Appendix I

ENVIRONMENTAL NOISE ASSESSMENT

Environmental Noise Assessment

Boca Quarry Expansion Project

Nevada County, California

BAC Job # 2011-056

Prepared For:

Teichert Aggregates

Attn: Mr. Jeff Thatcher
P.O. Box 15002
Sacramento, CA 95851

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard, President

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BOLLARD
Acoustical Consultants

3551 Bankhead Road ▸ Loomis, CA 95650 ▸ Phone: (916) 663-0500 ▸ Fax: (916) 663-0501 ▸ BACNOISE.COM

Introduction

The proposed project is an expansion of existing mining operations within the Teichert Boca Quarry. Proposed mining operations will occur in three phases. Phase 1 is the mining of the East Pit (largely complete). Phase 2 is the mining of lowest pit bench, and Phase 3 is the mining of the hillside with backfill and, when feasible, concurrent reclamation of the lowest bench. The project site location is shown on Figure 1. Figure 2 shows the proposed mine plan.

This report describes the noise environment in the vicinity of the Teichert Boca Quarry Expansion Project (project), and analyzes potential noise impacts associated with the proposed project.

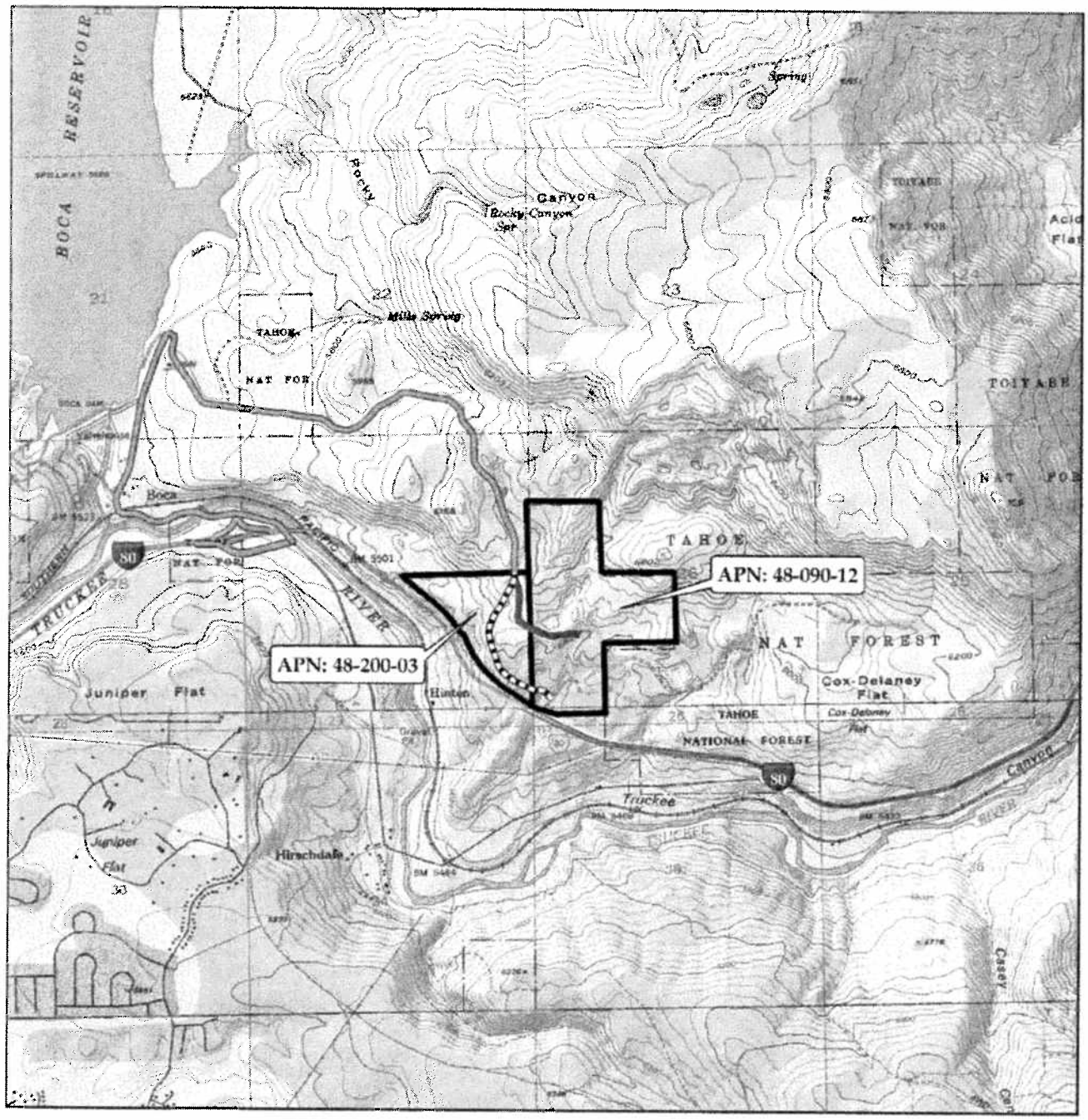
Noise Fundamentals and Terminology

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

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

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

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 (Leq), which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The Leq is the foundation of the composite noise descriptor, Ldn, and shows very good correlation with community response to noise.



SCALE:

0 0.25 0.5 Miles

SOURCE:

USGS 7.5' Topographic Quads: Boca & Martis Peak

MAP CREATED BY: DATE:

C. Cornejo 07/27/2011

BOQ_ViewPrt_Fig2SiteLocation_201107.mxd

FIGURE 1

SITE LOCATION

BOCA QUARRY
TEICHERT AGGREGATES
NEVADA COUNTY, CALIFORNIA

LEGEND:

- Existing Access Road
- Existing Haul Road
- Proposed County Access Road (Approx. Location- To Be Built)
- Boca Quarry Parcel Boundaries

DISCLAIMER:

The data was mapped for assessment purposes only. No liability is assumed for the accuracy of the data shown.

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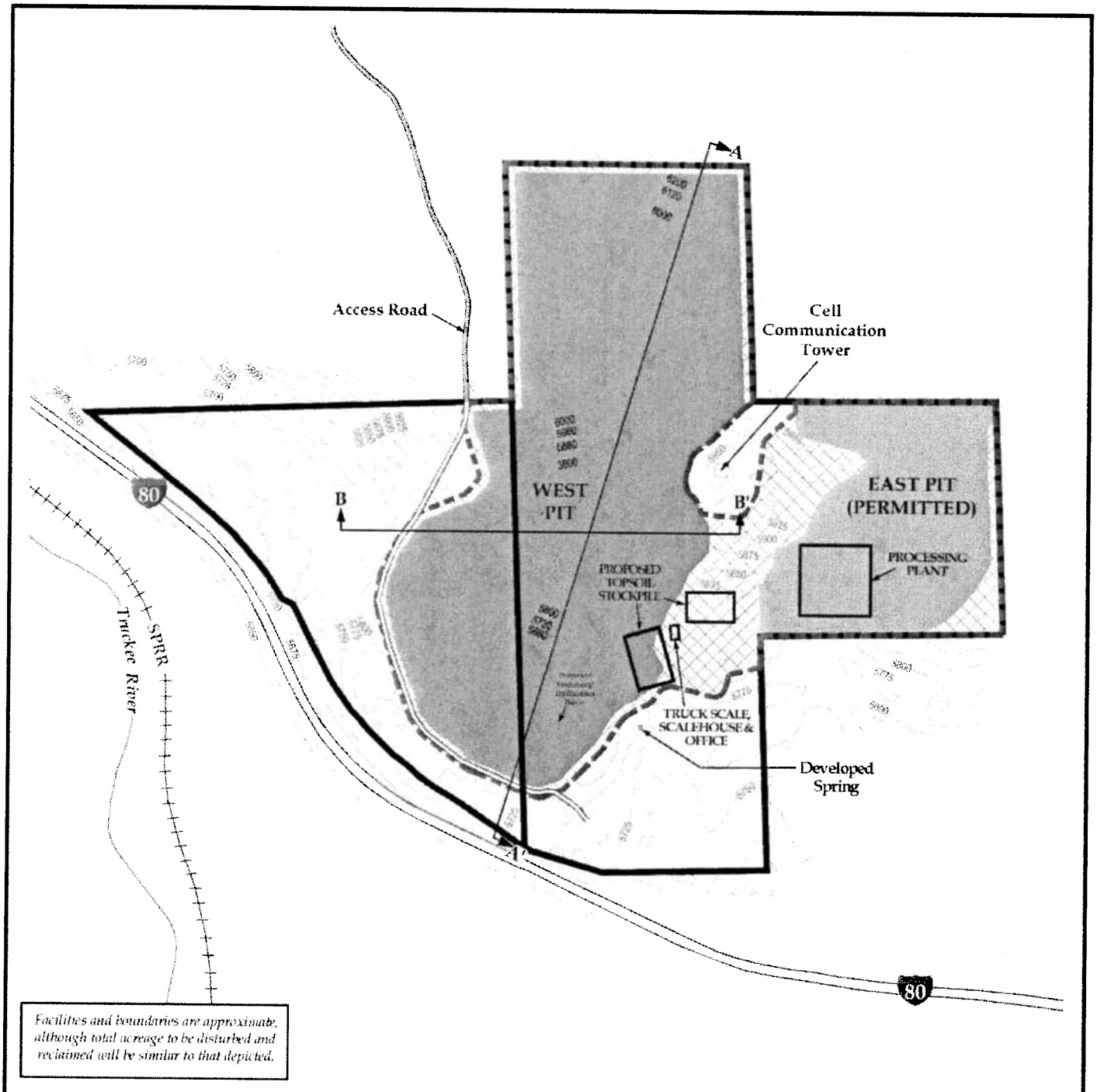

