MOODY FLATS QUARRY PROJECT
NOISE

DECEMBER | 2009

REVISED FEBRUARY 2011

Lead Agency
Shasta County, Department of Resource Management – Planning Division

Applicant/Operator
Moody Flats Quarry, LLC

BENCHMARK RESOURCES

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NOISE

This analysis evaluates potential impacts of the Moody Flats Quarry (Project) on ambient noise levels. An Environmental Noise Assessment was performed to assess the Project's impacts to the surrounding environment including an analysis of the Project's impacts to receptors near the site from noise generated by mining of the North and South pit, primary processing plant, secondary and ancillary processing and load-out area, rail siding/spur, and anticipated haul route. This analysis assesses the Project's compliance with applicable Shasta County (County) noise level standards, increases in ambient noise, traffic noise, and recommends feasible mitigation, as necessary, to ensure compliance with those standards as well as compliance with the standards set forth in the CEQA guidelines. A copy of the Environmental Noise Assessment is included as Appendix M to this analysis.

1.0 METHODOLOGY AND TERMINOLOGY

1.1 Terminology

1.1.1 Noise

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).

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 applied 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. Table 1, Typical Sound Levels Measured in the Environment and Industry 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 1 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 (see Table 1).

TABLE 1
TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Civil Defense Siren (100 ft)	140	–	–
Next to a Jet Engine	130	–	Limits Amplified Speech
Jet Takeoff (200 ft.)	120	–	Pain Threshold
Acceleration of Motorcycle at a few feet	110	Rock Music Concert	–
Pile Driver (50 ft)	100	–	Very Loud
Ambulance Siren (100 ft) Freight Cars (50 ft)	90	Boiler Room; Food Blender; or Printing Press Plant	Hearing Loss
Pneumatic Drill (50 ft)	80	In Kitchen with Garbage Disposal Running; or Very Noisy Restaurant	Complaints Likely
Freeway (100 ft)	70	–	Moderately Loud Complaints Possible
Vacuum Cleaner (10 ft)	60	Data Processing Center	–
Department Store	60	Normal Conversation	–
Light Traffic (100 ft)	50	Private Business Office; or Dishwasher in Next Room	Acceptable Noise
Large Transformer (200 ft)	40	Quiet Urban Area at Nighttime	Quiet
Soft Whisper (5 ft)	30	Quiet Bedroom	Very Quiet
	20	Recording Studio; or Rural Area at Nighttime	–
	10	–	Hearing Threshold

Source: U.S. EPA 1974 and compilation of data from a number of private and governmental agency sources.

1.1.2 Vibration

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, while vibration is usually associated with transmission through a structure. As with noise, vibration consists of an amplitude and

frequency. A person's response to vibration will depend on their individual sensitivity as well as the amplitude and frequency of the source.

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities (inches/second). Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity.

1.2 Methodology

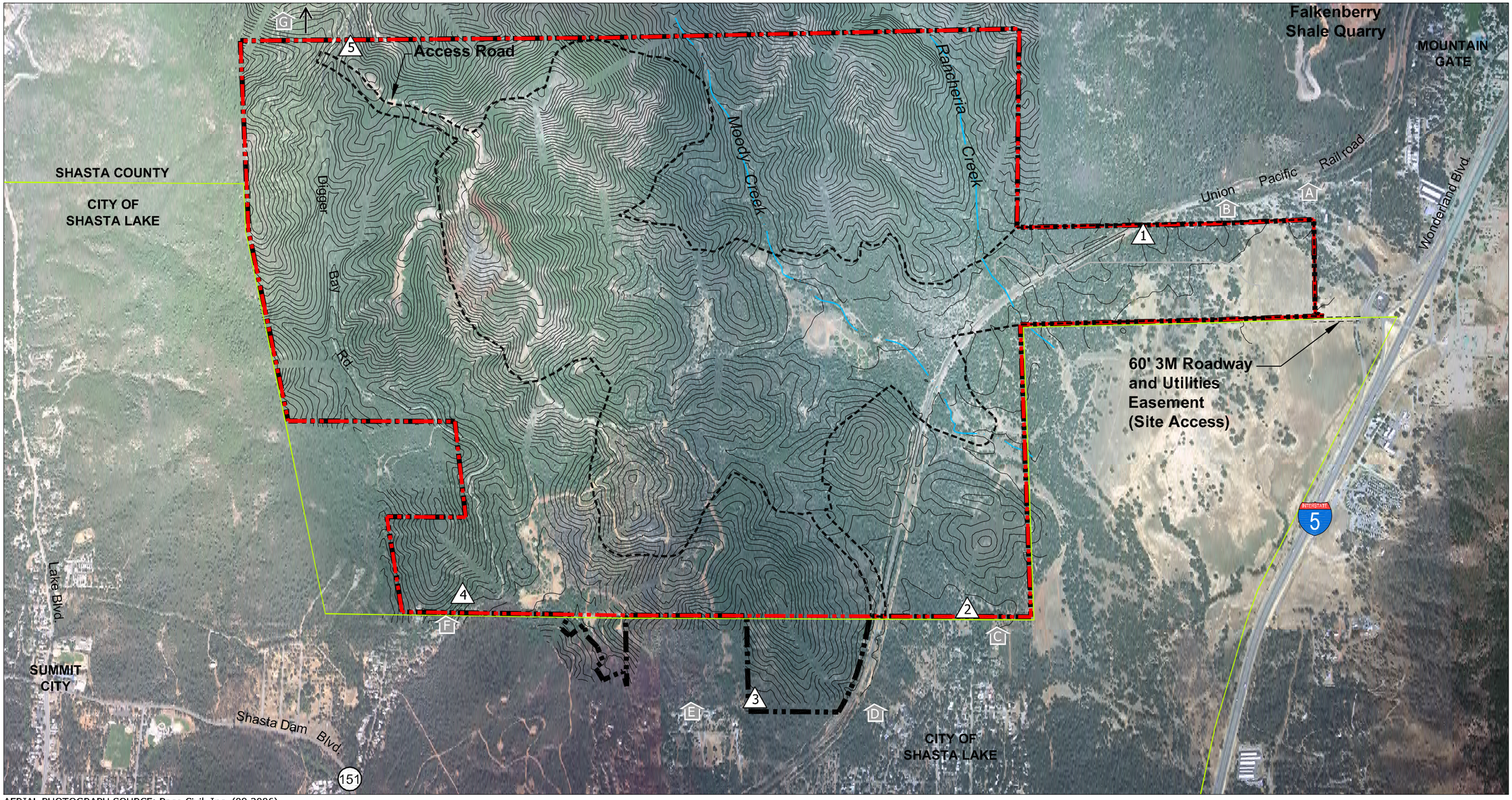
1.2.1 Ambient Noise Measurements

A combination of noise measurements, existing literature review, noise estimates, and application of accepted noise prediction and sound propagation algorithms were used to predict changes in noise levels resulting from the construction and operation of the Project.

To quantify the ambient noise environment in the area of the Project at representative receptors, continuous ambient noise level measurements were conducted at five locations, as shown on NOISE-Figure 1, Receptor and Noise Measurement Locations. Ambient noise level measurements were performed on October 28-29, 2009. The noise measurement sites are described in Table 2, Description of Ambient Noise Measurement Locations.

