

## 4.12 NOISE AND VIBRATION

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This section discusses the existing noise and vibration levels in the project vicinity, describes future noise and vibration levels resulting from the proposed project, and evaluates the potential for significant noise and vibration impacts with respect to established criteria of significance associated with the Project. Included in the setting section are a discussion of the fundamentals of acoustics and groundborne vibration, a description of applicable regulatory criteria, and a summary of existing noise and vibration levels at sensitive receptors in the project vicinity. The impacts and mitigation measures section establishes the criteria of significance, evaluates noise and vibration levels resulting from the proposed project, and identifies the significance of noise impacts. In support of this section, Illingworth & Rodkin, Inc. performed noise and vibration monitoring in April and May 2010.

### SETTING

#### Fundamentals of Acoustics

##### *Characteristics of Sound*

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its pitch or its loudness. Pitch is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. Loudness is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Representative outdoor and indoor noise levels in units of dBA are shown in Table 4.12-1. Technical terms are defined in Table 4.12-2.

There are several methods of characterizing sound. The most common in California is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called  $L_{eq}$ . The most common averaging period is hourly, but  $L_{eq}$  can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The Day/Night Average Sound Level ( $L_{dn}$ ) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

### **Effects of Noise**

#### *Sleep and Speech Interference*

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA  $L_{dn}$ . Typically, the highest steady traffic noise level during the daytime is about equal to the  $L_{dn}$  and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA  $L_{dn}$  with open windows and 65-70 dBA  $L_{dn}$  if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

#### *Annoyance*

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it has been determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The  $L_{dn}$  as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA  $L_{dn}$ . At an  $L_{dn}$  of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the  $L_{dn}$  increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between an  $L_{dn}$  of 60-70 dBA. Between an  $L_{dn}$  of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the  $L_{dn}$  is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

**TABLE 4.12-1  
Typical Sound Levels Measured in the Environment and Industry**

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Impression
	140		
Civil Defense Siren (100')	130		
	120		Pain Threshold
Jet Takeoff (200')	110	Rock Music Concert	
	100		Very Loud
Diesel Pile Driver (100')	90	Boiler Room Printing Press Plant	
	80		
Freight Cars (50')	70	Vacuum Cleaner In Kitchen With Garbage Disposal Running	Moderately Loud
Pneumatic Drill (50')	60		
Freeway (100')	50	Data Processing Center	
	40	Department Store	
Light Traffic (100')	30	Private Business Office	Quiet
Large Transformer (200')	20		
	10	Quiet Bedroom	
Soft Whisper (5')	0	Recording Studio	
			Threshold of Hearing

Source: Illingworth & Rodkin, Inc./Acoustical Engineers

**TABLE 4.12-2**  
**Definitions of Acoustical Terms**

<b>Term</b>	<b>Definitions</b>
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this section are A-weighted, unless indicated otherwise.
$L_{01}$ , $L_{10}$ , $L_{50}$ , $L_{90}$	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Equivalent Noise Level, $L_{eq}$	The average A-weighted noise level during the measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 PM to 10:00 PM and after addition of 10 decibels to sound levels in the night between 10:00 PM and 7:00 AM.
Day/Night Noise Level, $L_{dn}$	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 PM and 7:00 AM.
$L_{max}$ , $L_{min}$	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Illingworth & Rodkin, Inc./Acoustical Engineers

## Fundamentals of Groundborne Vibration

### *Characteristics of Vibration*

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the Peak Particle Velocity (PPV) and another is the Root Mean Square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. In this section, a PPV descriptor with units of mm/sec. or in/sec. is used to evaluate construction generated vibration for building damage and human complaints.

### *Effects of Vibration*

Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

## Existing Noise Environment in Project Area

Lake Herman Quarry is located in Solano County on the slopes of Sulphur Springs Mountain, just east of the City of Vallejo. The main quarry entrance is located on Lake Herman Road approximately 0.6 miles east of its intersection with Columbus Parkway, a thoroughfare in the City of Vallejo.

Properties adjoining the active portion of the quarry site to the north, east and south are predominantly used for rangeland and open space. Parcel sizes range from less than one acre to more than 400 acres. The Blue Rock Springs Golf Course, owned by the City of Vallejo, is located on 114 acres to the northwest of the Project site.

