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# NOISE ASSESSMENT STUDY

# GRANITE CONSTRUCTION COMPANY

# COALINGA MINE EXPANSION PROJECT

# CITY OF COALINGA

# COUNTY OF FRESNO

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## I. Executive Summary

This report presents the results of a noise assessment study for the proposed Coalinga Mine Expansion Project ("Project") located along Highway 198/33 in Coalinga.

This study analyzes and evaluates the Project's potential noise effects on the closest receptors to the Project site, which include residences to the east and south of the Project area as well as an Elks Lodge and schools to the south.

For the purposes of evaluation, the measured noise levels and noise exposures were compared to the City of Coalinga Noise Element of the General Plan, the County of Fresno Noise Element of the General Plan and the County of Fresno Noise Ordinance.

The results of this study reveal that the stripping of the surface overburden materials will generate the highest noise levels as the noise generating equipment will be working at the surface. The noise analysis indicates that, absent noise mitigation, the Project has the potential to result in exceedances of the applicable City/County noise standards. These exceedances would occur once stripping operations are within 2,200 ft. of a residential or school receptor location or within 2,300 ft. of the Elks Lodge property line. However, the Project design incorporates perimeter berms six feet in height along the eastern and southern mining boundaries, which serve to decrease noise levels for compliance with the applicable noise standards.

With the installation of the noise control berms, the project-generated noise levels and noise exposures will be in compliance with the standards of the City of Coalinga Noise Element and the Fresno County Noise Element and Noise Ordinance. No further noise mitigation measures are required.

## II. Background Information on Acoustics

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB) with 0 dB corresponding roughly to the threshold of hearing. The decibel scale is logarithmic, whereby a sound 10 dB higher than another contains 10 times the sound energy. Decibels are combined using the equation,

$$\mathbf{sum = 10log_{10}(10^{SL/10} + 10^{SL/10}).}$$

The sum of two sound sources of the same level is 3 dB higher than the sound level of one of the sources. For example, 60 dB + 60 dB = 63 dB. The sum of two sound levels that are 10 dB apart is merely the higher of the two levels, that is, the lower level does not add to the higher level. For example, 50 dB + 60 dB = 60 dB.

Most of the sounds which we hear in our normal environment do not consist of a single frequency, but rather a broad range of frequencies. As humans do not have perfect hearing, environmental sound measuring instruments have a built-in electrical filter that allows the instrument's detector to replicate human hearing. This filter is called the "A-weighting" network which filters out low and very high frequencies. All environmental noise is reported in terms of A-weighted decibels, notated as dBA. All sound levels used in this report are A-weighted unless otherwise noted. Table I provides the typical noise levels for common noise sources.

Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a mixture of noise from distant sources which create a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors, $L_n$, are commonly used. They are the A-weighted noise levels exceeded during n% of a stated time period. Common $L_n$ values are the $L_1$, $L_{10}$, $L_{50}$ and $L_{90}$, i.e., those levels of noise exceeded 1%, 10%, 50% and 90% of the time.

The continuous equivalent-energy level ($L_{eq}$) is also a common noise descriptor and is the level of a steady state noise which has the same sound energy as a time varying noise. It is often considered the average noise level.

**TABLE I**

**The A-Weighted Decibel Scale and Common Noise Sources**

| Noise Level, dBA | Noise Source | Sound Level |
|---|---|---|
| 120-150+ | Sonic Boom | 140 dBA |
| 100-120 | Fast Motorcycle at 20 ft. | 110 dBA |
| | Nightclub Music | 105 dBA |
| | Train Horn at 50 ft. | 104 dBA |
| | Power Mower | 100 dBA |
| 70-100 | Diesel Pump at 100 ft. | 95 dBA |
| | Freight Train at 50 ft. | 90 dBA |
| | Jet Aircraft at 1000 ft. | 85 dBA |
| | Freeway at 100 ft. | 80 dBA |
| 50-70 | Average Traffic at 100 ft. | 70 dBA |
| | Vacuum Cleaner | 70 dBA |
| | Passing Car 30 mph at 25ft. | 65 dBA |
| | Television | 53 dBA |
| 0-50 | Normal Conversation | 50 dBA |
| | Light Traffic at 100 ft. | 45 dBA |
| | Refrigerator | 43 dBA |
| | Desktop Computer | 38 dBA |
| | Whispering | 35 dBA |
| | Leaves Rustling | 20 dBA |
| | Threshold of Hearing | 0 dBA |

In determining the daily level of environmental noise, it is important to account for the difference in response of people to daytime and nighttime noises. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes very noticeable. Further, most people sleep at night and are very sensitive to noise intrusion. To account for human sensitivity to nighttime noise levels, the Day-Night Level (DNL) noise descriptor was developed. The DNL is also called the $L_{dn}$. Either is acceptable, however, DNL is the more popular descriptor. The DNL divides the 24-hour day into the daytime period of 7:00 AM to 10:00 PM and the nighttime period of 10:00 PM to 7:00 AM. The nighttime noise levels are penalized by 10 dB to account for the greater sensitivity to noise at night. The Community Noise Equivalent Level (CNEL) is another 24-hour average which includes a 5 dB evening (7:00 PM - 10:00 PM) penalty and a 10 dB nighttime (10:00 PM to 7:00 AM) penalty. Both the DNL and the CNEL average the daytime, evening and nighttime noise levels over a 24-hour period to attain a single digit *noise exposure*. The proper notations for the Day-Night Level and the Community Noise Equivalent Level are dB DNL and dB CNEL, respectively, as they can only be calculated using A-weighted decibels. It is, therefore, considered redundant to notate dB(A) DNL or dB(A) CNEL.

The effects of noise on people can be listed in three general categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning, relaxing;
- physiological effects such as startling, hearing loss.

The levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants, airports, etc., can experience noise in the last category. There is, as yet, no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily due to the wide variation in individual thresholds of annoyance and differing individual past experiences with noise.

An important way to determine a person's subjective reaction to a new noise is to compare it to the existing environment to which one has adapted, i.e., the "ambient". In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the receivers.

With regard to increases in A-weighted noise levels, the Environmental Protection Agency has determined the following relationships that will be helpful in understanding this report.

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived.
- Outside of the laboratory, a 3 dB change is considered a just-perceptible difference.
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected.
- A 10 dB change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse change in community response.

The adding or subtracting of sound levels is not simply arithmetic. The sound levels, in decibels, must be converted to Bels, the anti-log's of which are then calculated. The manipulation is then performed (arithmetic addition or subtraction), the logarithm of the sum or difference is calculated. The final number is then multiplied by 10 to convert Bels to decibels. The formula for adding decibels is as follows:

$$Sum = 10\log(10^{SL/10} + 10^{SL/10})$$ where, SL is the Sound Level in decibels.

For example, 60 dB + 60 dB = 63 dB, and 60 dB + 50 dB = 60 dB. Two sound sources of the same level are barely noisier than just one of the sources by itself. When one source is 10 dB higher than the other, the less noisy source does not add to the noisier source.

## III. Noise Standards

### City of Coalinga Noise Element of the General Plan

The Noise Element of the City of Coalinga General Plan 2025, Ref. (a), utilizes the Day-Night Level (DNL) descriptor to define acceptable noise exposures for various land uses. The DNL is a 24-hour time-weighted average descriptor commonly used to describe community noise environments. The Noise Element does not specifically address noise exposure impacts from industrial or commercial uses impacting noise sensitive uses. However, in Table 5-6 of the Noise Element, the Normally Acceptable noise exposure limits for residential, transient lodging and school land uses is 55 dB DNL. For commercial uses, such as the nearby Elks Lodge, the Noise Element indicates a Normally Acceptable limit of 60 dB DNL. The DNL is defined further in Appendix B.

### City of Coalinga Municipal Code

The City of Coalinga Municipal Code does not contain standards that limit the noise levels at noise sensitive land uses from noise generated by an industrial facility or commercial facility, including mining operations.

### Fresno County Noise Element of the General Plan

The Noise Element of the Fresno County General Plan 2000, Ref. (b), adopted in December of 1975, establishes maximum acceptable noise levels for various land use categories. The Noise Element utilizes both the DNL and $L_{50}$ and specifies exterior noise limits for urban residential and noise sensitive receivers (including transient lodging) of 60 dB DNL, 55 dBA $L_{50}$ daytime and 50 dBA $L_{50}$ nighttime. Note that the urban residential noise standards are used in this study as the residential areas near the quarry are mostly tract homes and closely spaced characterizing a more urban/suburban environment rather than a rural environment.

