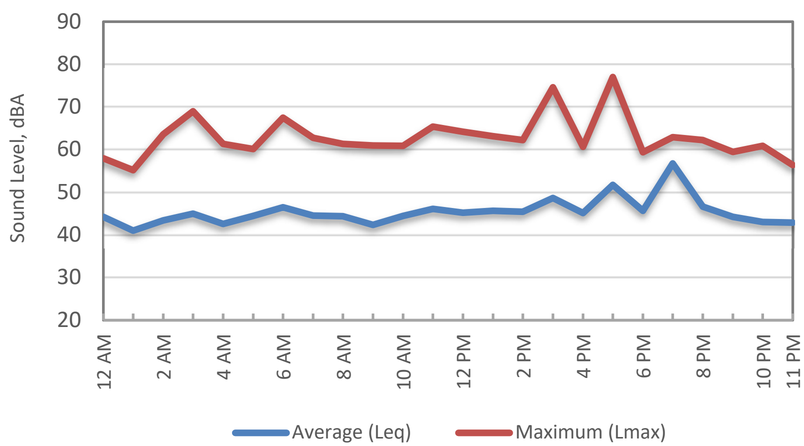

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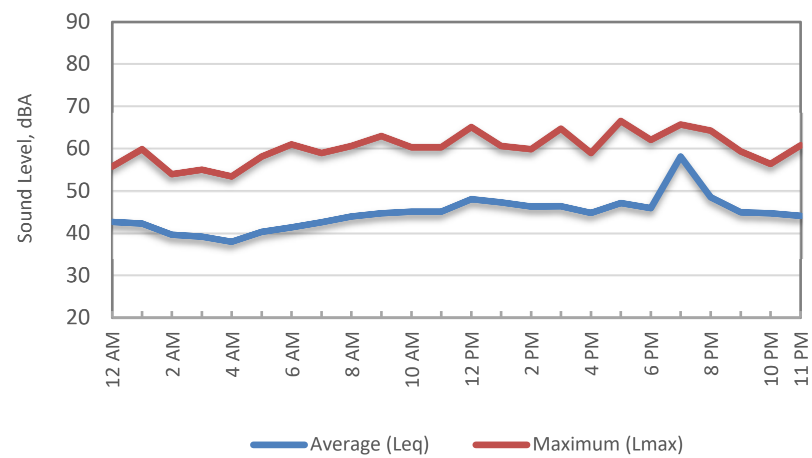

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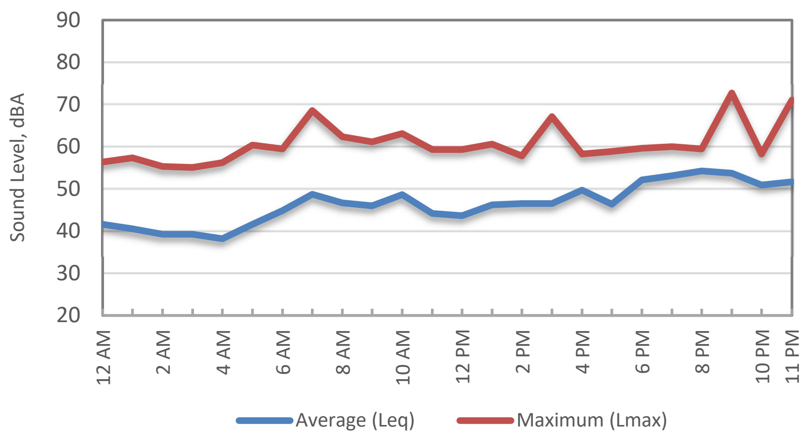
Appendix C - 2
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 1

Monday, October 12, 2020



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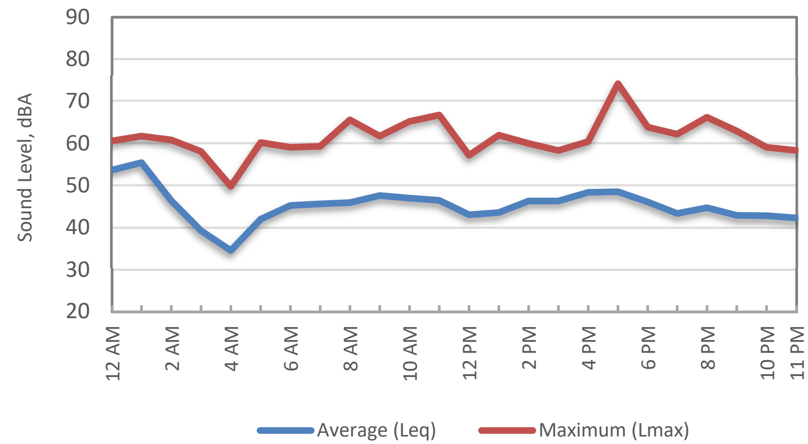

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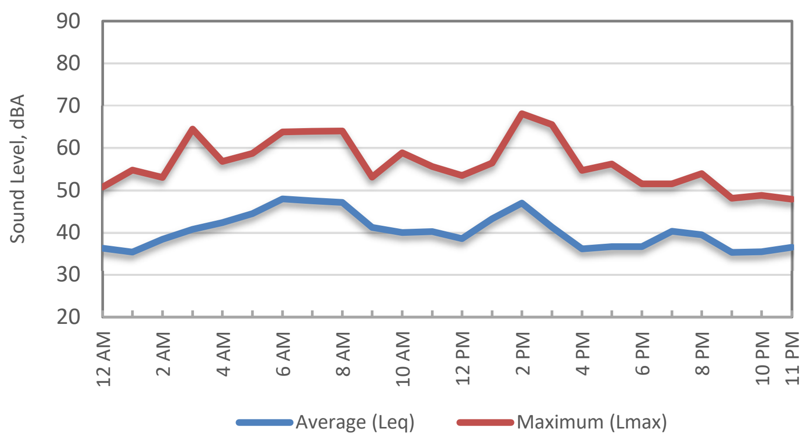
Appendix C - 3
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 2

Thursday, October 08, 2020



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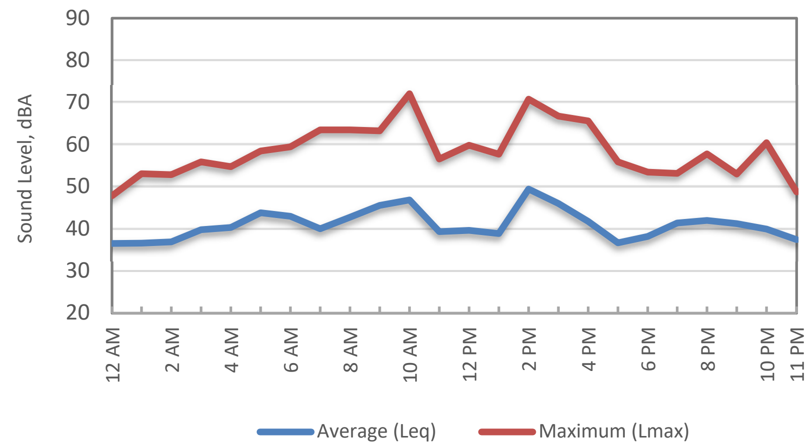

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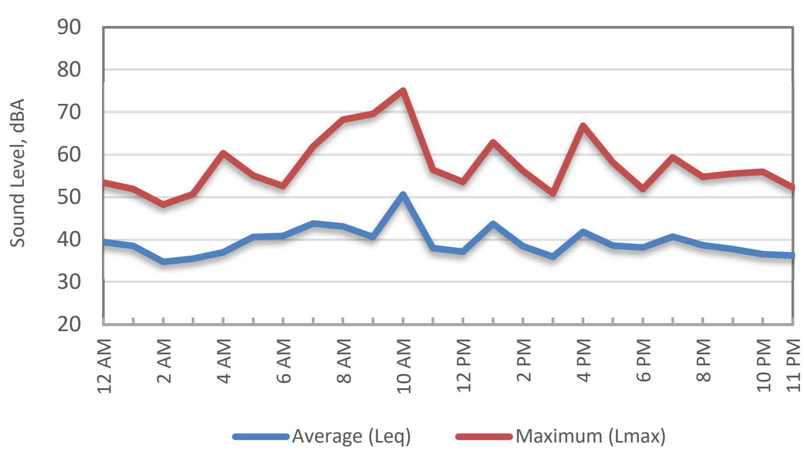

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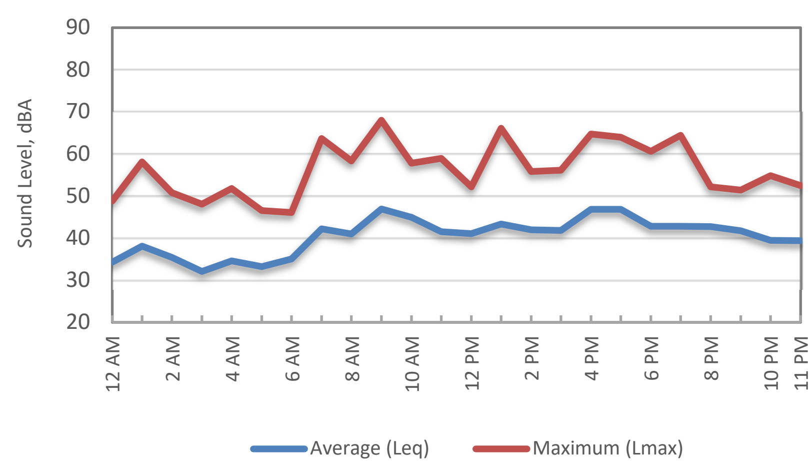