TABLE 2
DESCRIPTION OF AMBIENT NOISE MEASUREMENT LOCATIONS

Measurement Site	Represented Receiver(s)	Description of Location	Measurement Dates
1	A, B	Northeastern portion of property near Union Pacific rail line	October 28-29, 2009
2	C	Southeastern portion of property	October 28-29, 2009
3	D, E	Southern portion of property	October 28-29, 2009
4	F	Southwestern portion of property	October 28-29, 2009
5	G	Northwestern portion of property	October 28-29, 2009



AERIAL PHOTOGRAPH SOURCE: Pace Civil, Inc. (08-2006)

N

0 1/4 mile

SCALE: 1" = 1/4 mile

1 Noise Monitoring Locations

Noise Receptors
* Receptor G: Digger Bay Marina
Approximately 1 mile North of the Project Site

Property Ownership ± 1900 acres

Site Boundary ± 1810 acres

Limits of Surface Disturbance

City of Shasta Lake Boundary

Receptor and Noise Measurement Locations

MOODY FLATS QUARRY

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NOISE - Figure 1

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used to complete the ambient noise level measurement 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 (Precision) sound measurement equipment (ANSI S1.4).

1.2.2 Traffic Noise Analysis

To describe existing noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The Model is based on the Calveno reference noise factors for automobiles, medium trucks, and heavy trucks – with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the area. The Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. The day/night distribution of traffic is factored into the Model calculations to assess noise exposure in terms of L_{dn}.

Traffic volumes for existing conditions were provided by Caltrans. The extent to which existing land uses located along the roadways are affected by existing traffic noise depends on their proximity to the roads and their individual sensitivity to noise.

1.2.3 Railroad Noise

To assess the existing and projected future railroad noise environment at the Project site, a combination of noise level measurements, existing railroad noise level data for this area, and accepted railroad noise-prediction algorithms were utilized.

Based upon previous discussions with the Union Pacific Railroad (UPRR) officials and file data, operations on this line consist of approximately 15 trains per day, randomly distributed throughout the day and nighttime hours. To relate railroad noise level and operational information to Day/Night Average noise levels (L_{dn}), the following formula is used:

L_{dn} = SEL + 10 log N_{eq} - 49.4, dB, where:

Sound Exposure Level (SEL) is the mean SEL of the event, N_{eq} is the sum of the number of daytime events (7 a.m. – 10 p.m.) per day, plus 10 times the number of nighttime events (10 p.m. - 7 a.m.) per day, and 49.4 is 10 times the logarithm of the number of seconds per day.

1.2.4 Ambient Vibration Environment

To quantify the existing ambient vibration environment in the immediate Project vicinity, short-term ambient vibration measurements were conducted at the same five locations where ambient noise measurements were conducted, as shown on NOISE-Figure 1, using a Larson Davis Laboratories Model HVM vibration meter and a PCB Piezotronics Model 356B08 vibration transducer.

2.0 EXISTING CONDITIONS

The existing ambient noise environment in the immediate Project vicinity is defined by local railroad activity, Interstate 5 traffic, and natural sounds (wind, birds, insects, etc.). Numerical summaries of daytime and nighttime ambient noise level measurements are provided in Table 3, Ambient Noise Level Measurements. This data is used to establish appropriate noise exposure standards for specific Project noise sources.

TABLE 3
AMBIENT NOISE LEVEL MEASUREMENTS

Measurement Site	Average Measured Noise Level, dB (Range)				
	L_{dn}	L_{max} (Range)	L_{eq} (Range)	L_{50} (Range)	L_{90} (Range)
DAYTIME (7:00 A.M. – 10:00 P.M.)					
1	64	72 (48-91)	63 (37-70)	40 (33-46)	37 (31-43)
2	47	58 (50-65)	42 (37-46)	39 (35-42)	36 (33-40)
3	44	57 (42-80)	43 (31-52)	31 (28-37)	28 (25-30)
4	41	59 (53-74)	41 (31-50)	32 (27-38)	28 (24-35)
5	64	68 (41-83)	55 (26-61)	37 (23-58)	29 (21-53)
NIGHTTIME (10:00 P.M. – 7:00 A.M.)					
1	64	60 (50-86)	55 (39-63)	39 (38-43)	35 (34-38)
2	47	52 (45-63)	40 (36-46)	37 (35-38)	33 (31-36)
3	44	42 (33-62)	35 (24-43)	25 (23-31)	23 (21-27)
4	41	49 (38-53)	31 (26-33)	29 (25-33)	26 (23-31)
5	64	64 (40-81)	58 (25-64)	40 (24-59)	28 (22-53)

Source: Bollard Acoustical Consultants, Inc.
Notes:
1. See NOISE-Figure 1 for ambient noise measurement locations.
2. L_{dn} values shown represent 24-hour weighted averages, so the levels shown for both daytime and nighttime periods are similar but not intended to imply that L_{dn} is computed separately for daytime and nighttime periods.

Table 3 indicates that baseline ambient noise levels present during the ambient noise measurement period were fairly low at Sites 2-4, and elevated at Sites 1 and 5. At Site 1, the elevated average (L_{eq}) and maximum (L_{max}) noise readings were due to the passage of several trains near the monitoring station. At Site 5, the elevated measured average (L_{eq}) and maximum (L_{max}) noise levels are believed to have been affected both by nearby traffic on Digger Bay Road and unidentified sources near the microphone. At Sites 2-4, the remote location of the monitors at positions somewhat removed from significant sources of noise led to the lower ambient conditions.

2.1 Existing Traffic Environment

Table 4, Existing Traffic Noise, shows the predicted existing traffic noise levels in terms of L_{dn} at a reference distance of 100 feet from the centerlines of the primary Project-area roadways. This is considered to be the baseline condition.

TABLE 4
EXISTING TRAFFIC NOISE

Roadway	Segment	L_{dn} (dB at 100 Feet)	60 dB L_{dn} Contour (Feet)
Interstate 5	North of Old Oregon Trail	76	1,103
Interstate 5	Old Oregon Trail to State Route 151	76	1,131
Interstate 5	State Route 151 to State Route 273	75	1,061
Interstate 5	State Route 273 to State Route 299	77	1,261
Interstate 5	State Route 299 to State Route 44	77	1,360
Interstate 5	South of State Route 44	79	1,720
State Route 151	West of Interstate 5	66	271
State Route 273	South of Interstate 5	66	265
State Route 299	East of Interstate 5	70	472
State Route 44	East of Interstate 5	74	814

Source: Caltrans Traffic Volumes (AADT) and Bollard Acoustical Consultants, Inc.

2.2 Existing Railroad Noise Environment

Based on a combination of historical data and normalized reference noise level data collected at noise measurement Sites 1 and 3 (see NOISE-Figure 1), the mean SEL for trains passing the Project area was assessed to be approximately 100 dB SEL at a distance of 100 feet from the railroad tracks, with a maximum noise level of approximately 95 dB L_{max} at that 100-foot reference distance. The results of this analysis indicate that existing L_{dn} value at an unshielded location 100 feet from the tracks

computes to 69 dB L_{dn}. As noted previously, the computed L_{max} at that 100-foot distance would be approximately 95 dB during the loudest portion of the train passage.

2.3 Ambient Vibration Environment

The existing ambient vibration environment in the immediate Project vicinity is extremely low, as would be expected in a rural area with no appreciable sources of local vibration other than very near the railroad tracks during brief train passages. Because there were no identified sources of existing vibration present during the vibration monitoring, measured vibration levels were well below the threshold of perception. Specifically, peak particle velocities representing the sum of all peak vibration levels along the x, y, and z axes were measured to range from 0.005 to 0.013 inches per second.