**Fresno County Noise Ordinance**

The Fresno County Noise Element of the General Plan includes the noise standards outlined in the Fresno County Noise Ordinance. The Noise Ordinance standards are designed to be consistent with the noise standards of the General Plan's $L_{50}$ guidelines. For urban residential areas with the baseline noise level of 55 dBA $L_{50}$, table 10-10a of the Noise Ordinance limits the short-term (dBA) noise levels to various levels depending upon the time of day and the duration of the noise, as shown below. The stripping operations are anticipated only during daytime hours.

| **Fresno County Noise Ordinance Standards** | | |
|---|---|---|
| | Noise Level Limit, dBA | |
| Duration of Noise Event | Daytime (7:00 AM – 10:00 PM) | Nighttime (10:00 PM – 7:00 AM) |
| 30 min./hr. ($L_{50}$) | 55 | 50 |
| 15 min./hr. ($L_{25}$) | 60 | 55 |
| 5 min./hr. ($L_{8}$) | 65 | 60 |
| 1 min./hr. ($L_{2}$) | 70 | 65 |
| Maximum ($L_{max}$) | 75 | 70 |

## IV. Acoustical Setting and Existing Noise Environments

The current land uses surrounding the Project area include the existing Granite Construction mining and aggregate processing facility to the north, Highway 198/33 to the east and mostly vacant land with a facility associated with oil production to the west. Land immediately adjacent to the south of the Project area is either vacant or part of a City of Coalinga recreational facility that was under construction, but is apparently in a hold status. There are two completed soccer fields along the north side of Cambridge Avenue. At the southeast are the Elks Lodge, the Cambridge Inn Motor Lodge (currently vacant) and Key Energy Services. The nearest residences are across Cambridge Avenue to the south and across Highway 198/33 to the east. West Hills College, Coalinga Middle School and Bishop (Elementary) School are also across Cambridge Avenue to the south.

The primary source of noise in the area is traffic on Highway 198/33. Traffic on Cambridge Avenue and activities at the schools are secondary sources of noise in the area. Figure 1, below, provides an overview of the quarry and vicinity.

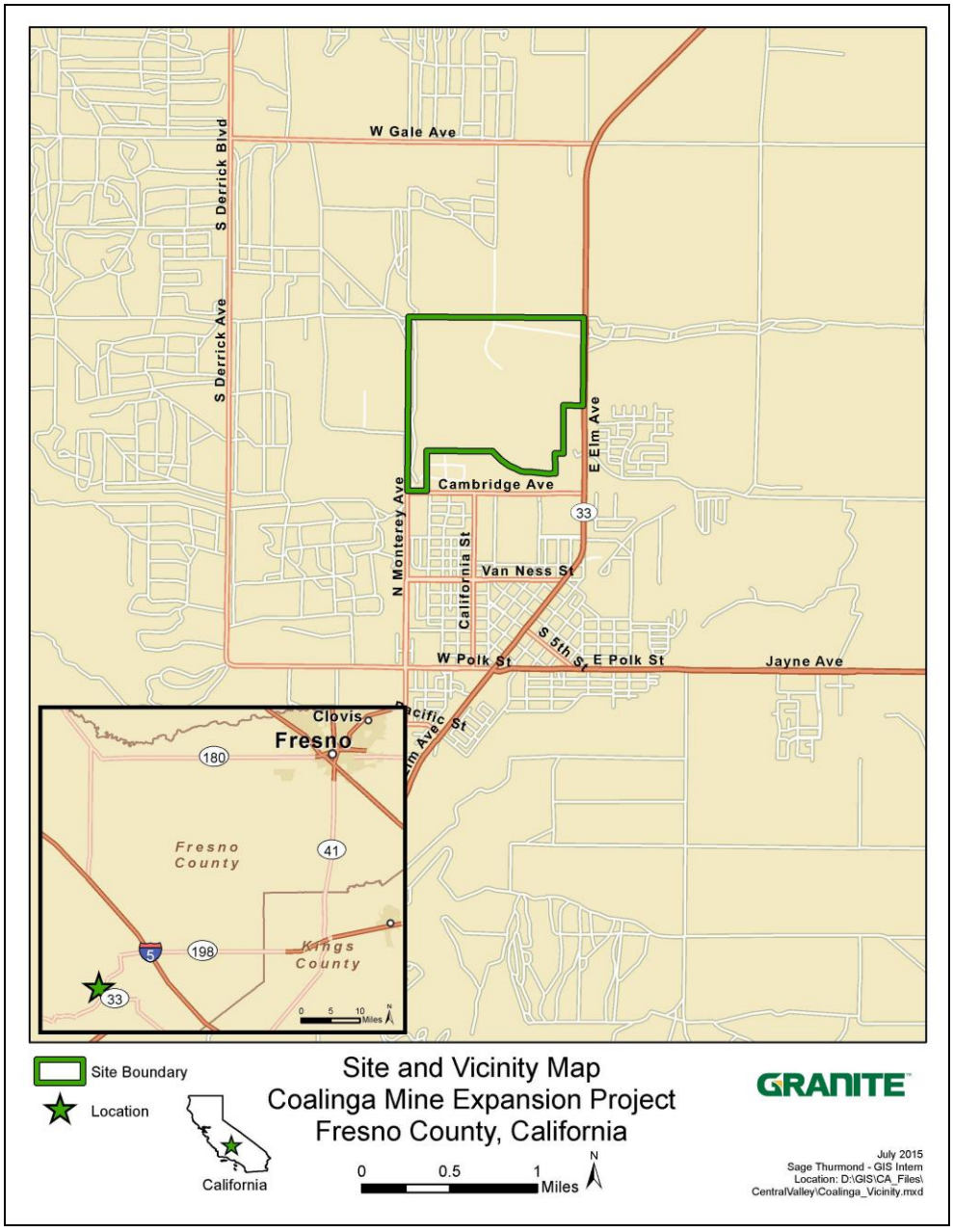


**FIGURE 1 – Site and Vicinity Overview**

**Atmospheric Effects on Sound Propagation**

Sound from a single stationary source typically attenuates at a rate of $20\log_{10}(r_1/r_2)$, where $r_1$ is the measurement distance and $r_2$ is the distance to the receptor. This equates to a 6 dB reduction for every doubling of the distance and is accurate for conditions where the distances are within approximately 1,000 ft. and the intervening ground surface is flat and somewhat porous, such as a vacant field.

Since sound is merely a fluctuation of air pressure, a sound barrier must be an air tight structure. Solid walls, earthen berms or topography are the most common sound barriers. Vegetation does little for blocking sound unless the vegetation is a thick forest of high density planting a minimum of 100 ft. thick. Over great distances, heavy vegetation can cause excess scattering of sound waves, which reduces sound slightly more than the normal attenuation rate.

With variations in elevation and large separation distances, topography, vegetation and the atmosphere can affect the attenuation of sound. Topographic elements provide some barrier effect. Vegetation may provide excess air particle (sound wave) scattering. The remaining atmospheric affects include; pressure gradients, humidity, temperature gradients, atmospheric turbulence, wind and atmospheric absorption.

Sound slows down with lower temperatures. Thus, over a large distance where temperature gradients occur and inversions occur in the evening, sound travels slower along the ground and bends toward the ground rather than bending upward as it does during the day under superadiabatic conditions. Temperature inversions occur as the warm daytime air close to the ground is absorbed into the ground faster than the normal cooling rate. Thus, the air close to the ground is cooler than the air at higher elevations.

It has been well documented that sound generated in the valleys and canyons near the Coastal Mountain Range along the Pacific Ocean is less pronounced on warm evenings and sound tends to travel farther on cool evenings. Because of the far distance from Coalinga to the Pacific Ocean, the effects of temperature inversions are minimal.

The effect of wind can be two-fold. Under one condition, the prevailing wind from the north/northeast blows across the low hills to the south/southwest toward the Cambridge Avenue residential area. Upper atmosphere winds travel faster than wind at low elevation. The higher winds bend sound down toward the ground increasing the sound levels at locations relatively close to the quarry. Under the second condition, wind noise through trees and shrubbery can produce a sound masking effect by raising the natural noise floor. Vegetation is sparse in the area such that wind noise through vegetation is minimal.

Atmospheric absorption occurs as air molecules carrying the sound waves collide with relatively static air molecules and the loss of energy (converted to heat) during these molecular collisions result in a reduction of sound. Typically, a 1 kHz sound wave will be absorbed at a rate of 1 dB/650 ft. At 2,500 ft., the excess attenuation due to absorption is 4 dB for 1 kHz. At 4,700 ft., the excess attenuation due to absorption is 7 dB for 1 kHz. However, at 125 Hz the sound level reduction values are approximately 1/10th of those at 1 kHz. At the receptor locations to the south and east, excess absorption for the frequencies produced by the mining operations are in the 1 to 2 dB range, which is considered negligible.