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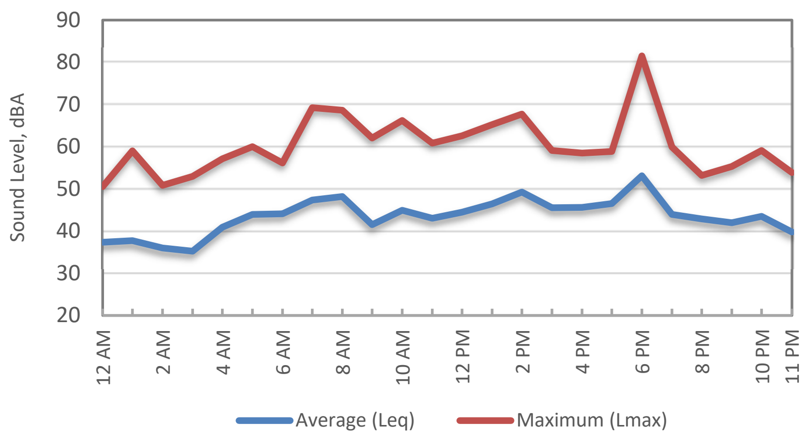
Appendix C - 4
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 2

Monday, October 12, 2020



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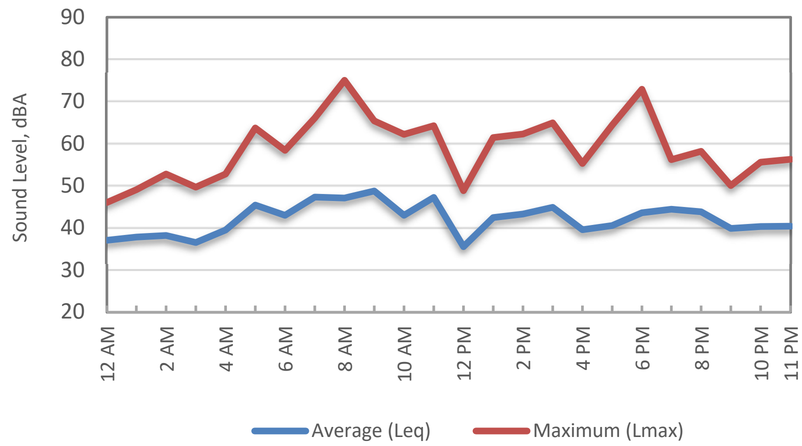

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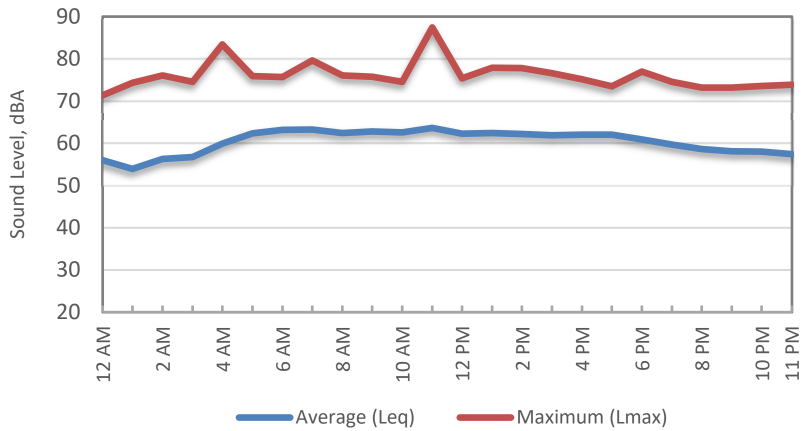
Appendix C - 5
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 3

Thursday, October 08, 2020



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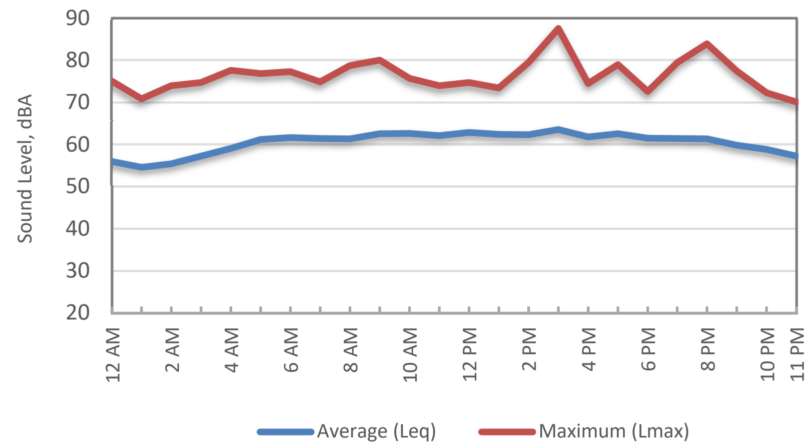

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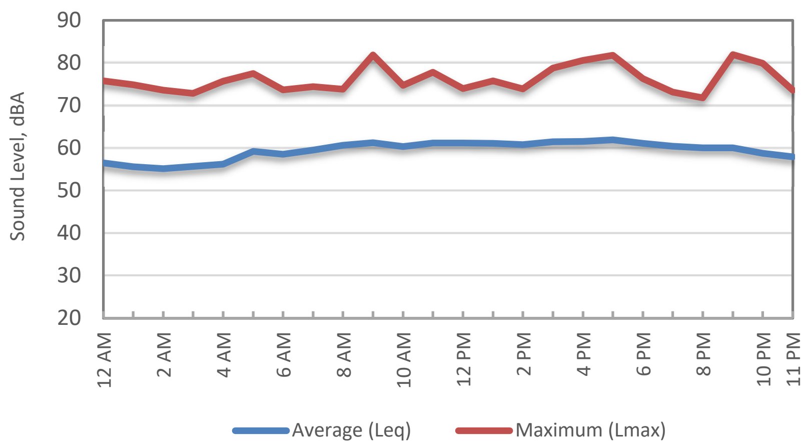

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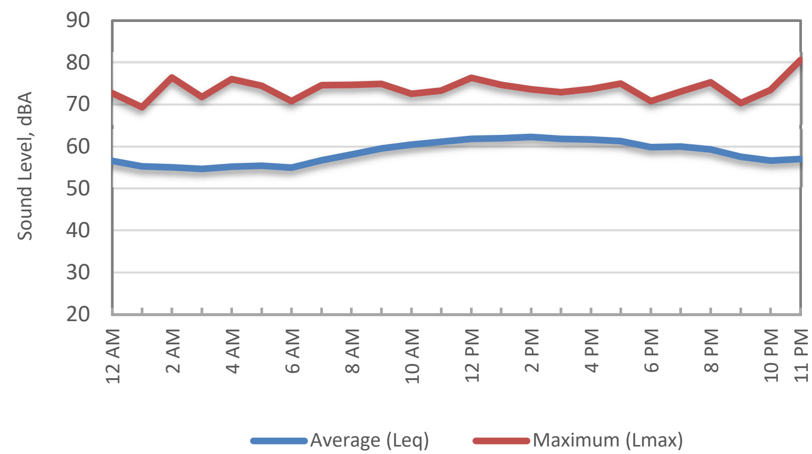

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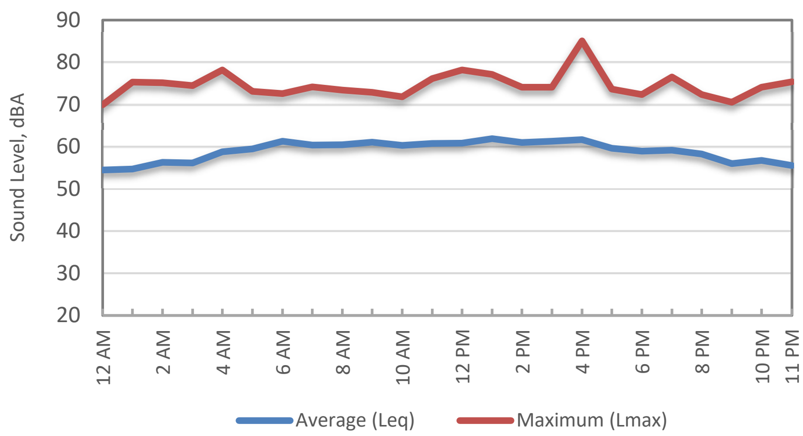
Appendix C - 6
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 3