Facilities and boundaries are approximate, although total acreage to be disturbed and reclaimed will be similar to that depicted.

SCALE:
0 400 800 Feet
1 inch = 800 feet

SOURCE:	DATE:
Mine Plan Provided by Teichert Mine Planning Dept.	08/2009
Original Topography Provided by TSI	04/2005
MAP CREATED BY:	**DATE:**
C. Cornejo	07/27/2011

BOCA_WestPit_Fig5MinePlan_201107.dwg

FIGURE 2
MINE PLAN
BOCA QUARRY
TEICHERT AGGREGATES
NEVADA COUNTY, CALIFORNIA

LEGEND:

- Existing Access Road
- Proposed County Access Road (Approx. Location- To Be Built)
- Index Contour
- Parcel Boundary
- Ultimate Disturbed Area
- West Pit Mining Area
- East Pit (Permitted)
- Disturbed Area

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Environmental Setting

Description of Project Area and Existing Noise Environment

The project site is located on the north side of Interstate 80, east of the Town of Truckee, in eastern Nevada County, California. The project site currently contains the Existing Teichert Boca quarry and aggregate processing equipment. The nearest residences to the project site are located approximately 2,000 to 5,000 feet away. There is substantial topographic relief both within the project site and the intervening lands between the project site and nearest existing residences.

The existing ambient noise environment at the nearest residences to the project site is defined primarily by traffic on Interstate 80. To quantify the existing ambient noise environment in the project vicinity, noise level measurements were conducted at the three of the nearest residential areas to the project site on February 8, 2006, with the measurements repeated at one of the locations on June 22, 2007. The noise measurement sites are shown on Figure 3. Weather conditions present during the monitoring program were typical for the season, with no adverse conditions which would have anomalously affected the noise survey results.