3.0 REGULATORY SETTING

3.1 Shasta County General Plan

The County, through their General Plan, adopted policies and regulations concerning the generation and control of noise that could adversely affect its citizens and noise-sensitive land uses. The Noise Element of the General Plan contains planning guidelines relating to noise and identifies goals and policies to support achievement of those goals. Noise element guidelines relate primarily to land use compatibility with noise sources that are regulated at the local level, such as traffic, aircraft, and trains. The County's General Plan noise policies applicable to this Project are summarized below:

N-1: To protect County residents from the harmful and annoying effects of exposure to excessive noise.

N-2: To protect the economic base of the County by preventing incompatible land uses from encroaching upon existing or programmed land uses likely to create significant noise impacts.

N-3: To encourage the application of state-of-the-art land use planning methodologies in the area of managing and minimizing potential noise conflicts.

N-b: Noise likely to be created by a proposed non-transportation land use shall be mitigated so as not to exceed the noise level standards of Table N–IV as measured immediately within the property line of adjacent lands designated as noise-sensitive. Noise generated from existing or proposed agricultural operations conducted in accordance with generally accepted agricultural industry standards and practices is not required to be mitigated.

N-c: Where proposed non-residential land uses are likely to produce noise levels exceeding the performance standards of Table N–IV upon existing or planned noise-sensitive uses, an acoustical analysis shall be required as part of the environmental review process so that

appropriate noise mitigation may be included in the project design. The requirements for the content of an acoustical analysis are given by Table N-V.

N-d: The feasibility of proposed projects with respect to existing and future transportation noise levels shall be evaluated by comparison to Figure N-1 and Table N–VI.

N-f: Noise created by new transportation sources shall be mitigated to satisfy the levels specified in Table N–VI at outdoor activity areas and/or interior spaces of existing noise-sensitive land uses. Transportation noise shall be compared with existing and projected noise levels shown in Tables N-I and N-II.

N-g: Existing noise-sensitive uses may be exposed to increased noise levels due to future roadway improvement projects as a result of increased traffic capacity and volumes and increases in travel speeds. In these instances, it may not be practical to reduce increased traffic noise levels consistent with those contained in Table N-VI. Therefore, as an alternative, the following criteria may be used as a test of significance for increases in the ambient outdoor activity areas of the noise level of noise-sensitive uses created as a result of a new roadway improvement project:

- Where existing traffic noise levels are less than 60 dB L_{dn}, a +5 dB L_{dn} increase will be considered significant; and
- Where existing traffic noise levels range between 60 and 65 dB L_{dn}, a +3 dB L_{dn} increase will be considered significant; and
- Where existing traffic noise levels are greater than 65 dB L_{dn}, a + 1.5 dB L_{dn} increase will be considered significant.

N-i: Where noise mitigation measures are required to achieve the standards of Tables N-IV and N-VI, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered a means of achieving compliance with the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project.

N-l: The use of site planning and building materials/design as primary methods of noise attenuation is encouraged. Recommended techniques include, but are not limited to, such items as:

Site Planning

- Use of building setbacks and dedication of noise easements to increase the distance between the noise source and the receiver.
- Locating uses and orienting buildings that are compatible with higher noise levels adjacent to noise-generators or in clusters as a means to shield more noise-sensitive areas and uses.
- Using noise-tolerant structures, such as garages or carports, to shield noise-sensitive areas.
- Clustering office, commercial, or multiple-family residential structures to reduce interior open-space noise levels.
- Locate automobile and truck access to commercial or industrial land uses abutting residential parcels at the maximum practical distance from the residential parcels.

- Avoid the siting of commercial and industrial loading and shipping facilities adjacent to residential parcels whenever practicable.
- Parking areas for commercial and industrial uses should be set back from adjacent residential uses to the maximum extent feasible, or buffered and shielded by walls, fences, berms, and/or landscaping techniques.

Building Materials/Design

- Using dense building materials and tight-fitting doors.
- Employing multi-glazed and multi-pane windows.
- Placing unopenable windows on the side of the structure facing a major roadway and entry
- Doors on the side of the building facing away from the major roadway.
- Avoiding placing balconies and patio areas facing major transportation routes.

3.2 Ambient Noise Level Increases

The Federal Interagency Commission on Noise (FICON) has developed a graduated scale for use in the assessment of Project-related noise level increases. Table 5, Significance of Changes in Cumulative Noise Exposure, was developed by FICON as a means of developing thresholds for impact identification for project-related noise level increases. The rationale for the graduated scale is that test subject's reactions to increases in noise levels varied depending on the starting level of the noise. Specifically, with lower ambient noise environments, such as those below 60 dB L_{dn}, a larger increase in noise levels was required to achieve a negative reaction than was necessary in more elevated noise environments.

TABLE 5
SIGNIFICANCE OF CHANGES IN CUMULATIVE NOISE EXPOSURE

Ambient Noise Level (No Project) dB L_{dn}	Increase Required for Finding of Significance, dB
<60	+5 or more
60-65	+3 or more
>65	+1.5 or more

Source: Federal Interagency Committee on Noise (FICON)

Based on the FICON research, a 5 dB increase in noise levels due to a project is required for a finding of significant noise impact where ambient noise levels without the project are less than 60 dB L_{dn}. Where pre-project ambient conditions are between 60 and 65 dB L_{dn}, a 3 dB increase is applied as the standard of significance. Finally, in areas already

exposed to higher noise levels – specifically pre-project noise levels in excess of 65 dB L_{dn} – a 1.5 dB increase is considered by FICON as the threshold of significance.

While CEQA requires that noise impacts be assessed relative to ambient noise levels which are present without the project, 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 unacceptable according to CEQA. Because every physical process creates noise, whether by the addition of a single vehicle on a roadway, or a tractor in an agricultural field, the use of audibility alone as a significance criterion would be unworkable. CEQA requires a substantial increase in noise levels before noise impacts are identified, not simply an audible change.

3.3 Ambient Vibration Level Increases

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 6, General Human and Structural Responses to Vibration Levels, indicates that the threshold for damage to structures ranges from 2 to 6 inches per second (in/sec) peak particle velocity (ppv). One-half this minimum threshold, or 1 in/sec ppv, is considered a criterion that would protect against significant architectural or structural damage. The general threshold at which human annoyance could occur is noted as one-tenth of that level, or 0.1 in/sec ppv.

TABLE 6
GENERAL HUMAN AND STRUCTURAL RESPONSES TO VIBRATION LEVELS

Effects on Structures and People	Peak Vibration Threshold (in./sec. ppv)
Structural damage to commercial structures	6
Structural damage to residential structures	2
Architectural damage to structures (cracking, etc.)	1
General threshold of human annoyance	0.1
General threshold of human perception	0.01

Sources:
Survey of Earth-borne Vibrations due to Highway Construction and Highway Traffic, Caltrans, 1976

4.0 THRESHOLDS OF SIGNIFICANCE

A project is considered to have a significant impact if it would result 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;
- Exposure of persons to or generation of excessive groundborne vibrations or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

5.0 ENVIRONMENTAL IMPACTS, MITIGATION MEASURES, AND SIGNIFICANCE DETERMINATIONS

Impact NOISE-1: Mining and Processing Operations Could Exceed Shasta County General Plan Noise Element Standards

Project Noise Sources

The major noise sources identified for this Project are the aggregate removal operations (including blasting), primary processing plant, secondary and ancillary processing and load-out operations (including the asphalt batch plant, ready mix plant, and recycle materials plant), mobile equipment operation, and off-site transport of saleable material. Operations at the Quarry will use conventional mining practices common in the industry. Prior to aggregate removal, vegetation will be removed in the immediate working areas, topsoil and overburden will be removed and stockpiled. Mineral reserves will be removed through a combination of drilling and blasting and use of heavy-duty excavating equipment. All blasting will occur during daylight hours on regular business days only (not weekends or federal holidays). Loaders or similar excavating equipment will complete the process of removing the aggregate for processing after blasting. Blasted rock will be loaded onto haul trucks and transported to the primary processing plant.