Monday, October 12, 2020



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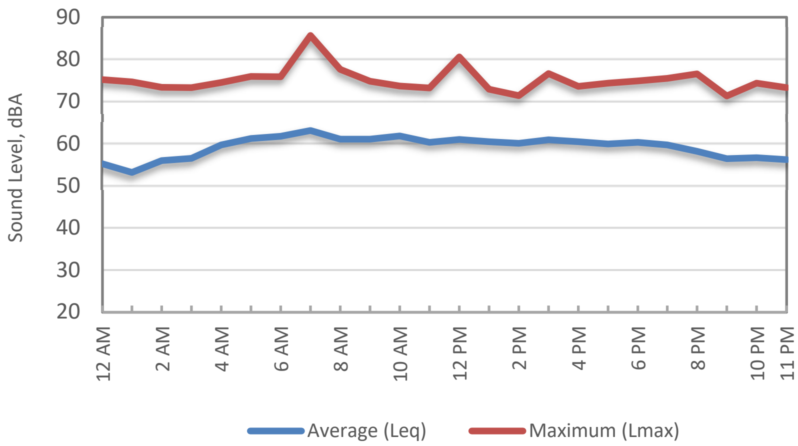

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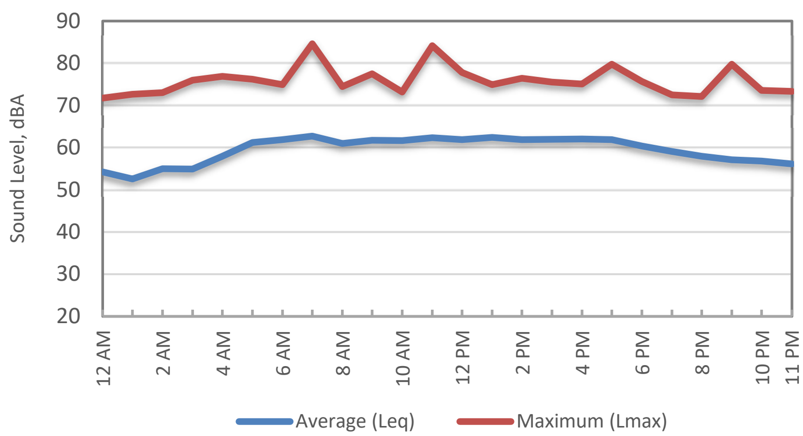
Appendix C - 7
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 4

Thursday, October 08, 2020



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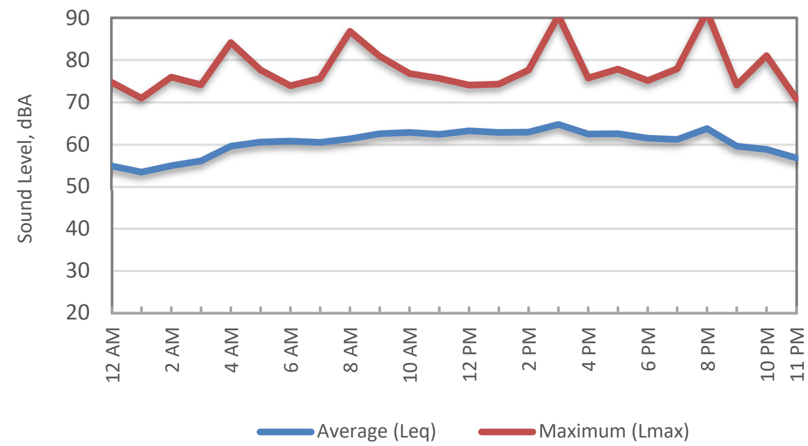

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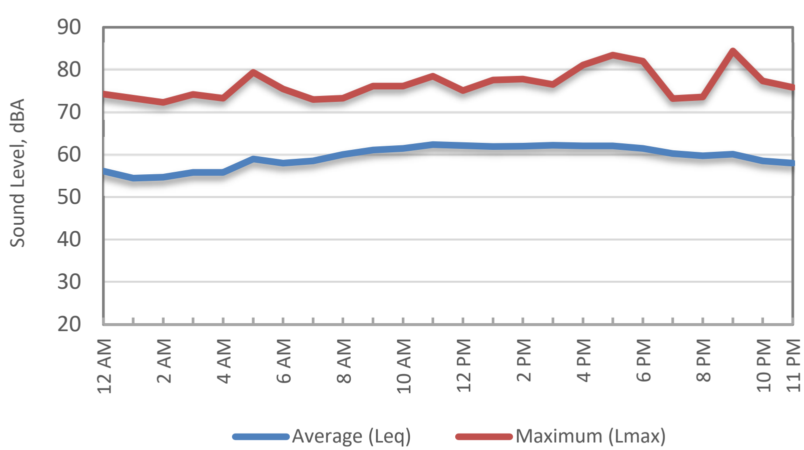

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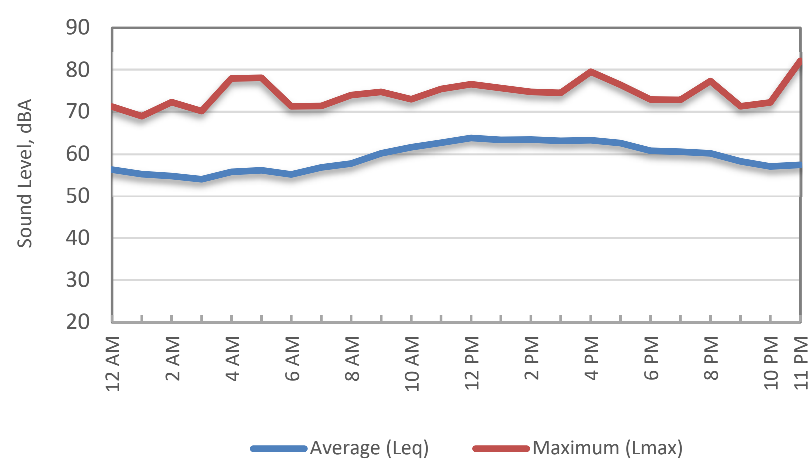

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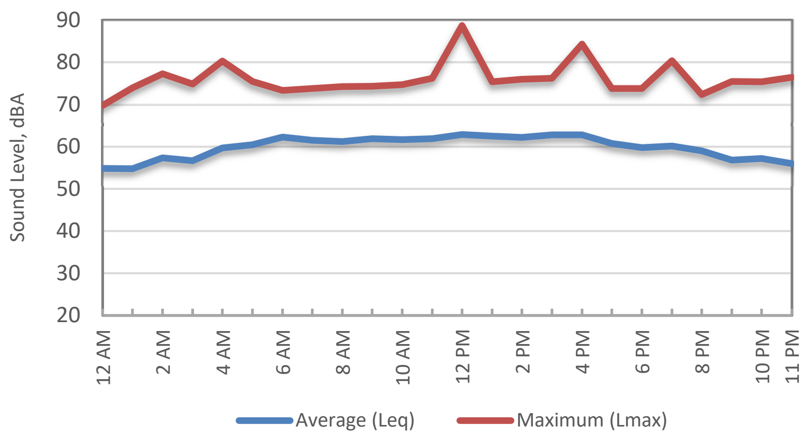
Appendix C - 8
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 4

Monday, October 12, 2020



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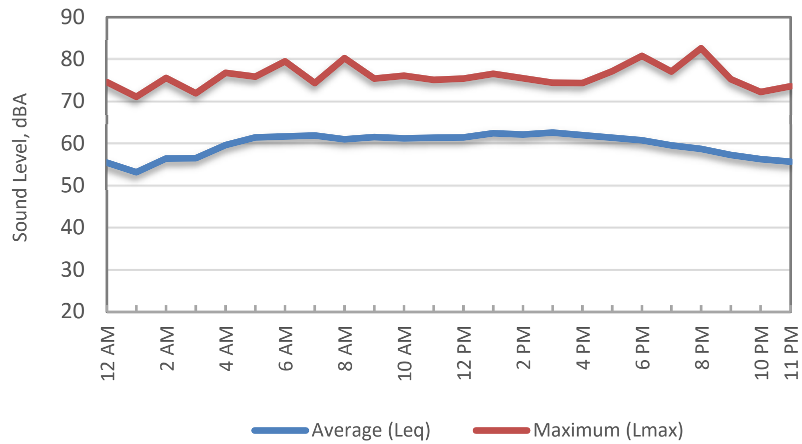