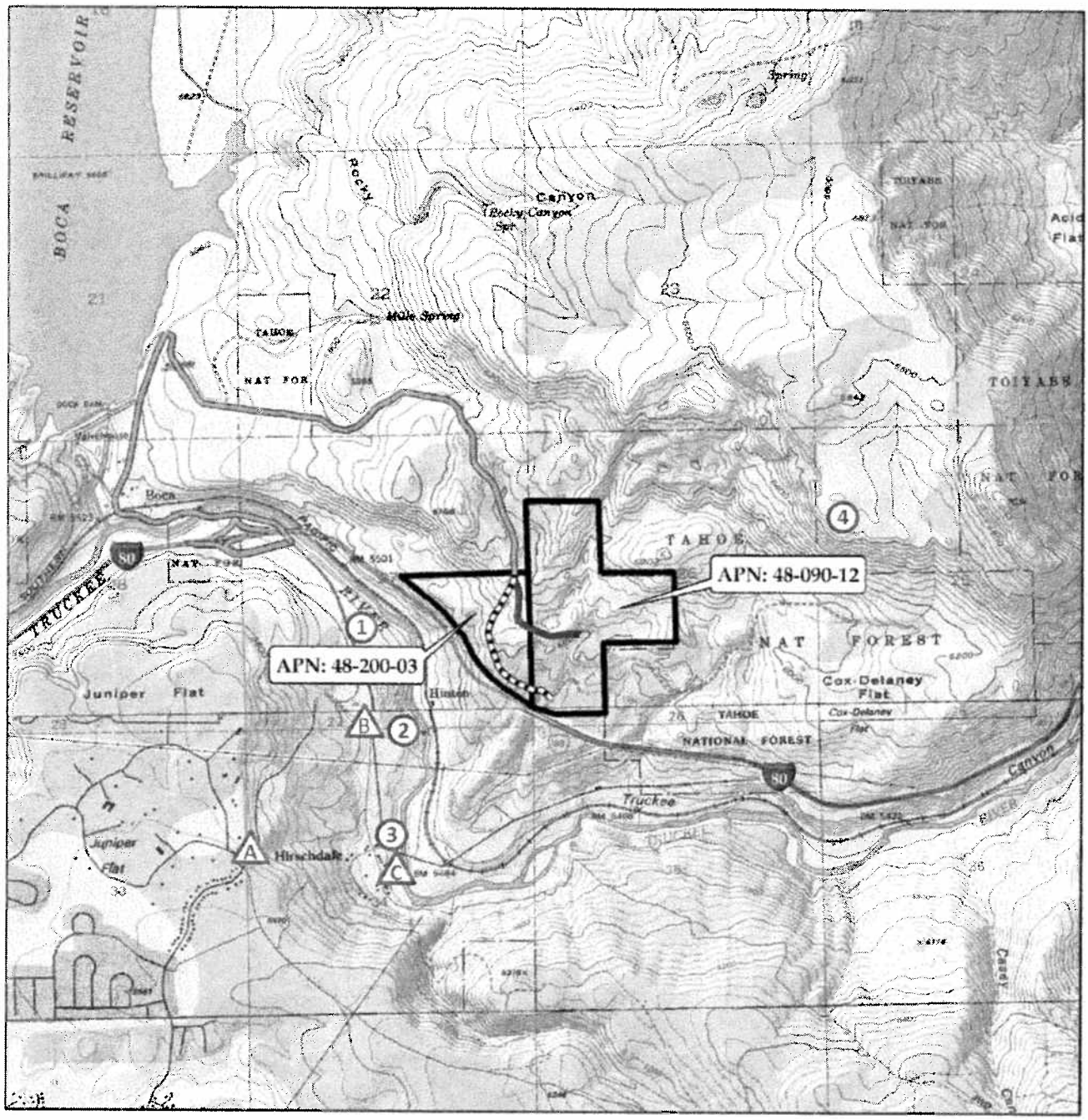
Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the noise level measurement survey. The meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4). The numerical summaries of the ambient noise level measurements are provided in Table 1.

Table 1
Statistical Summary of Ambient Noise Measurement Results
Nearest Residences to Teichert Boca Quarry Expansion Project

Site	Time	Average (Leq)	Maximum (Lmax)
A	1:45 pm	52	63
B	2:05 pm	50	65
C	2:25 pm, 11 am - noon	44, 47-51	54, 72

Source: Bollard Acoustical Consultants, Inc.

Noise measurement locations are identified on Figure 1.