The effects of the atmosphere are relatively negligible over long periods of time and occur during specific times of the day and times of year. The variation in the noise levels at receptor locations due to atmospheric conditions will be minimal.

**Existing Noise Environments**

To determine the existing noise environment at the closest noise sensitive receptor locations, continuous recordings of the sound levels were made at three representative locations. Location 1 was at the northwest corner of the Elks Lodge property closest to the Project area. Location 2 was at the west (rear) residential property line of a currently vacant lot at the terminus of Cabrillo Drive to the east of the site. Location 3 was at the back of sidewalk along Cambridge Avenue across the street from the residences. This location corresponds to the distance from the centerline of the road to the residential property lines, thus, representing the noise environment at the residential properties. The measurements were made on April 8-10, 2015 for a continuous period of 24 hours and included measurements during representative hours of the daytime and nighttime periods of the DNL index.

The ambient sound levels were recorded and analyzed using Larson-Davis Model 812 Precision Integrating Sound Level Meters. The meters yield, by direct readout, a series of descriptors of the sound levels versus time, which include the $L_1$, $L_{10}$, $L_{50}$, and $L_{90}$, i.e., those levels that are exceeded 1%, 10, 50%, and 90% of the time. The meters also yield the maximum and minimum levels, and the continuous equivalent-energy levels ($L_{eq}$), which are used to calculate the DNL. The measured $L_{eq}$'s are shown in the data tables in Appendix C.

On the first day of measurements, the $L_{eq}$'s at measurement Location 1 behind the Elks Lodge ranged from 42.4 to 52.5 dBA during the daytime and from 38.8 to 48.8 dBA at night. On day 2, the $L_{eq}$'s ranged from 43.7 to 51.3 dBA during the daytime and from 37.8 to 50.0 dBA at night.

At measurement Location 2 at the end of Cabrillo Drive, the $L_{eq}$'s on Day 1 ranged from 40.9 to 53.9 dBA during the daytime and from 42.1 to 53.6 dBA at night. On day 2, the $L_{eq}$'s ranged from 39.6 to 54.5 dBA during the daytime and from 40.7 to 55.4 dBA at night.

At measurement Location 3 along Cambridge Avenue, the $L_{eq}$'s on Day 1 ranged from 52.0 to 58.4 dBA during the daytime and from 35.1 to 56.1 dBA at night. On day 2, the $L_{eq}$'s ranged from 50.2 to 62.1 dBA during the daytime and from 31.8 to 55.2 dBA at night.

The ambient sound level measurement locations are shown on Figure 2, below.


**FIGURE 2 – Ambient Sound Level Measurement Locations**

To calculate the baseline noise exposures at the receptors for the determination of project-related noise impacts, the DNL's for the survey locations were calculated by decibel averaging of the $L_{eq}$'s as they apply to the daytime and nighttime time periods of the DNL index. A 10 decibel nighttime weighting factor was applied and the DNL was calculated using the formula shown in Appendix B. The measured $L_{eq}$'s and DNL calculations are shown in the data tables in Appendix C.

The results of the calculations indicate that the noise exposures at measurement Location 1 behind the Elks Lodge were 51 dB DNL on each day of measurements.

The noise exposures at Location 2 at the end of Cabrillo Drive were 55 dB DNL on each day of measurements.

The noise exposures at Location 3 along Cambridge Avenue were 58 dB DNL on each day of measurements.

## V. Project Description

Granite Construction Company owns and operates an existing, permitted aggregate mining and processing operation in western Fresno County known as the Coalinga Facility. In addition to mining and reclamation, existing permitted uses at the Coalinga Facility include aggregate, asphalt and concrete processing plants, as well as ancillary uses such as aggregate stockpiling/loading/sales, construction materials recycling, and equipment storage and maintenance.

Under the proposed project, Granite Construction Company would entitle a new mining area on Granite Construction-owned property directly south and southeast of the existing Coalinga Facility. Project parcels total approximately 502 acres, and straddle two jurisdictions: 1) the West Pit in the County of Fresno (APN# 07006086s, 299.11 acres); and, 2) the East Pit partially in the City of Coalinga (APN# 07006089s, 202.54 acres). Mining and related project activities would be conducted on a portion of those Project parcels, with the remainder in avoidance and setback areas.

Mining operations will be performed in a manner consistent with existing practices at the Coalinga Facility, and would be initiated by the removal of vegetation, topsoil/growth media, and overburden materials which lie above marketable sand and gravel deposits. The overlying materials will be removed using scrapers aided by a motor grader and a bull dozer, as needed.

After overlying materials are removed, marketable sand and gravel will be excavated using a combination of scrapers, front-end loaders, hydraulic excavators, bulldozers and other support equipment. Following excavation, the sand and gravel will be transported via conveyor and/or internal haul roads to the existing Coalinga Facility where it will be processed and/or sold for use in construction materials. Mining methods will be consistent with existing operations at the Coalinga Facility, and no changes to permitted mining production levels are proposed. The proposed project involves only mining/reclamation and transportation of mined aggregates to the existing Coalinga Facility. Beyond potentially limited initial screening of aggregates in the mining area, no processing is anticipated in the Project area.

Figure 3 on page 15 shows an overview of the site and proposed expansion area, Ref. (c).

Typically, mining activities occur during daytime hours and occur primarily below grade. Mined materials are conveyed to the existing aggregate processing plant. The aggregate processing plant is not proposed to be relocated in the Project area. Information on mining operations was provided by Granite Construction Company personnel, Ref. (d).