The current hours of operation at the quarry are Monday thru Friday from 7:00 a.m. to 10:00 p.m. and Saturday from 7:00 a.m. to 4:30 p.m. Hours may be extended during emergency situations.

Noise measurements were made at locations surrounding the quarry during April and May 2010. The noise monitoring survey included long-term noise measurements at four locations and six short-term noise measurements. Several additional noise measurements were made within the quarry itself to document noise levels near equipment and processing areas. Figure 4.12-1 shows the approximate locations of noise measurements on an aerial photograph of the area.

Continuous noise measurements were made at four locations surrounding the quarry between Thursday, April 29, 2010 and Tuesday, May 4, 2010. Measurements made at night and over the weekend were representative of existing conditions without the quarry in operation. Weather conditions during the survey were favorable for noise monitoring purposes, generally consisting of clear to partly cloudy skies and calm to light winds.

Site LT-1 was near Turnberry Way residences, approximately 420 feet from the center of Columbus Parkway and approximately 3,200 feet west of the existing rock processing plant and Project boundary. Noise levels measured at this site were primarily the result of vehicle traffic along Columbus Parkway. Distant quarry operations were audible in the absence of local traffic noise. Day-night average noise levels measured at Site LT-1 ranged from 58 dBA to 60 dBA  $L_{dn}$ . Hourly noise data gathered at this site are summarized in Figures 4.12-2 to 4.12-7. As shown on these figures, hourly average noise levels during quarry operational hours (7:00 a.m. to 10:00 p.m.) typically ranged from 53 to 60 dBA  $L_{eq}$ . Hourly average noise levels were slightly lower over the weekend when the quarry was not operating, typically ranging from 51 to 59 dBA  $L_{eq}$ .

Long-term noise measurement LT-2 was located just north of the nearest existing residence located east of the quarry along Sky Valley Lane. This position was approximately 3,500 feet east of the existing quarry pit. The distance and acoustical shielding provided by intervening topography results in little to no quarry-related noise received at this location. Day-night average noise levels measured at Site LT-2 were low ranging from 49 dBA to 52 dBA  $L_{dn}$ , with and without the quarry operating. Noise data gathered at Site LT-2 are summarized in Figures 4.12-8 to 4.12-13.

Site LT-3 was selected to document noise levels near the asphalt and concrete plants located within the quarry. This monitoring position was approximately 400 feet from the acoustic center of the processing plants. Calculated day-night average noise levels ranged from 61 dBA to 62 dBA  $L_{dn}$  on weekdays when the quarry was operational and from 53 dBA to 56 dBA  $L_{dn}$  on the weekend. Hourly noise data gathered at this site are summarized in Figures 4.12-14 to 4.12-19. Hourly average noise levels during time periods where activities were occurring at the asphalt and concrete plants ranged from 61 to 67 dBA  $L_{eq}$ .

Noise measurement site LT-4 was located approximately one mile northwest of the existing extents of the quarry pit, at the end of St. John's Mine Road (McIntire Ranch property). This location was selected to represent the ambient noise environment at the nearest sensitive uses north and northwest of the quarry site. Ambient noise levels were primarily the result of distant traffic, wind through vegetation, and birds/insects. Quarry noise was not observed at this site. Measured noise levels at this site were generally low with day-night average noise levels ranging from 48 dBA to 51 dBA  $L_{dn}$ . Hourly average noise levels during the daytime typically ranged from 41 to 50 dBA  $L_{eq}$  on weekdays and over the weekend. Noise data gathered at Site LT-4 are summarized in Figures 4.12-20 to 4.12-25.

Short-term noise measurements were made at six locations in the site vicinity on April 30, 2010 and May 3, 2010 (indicated as Sites ST-1 to ST-6 on Figure 4.12-1). Data collected at these sites were primarily the result of vehicle traffic along area roadways. Table 4.12-3 summarizes the results of the short-term noise measurements.