After primary processing within the active quarry or primary processing plant area adjacent to the south pit, raw aggregate would be conveyed via an overland conveyor to a surge pile in the secondary and ancillary processing and load out area. The aggregate would be processed in cycles (i.e., secondary and tertiary crushing and screening) until the various sizes and grades were attained. After processing, aggregate may be shipped directly to customers via truck, loaded in railcars, stockpiled, or converted to Portland Cement Concrete or asphalt at the on-site batch plants.

Typical Quarry operating hours would be from 6:00 a.m. to 10:00 p.m. (16 hours per day), Monday through Friday, and 6:00 a.m. to 3:00 p.m. on Saturdays. Processing, loadout, and hauling of aggregate material off-site and loading of rail cars will occur up to 24 hours a day, 7 days a week. To accommodate CalTrans and other public agency projects, the Asphalt Batch and Ready-Mix Plants could also operate and load out material 24 hours a day, 7 days a week.

Table 7, Reference Noise Level Data and Predicted Noise Contours, shows the reference noise levels corresponding to the operation of the proposed equipment that would be used at the Project site. Table 7 also shows the approximate distances to the 55 and 50 dB L_{eq} noise contours for each on-site noise source without correction for shielding by intervening topography which exists between most of the Project area noise sources and receptors (discussed in detail below). As a result, the contour distances should be considered worst-case.

Receptor Distances

The Project site is located in the western portion of the County, encompassing approximately 1,900 acres. Surface disturbance totals would result from development of the North and South Pits, primary processing plant, secondary and ancillary processing and load out area, and rail spur. The closest receptors to surface disturbance activities are located to the northeast, southeast, and southwest. Table 8, Distances from On-Site Noise Sources to Nearest Receptors, provides the distances to these receptors from each of the major Project facilities.

TABLE 7
REFERENCE NOISE LEVEL DATA AND PREDICTED NOISE CONTOURS

Noise Source	Reference Noise Level at 100 Feet[1] L_{eq}, dB	Distance to Unmitigated/ Unshielded Noise Contours (Feet[2])	
		55 dB L_{eq} (Day)	*50 dB L_{eq} (Night*
Excavation	80	1,400	2,200
Jaw Crushing	85	2,200	3,200
Processing (Rock) Plant	85	2,200	3,200
Hot-Mix Asphalt Plant	80	1,400	2,200
Ready-Mix Concrete Plant	75	850	1,400
Recycle Plant	78	1,150	1,800
Rail Car Loading	80	1,400	2,200
Load-Out (Rock Plant)	70	500	850

Notes:

[1] Average noise levels represent any 1-hour period and assume continuous operation of the noise sources.

[2] The locations of the noise contours were computed from the reference levels assuming standard spherical spreading loss (-6 dB per doubling of distance) and a 1.5 dB reduction per 1,000 feet for atmospheric absorption and ground attenuation. The distances to noise contours shown in this table *do not* include corrections for shielding of these noise sources by existing topography.

TABLE 8
DISTANCES FROM ON-SITE NOISE SOURCES TO NEAREST RECEPTORS

Receiver	Source to Receiver Distance (Feet)			
	Excavation	*Jaw Crushing*	*Plant Operations*	*Rail Operations*
1	9,300	7,600	5,900	4,900
2	8,400	6,600	4,800	3,900
3	4,500	3,600	4,100	4,000
4	4,200	3,800	5,000	5,200
5	2,900	3,800	5,500	6,200
6	1,900	4,200	6,000	6,900
7	5,500	11,000	11,000	11,700

Notes:

1. The distances to the nearest noise-sensitive uses were obtained from USGS mapping and the locations of Project noise sources and identified representative sensitive receptors.
2. Plant Operations includes the processing plant, asphalt plant, ready-mix plant, and recycle plant
3. Rail Operations includes rail car loading and rail engine idle
4. The closest excavation locations were assumed to be at the mining border closest to the affected receiver.

Topographic Shielding Between On-Site Noise Sources and Nearest Residences

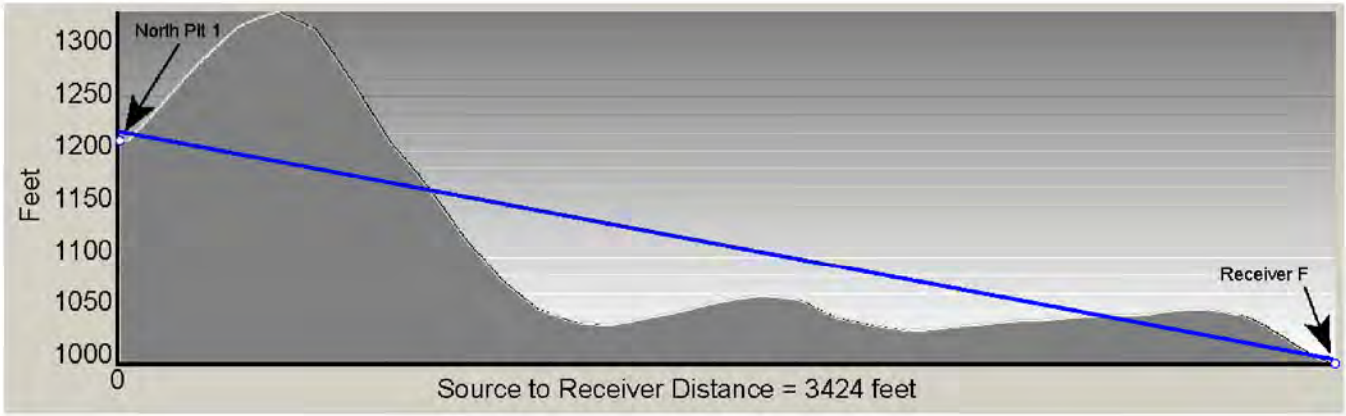
There is considerable topographic relief within the Project site and surrounding areas. At locations where existing topography would intercept line of sight between Project noise sources and nearby residences, a noise reduction of at least 5 dB would result. This 5 dB offset was applied to this analysis where applicable. At locations where this relief would go substantially beyond simply intercepting line of sight between the noise source and receptors, this analysis conservatively assumed a 10 dB reduction in Project noise levels. To identify the extent by which intervening topography would provide shielding of Project noise sources at nearby residences, the Terrain Navigator computer program was utilized. That program produces line of sight drawings between sources and receptors using USGS topographic maps, and allows for increasing the height above ground of both the noise source and receptor, which was performed for this analysis as appropriate for each source type. NOISE-Figures 2a through 2c, Line of Sight from Noise Sources to Receivers, show representative Terrain Navigator cross-sections for this Project.