SCALE:
0 0.25 0.5 Miles

SOURCE:
USGS 7.5' Topographic Quads: Boca & Martis Peak

MAP CREATED BY: DATE:
C. Cornejo 07/27/2011
P. Bollard 08/12/2011

FIGURE 3
NOISE RECEPTORS AND MEASUREMENT SITES
BOCA QUARRY
TEICHERT AGGREGATES
NEVADA COUNTY, CALIFORNIA

LEGEND:
- Existing Access Road
- Existing Haul Road
- Proposed County Access Road (Approx. Location- To Be Built)
- Boca Quarry Parcel Boundaries
- (#) : Receptor
- (#) : Noise Survey Site

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Noise Impacts and Mitigation Measures

Standards of Significance

Nevada County Noise Standards

The Nevada County Noise Element establishes criteria for acceptable exterior noise exposures in terms of day, evening and nighttime average and maximum noise levels for various zoning districts. The Nevada County Noise Element standards which are applicable to residential uses are reproduced in Table 2.

Table 2
Exterior Noise Limits
Nevada County Noise Element

Land Use	Time of Day	Average (Leq)	Maximum (Lmax)
Residential	7 a.m. - 7 p.m.	55	75
	7 p.m. - 10 p.m.	50	65
	10 p.m. - 7 a.m.	40	55

Nevada County also has a noise ordinance which provides numeric noise standards for various uses. Because the Noise Ordinance standards are similar to the Noise Element standards, satisfaction with the Table 2 standards would ensure compliance with the Noise Ordinance as well.

California Environmental Quality Act (CEQA) Guidelines

Criteria for determining the significance of noise impacts were developed based on information contained in the California Environmental Quality Act Guidelines (State CEQA Guidelines). According to those guidelines, a project may have a significant effect on the environment if it will satisfy the following conditions:

1. 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.

2. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

3. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Methodology for Quantifying Noise Generated by the Project

According to the project application, the proposed project would expand existing mining into an area just west of current mining activities, but would not result in changes in processing or load out (off-site traffic). In addition, this project does not involve the relocation of the existing crushing and screening facility, nor does it propose an expansion of plant capacity. As a result, no changes in processing or off-site traffic noise emissions are predicted. The only anticipated change in operations associated with this project which could affect the ambient noise environment is the creation of mining areas to the west of existing mining areas.

Crushing and Screening Facility Noise Generation

Bollard Acoustical Consultants file data for similar sized crushing and screening plants indicates that the Teichert Boca facility processing equipment likely generates average and maximum noise levels of 90 and 100 dBA at a reference distance of 50 feet. The predicted noise generation of the crushing /screening plant equipment at the nearest receptors is shown in Table 3. It should be noted that receptor 4 represents a parcel to the northeast of the processing area which does not contain a residence at this time but, due to concerns regarding project noise at a future residence at this location it was included in this analysis.

Table 3
Crushing and Screening Facility Noise Levels at the Nearest Residences
Boca Quarry Project: Nevada County

Receiver	Distance (ft)	Predicted Leq, dB	Predicted Lmax, dB
1	4,000	46	56
2	3,750	47	57
3	5,000	43	53
4	4,000	46	56

Notes:

1. Figure 1 shows locations of the nearest potentially affected receptors.
2. These distances shown are measured in feet from the nearest residences to the processing area.
3. Noise level predictions are based on the reported reference levels (90 dB Leq and 100 dB Lmax at 50 feet) with a 6 dB attenuation rate per each doubling of distance and a 1.5 dB offset per 1000 feet for atmospheric and excess ground attenuation. The predicted noise levels do not include shielding of processing area equipment by intervening topography, which provides further attenuation at the nearest residences.

Excavation Noise Generation

Bollard Acoustical Consultants file data for similar quarry areas indicates that the Teichert Boca facility mining operations likely generates average and maximum noise levels of 80 and 90 dBA at a reference distance of 50 feet. The predicted noise generation of the mining operations at the nearest receptors is shown in Table 4.

Table 4
Predicted Excavation Noise Levels at the Nearest Residences
Boca Quarry Project: Nevada County

Receiver	Distance (ft)	Predicted Leq, dB	Predicted Lmax, dB
1	2,000	45	55
2	2,300	33	53
3	3,500	38	48
4	3,000	40	50

Notes:

1 Figure 1 shows locations of the nearest potentially affected receptors.

2 These distances shown are measured in feet from the nearest residences to the nearest point of the mining expansion area.