**TABLE 4.12-3  
Short-Term Noise Measurements along Area Roadways**

Site Description (Date/Time)	Noise Level, dBA				Comments
	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>	Est. L <sub>dn</sub>	
ST-1 ~ 420 feet from the center of Columbus Parkway, east of Turnberry Way residences. (4/30/10, 1040 -1050)	68	59	51	60	87 autos, 1 medium-duty truck, 14 heavy-duty trucks
ST-2 ~ 60 feet from the center of Lake Herman Road at Sky Valley Lane. (5/3/10, 1140 -1150)	76	61	41	61	17 autos, 1 bus, 1 motorcycle
ST-3 ~ 220 feet from the center of Ascot Parkway at Hawkins Street. (5/3/10, 1210 -1220)	59	49	38	<50	18 autos, 1 motorcycle
ST-4 ~ 65 feet from the center of Columbus Parkway south of Ascot Parkway. (5/3/10, 1230 -1240)	76	65	52	65	102 autos, 1 heavy-duty truck
ST-5 ~ Front of 224 Turnberry Way. (5/3/10, 1300 -1310)	56	43	39	<50	1 local auto, quarry noise (back-up alarms) barely audible
ST-6 ~ 100 feet from the center of Columbus Parkway west of Blue Rock Springs Park. (5/3/10, 1340 -1350)	80	68	47	68	106 autos, 17 heavy-duty trucks

Short-term noise measurements were also made to quantify the source levels of stationary and mobile equipment operating within the quarry. Significant sources of stationary noise include rock crushing and screening operations at the rock plant, operations at the asphalt batch plant, operations at the concrete plant, and operations at the recycling area. The equipment in these areas is continuous feed in nature. As a result, the noise produced by these stationary noise sources is fairly constant whenever in operation. The primary crushing process is a batch feed operation in which large rock is fed into the crusher by a front-end loader. Noise is generated by the circulation of the loader between the material pile and the hopper, rock falling into the hopper, and from the crushing of the rock itself within the primary jaw crusher. The rock is then conveyed to secondary crushers and screened in order to sort the material by size. Noise levels are approximately 69 to 77 dBA when normalized at a receptor positioned 150 feet from acoustic center of these activities. Table 4.12-4 summarizes the results of the short-term noise measurements made within the quarry.

**TABLE 4.12-4**  
**Short-Term Noise Measurements within Lake Herman Quarry**

Site Description (Date/Time)	Noise Level, dBA			Comments
	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>	
Q-1 ~ 160 feet west of the asphalt plants. (5/4/10, 0950 -1000)	86	75	74	Asphalt plants plus truck traffic
Q-2 ~ 120 feet southwest of the concrete plant. (5/4/10, 1010 -1020)	88	79	74	Concrete plant plus truck traffic
Q-3 ~ 225 feet from loaders and dozer operating on the quarry bench. (5/4/10, 1035 -1040)	78	66	60	Front-end loader and dozer operating simultaneously on bench
Q-4 ~ 150 feet west of rock plant. (5/3/10, 1050 -1100)	80	73	71	Rock plant, loader, and trucks
Q-5 ~ 105 feet east of rock plant. (5/3/10, 1050 -1100)	83	79	77	1 local auto, quarry noise (back-up alarms) barely audible

### Existing Vibration Levels from Blasting

A blast event was monitored at Lake Herman Quarry on April 30, 2010 to document existing ground vibration levels and air-blast overpressures at locations representative of nearby receptors. The blasting event occurred at 11:10 a.m. Weather conditions during the blast consisted of clear skies, an air temperature of approximately 70° F., and calm to light winds from the west.

According to the blaster's report, approximately 11,860 pounds of explosives were distributed amongst fourteen 6 ¾-inch diameter holes. The holes were drilled to depths ranging from 65 to 70 feet on the east face of the quarry. A 16-foot x 18-foot grid was used to space the holes and a maximum of 900 pounds of explosives were used per hole.

The blast monitoring occurred at three locations as indicated in Figure 4.12-1. Vibration monitoring location V-1 was near noise monitoring location LT-1, just east of residences located along Turnberry Way. This location was approximately 5,200 feet west of the blast. Personnel at the station were able to audibly and visually detect the blast. Vibration levels resulting from the blast reached 0.003 in/sec PPV and the air-blast overpressure was recorded at 112 dB(L).

Vibration monitoring location V-2 was approximately 3,100 feet west of the blast zone near Blue Rock Springs Golf Course. Syar representatives also monitored the blast at this site. Vibration levels resulting from the blast reached 0.019 in/sec PPV and the air-blast overpressure was recorded at 114 dB(L). The co-located equipment operated by Syar recorded data that was consistent with the data collected by I&R.

The third vibration monitoring location, V-3 was approximately 4,100 feet east of the blast zone along Sky Valley Lane, adjacent to the nearest sensitive residential receptors. Vibration levels resulting from the blast reached 0.013 in/sec PPV. The air-blast resulted in a noise levels of 106 dB(L).