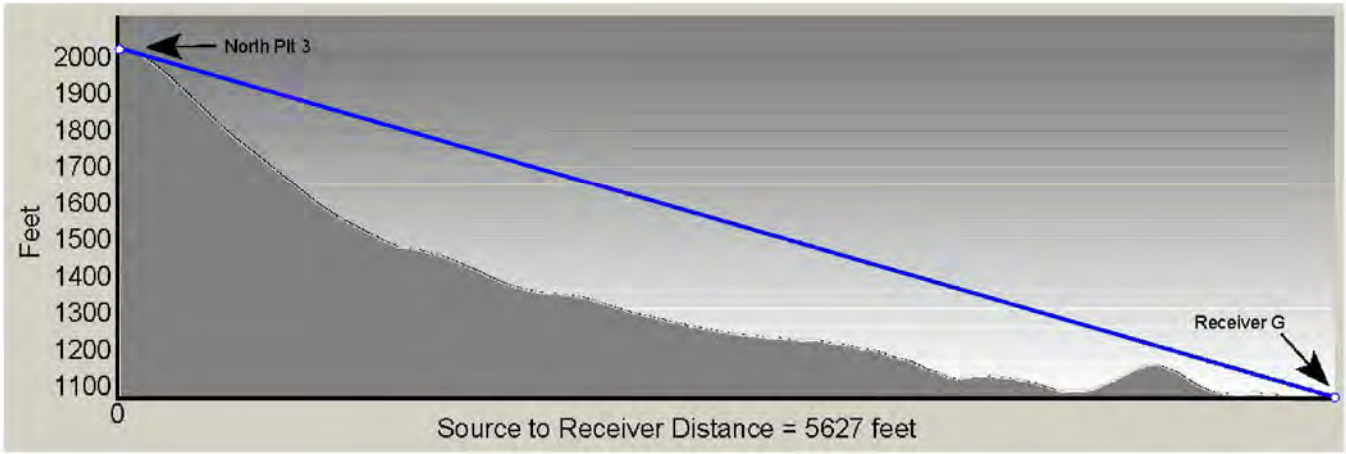
Noise from On-Site Project Noise Sources at Nearest Receptors

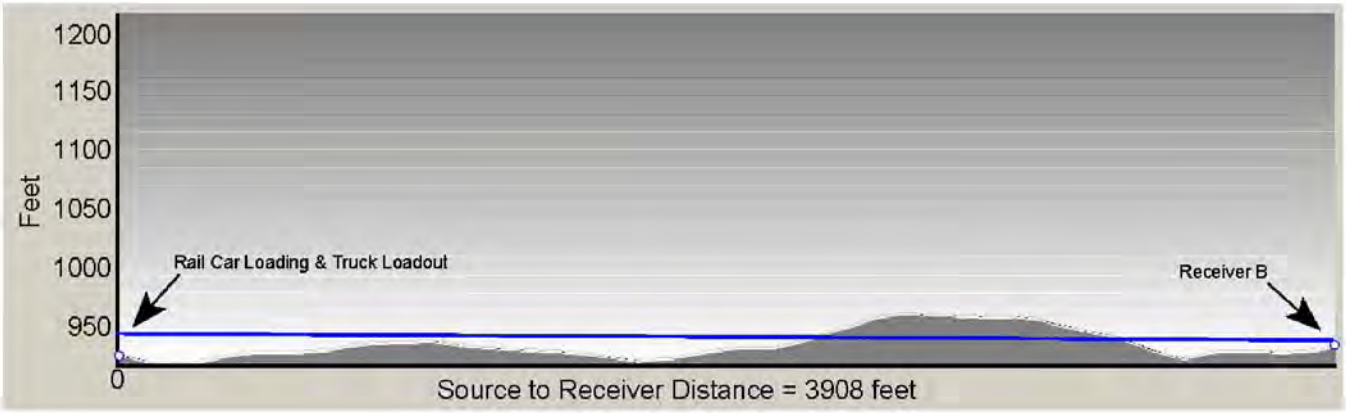
To estimate Project-generated noise levels at each of the representative receptor locations surrounding the Project site, the SoundPlan model was utilized. SoundPlan is a three-dimensional noise prediction model capable of accounting for variations in noise sources, receiver locations, intervening ground topography, ground absorption, intervening structures, vegetation, and atmospheric conditions.

Table 9, Predicted Noise Levels at Nearest Existing Receptors, summarizes the SoundPlan-predicted noise exposure from on-site noise sources at the nearest identified noise-sensitive receivers, including the effects of intervening topography. Table 9 also compares the predicted noise levels against the daytime and nighttime noise level standards of the County. The bolded values in Table 9 indicate levels which could exceed the County noise standards.

The Table 9 data indicates that the County noise standards would be satisfied for the majority of nearby residences. However, noise generated by excavation and cumulative operations could exceed the County nighttime noise standard at receptor F by 3 dB. The County nighttime noise standard is 50 dB, and the Project's contribution to noise could result in both excavation and cumulative





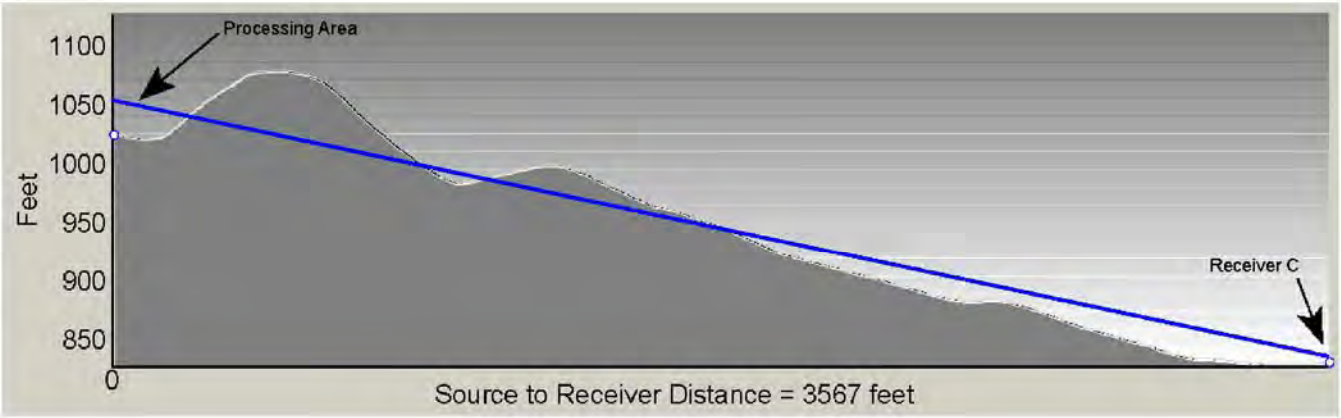


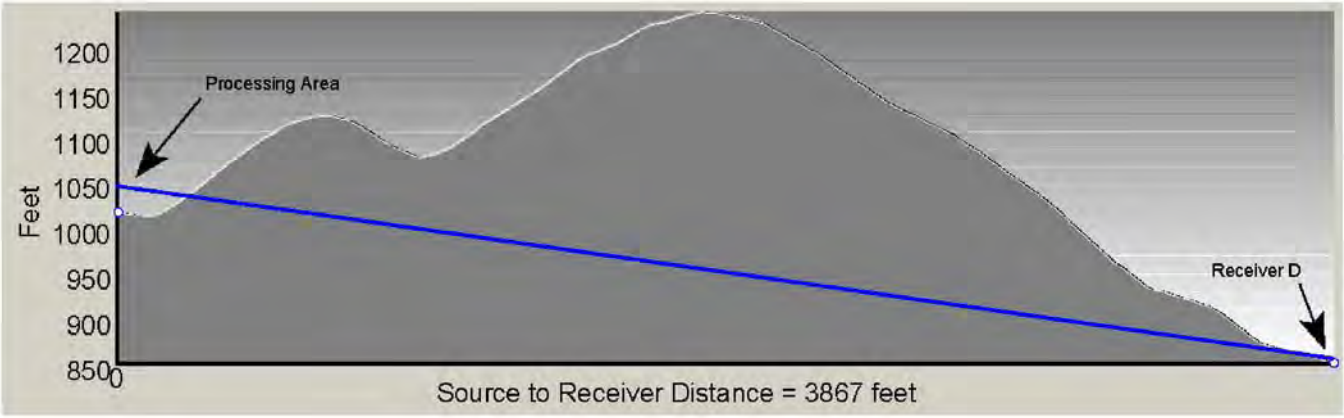
Line of Sight from Noise Sources to Recievers