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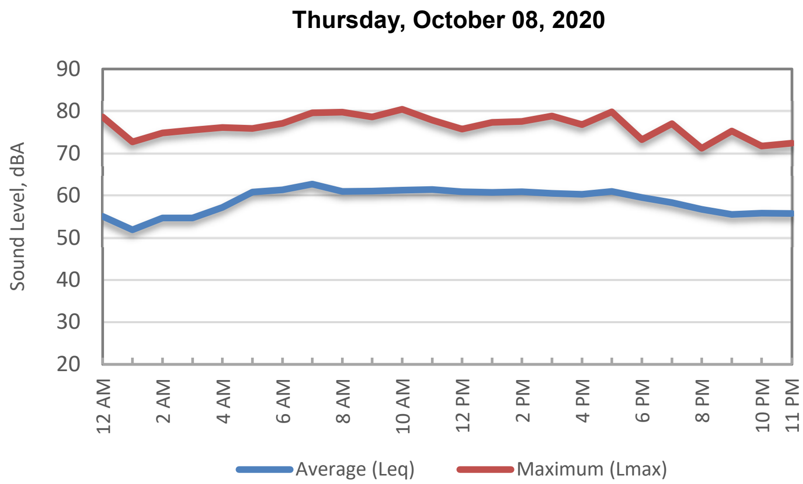
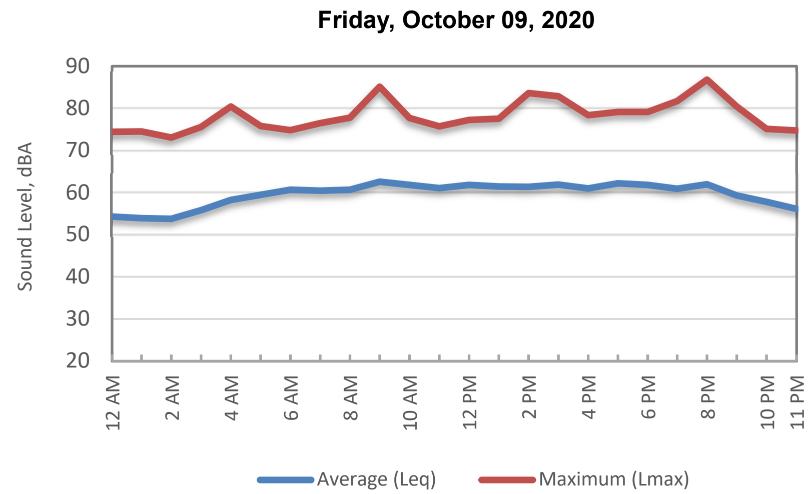
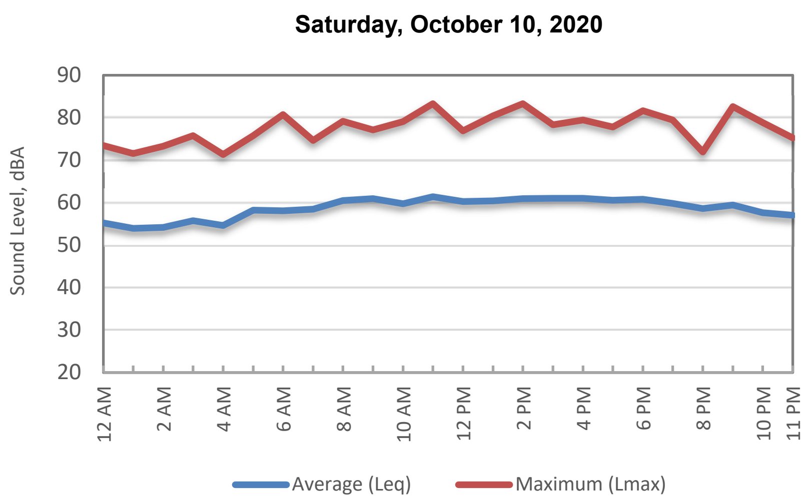
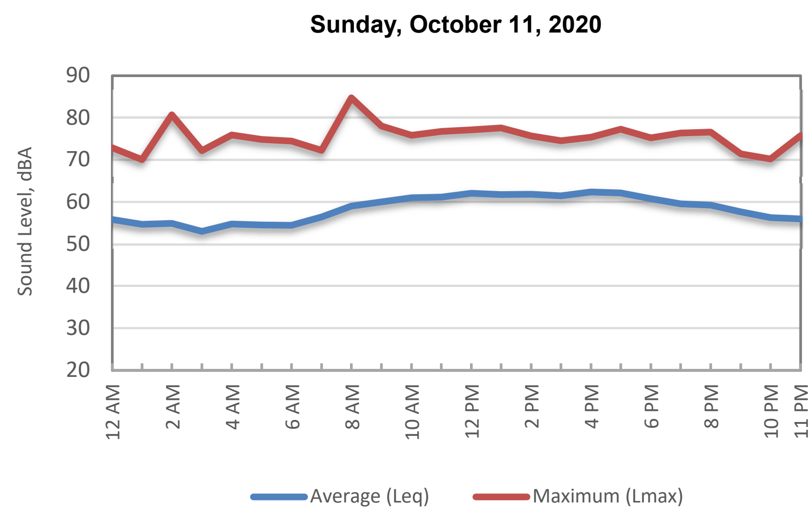
Appendix C - 9
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 5









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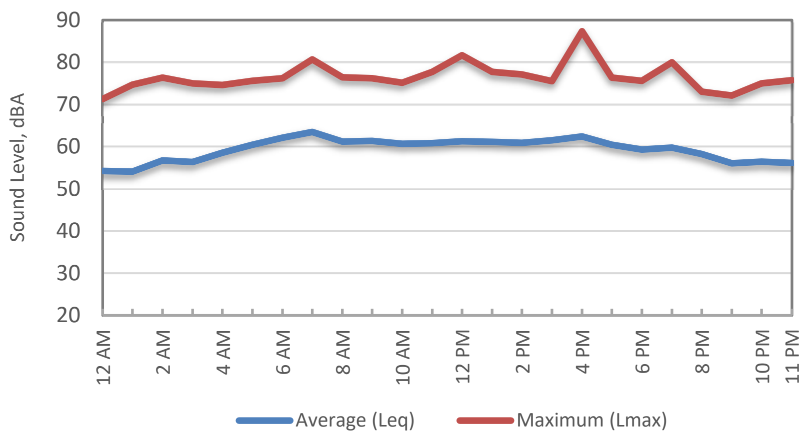
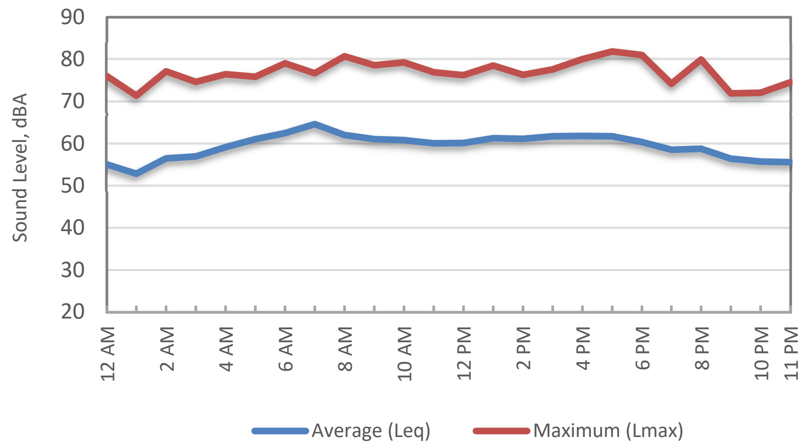
Appendix C - 10
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 5

Monday, October 12, 2020



Tuesday, October 13, 2020



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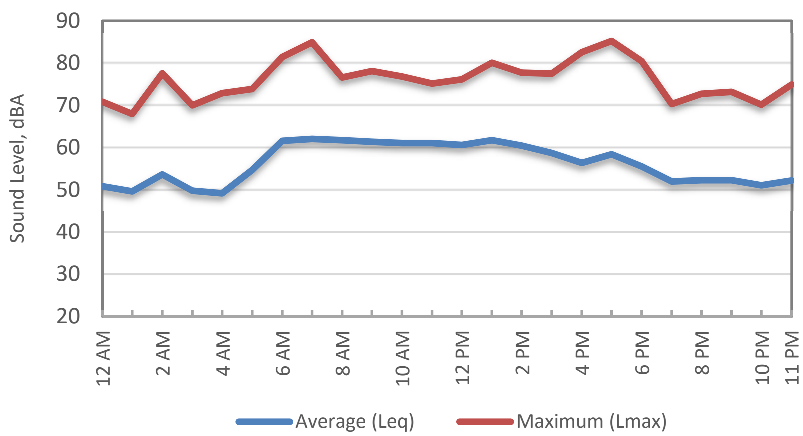
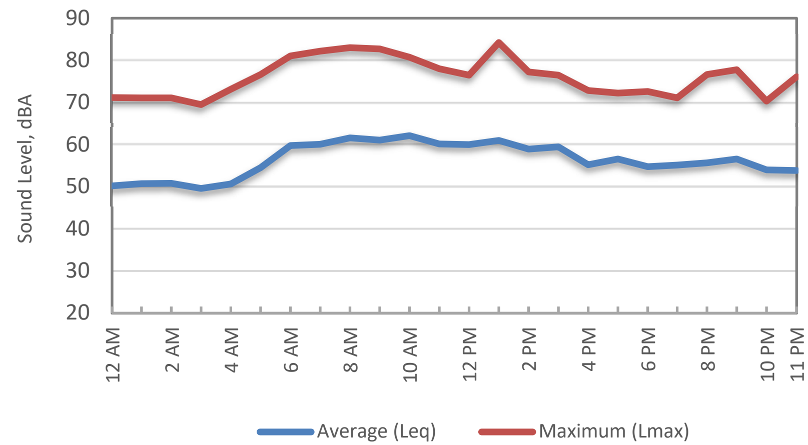
Appendix C - 11
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 6