### REGULATORY FRAMEWORK

The State of California, Solano County, and the City of Vallejo have established plans and policies that are designed to limit noise exposure at noise sensitive land uses. Applicable regulatory materials include: (1) the State CEQA Guidelines, Appendix G; (2) the Public Health and Safety Element of the Solano County General Plan; (3) the Zoning Regulations contained in the Solano County Code; (4) the City of Vallejo General Plan Noise Elements; and (5) the City of Vallejo Noise Ordinance.

## State CEQA Guidelines

The State CEQA guidelines address how to evaluate the significance of effects of environmental noise and vibration attributable to a proposed project. Applicable CEQA questions ask whether a proposed project 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 vibration 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.

The checklist question regarding temporary or periodic noise increases usually applies to construction activities. For this project, noise resulting from the replacement of the bridge across Sulphur Springs Creek would be considered temporary and all other noise level changes would be considered permanent. Checklist questions addressing aircraft noise are not applicable to the project because the site is not located within an airport land use plan or near a public or private airport. Airport noise impacts are not discussed further.

The California Environmental Quality Act does not define what ambient noise level increase would be considered substantial. This determination is made by the lead agency. Typically, in higher noise environments (e.g., where the day-night average noise level would exceed the “normally acceptable” level established by the lead agency), the impact would be considered significant if the  $L_{dn}$  due to the project would increase existing noise levels by 3 dBA  $L_{dn}$  or more at noise-sensitive receptors. Where the noise environment with the project would remain at or below the normally acceptable level (e.g., 60 dBA  $L_{dn}$ ), a somewhat higher increase can be tolerated (up to 5 dBA  $L_{dn}$ ) before a significant impact would occur. It is generally accepted that in quiet to moderate noise environments, such as the noise environment in areas in the vicinity of the Quarry away from Columbus Parkway and Lake Herman Road, a 5 decibel increase in the day/night average noise level is required to substantially increase the percentage of people highly annoyed by the noise. For temporary construction noise, hourly average noise levels exceeding 60 dBA  $L_{eq}$ , and the ambient noise level by at least 5 dBA  $L_{eq}$ , for a period greater than one year would constitute a significant temporary noise increase at adjacent residential land uses.

## Solano County General Plan

Refer to the following section for a list of the noise related goals and policies applicable to the Project.

The General Plan also presents a noise and land use compatibility matrix (General Plan Table HS-2; see Table 4.12-5 below) to identify acceptable and unacceptable noise level ranges for specific land use types. The matrix is based on the State of California Land Use Noise Compatibility Matrix for evaluating the compatibility of proposed land uses with the on-site noise environment. In addition, the General Plan establishes non-transportation noise standards (General Plan Table HS-4; see Table 4.12-6 below).

**TABLE 4.12-5  
Solano County Land Use Noise Compatibility Guidelines**

Land Use Category	Community Noise Exposure					
	L <sub>dn</sub> or CNEL, dB					
	55	60	65	70	75	80
Residential – Low Density Single Family, Duplex, Mobile Home	[Hatched]		[Hatched]		[Solid Black]	[Cross-hatched]
Residential – Multi-family	[Hatched]		[Hatched]		[Solid Black]	[Cross-hatched]
Transient Lodging – Motel, Hotel	[Hatched]		[Hatched]		[Solid Black]	[Cross-hatched]
Schools, Libraries, Churches, Hospitals, Nursing Homes	[Hatched]		[Hatched]		[Solid Black]	[Cross-hatched]
Auditoriums, Concert Halls, Amphitheaters	[Hatched]		[Cross-hatched]		[Cross-hatched]	
Sports Arena, Outdoor Spectator Sports	[Hatched]		[Hatched]		[Solid Black]	[Cross-hatched]
Playgrounds, Neighborhood Parks	[Hatched]		[Solid Black]		[Cross-hatched]	[Cross-hatched]
Golf Courses, Riding Stables, Water Recreation, Cemeteries	[Hatched]		[Hatched]		[Solid Black]	[Cross-hatched]
Office Buildings, Business Commercial, Professional	[Hatched]		[Hatched]		[Hatched]	[Solid Black]
Industrial, Manufacturing, Utilities, Agriculture	[Hatched]		[Hatched]		[Hatched]	[Solid Black]
 <b>Normally Acceptable</b> Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.	 <b>Normally Unacceptable</b> New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.					
 <b>Conditionally Acceptable</b> New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.	 <b>Clearly Unacceptable</b> New construction or development should generally not be undertaken.					