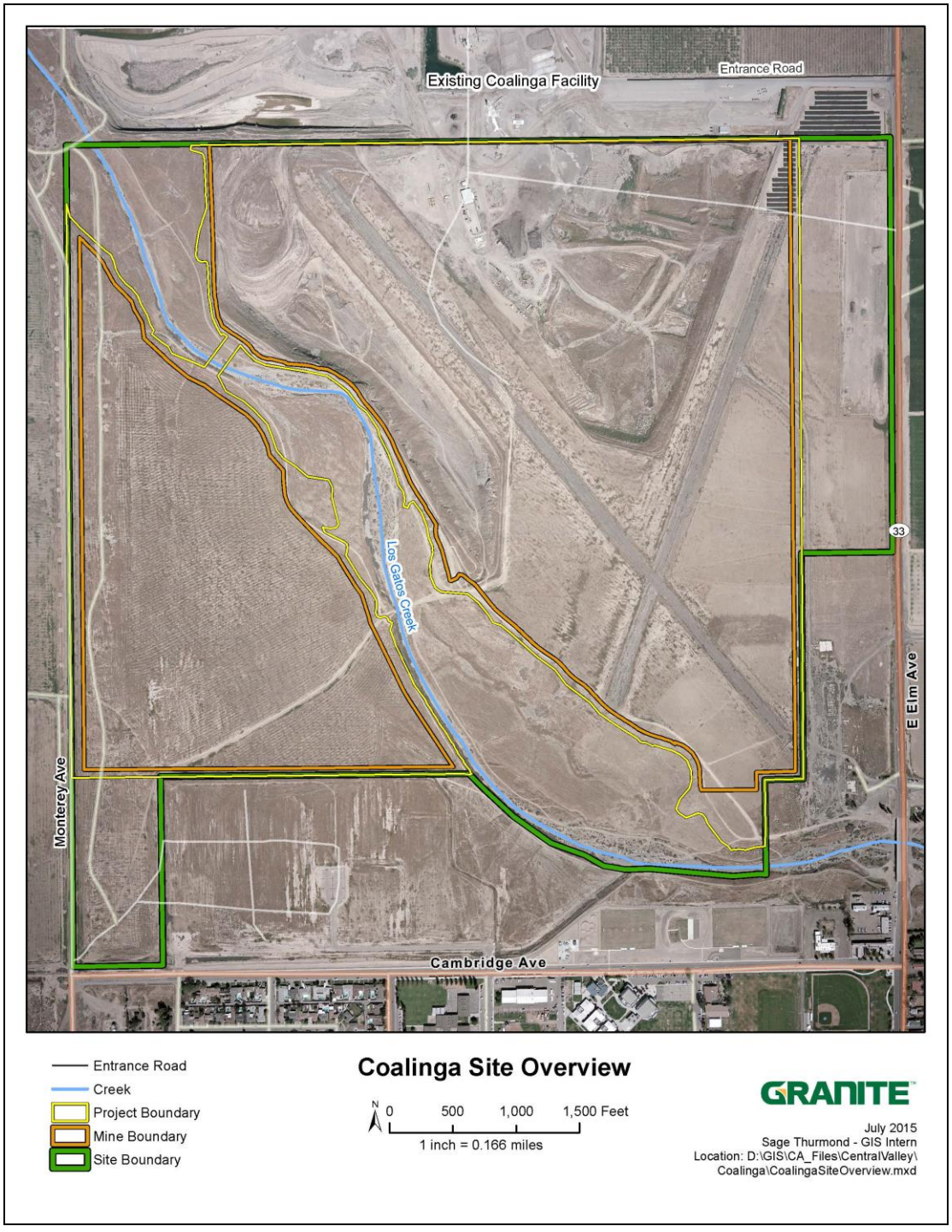


**FIGURE 3 – Granite Construction Quarry Property and Expansion Area**

## VI. Project-Generated Noise

### Noise Levels

To determine the levels of noise generated by typical stripping and mining operations, on-site noise level recordings were made on April 8, 2015 using a Larson Davis LDL 812 Precision Integrating Sound Level Meter and a Tascam DR40 Linear PCM Digital Audio Recorder. The sound meter was programmed to measure the $L_2$, $L_8$, $L_{25}$ and $L_{50}$ noise levels to correspond to the standards of the Fresno County Noise Ordinance. Stripping operations were being performed near the northerly boundary of the existing mine off of West Gale Avenue. The three Cat 651 scrapers and one Cat D10 push dozer were operating in a pit 27 ft. deep. The sound meter was placed at the edge of the pit 250 ft. to 310 ft. from the scraping operation. The average distance to the operation was 275 ft.

The stripping operation is the highest noise generating activity as the sources are at the ground surface during the operation. Mining occurs below grade and the mining pit walls create a noise barrier. Therefore, the noise levels and noise exposures presented in this section are considered worst-case.

Table II provides the measured (adjusted) sound levels of the stripping operations at an average of 275 ft. from the mining equipment and over a 12 minute duration. The sound levels of the scrapers exiting the pit and driving behind the noise monitor were removed from the data as scrapers will not operate behind the receptor locations. Note that the stripping operations and the mining operations involve the use of similar equipment. In addition, noise level measurements of conveyor operations were made. When adjusted for similar distances, the conveyor noise levels are more than 10 dB below the equipment noise levels. Thus, the conveyor noise becomes insignificant in relation to the equipment noise.

| TABLE II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Stripping/Mining Noise Levels, dBA** | | | | | | | |
| Operation | Distance | $L_{max}$ | $L_2$ | $L_8$ | $L_{25}$ | $L_{50}$ | $L_{eq}$ |
| Stripping/Mining | 275 ft. | 91 | 80 | 79 | 76 | 75 | 76 |
| Conveying | 20 ft. | 92 | 82 | 78 | 77 | 76 | 77 |

The Elks Lodge property is located approximately 1,110 ft. from the proposed mining operations. The residential area to the east, south of El Rancho Boulevard, is located approximately 1,200 ft. from the proposed mining operation. The residential area to the east, north of El Rancho Boulevard, is located approximately 1,400 ft. from the proposed mining operation. The schools on the south side of Cambridge Avenue are approximately 1,500 ft. from the proposed mining area. The residences on the south side of Cambridge Avenue are approximately 1,400 ft. from the proposed mining area. The topography in the area is generally flat.

The attenuation rate used for sound propagation is $20\log_{10}(r_1/r_2)$, where $r_1$ is the reference distance and $r_2$ is the distance to the receiver. Wave scattering was not included due to the sparse vegetation in the area.

Table III on page 18 provides the results of the short-term noise level analysis and evaluations against the standards of the City of Coalinga Noise Element and the Fresno County Noise Ordinance. The noise levels shown in Table IV do not include the noise reduction provided by the noise control berms.

| TABLE III | | | | | | |
|---|---|---|---|---|---|---|
| **Unmitigated Short Term Noise Level Analysis** | | | | | | |
| | | Lmax | L2 | L8 | L25 | L50 |
| Limits= | Fresno | 75 | 70 | 65 | 60 | 55 |
| | Coalinga | | | | | 55 |
| | Dist | | | | | |
| Reference Data | 275 | 91 | 80 | 79 | 76 | 75 |
| | | | | | | |
| Residences to East | 1200 | 78 | 67 | 66 | 63 | 62 |
| Excess | | 3 | -3 | 1 | 3 | 7 |
| | | | | | | |
| | | | | | | |
| Elks Lodge | 1100 | NA | NA | NA | NA | 63 |
| Excess | | | | | | 8 |
| | | | | | | |
| | | | | | | |
| Residences to South | 1400 | 77 | 66 | 65 | 62 | 61 |
| Excess | | 2 | -4 | 0 | 2 | 6 |

As shown in Table III, without the benefit of a noise control berm, the short-term noise levels during stripping (worst-case) operations could exceed the limits of the City of Coalinga Noise Element and the Fresno County Noise Ordinance at the most impacted residential receptor locations. The short-term noise levels at the Elks Lodge will exceed the limits of the City of Coalinga Noise Element. The Fresno County Noise Ordinance is not applicable to the Elks Lodge property.

The Project will incorporate noise mitigation measures that serve to lower the noise levels for compliance with the applicable standards. The planned noise reduction measures are described in Section VI of this report.

**Noise Exposures**

The project-generated noise exposures (dB DNL) were calculated as a decibel average of the $L_{eq}$'s as they apply to the daily time periods of the DNL index. Since the stripping operational average noise level is fairly consistent, the measured 12 minute $L_{eq}$ (adjusted to remove the scraper passbys) can be extrapolated to a one hour $L_{eq}$. The hourly $L_{eq}$ is then incorporated into the DNL formula, as shown in Appendix B.

The adjusted $L_{eq}$ of 76 dBA at 275 ft. over the 12 minute measurement period is extrapolated to an hourly noise level of 76 dBA $L_{eq(h)}$. For operational hours of 7:00 AM to 5:00 PM, the DNL was calculated to be 73 dB DNL at 275 ft.

Table IV, below, provides the calculated project-generated noise exposures for each receptor location, the noise limits and evaluations of the noise exposures against the applicable standards. These noise exposures are worst-case values when the stripping operations would be at the closest distance to the receptor locations and do not include the effects of the noise control berms.

**TABLE IV**

**Unmitigated Project-Generated Noise Exposures, dB DNL**

| Location | Dist. | DNL | Noise Evaluation | |
|---|---|---|---|---|
| | | | Coalinga Limit (55-60 dB DNL) | Fresno Co. Limit (60 dB DNL) |
| Residence to East, North of El Rancho | 1,400 ft. | 59 | +4 dB | -1 dB |
| Residence to East, South of El Rancho | 1,200 ft. | 60 | +5 dB | 0 dB |
| Elks Lodge | 800 ft. | 65 | +5 dB | +5 dB |
| Schools | 1,500 ft. | 59 | +4 dB | -1 dB |
| Residences South of Cambridge Ave. | 1,400 ft. | 59 | +4 dB | -1 dB |

As in Table IV, without the benefit of the planned noise reduction measures, the noise exposures generated during worst-case stripping operations could exceed the limits of the City of Coalinga Noise Element and the Fresno County Noise Element at the most impacted residences, schools and Elks Lodge.

## VII. Description of Noise Reduction Measures

To reduce Project noise levels and noise exposures for compliance with the standards of the City of Coalinga Noise Element, the Fresno County Noise Element and Fresno County Noise Ordinance, the following noise control measures have been incorporated into the Project design.

- Prior to mining within 2,300 ft. of the Elks Lodge property line, 6 ft. high earthen berms will be constructed along the Project mine boundary in the eastern pit, as shown in Figure 4.

- Prior to mining within 2,200 ft. of the school/residential property lines on the south side of Cambridge Avenue, 6 ft. high earthen berms will be constructed along the expansion boundary to the south parallel with Cambridge Avenue. The berms will extend from the west boundary and turn along the flood plain/mining boundary to the west of Los Gatos Creek to terminate at a distance of 2,200 ft. from the school/residential property lines on the south side of Cambridge Avenue.

Please see Figure 4 for the approximate locations of the noise control berms. The blue lines on the figures represent the distances at which the noise control berms will be necessary.