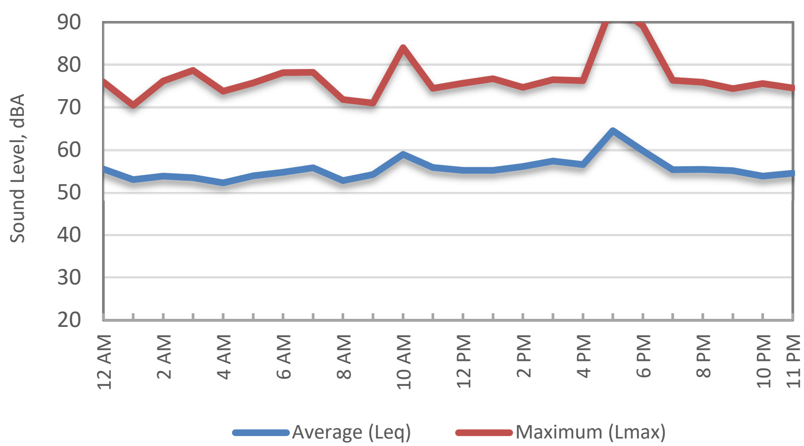
Thursday, October 08, 2020



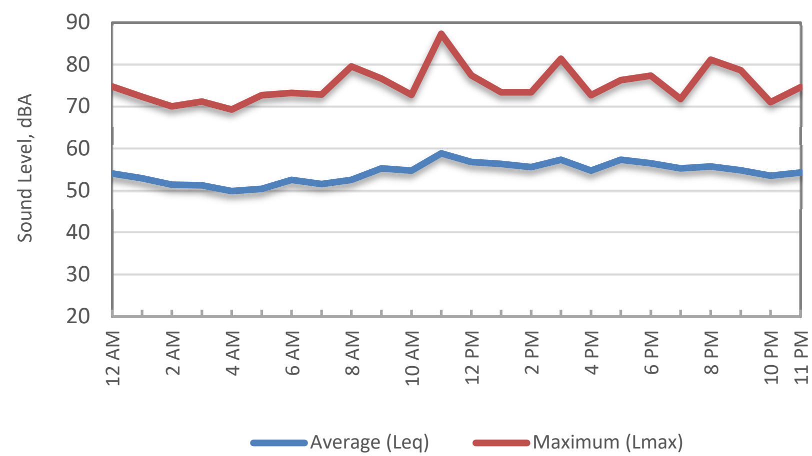
Friday, October 09, 2020



Saturday, October 10, 2020



Sunday, October 11, 2020



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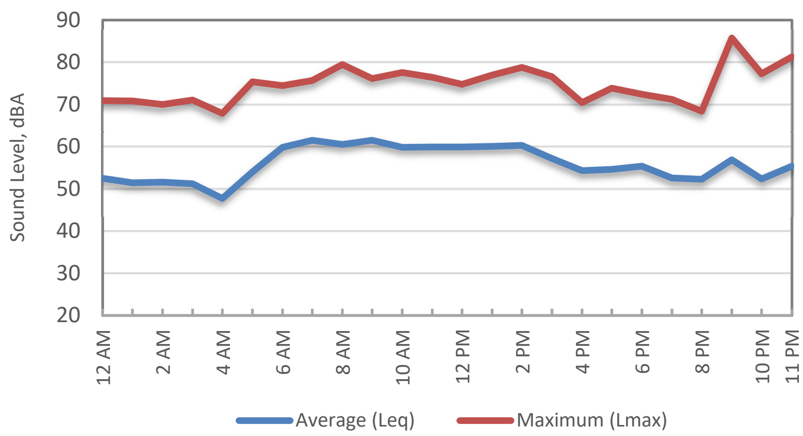
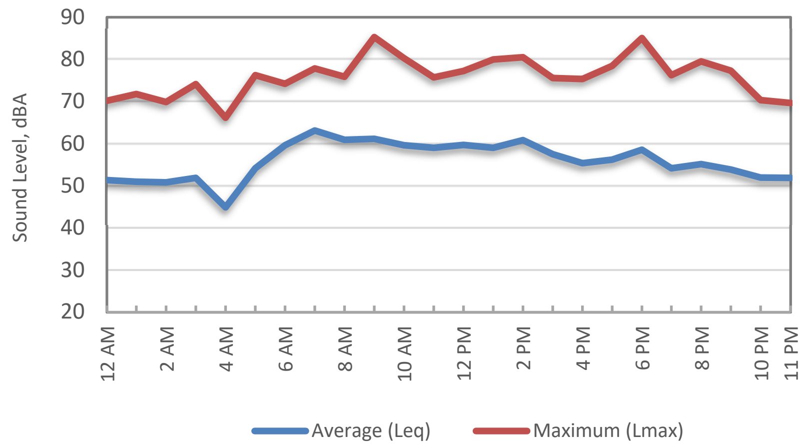
Appendix C - 12
Ambient Noise Monitoring Results
Jackson Valley Quarry - Amador County
Site 6

Monday, October 12, 2020



Tuesday, October 13, 2020



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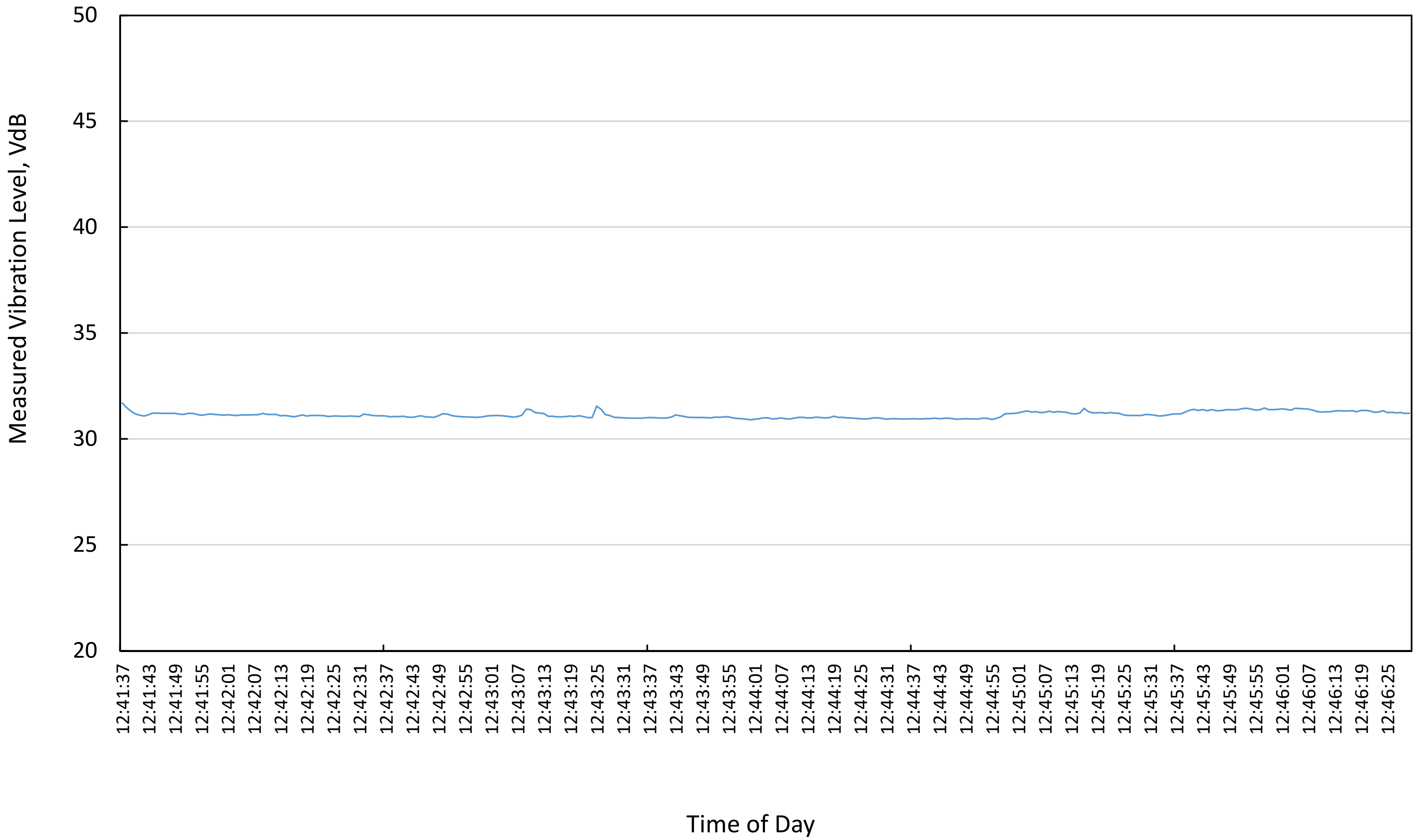
Appendix D-1
Short-Term Vibration Measurement Results
Site 1: Jackson Valley Quarry, Amador County, California
October 14, 2020