SOURCE: Solano County General Plan, December 2008, Table HS-2.

**TABLE 4.12-6  
Solano County Non-Transportation Noise Standards**

Receiving Land Use	Outdoor Area		Interior <sup>2</sup> – Day and Night	Notes
	Average dBA $L_{eq}$ /Maximum dBA $L_{max}$ <sup>1</sup>		Average dBA $L_{eq}$ /maximum dBA $L_{max}$ <sup>1</sup>	
	Daytime	Nighttime		
All Residential	55/70	50/65	35/55	
Transient Lodging	55/75	---	35/55	3
Hospitals and Nursing Homes	55/75	---	35/55	4, 5
Theaters and Auditoriums	---	---	30/50	5
Churches, Meeting Halls, Schools, Libraries, etc.	55/75	---	35/60	5
Office Buildings	60/75	---	45/65	5
Commercial Buildings	55/75	---	45/65	5
Playgrounds, Parks, etc.	65/75	---	---	5
Industry	60/80	---	50/70	5

SOURCE: Solano County General Plan, December 2008, Table HS-4

$L_{eq}$  = equivalent or energy-averaged sound level,  $L_{max}$  = highest root-mean-square sound level measured over a given period of time

<sup>1</sup> The standards shall be reduced by 5 dBA for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards, then the noise level standards shall be increased at 5-dBA increments to encompass the ambient.

<sup>2</sup> Interior noise level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in closed positions.

<sup>3</sup> Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.

<sup>4</sup> Hospitals are often noise-generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.

<sup>5</sup> The outdoor activity areas of these uses (if any) are not typically used during nighttime hours.

### Solano County Code

Chapter 28, Zoning Regulations, of the Solano County Code established general noise and vibration-related development standards applicable to all land use types in every zoning district. Section 28.70.10

prevents offensive noise and vibration. Specifically, vibrations detectable beyond any property line and noise levels exceeding 65 dBA  $L_{dn}$  are prohibited by the Zoning Regulations.

### **City of Vallejo General Plan**

The Vallejo General Plan establishes noise and land use compatibility guidelines for new development. In residential areas the maximum exterior noise level goal at primary outdoor use areas is 60 dBA  $L_{dn}$ . Noise levels up to of 65 dBA  $L_{dn}$  may be allowed at the discretion of the City where it is not economically or aesthetically reasonable to meet the more restrictive outdoor goal. The interior noise standard is 45 dBA  $L_{dn}$  for all residential uses, including single and multi-family housing, hotels/motels and residential healthcare facilities. Policy 2b limits, where appropriate, noise generating activities (for example, construction and maintenance activities and loading and unloading activities) to the hours of 7:00 am to 9:00 pm.

The Noise Element also addresses “increase in the ambient” resulting from a proposed project. That is the amount by which a new project would cause noise levels in a community to increase above existing levels. When approving new development, project related noise increases shall be limited to 5 dBA in quiet residential areas and to no more than 3 dBA in residential areas where noise levels currently exceed 60 dBA  $L_{dn}$ .

### **City of Vallejo Noise Ordinance**

The Vallejo Municipal Code establishes noise performance standards for noise sources and receptors in Vallejo. Section 7.84.010 generally prohibits loud unnecessary noises, but does not provide quantifiable noise level limits. Section 7.84.020 defines a “noise disturbance” as any sound which (1) endangers or injures the safety or health of humans or animals; (2) annoys or disturbs a reasonable person of normal sensitiveness; or (3) endangers or injures personal or real property. Section 12.40.070 addresses excavating, grading and filling related to construction: All grading and noise there from, including but not limited to, warming of equipment motors, in residential zones or within 1,000 feet of any residential occupancy, hotel, motel or hospital shall be limited to between the hours of 7:00 am to 6:00 pm.

Chapter 16.72 establishes noise performance standards for land use generated noise. When sound is received at a rural residence the maximum allowable level is 55 dBA. The maximum allowable level is 60 dBA  $L_{eq}^1$  at low, medium, and high density residential districts. Correction factors are applied for time of day that the noise is generated and the character of the noise. If noise is only generated during the daytime (7:00 am to 10:00 pm) the allowable limit would be raised 5 dBA to 65 dBA  $L_{eq}$ . If the noise source is impulsive such as hammering or screeching, the allowable level would be reduced 5 dBA. Sounds from transportation equipment used exclusively in the movement of goods and people to and from a given premises are exempted from the code.