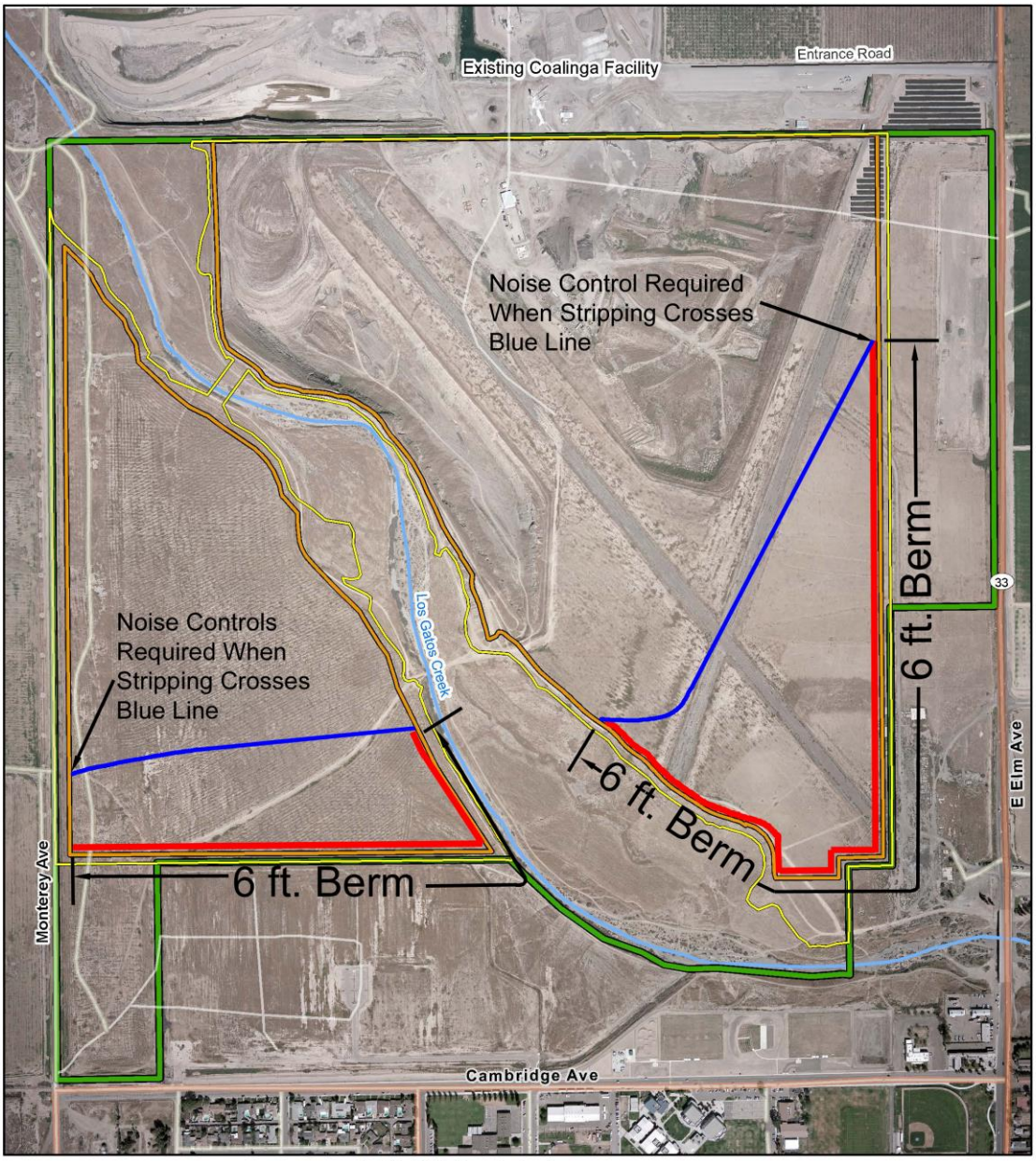


FIGURE 4

Locations of the recommended 6 ft. high noise control berms

Locations of the distance limits when the berms will be required

The construction of the noise control berms will reduce the Project noise levels for compliance with the applicable noise standards of the City of Coalinga and County of Fresno. Table V, below, provides the resulting short-term noise levels with the construction of the berms. Table VI provides the resulting noise exposures with the construction of the berms.

**TABLE V**

**Mitigated Short Term Noise Level Analysis**

| | | Lmax | L2 | L8 | L25 | L50 |
|---|---|---|---|---|---|---|
| Limits= | Fresno | 75 | 70 | 65 | 60 | 55 |
| | Coalinga | | | | | 55 |
| | Dist | | | | | |
| Reference Data | 275 | 91 | 80 | 79 | 76 | 75 |
| | | | | | | |
| Residences to East | 1200 | 70 | 59 | 58 | 55 | 54 |
| Excess | | -5 | -11 | -7 | -5 | -1 |
| | | | | | | |
| | | | | | | |
| Elks Lodge | 1100 | NA | NA | NA | NA | 55 |
| Excess | | | | | | 0 |
| | | | | | | |
| | | | | | | |
| Residences to South | 1400 | 68 | 56 | 56 | 53 | 52 |
| Excess | | -7 | -14 | -9 | -7 | -3 |

**TABLE VI**

**Mitigated Project-Generated Noise Exposures, dB DNL**

| Location | Dist. | DNL | Noise Evaluation | |
|---|---|---|---|---|
| | | | Coalinga Limit (55-60 dB DNL) | Fresno Co. Limit (60 dB DNL) |
| Residence to East, North of El Rancho | 1,400 ft. | 51 | -4 dB | -9 dB |
| Residence to East, South of El Rancho | 1,200 ft. | 52 | -3 dB | -8 dB |
| Elks Lodge | 800 ft. | 58 | -2 dB | -2 dB |
| Schools | 1,500 ft. | 51 | -4 dB | -9 dB |
| Residences South of Cambridge Ave. | 1,400 ft. | 51 | -4 dB | -9 dB |

As shown in the Tables, with the installation of the noise control berms, the project-generated noise levels and noise exposures will be in compliance with the standards of the City of Coalinga Noise Element and the Fresno County Noise Element and Noise Ordinance. No further noise mitigation measures will be required.

The above report presents the results of a noise assessment study for the proposed mining expansion area application for Granite Construction Company Coalinga Quarry along Highway 198/33 in Coalinga. The noise levels presented herein were from on-site and near-site measurements and other data and are correct to the best of our knowledge. However, changes in equipment, operations, activities, quarrying technology, noise regulations or other future changes beyond our control may produce long-range noise results different from our estimates. If you have any questions or would like an elaboration on this report, please call me.

Report Prepared By,

EDWARD L. PACK ASSOC., INC.

Jeffrey K. Pack
President

Attachments: Appendices A, B, and C

# APPENDIX A

## References


(a) City of Coalinga General Plan, Chapter 5, Safety, Air Quality and Noise Element, Adopted June 2009

(b) Fresno County General Plan Background Report, Chapter 10: Noise, pp.10-1 through 10-32, Adopted October 3, 2000

(c) Coalinga Expansion Plan, Granite Construction, July 2015

(d) Information on Granite Construction Company Quarry Operations Provided by Ms. Candice Longnecker, by email to Edward L. Pack Associates, Inc., February 26 and March 27, 2015

# APPENDIX B

## Noise Standards, Terminology and Instrumentation

## 1. Noise Standards

### A. City of Coalinga Noise Element Standards

**NOISE - BACKGROUND AND SETTING**

Noise sources in Coalinga fall into three basic categories: motor vehicle and farm equipment, aircraft, and stationary sources. Motor vehicle and farm equipment noise sources include automobiles, trucks, and motorcycles. Motor vehicle noise is of concern due to the high number of individual events which often create a sustained noise level and proximity to areas sensitive to noise exposure. Historically, due to the relatively small amount of traffic in Coalinga, traffic-related noise has not generally been significant problem. However, the traffic mix includes an unusually high percentage of large trucks on the City's major roadways, including Polk Street east of Elm Avenue, Elm Avenue and Phelps Avenue. It is possible that residences near the right-of-way of these streets may be exposed to excessive noise levels.

A comprehensive assessment of aircraft noise was undertaken as part of planning for the new Coalinga Municipal Airport. The future 60 and 65 Community Noise Equivalent Level (CNEL) contours (a measurement of the cumulative noise exposure in a community) do not extend past the airport boundaries. No significant adverse noise impacts are anticipated from operation of the new airport.

Stationary noise sources are generally larger facilities such as power plants, sewage treatment plants, oil production facilities, agricultural operations and heavy industrial uses. No major heavy industrial uses are located within the City; however, agricultural operations occurring in the area generate noise from tractors, irrigation and crop-dusting. The existing sewage treatment plant is located just east of the City; however, the treatment plant is planned to be relocated further east of the City, near the Pleasant Valley State Prison. According to the Environmental Impact Report (EIR) prepared for the relocation of the plant (City of Coalinga WWTP EIR prepared by Morro Group April 2006), the nearest sensitive noise receptor (residence) is located approximately 2,100 feet from the plant site. Based on comparative noise readings, the new treatment plant is not expected to produce significant noise impacts at the nearest sensitive receptor. Due to the uncertainties of the final treatment plant design, the EIR recommends as mitigation that a qualified acoustical engineer verify that the plant can maintain a maximum noise level of 60 dBA or lower

at the nearest sensitive receptor. Gravel mining operations are to remain more than ½-mile from any current or potential residential development.