3 Noise level predictions are based on the reported reference levels (80 dB Leq and 90 dB Lmax at 50 feet) with a 6 dB attenuation rate per each doubling of distance and a 1.5 dB offset per 1000 feet for atmospheric and excess ground attenuation. The predicted noise levels do not include shielding of processing area equipment by intervening topography, which provides further attenuation at the nearest residences.

Traffic Noise Generation

The proposed project is intended to provide for future aggregate reserves through increased mining area. The project proposes to increase the possible maximum production from 300,000 tons per year to a maximum of 1 million tons per year. According to the project application, daily one-way truck trips are estimated to average 530 with a maximum of 1,432. However, Teichert has constructed a new access road to the project site which will eliminate the requirement that trucks pass through the community of Hirschdale. In addition, there are no sensitive receptors located along the new site access route.

Blasting Noise Generation

In addition to the aforementioned mining and processing noise sources, it will be necessary to conduct blasting to free the aggregate resources for subsequent excavation. Noise sources associated with blasting consist of rock drills and the shot itself. The noise levels generated by the rock drills are dependant on drill type, but are predicted to be generally similar to the noise levels generated by excavation equipment, and are included in the levels described in the previous section pertaining to mining noise sources.

Noise generated by aggregate shots are more variable, depending on the amount of charge-material used, the number of holes and the depth of those holes, timing delays, and other factors. There tends to be misconceptions regarding what an aggregate blast looks and sounds like, due in part to the types of explosions which are frequently seen in movies. In reality, aggregate shots are designed to transfer the energy of the shot into the ground, rather than have it vent into the atmosphere.

Based on Bollard Acoustical Consultants, Inc. observations of various aggregate shots in recent years, it is our opinion that aggregate shots are characteristic of muffled thunder. Using noise level data collected during those blasts, blasting levels at the nearest residences are predicted to be less than 60 dB Lmax due to the considerable distances between the blasting areas and nearest residences.

Specific Impact and Mitigation Statements

Impact 1: Excavation Noise

Noise generated by excavation equipment at the proposed expansion area is predicted to satisfy Nevada County Noise Level standards at the two nearest residences during daytime, evening, and nighttime hours. In addition, comparison of projected mining-related noise levels to measured ambient noise levels indicated that the expansion of the mining activities would not result in a significant increase in ambient noise levels. Therefore, **this is considered a less than significant noise impact**.

Mitigation Measures: None Required

Impact 2: Processing Equipment Noise

Table 1 indicates that noise generated by the existing processing equipment is predicted to be below both the daytime and evening noise level standards of Nevada County at the nearest existing residences. However, Table 1 indicates that the County's 45 dB Leq standard could be exceeded at receivers 1 and 2 during nighttime processing operations. Given the additional shielding by intervening topography and vegetation, it is unlikely that nighttime operations would exceed 45 dB Leq at any of the nearest receptors. Nonetheless, until site-specific noise monitoring is conducted during nighttime conditions to demonstrate compliance with the nighttime standard, **this impact would be considered potentially significant.**

Mitigation Measures:

MM2: Aggregate processing operations should be limited to the hours of 7 am to 10 pm unless it can be demonstrated through site-specific monitoring of the processing equipment during nighttime conditions that the County's 45 dB Leq standard can be satisfied at all of the nearest receptors.

Significance after Mitigation: ***Less than Significant***

Impact 3: Off-Site Truck Traffic Noise

Because there are no sensitive receptors located along the project access road, no exceedance of the County's noise standards would result. Therefore, **this impact is considered less than significant.**

Mitigation Measures: None Required

Impact 4: Blasting Noise

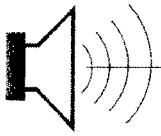
Maximum noise levels associated with blasting are predicted to be 60 dB Lmax or less at the nearest residences. Noise levels of this magnitude would be well within compliance with the daytime and evening noise standards, but could exceed the nighttime noise level standards. Because blasting activities are proposed during daytime hours, **this is considered a less than significant noise impact.**

Mitigation Measures: None Required

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.



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