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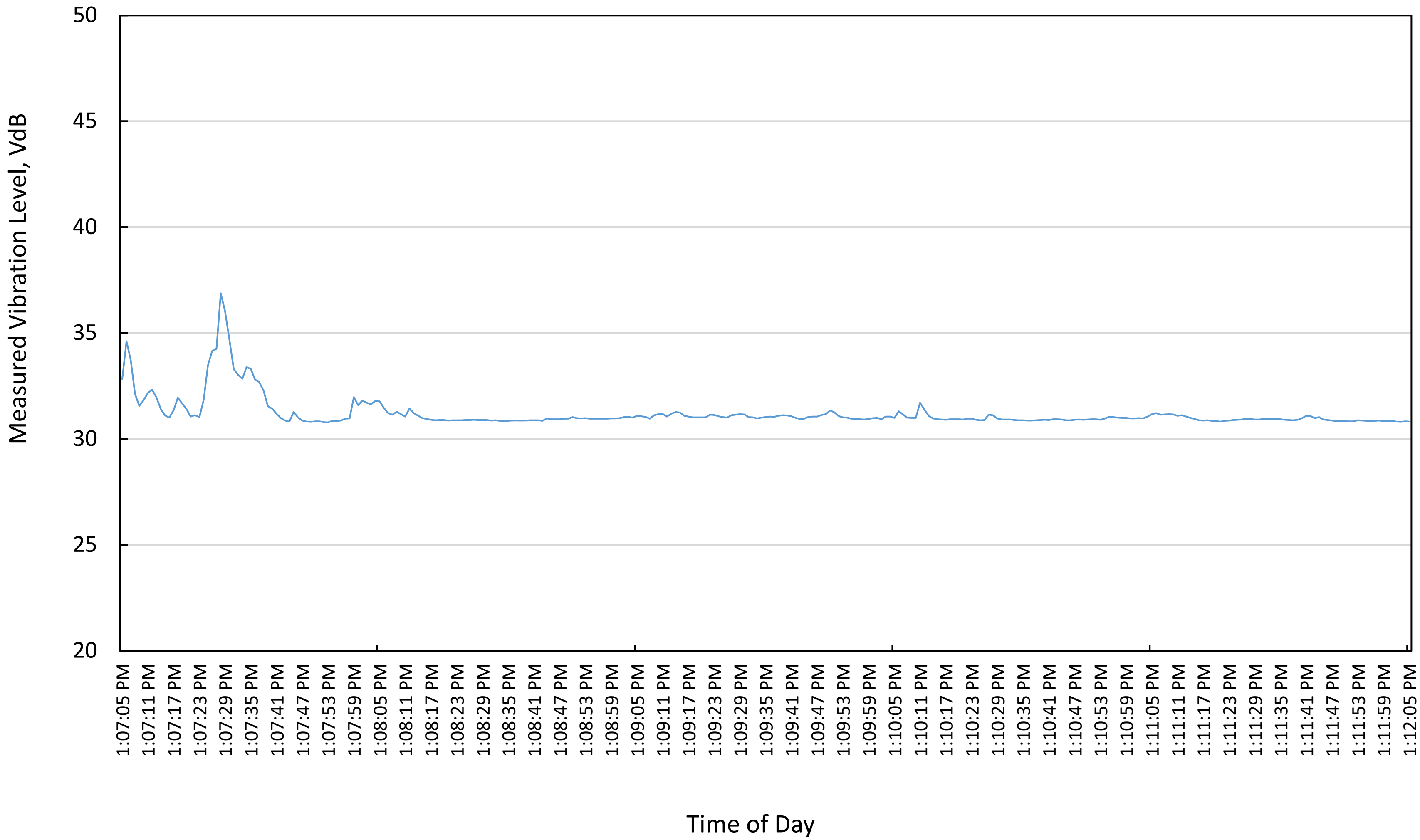
Appendix D-2
Short-Term Vibration Measurement Results
Site 2: Jackson Valley Quarry, Amador County, California
October 14, 2020



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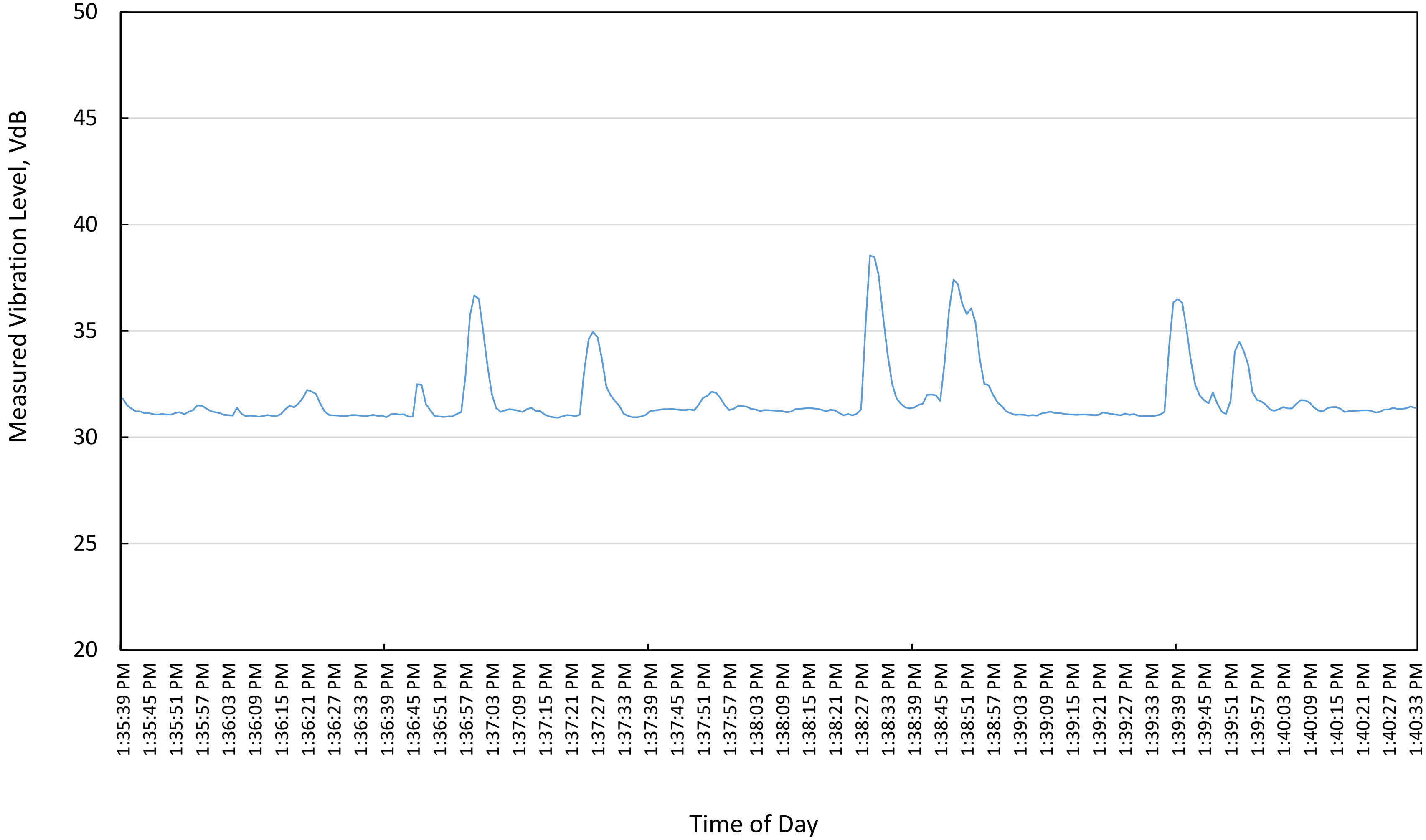
Appendix D-3
Short-Term Vibration Measurement Results
Site 4: Jackson Valley Quarry, Amador County, California
October 14, 2020