The most common noise sensitive land uses include residential uses, schools, hospitals, nursing and personal care facilities, churches, places of public assembly and entertainment, libraries, museums, hotels, motels, bed and breakfast facilities, outdoor sports and recreation facilities and offices. **Table 5-6**, presented below**,** specifies noise levels acceptable within each land use. The Community Noise Equivalent Level (CNEL) and Day-Night Noise Level (Ldn) are measures of the 24-hour noise environment. They represent the constant A-weighted noise level (an approximation of human sensitivity to sound) that would be measured if all the sound energy received over the day were averaged. In order to account for the greater sensitivity of people to noise at night, the CNEL weighting includes a five-decibel penalty on noise generated between 7:00 p.m. and 10:00 p.m. and a 10-decibel penalty between 10:00 p.m. and 7:00 a.m. the following day. The Ldn includes only the 10-decibel weighting for late-night noise events. For practical purposes, the two measures are equivalent for typical urban noise environments.

The most noise sensitive land uses in Coalinga are residential areas. Residential development is considered especially noise sensitive because, 1) considerable time is spent by individuals at home, 2) significant activities occur outdoors, and 3) sleep disturbance is most likely to occur in a residential neighborhood. The Coalinga Regional Medical Center, located in the northeast part of town, is also considered a sensitive receptor.

**TABLE 5-6**
**ACCEPTABLE NOISE LEVELS BY LAND USE**

| Land Use | Community Noise Equivalent Level (CNEL) or Day-Night Level (Ldn), dB | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 |
| Residential: Low-Density Single-Family, Duplex, Mobile Homes | | | | | | | | |
| Residential: Multi-Family | | | | | | | | |
| Transient Lodging: Motels, Hotels | | | | | | | | |
| Schools, Libraries, Churches, Hospitals, Nursing Homes | | | | | | | | |
| Auditoriums, Concert Halls, Amphitheaters | | | | | | | | |
| Sports Arenas, Outdoor Spectator Sports | | | | | | | | |
| Playgrounds, Neighborhood Parks | | | | | | | | |
| Golf Courses, Riding Stables, Water Recreation, Cemeteries | | | | | | | | |
| Office Buildings, Business, Commercial and Professional | | | | | | | | |
| Normally Acceptable | Specified land use is satisfactory, based on the assumption that any buildings are of normal conventional construction, without any special noise insulation requirements. | | | | | | | |
| Conditionally Acceptable | New construction or development should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features included in design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice. | | | | | | | |
| Normally Acceptable | New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in design. | | | | | | | |
| Clearly Acceptable | New construction or development should generally not be undertaken. | | | | | | | |
| Nature of the noise environment where the CNEL or Ldn level is: | Below 55 db: Relatively quiet suburban or urban areas, no arterial streets within one block, no freeways within one-quarter mile. | | | | | | | |
| | 55-65 db: Mostly somewhat noisy urban areas, near but not directly adjacent to high volumes of traffic. | | | | | | | |
| | 65-75 db: Very noisy urban areas near arterials, freeways, or airports. | | | | | | | |
| | 75+ db: Extremely noise urban areas adjacent to freeways or under airport traffic patterns. Hearing damage with constant exposure outdoors. | | | | | | | |

*Source: Cotton/Beland/Associates, adapted from City of Los Angeles EIR Manual for Private Projects, U.S. Department of Housing and Urban Development and State of California Guidelines and U.S. EPA, Report on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety, 1974.*

***Implementation Measure AQ5-2.3***
*The City shall evaluate the feasibility of constructing new City structures to LEED standards, and will give preference in approval, water and sewer service, to housing developments that meet the LEED neighborhood design standards.*

***Implementation Measure AQ5-2.4***
*The City shall give preference in approval and water and sewer service, to housing developments that incorporate photovoltaic and or solar water heating systems.*

***Implementation Measure AQ5-2.5***
*Solar water heating and/or photovoltaic systems shall be required for all new single-family residences with more than two (2) baths, multi-family residential developments larger than four (4) units and commercial buildings larger than 20,000 square feet.*

Policy AQ5-3
The City shall encourage sustainable employee commuting and municipal transportation practices.

***Implementation Measure AQ5-3-1***
*Encourage alternatives to employees commuting as occupants of individual vehicles powered by non-sustainable fuels.*

***Implementation Measure AQ5-3-2***
*As feasible, offer free parking for alternative fuel vehicles and fuel-efficient cars.*

***Implementation Measure AQ5-3-3***
*Retire old and under-used municipal vehicles, as feasible, and promote replacement purchases of compact and hybrid vehicles.*

Implementation Measure AQ5-3.4
*Create car-pooling, van-pooling, and transit programs for municipal employees.*

***Implementation Measure AQ5-3.5***
*Implement telecommuting policy for municipal employees where feasible and appropriate*

Goal N1
**A community free from the harmful and annoying effects of excessive noise.**

Policy N1-1
The City shall ensure noise mitigation measures and techniques are incorporated into site planning, architecture, design and construction projects.

***Implementation Measure N1-1.1***
*Within one (1) year of adoption of the General Plan, the City shall develop and adopt a comprehensive noise ordinance that regulates hours of operation and controls excessive*

*noise from construction activity, lawn blowers, trimmers, street sweepers, machinery and other disturbances. The City shall restrict construction activities to the hours between 7 am and 9 pm Monday through Friday and 8 am and 5 pm on Saturday and Sunday for all development projects, unless it can be shown that longer construction hours would not increase noise impacts to sensitive receptors.*

***Implementation Measure N1-1.2***
*Require development proposals to conform with the policies of the City's Noise Element ensuring compatibility with the existing noise environment.*

***Implementation Measure N1-1.3***
*The City shall require an acoustical analysis for new development that may result in noise that exceeds specified levels.*

***Implementation Measure N1-1.4***
*Develop procedures that monitor and ensure implementation of noise mitigation measures pursuant to an acoustical analysis.*

***Implementation Measure N1-1.5***
*Require the construction of barriers to shield noise-sensitive uses from excessive noise.*

***Implementation Measure N1-1.6***
*Reduce noise generated by construction activities by requiring sound attenuation devices on construction vehicles and equipment.*

***Implementation Measure N1-1.7***
*Reduce noise generated by building equipment (e.g., HVAC, exhaust fans) by requiring buffering techniques including sound attenuation walls and berms.*

Policy N1-2
The City shall ensure acceptable noise levels near sensitive noise receptors including schools, hospitals, convalescent homes and other noise-sensitive areas.

***Implementation Measure N1-2.1***
*Periodically review and update the Noise Element to ensure policies are consistent with changing conditions in the City's noise environment. Current standards are what the City will use.*

***Implementation Measure N1-2.2***
*Enforce City, State and Federal traffic noise standards.*

***Implementation Measure N1-2.3***
*Require a landscaped buffer between commercial, industrial or mixed uses and any adjoining noise sensitive receptor.*

***Implementation Measure N1-2.4***
*Require automobile and truck access to commercial properties be the maximum practical distance from any adjoining noise sensitive receptor.*

***Implementation Measure N1-2.5***
*The City shall prohibit truck deliveries to commercial and industrial properties abutting residential uses before 7 a.m. and after 9 p.m. unless there is no feasible alternative.*

**Policy N1-3**
The City shall discourage the use of soundwalls to be used as noise buffering.

***Implementation Measure N1-3.1***
*Consistent with **Implementation Measure LU2.2-2**, the use of soundwalls is discouraged, and should only be used if other techniques such as landscaping, setbacks and screening are proved infeasible or inadequate.*

## B. Fresno County Noise Element and Noise Ordinance Standards

The Fresno County General Plan Background Report, Adopted October 3, 2000 contains a Noise Element in Chapter 10. The Noise Element standards utilized the Day-Night Level (DNL) noise descriptor. The County noise standards are shown below:

**Current Fresno County Noise Element**

The *Fresno County General Plan Noise Element*, adopted in December of 1975, establishes maximum acceptable noise levels for various land use categories (see Table 10-9).