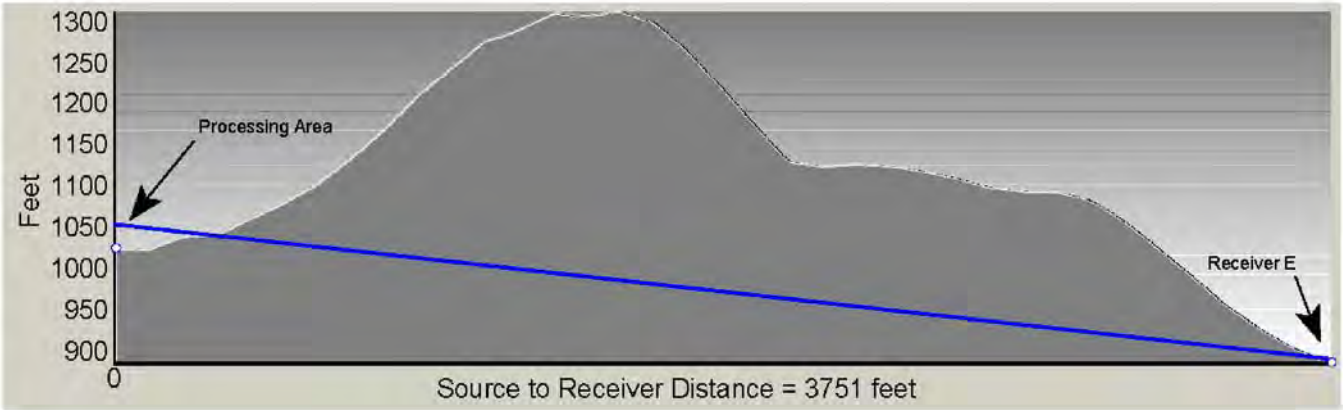
MOODY FLATS QUARRY

BENCHMARK RESOURCES

NOISE - Figure 2a





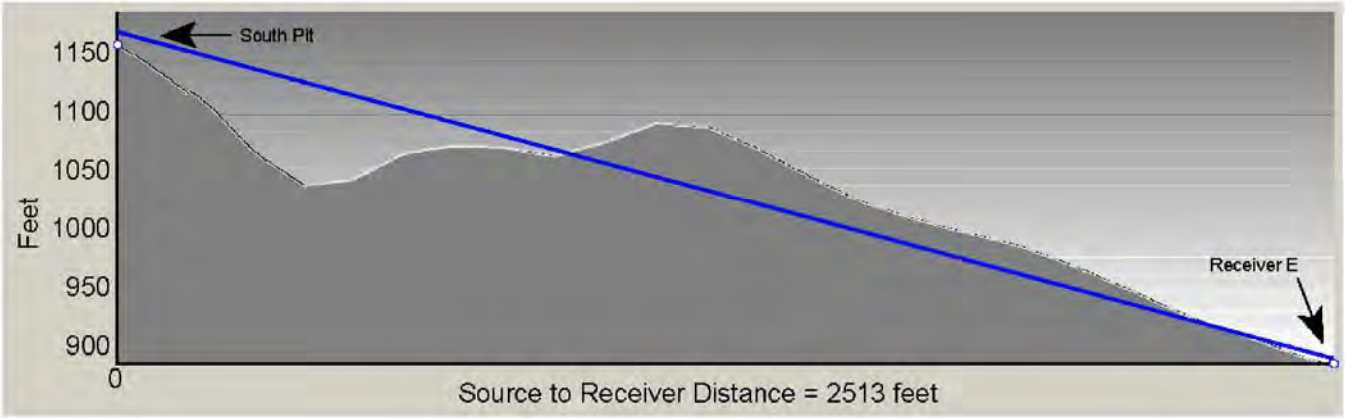


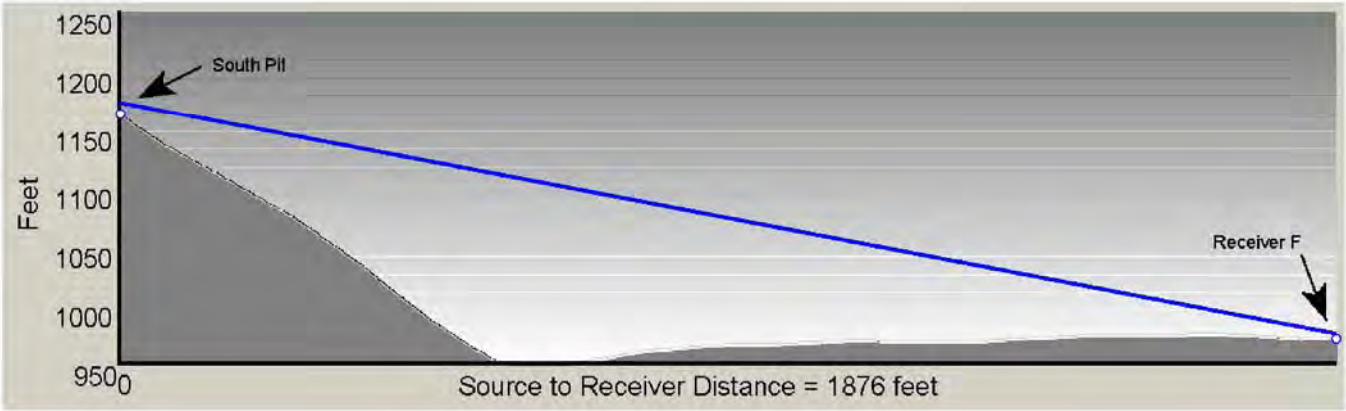
Line of Sight from Noise Sources to Recievers

MOODY FLATS QUARRY

BENCHMARK RESOURCES

NOISE - Figure 2b





Line of Sight from Noise Sources to Recievers

MOODY FLATS QUARRY

BENCHMARK RESOURCES

NOISE - Figure 2c

noise levels of 53 dB at receptor F. It is important to note that the excavation noise predictions shown in Table 9 do not account for shielding which will develop as mining depths increase. Specifically, the Table 9 predictions assume direct line of sight between the excavation noise sources and modeled receptors. As a result, the exceedances identified in Table 9 would be temporary, and would not occur once excavation equipment is recessed into the South Pit and the quarry walls provide shielding of excavation equipment and associated noise.

The identified 3 dB exceedances are relatively small and potentially within the margin of error of modeling assumptions. Nonetheless, in order to ensure satisfaction with the standards of significance and County General Plan, the following specific measures are recommended to reduce noise generated by Project noise sources.

Level of Significance Before Mitigation: Potentially Significant

Mitigation Measures:

Mitigation Measure NOISE-1a:
Secondary and Ancillary Processing Plant

- *Aggregate stockpiles, earthen berms, or other line-of-sight barriers shall be positioned to provide complete line-of-sight interception between the second and ancillary processing plant and receptors represented by letters B and C on NOISE-Figure 1.*
- *Back-up warning devices on all plant-area mobile equipment (i.e. front-loaders, dozers, etc.), should utilize radar or strobe-based warning mechanisms during nighttime hours, provided such equipment complies with all regulatory requirements and can be safely utilized at this facility.*

Mitigation Measure NOISE-1b: Primary Processing Plant

- *Aggregate stockpiles, earthen berms, or other line-of-sight barriers shall be positioned to provide complete line-of-sight interception between the primary processing plant and residences represented by letters C, D, and E on NOISE-Figure 1.*
- *Back-up warning devices on all plant-area mobile equipment (i.e. front-loaders, dozers, etc.), should utilize radar or strobe-based warning*

mechanisms during nighttime hours, provided such equipment complies with all regulatory requirements and can be safely utilized at this facility.