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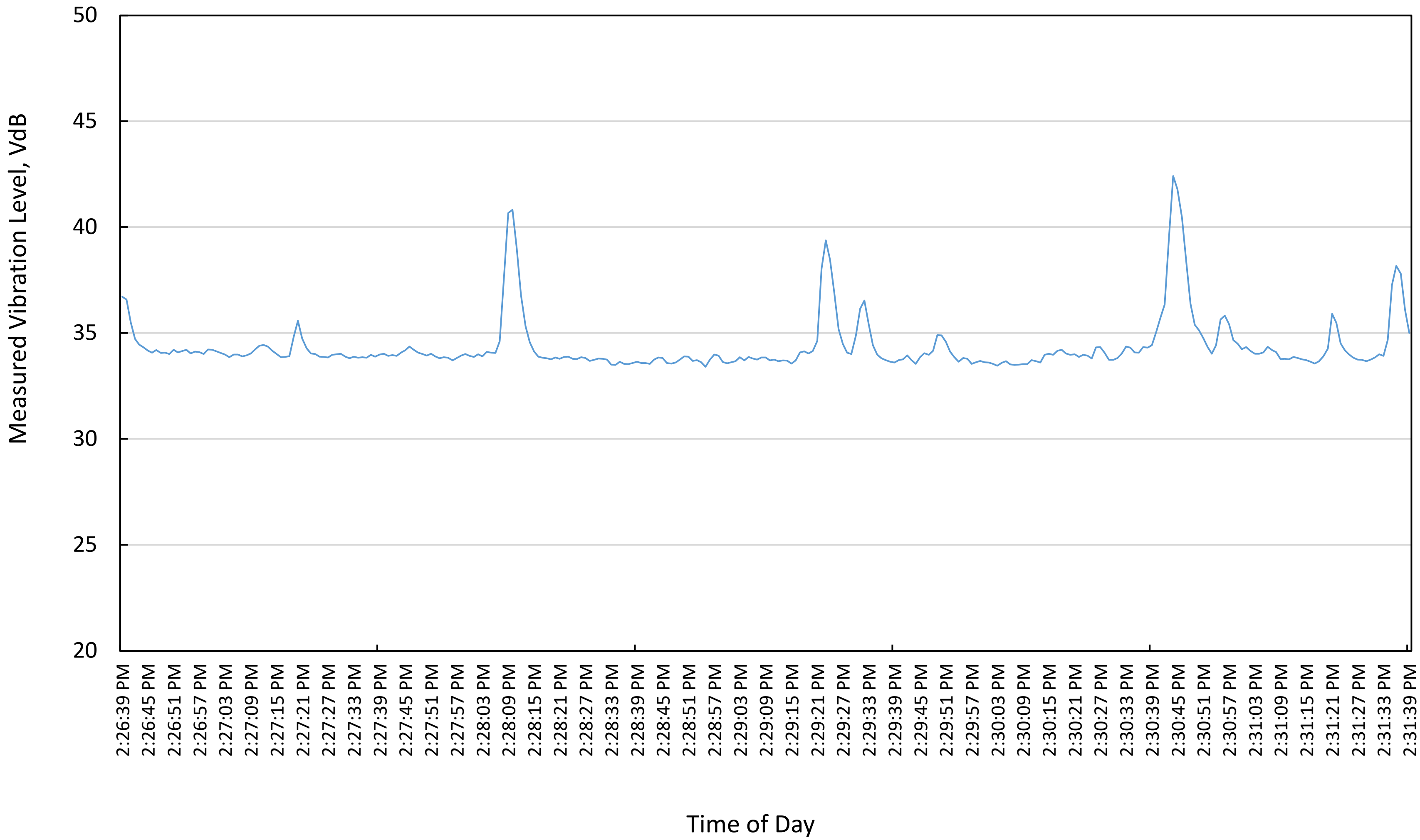
Appendix D-4
Short-Term Vibration Measurement Results
Site 5: Jackson Valley Quarry, Amador County, California
October 14, 2020



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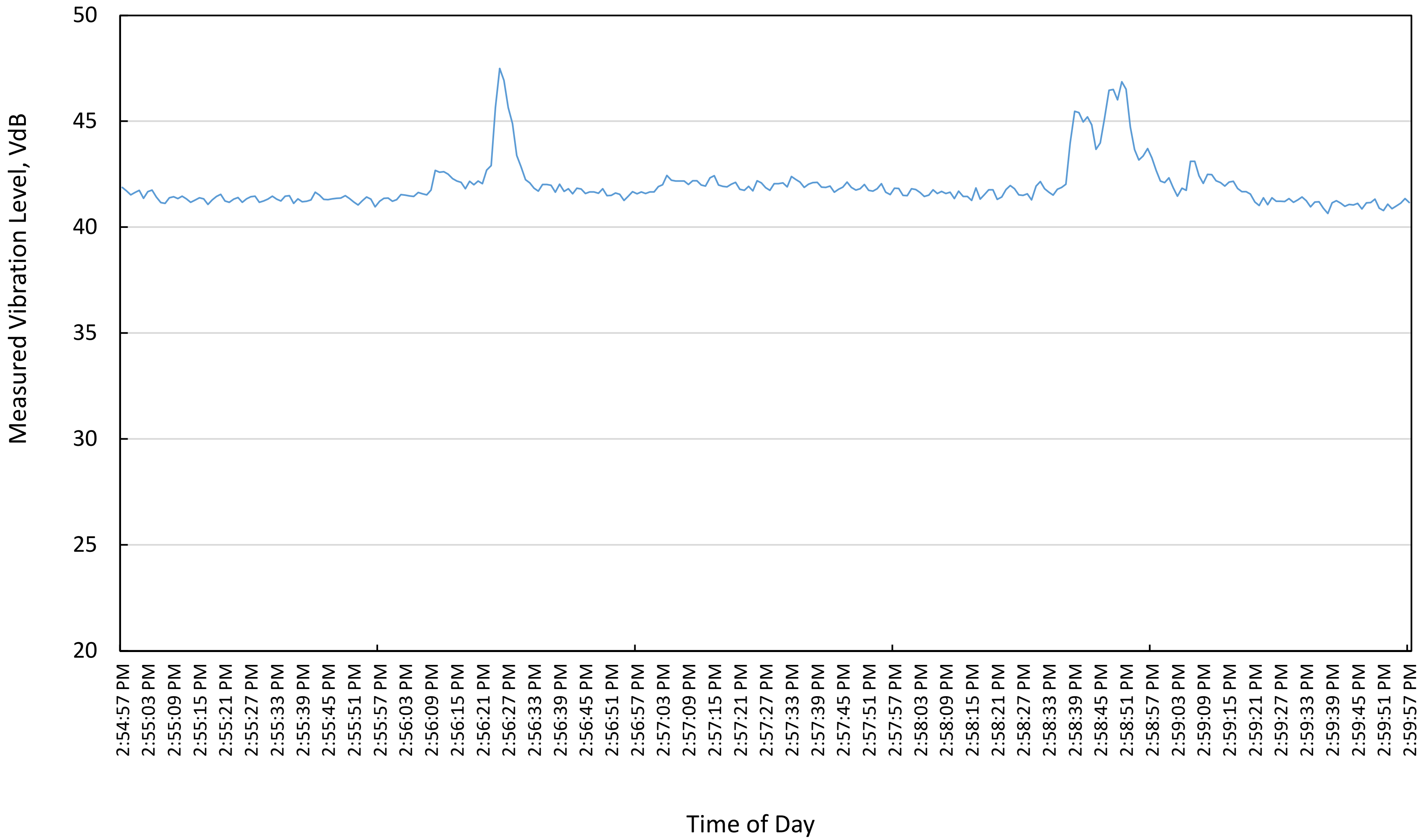
Appendix D-5
Short-Term Vibration Measurement Results
Site 6: Jackson Valley Quarry, Amador County, California
October 14, 2020



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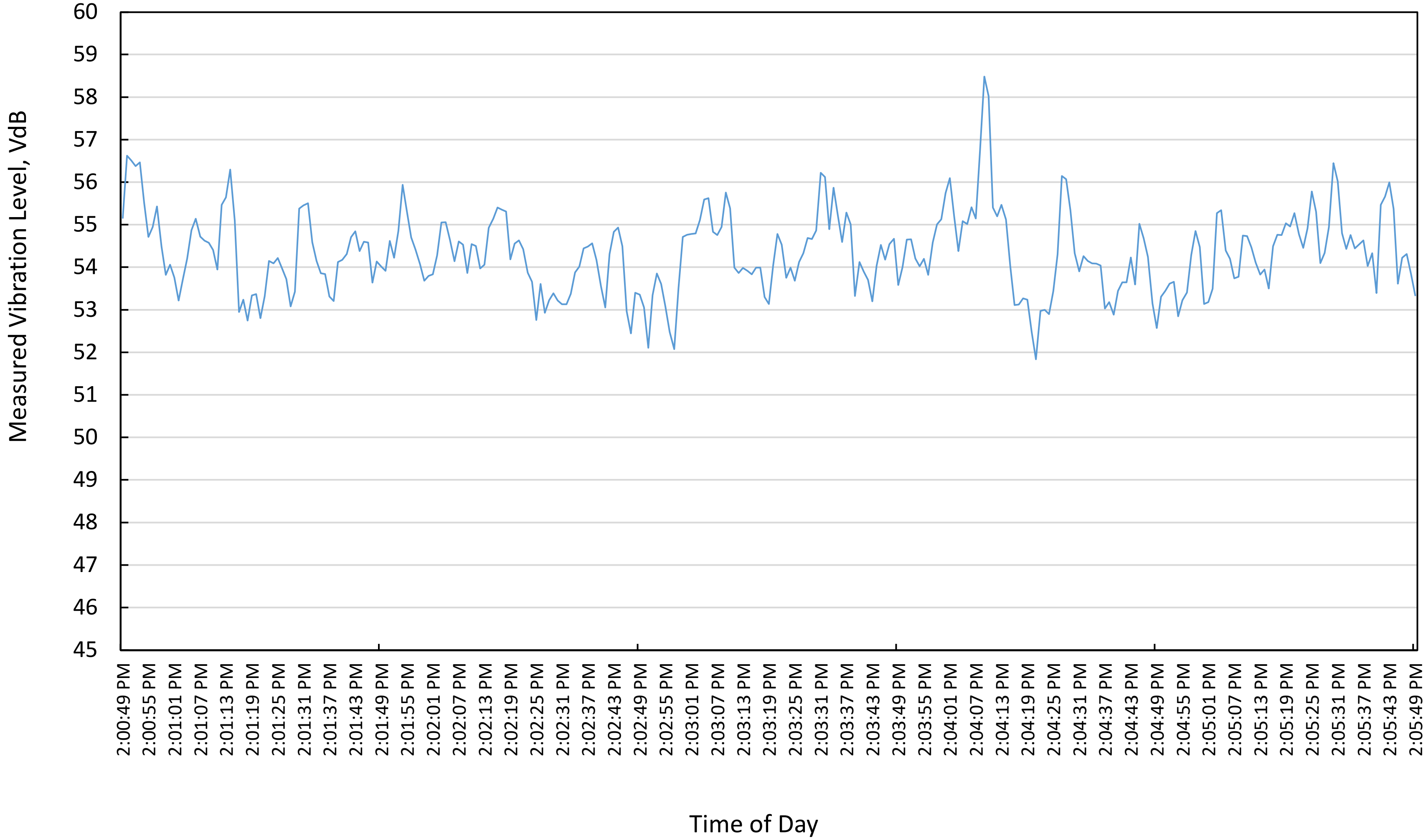
Appendix D-6
Short-Term Vibration Measurement Results
Plant Site: Jackson Valley Quarry, Amador County, California
October 14, 2020