**TABLE 10-9**

**EXISTING NOISE ELEMENT: MAXIMUM ACCEPTABLE NOISE LEVELS**

| Land Use | $L_{50}$ | | $L_{dn}$ | |
|---|---|---|---|---|
| | Daytime | Nighttime | Exterior | Interior |
| Rural Residential | 50 | 45 | 55 | 45 |
| Urban Residential & Noise Sensitive Receivers[1] | 55 | 50 | 60 | 45 |
| Urban Commercial | 65 | 60 | | |
| Urban Industrial | 70 | 70 | | |

Source: EIP Associates

[1] Schools, parks, hospitals and rest homes

The Fresno County Noise Element also contains the standards of the Fresno County Noise Ordinance.

**Fresno County Noise Ordinance**

The standards of the *Fresno County Noise Ordinance* incorporate a structure similar to that presented in the ONC's *Model Noise Ordinance* (Tables 10-6 and 10-7) and include baseline exterior noise standards that are consistent with the General Plan's $L_{50}$ guidelines (Table 10-9) for rural residential areas. County standards apply specifically to noise exposure at residences, schools, hospitals, churches, and libraries; these standards are shown in Tables 10-10a and 10-10b:

**TABLE 10-10a**

**FRESNO COUNTY NOISE CONTROL ORDINANCE: EXTERIOR NOISE STANDARDS**

| Category | Cumulative Number of Minutes in any One-Hour Time Period | Noise Level Standards (dBA) | |
|---|---|---|---|
| | | Daytime (7 a.m.-10 p.m.) | Nighttime (10 p.m.-7 a.m.) |
| 1 | 30 | 50 | 45 |
| 2 | 15 | 55 | 50 |
| 3 | 5 | 60 | 55 |
| 4 | 1 | 65 | 60 |
| 5 | 0 | 70 | 65 |

Source: Fresno County Noise Control Ordinance, July 1978

## 2. Terminology

### A. Statistical Noise Levels

Due to the fluctuating character of urban traffic noise, statistical procedures are needed to provide an adequate description of the environment. A series of statistical descriptors have been developed which represent the noise levels exceeded a given percentage of the time. These descriptors are obtained by direct readout of the Community Noise Analyzer. Some of the statistical levels used to describe community noise are defined as follows:

$L_1$ - A noise level exceeded for 1% of the time.

$L_{10}$ - A noise level exceeded for 10% of the time, considered to be an "intrusive" level.

$L_{50}$ - The noise level exceeded 50% of the time representing an "average" sound level.

$L_{90}$ - The noise level exceeded 90 % of the time, designated as a "background" noise level.

$L_{eq}$ - The continuous equivalent-energy level is that level of a steady-state noise having the same sound energy as a given time-varying noise. The $L_{eq}$ represents the decibel level of the time-averaged value of sound energy or sound pressure squared and is used to calculate the DNL and CNEL.

## B. Day-Night Level (DNL)

Noise levels utilized in the standards are described in terms of the Day-Night Level (DNL). The DNL rating is determined by the cumulative noise exposures occurring over a 24-hour day in terms of A-Weighted sound energy. The 24-hour day is divided into two subperiods for the DNL index, i.e., the daytime period from 7:00 a.m. to 10:00 p.m., and the nighttime period from 10:00 p.m. to 7:00 a.m. A 10 dB weighting factor is applied (added) to the noise levels occurring during the nighttime period to account for the greater sensitivity of people to noise during these hours. The DNL is calculated from the measured $L_{eq}$ in accordance with the following mathematical formula:

$$DNL = \left[[(10\log_{10}(10^{\Sigma Leq(7\text{-}10)})) \times 15] + [((10\log_{10}(10^{\Sigma Leq(10\text{-}7))})+10) \times 9]\right]/24$$

## C. A-Weighted Sound Level

The decibel measure of the sound level utilizing the "A" weighted network of a sound level meter is referred to as "dBA". The "A" weighting is the accepted standard weighting system used when noise is measured and recorded for the purpose of determining total noise levels and conducting statistical analyses of the environment so that the output correlates well with the response of the human ear.

## 3. Instrumentation

The on-site field measurement data were acquired by the use of one or more of the sound analyzer listed below. The instrumentation provides a direct readout of the L exceedance statistical levels including the equivalent-energy level ($L_{eq}$). Input to the meters were provided by microphones extended to a height of 5 ft. above the ground. The "A" weighting network and the "Fast" response setting of the meters were used in conformance with the applicable standards. The Larson-Davis meters were factory modified to conform with the Type 1 performance standards of ANSI S1.4. All instrumentation was acoustically calibrated before and after field tests to assure accuracy.

Bruel & Kjaer 2231 Precision Integrating Sound Level Meter
Larson Davis LDL 812 Precision Integrating Sound Level Meter
Larson Davis 2900 Real Time Analyzer
Tascam DR-40 Linear PCM Digital Audio Recorder

# APPENDIX C

## Noise Measurement Data and Calculation Tables

## DNL CALCULATIONS

CLIENT: GRANITE CONSTRUCTION CO.
FILE: 47-022
PROJECT: COALINGA QUARRY EXPANSION
DATE: 4/8-10/2015
SOURCE: EXISTING AMBIENT

| LOCATION 1 | Elks Lodge Prop. Line | | | |
|---|---|---|---|---|
| | Wed.-Thurs. | | | |
| TIME | Leq | 10^Leq/10 | | |
| 7:00 AM | 49.3 | 85113.8 | | |
| 8:00 AM | 46.7 | 46773.5 | | |
| 9:00 AM | 49.4 | 87096.4 | | |
| 10:00 AM | 46.9 | 48977.9 | | |
| 11:00 AM | 47.0 | 50118.7 | | |
| 12:00 PM | 46.7 | 46773.5 | | |
| 1:00 PM | 46.6 | 45708.8 | | |
| 2:00 PM | 52.5 | 177827.9 | | |
| 3:00 PM | 50.2 | 104712.9 | | |
| 4:00 PM | 50.5 | 112201.8 | | |
| 5:00 PM | 50.1 | 102329.3 | | |
| 6:00 PM | 49.6 | 91201.1 | | |
| 7:00 PM | 49.0 | 79432.8 | | |
| 8:00 PM | 45.4 | 34673.7 | | |
| 9:00 PM | 42.4 | 17378.0 | SUM= | 1130320.2 |
| 10:00 PM | 41.7 | 14791.1 | Ld= | 60.5 |
| 11:00 PM | 40.2 | 10471.3 | | |
| 12:00 AM | 38.8 | 7585.8 | | |
| 1:00 AM | 41.6 | 14454.4 | | |
| 2:00 AM | 38.8 | 7585.8 | | |
| 3:00 AM | 40.7 | 11749.0 | | |
| 4:00 AM | 41.3 | 13489.6 | | |
| 5:00 AM | 46.2 | 41686.9 | | |
| 6:00 AM | 48.8 | 75857.8 | SUM= | 197671.6 |
| | | | Ln= | 53.0 |
| | Daytime Level= | 60.5 | | |
| | Nighttime Level= | 63.0 | | |
| | **DNL=** | **51** | | |
| | 24-Hour Leq= | 47.4 | | |

| LOCATION 1 | Elks Lodge Prop. Line | | | |
|---|---|---|---|---|
| | Thurs.-Fri. | | | |
| TIME | Leq | 10^Leq/10 | | |
| 7:00 AM | 51.3 | 134896.3 | | |
| 8:00 AM | 47.9 | 61659.5 | | |
| 9:00 AM | 47.6 | 57544.0 | | |
| 10:00 AM | 47.1 | 51286.1 | | |
| 11:00 AM | 48.3 | 67608.3 | | |
| 12:00 PM | 45.7 | 37153.5 | | |
| 1:00 PM | 46.8 | 47863.0 | | |
| 2:00 PM | 48.4 | 69183.1 | | |
| 3:00 PM | 49.0 | 79432.8 | | |
| 4:00 PM | 48.2 | 66069.3 | | |
| 5:00 PM | 49.5 | 89125.1 | | |
| 6:00 PM | 47.0 | 50118.7 | | |
| 7:00 PM | 47.1 | 51286.1 | | |
| 8:00 PM | 45.8 | 38018.9 | | |
| 9:00 PM | 43.7 | 23442.3 | SUM= | 924687.2 |
| 10:00 PM | 42.7 | 18620.9 | Ld= | 59.7 |
| 11:00 PM | 41.2 | 13182.6 | | |
| 12:00 AM | 39.9 | 9772.4 | | |
| 1:00 AM | 37.8 | 6025.6 | | |
| 2:00 AM | 39.4 | 8709.6 | | |
| 3:00 AM | 39.2 | 8317.6 | | |
| 4:00 AM | 42.0 | 15848.9 | | |
| 5:00 AM | 44.9 | 30903.0 | | |
| 6:00 AM | 50.0 | 100000.0 | SUM= | 211380.6 |
| | | | Ln= | 53.3 |
| | Daytime Level= | 59.7 | | |
| | Nighttime Level= | 63.3 | | |
| | **DNL=** | **51** | | |
| | 24-Hour Leq= | 46.8 | | |