Mitigation Measure NOISE-1c: Excavation

- *Excavation activities with direct line of sight to receptor F on NOISE-Figure 1 should be limited to daytime hours until that equipment has recessed a sufficient distance into the pit to lower excavation noise to a state of compliance with the Project nighttime noise thresholds.*

  1) *To the extent feasible, excavation activities which would have direct line of sight to receptor F on NOISE-Figure 1 should start on the portion of the pit furthest from that receptor to maintain the maximum degree of shielding by existing topography for as long as possible.*

Mitigation Measure NOISE-1d: Noise Monitoring

- *The Operator, in place of implementing any or all of the above identified mitigation measures, may conduct noise monitoring at identified receptor locations during the start of operations. If noise levels are below County and ambient standards, no mitigation is required. If noise levels are above County or ambient levels, the Operator shall implement those measures identified above to meet those standards or other measures standard to the industry.*

Level of Significance After Mitigation: Less than Significant

Impact NOISE-2: Expose Receptors to Excessive Ground-Borne Vibration Levels

Mineral reserves will be removed through a combination of drilling, blasting, and excavation equipment. All blasts will occur during daylight hours and only on regular business days (not on weekends or federal holidays). Loaders or similar excavating equipment will remove the aggregate for processing after blasting. Blasted rock will be loaded onto haul trucks and transported to or within the primary processing plant adjacent to the active pit.

Blasting could create local ground or air vibrations. The intensity of the vibration is dependent on various factors such as the type of soil or rock, number of charges, type of explosive, amount of explosive used, depth of the explosion, distance, and meteorological conditions. With the exception of vibration

TABLE 9
PREDICTED NOISE LEVELS AT NEAREST EXISTING RECEPTORS

Receiver	Noise Exposure – Hourly L_{eq}, dB										
	Excavation	*Jaw Crushing*	*Processing Plant*	*Asphalt Plant*	*Ready-Mix Plant*	*Recycle Plant*	*Rail Car Loading*	*Rail Engine Idle*	*Cumulative*	*Daytime Standard*	*Nighttime Standard*
A	29	24	29	27	18	23	31	22	36	55	50
B	30	23	28	25	17	22	29	21	35	55	50
C	34	44	39	34	28	32	40	27	47	55	50
D	29	25	31	27	19	23	27	24	36	55	50
E	41	25	27	23	15	20	17	10	41	55	50
F	**53**	25	31	28	20	24	26	18	**53**	55	50
G	37	11	13	9	2	6	7	0	37	55	50

Notes:

1. Average (Hourly L_{eq}) noise levels represent any 1-hour period and assume continuous operation of each noise source.
2. The predicted noise levels were calculated using the reference noise level data in Table 9 assuming spherical spreading loss (-6 dB per doubling of distance) and an additional 1.5 dB reduction per 1,000 feet for atmospheric and ground attenuation. These calculations are considered to be conservative.
3. Bolded values indicated levels in excess of the applicable County noise criteria.
4. Excavation levels assume a direct line of sight between source(s) and receiver. Once excavation equipment progresses deeper into the mining pit, excavation-related noise levels will be significantly reduced.

generated by blasting events, the Project is not expected to produce any discernible levels of vibration at receptors in the Project vicinity. This is due to the type of equipment which will be used at the site, substantial intervening topography, and relatively large distances between Project operations and receptors. As such, the potential impact associated with Project-generated vibration during normal (not blasting) operations is expected to be less than significant.

With respect to blast induced vibration, the type, sizes, number, depth, and timing delay sequence of the charges, as well as the geology of the surrounding area, will all be variables which will affect the transmission of that vibration from the site. BAC data collected from a blast at the San Rafael Rock Quarry in August of 2000 was used to generally estimate the magnitude of vibration which can be expected off site. That blast consisted of 7,000 lbs of ammonium nitrate fuel oil, distributed in 17 holes, each timed to detonate in a sequence, rather than all together. The measured ppv of that shot, at a distance of 1,400 feet, was 0.05 in/sec. Given the assumption that vibration energy is radiating away from the blast site proportional to inverse square law, the level of vibration energy present at 1,900 feet from the mining area (1,900 feet is the distance from the proposed excavation area to the nearest receptor), would be less than it would be at 1,400 feet. The resulting ppv at the nearest identified sensitive areas is, therefore, estimated to be below 0.05 in/sec ppv. This level is below the 0.01 in/sec ppv vibration threshold for annoyance, and well below thresholds required for damage to structures. As a result, vibration generated during periodic blasting operations is predicted to be less than significant at the nearest residences.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required

Impact NOISE-3: Project-Related Operations Could Result in Substantial Increase in Ambient Noise Levels

Impact Noise-1 provides a description of quarry and processing operations noise levels at representative receptor locations used in the noise assessment. As noted previously, CEQA guidelines (Appendix G), require that noise impacts of a Project be evaluated against ambient conditions as well as relative to locally adopted noise standards. Impact Noise-1 addressed anticipated Project generated noise conformance with locally adopted noise standards. Table 10, Predicted Noise Levels Relative to Ambient Conditions, compares Project noise

levels against existing ambient conditions. Existing average ambient conditions in the absence of railroad noise generally ranged from 40 to 50 dB L_{eq} at the nearest receptors during daytime hours, and from 30 to 40 dB L_{eq} during nighttime hours. Based on these ambient conditions, median daytime and nighttime ambient conditions were assumed to be approximately 45 dB L_{eq} and 35 dB L_{eq}, respectively at receptors B-D. At receptor A, daytime and nighttime ambient conditions were assumed to be approximately 5 dB higher, or 50 dB L_{eq} during daytime hours and 40 dB L_{eq} during nighttime hours. Based on these relatively low ambient levels, the FICON guidelines provided in Table 5 indicate that significant Project-related noise impacts could be expected where Project-generated noise levels exceed existing ambient conditions by 5 dB. Applying this 5 dB threshold to the median daytime and nighttime L_{eq} values of 35 and 45 dB L_{eq} yields noise impact thresholds of 40 and 50 dB L_{eq} for nighttime and daytime conditions, respectively, at receptors C-G. At receptors A-B, which are more heavily influenced by noise from Interstate 5, daytime and nighttime average noise level standards of 55 dB L_{eq} and 45 dB L_{eq}, respectively, are applied to this Project. The bolded values provided in Table 10 indicate levels which could exceed those adjusted noise standards.

Table 10 data indicates that ambient conditions will be exceed during excavation, jaw crushing, and cumulative noise scenarios but would be satisfied under a majority of the operating scenarios. Because existing ambient conditions may be exceed by 5 dB or more at the locations identified in Table 10, this impact is potentially significant.

Level of Significance Before Mitigation: Potentially Significant

Mitigation Measures: See Mitigation Measures NOISE-1a through NOISE-1c.