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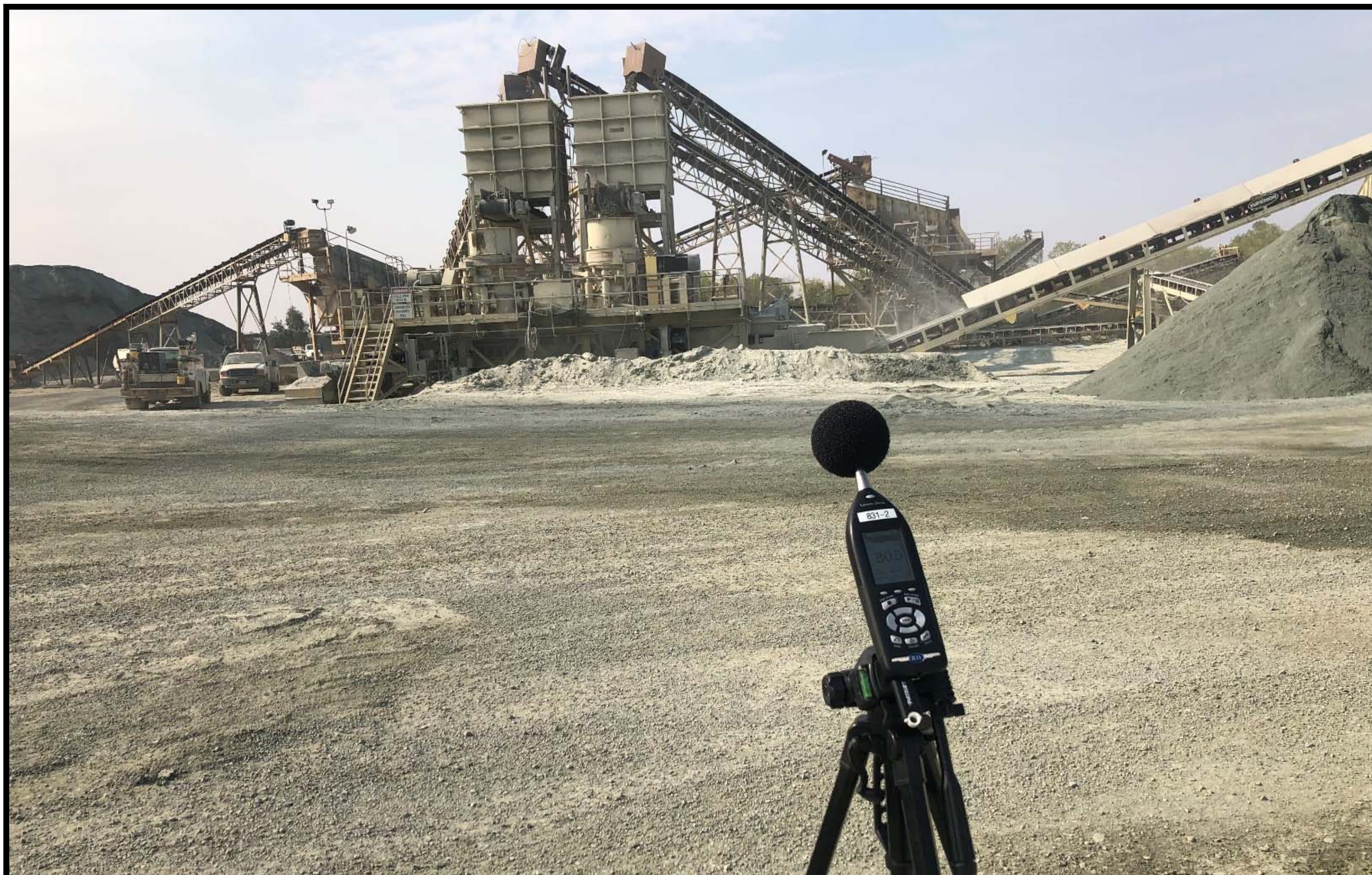

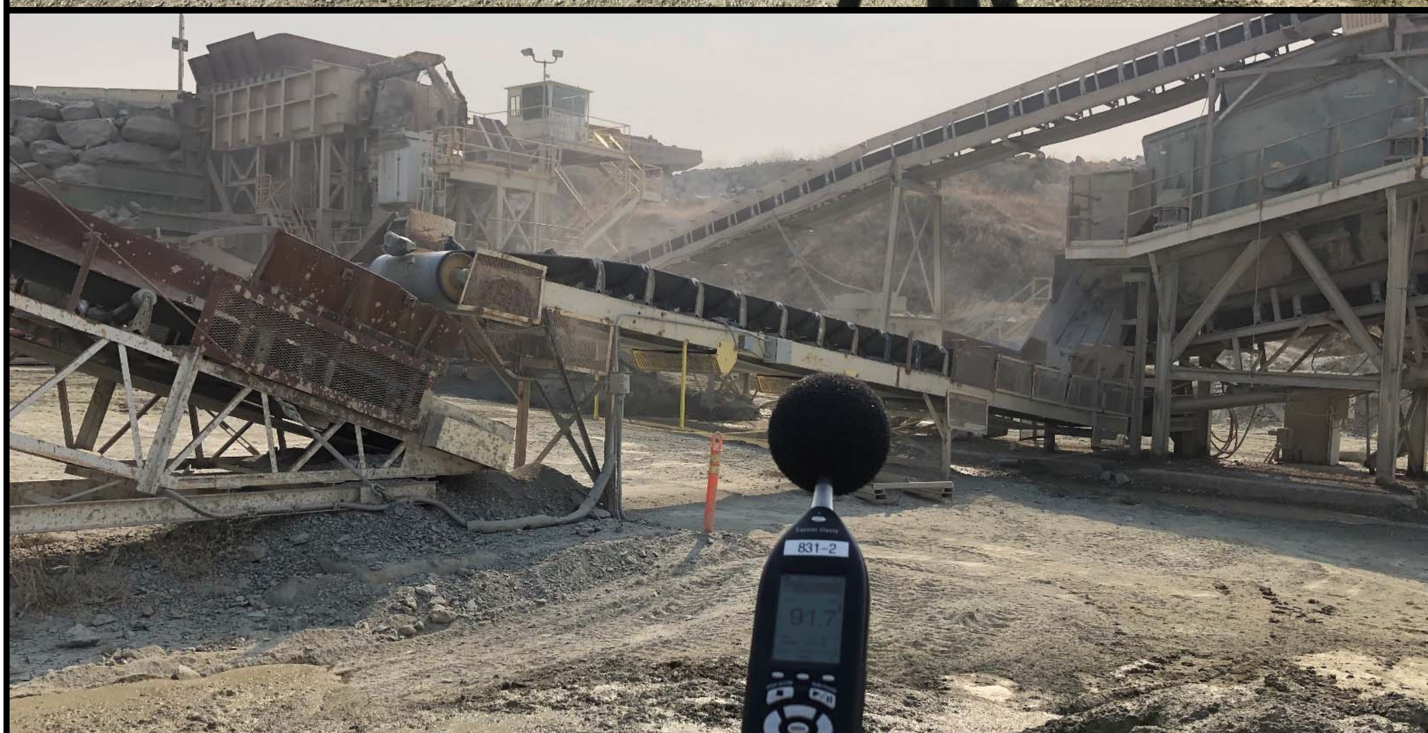

Jackson Valley Quarry

Amador County, CA

Short-Term Noise Measurement Photos

Processing Area

Appendix E-1

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Jackson Valley Quarry

Amador County, CA

Short-Term Noise Measurement Photos

Processing Area

Appendix E-2

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Appendix F
Short-Term Plant Area Noise Measurement Results
Jackson Valley Quarry - July 10, 2020

								1/1 Laeq								
Location	**LAeq**	**LASmax**	**LAS2**	**LAS8**	**LAS15**	**LAS25**	**LAS50**	**LAS90**	**31.5**	**63.0**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
A	67	68	68	68	67	67	67	67	28	41	45	52	55	62	63	60	48
B	73	76	75	74	73	73	72	72	34	47	56	62	65	68	66	62	52
C	81	84	83	83	83	82	81	80	38	56	62	70	73	77	76	71	60
D	91	95	94	93	93	92	91	85	48	63	72	77	85	87	84	78	68
E	86	87	87	86	86	86	85	85	40	55	66	71	77	81	81	76	65
F	69	80	78	77	66	58	55	53	33	35	43	51	65	61	62	57	46

Note: Short-Term Plant Area Noise Monitoring Locations are Shown on Figure 5

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