## DNL CALCULATIONS

CLIENT: GRANITE CONSTRUCTION CO.
FILE: 47-022
PROJECT: COALINGA QUARRY EXPANSION
DATE: 4/8-10/2015
SOURCE: EXISTING AMBIENT

| LOCATION 2 | Residential PL @ Cabrillo Dr. | | | |
|---|---|---|---|---|
| TIME | | 10^Leq/10 | | |
| 7:00 AM | 52.1 | 162181.0 | | |
| 8:00 AM | 47.8 | 60256.0 | | |
| 9:00 AM | 41.9 | 15488.2 | | |
| 10:00 AM | 48.1 | 64565.4 | | |
| 11:00 AM | 40.9 | 12302.7 | | |
| 12:00 PM | 43.3 | 21379.6 | | |
| 1:00 PM | 51.9 | 154881.7 | | |
| 2:00 PM | 53.9 | 245470.9 | | |
| 3:00 PM | 43.5 | 22387.2 | | |
| 4:00 PM | 44.2 | 26302.7 | | |
| 5:00 PM | 45.1 | 32359.4 | | |
| 6:00 PM | 45.9 | 38904.5 | | |
| 7:00 PM | 47.6 | 57544.0 | | |
| 8:00 PM | 46.5 | 44668.4 | | |
| 9:00 PM | 44.3 | 26915.3 | SUM= | 985606.9 |
| 10:00 PM | 44.5 | 28183.8 | Ld= | 59.9 |
| 11:00 PM | 45.9 | 38904.5 | | |
| 12:00 AM | 42.1 | 16218.1 | | |
| 1:00 AM | 46.7 | 46773.5 | | |
| 2:00 AM | 44.9 | 30903.0 | | |
| 3:00 AM | 45.6 | 36307.8 | | |
| 4:00 AM | 46.0 | 39810.7 | | |
| 5:00 AM | 51.0 | 125892.5 | | |
| 6:00 AM | 53.6 | 229086.8 | SUM= | 592080.7 |
| | | 1.0 | Ln= | 57.7 |
| | Daytime Level= | 59.9 | | |
| | Nighttime Level= | 67.7 | | |
| | **DNL=** | **55** | | |
| | 24-Hour Leq= | 48.2 | | |

| LOCATION 2 | Residential PL @ Cabrillo Dr. | | | |
|---|---|---|---|---|
| TIME | Leq | | | |
| 7:00 AM | 54.5 | 281838.3 | | |
| 8:00 AM | 48.0 | 63095.7 | | |
| 9:00 AM | 45.6 | 36307.8 | | |
| 10:00 AM | 41.4 | 13803.8 | | |
| 11:00 AM | 47.3 | 53703.2 | | |
| 12:00 PM | 41.7 | 14791.1 | | |
| 1:00 PM | 52.6 | 181970.1 | | |
| 2:00 PM | 53.6 | 229086.8 | | |
| 3:00 PM | 43.4 | 21877.6 | | |
| 4:00 PM | 40.6 | 11481.5 | | |
| 5:00 PM | 41.8 | 15135.6 | | |
| 6:00 PM | 39.6 | 9120.1 | | |
| 7:00 PM | 44.6 | 28840.3 | | |
| 8:00 PM | 47.7 | 58884.4 | | |
| 9:00 PM | 46.7 | 46773.5 | SUM= | 1066709.9 |
| 10:00 PM | 44.8 | 30199.5 | Ld= | 60.3 |
| 11:00 PM | 44.3 | 26915.3 | | |
| 12:00 AM | 44.2 | 26302.7 | | |
| 1:00 AM | 41.3 | 13489.6 | | |
| 2:00 AM | 40.7 | 11749.0 | | |
| 3:00 AM | 44.8 | 30199.5 | | |
| 4:00 AM | 45.7 | 37153.5 | | |
| 5:00 AM | 50.9 | 123026.9 | | |
| 6:00 AM | 55.4 | 346736.9 | SUM= | 645772.9 |
| | | | Ln= | 58.1 |
| | Daytime Level= | 60.3 | | |
| | Nighttime Level= | 68.1 | | |
| | **DNL=** | **55** | | |
| | 24-Hour Leq= | 48.5 | | |

## DNL CALCULATIONS

CLIENT: GRANITE CONSTRUCTION CO.
FILE: 47-022
PROJECT: COALINGA QUARRY EXPANSION
DATE: 4/8-10/2015
SOURCE: EXISTING AMBIENT

| LOCATION 3 | Cambridge Ave | | | |
|---|---|---|---|---|
| | Wed.-Thurs. | | | |
| TIME | Leq | 10^Leq/10 | | |
| 7:00 AM | 58.4 | 691831.0 | | |
| 8:00 AM | 57.3 | 537031.8 | | |
| 9:00 AM | 52.7 | 186208.7 | | |
| 10:00 AM | 55.2 | 331131.1 | | |
| 11:00 AM | 53.7 | 234422.9 | | |
| 12:00 PM | 54.3 | 269153.5 | | |
| 1:00 PM | 54.1 | 257039.6 | | |
| 2:00 PM | 57.7 | 588843.7 | | |
| 3:00 PM | 57.1 | 512861.4 | | |
| 4:00 PM | 58.2 | 660693.4 | | |
| 5:00 PM | 57.4 | 549540.9 | | |
| 6:00 PM | 57.6 | 575439.9 | | |
| 7:00 PM | 55.0 | 316227.8 | | |
| 8:00 PM | 54.9 | 309029.5 | | |
| 9:00 PM | 52.0 | 158489.3 | SUM= | 6177944.5 |
| 10:00 PM | 51.5 | 141253.8 | Ld= | 67.9 |
| 11:00 PM | 47.2 | 52480.7 | | |
| 12:00 AM | 41.4 | 13803.8 | | |
| 1:00 AM | 47.5 | 56234.1 | | |
| 2:00 AM | 35.1 | 3235.9 | | |
| 3:00 AM | 38.9 | 7762.5 | | |
| 4:00 AM | 42.9 | 19498.4 | | |
| 5:00 AM | 54.1 | 257039.6 | | |
| 6:00 AM | 56.1 | 407380.3 | SUM= | 958689.2 |
| | | | Ln= | 59.8 |
| | Daytime Level= | 67.9 | | |
| | Nighttime Level= | 69.8 | | |
| | **DNL=** | **58** | | |
| | 24-Hour Leq= | 54.7 | | |

| LOCATION 3 | Cambridge Ave | | | |
|---|---|---|---|---|
| | Thurs.-Fri. | | | |
| TIME | Leq | 10^Leq/10 | | |
| 7:00 AM | 58.4 | 691831.0 | | |
| 8:00 AM | 57.1 | 512861.4 | | |
| 9:00 AM | 59.5 | 891250.9 | | |
| 10:00 AM | 54.2 | 263026.8 | | |
| 11:00 AM | 56.2 | 416869.4 | | |
| 12:00 PM | 54.2 | 263026.8 | | |
| 1:00 PM | 54.7 | 295120.9 | | |
| 2:00 PM | 62.1 | 1621810.1 | | |
| 3:00 PM | 57.4 | 549540.9 | | |
| 4:00 PM | 55.5 | 354813.4 | | |
| 5:00 PM | 56.5 | 446683.6 | | |
| 6:00 PM | 55.8 | 380189.4 | | |
| 7:00 PM | 56.2 | 416869.4 | | |
| 8:00 PM | 52.4 | 173780.1 | | |
| 9:00 PM | 50.2 | 104712.9 | SUM= | 7382386.9 |
| 10:00 PM | 51.6 | 144544.0 | Ld= | 68.7 |
| 11:00 PM | 45.7 | 37153.5 | | |
| 12:00 AM | 47.3 | 53703.2 | | |
| 1:00 AM | 42.5 | 17782.8 | | |
| 2:00 AM | 43.2 | 20893.0 | | |
| 3:00 AM | 31.8 | 1513.6 | | |
| 4:00 AM | 40.2 | 10471.3 | | |
| 5:00 AM | 50.2 | 104712.9 | | |
| 6:00 AM | 55.2 | 331131.1 | SUM= | 721905.3 |
| | | | Ln= | 58.6 |
| | Daytime Level= | 68.7 | | |
| | Nighttime Level= | 68.6 | | |
| | **DNL=** | **58** | | |
| | 24-Hour Leq= | 55.3 | | |