Level of Significance After Mitigation: Less than Significant

Impact NOISE-4: Off-Site Truck Traffic Noise Could Exceed Noise Standards

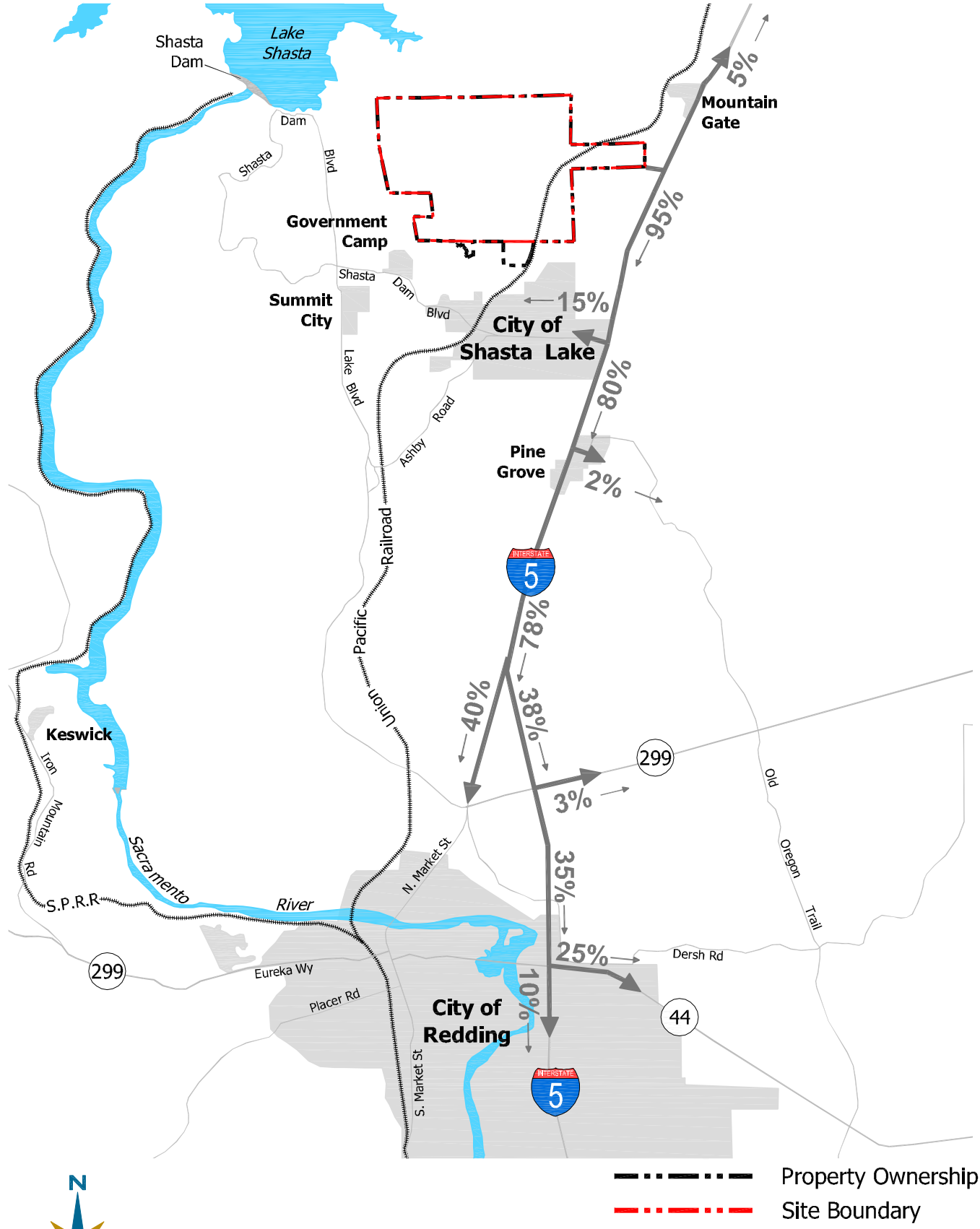
Traffic will enter and exit the Project site via a private access road connecting the site with Interstate 5 via the Mountain Gate Road interchange (see NOISE-Figure 3, Project Trip Distribution). All quarry-related truck traffic will access the site via Wonderland Road, Mountain Gate Road, and Interstate 5. Aggregate material transported off-site will typically be hauled in 25-ton trucks. The Project's annual and maximum daily number of truck trips is provided in Table 11, Project Trip Generation.

TABLE 10
PREDICTED NOISE LEVELS RELATIVE TO AMBIENT CONDITIONS

Receiver	Noise Exposure – Hourly L_{eq}, dB										
	Excavation	*Jaw Crushing*	*Processing Plant*	*Asphalt Plant*	*Ready-Mix Plant*	*Recycle Plant*	*Rail Car Loading*	*Rail Engine Idle*	*Cumulative*	*Daytime Standard Based on Ambient*	*Nighttime Standard Based on Ambient*
A	29	24	29	27	18	23	31	22	36	55	45
B	30	23	28	25	17	22	29	21	35	55	45
C	34	**44**	39	34	28	32	40	27	**47**	50	40
D	29	25	31	27	19	23	27	24	36	50	40
E	**41**	25	27	23	15	20	17	10	**41**	50	40
F	**53**	25	31	28	20	24	26	18	**53**	50	40
G	37	11	13	9	2	6	7	0	37	50	40

Notes:

1. Average (Hourly L_{eq}) noise levels represent any 1-hour period and assume continuous operation of each noise source.
2. The predicted noise levels were calculated using the reference noise level data in Table 6 assuming spherical spreading loss (-6 dB per doubling of distance) and an additional 1.5 dB reduction per 1,000 feet for atmospheric and ground attenuation. These calculations are considered to be conservative.
3. **Bold** values indicated levels in excess of 5 dB over typical daytime and nighttime average ambient noise levels.
4. Excavation levels assume a direct line of sight between source(s) and receiver. Once excavation equipment progresses deeper into the mining pit, excavation-related noise levels will be significantly reduced.



Project Trip Distribution

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BENCHMARK RESOURCES

NOISE - Figure 3

Table 5 in Section 2.0 provides the existing traffic noise levels at a distance of 100 feet from the centerline of identified intersections and the distance to the 60 dB contour.

TABLE 11
PROJECT TRIP GENERATION

Vehicle	Estimate	
	Annual Trips	*Maximum Daily Trips*
Asphalt	8,800	120
Ready-Mix Concrete	15,556	110
Aggregate (Outside Sales)	16,000	200
Cement Delivery Trucks	1,244	6
Asphalt Material Delivery Trucks	815	8
Fuel, Service, and Delivery	150	3

Table 12, Predicted Truck Traffic Noise Levels, shows the predicted noise levels resulting from Project traffic and its change to existing noise levels. Pursuant to the County General Plan Policy N-g and FICON ambient noise standards outlined in Section 3.2, a finding of significant impact is made if project-generated traffic noise will be 1.5 dB over existing conditions where existing traffic noise levels are greater than 65 dB L_{dn}. As shown above, traffic noise will increase approximately 1 dB at a distance of 100 feet from the centerline at three roadway segments.

TABLE 12
PREDICTED TRUCK TRAFFIC NOISE LEVELS

Roadway	Segment	L_{dn}, dB @100 Feet (Δ re: No Project)
Interstate 5	North of Old Oregon Trail	76 (0)
Interstate 5	Old Oregon Trail to State Route 151	76 (0)
Interstate 5	State Route 151 to State Route 273	75 (+1)
Interstate 5	State Route 273 to State Route 299	77 (0)
Interstate 5	State Route 299 to State Route 44	77 (0)
Interstate 5	South of State Route 44	79 (0)
State Route 151	West of Interstate 5	66 (+1)
State Route 273	South of Interstate 5	66 (+1)

Roadway	Segment	L_{dn}, dB @100 Feet (Δ re: No Project)
State Route 299	East of Interstate 5	70 (0)
State Route 44	East of Interstate 5	74 (0)

Sources: Caltrans Traffic Volumes (AADT), Moody Flats Quarry Project Description and Bollard Acoustical Consultants, Inc.

Level of Significance Before Mitigation: Less than Significant

Mitigation Measures: None Required