### **Goals and Policies of the Solano County General Plan**

The following are the noise goals, policies, and implementation programs from the Solano County General Plan that are applicable to this Project.

- HS.G-3     Protect people living, working, and visiting Solano County from the harmful impacts of excessive noise.**
- HS.G-4     Protect important agricultural, commercial, and industrial uses in Solano County from encroachment by land uses sensitive to noise and air quality impacts.**

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<sup>1</sup> Section 16.72.060 – Noise level measurement.

D. Measured Sound Levels. The measurement of sound level limits shall be the average sound level for a period of one hour.

- HS.P-48 Consider and promote land use compatibility between noise-sensitive<sup>2</sup> and noise-generating land uses when reviewing new development proposals.
- HS.P-51 Develop strategies with residents and businesses to reduce noise conflicts.
- HS.P-52 Minimize noise conflicts between current and proposed land uses and transportation networks by encouraging compatible land uses around critical areas with higher noise potential.
- HS.I-66 Trucks tend to generate noise in excess of applicable standards, but goods movement by truck is necessary to support the area's economy. Thus, continue to designate and maintain established truck routes where noise conflicts with land uses are least likely to occur.
- HS.I-67 When reviewing new development proposals,
- Require noise abatement measures to ensure that noise levels will not exceed those indicated in Tables HS-3 and HS-4.
  - Require buffering between noise-sensitive land uses and noise sources unless a detailed noise analysis is conducted and noise abatement measures can be taken to reduce noise to acceptable levels as shown on Tables HS-3 and HS-4.
  - Where development projects produce, or are affected by, nontransportation-related noise, require the inclusion of project features that will enable the project to achieve acceptable levels specified in Table HS-4, as measured at outdoor activity areas of existing and planned noise-sensitive land uses.
  - Require noise mitigation to reduce construction and other short-term noise impacts as a condition of approval for development projects by applying the performance standards outlined in Table HS-4. The total noise level resulting from new sources and ambient noise shall not exceed the standards in Table HS-4, as measured at outdoor activity areas of any affected noise sensitive land use except:
    - If the ambient noise level exceeds the standard in Table HS-4, the standard becomes the ambient level plus 5 dB.
    - Reduce the applicable standards in Table HS-4 by 5 dB if they exceed the ambient level by 10 or more dB.
    - Under the conditions outlined below, require acoustical studies to be prepared as part of the development review process to ensure adequate analysis of proposed development and incorporation of noise reducing features in project designs. Acoustical studies with appropriate noise abatement measures will be required for all discretionary projects where any of the following conditions apply:
      - The project is located within the existing or future 60 dB CNEL transportation noise contours as measured at outdoor activity areas of noise-sensitive land uses.
      - The project will cause future traffic volumes to exceed 5,000 average daily trips on any roadway that fronts residential, institutional, and open space land uses or will cause traffic volume to increase by 25 percent or more, on any of these roadways

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<sup>2</sup> The General Plan states noise-sensitive land uses include schools, hospitals, rest homes, long-term care, mental care facilities, and residences. Outdoor activity areas are considered to be the portion of a noise-sensitive property where outdoor activities would normally be expected (i.e., patios of residences and outdoor instructional areas of schools). Outdoor activity areas for the purposes of this section do not include gathering spaces alongside transportation corridors or associated public rights-of-way.

- The project will introduce noise or vibration sources associated with mechanical equipment operations, entertainment, maintenance, and facility operations.
  - The project is a proposed residential use in the vicinity of existing and proposed commercial and industrial areas.
  - The project is proposed in an area where existing noise levels exceed acceptable levels in Table HS-4 as measured at outdoor activity areas of noise sensitive land uses.
- Where it is not possible to reduce noise levels in outdoor activity areas to 60 dB or less using practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB may be allowed, provided that all available exterior noise level reduction measures have been implemented.

HS.I-69 Promote the use of berms, landscaping, setbacks, or architectural design for noise abatement, in addition to conventional wall barriers, to enhance aesthetics and minimize pedestrian barriers. Development of noise-sensitive land uses in areas exposed to existing or projected levels of noise from transportation, stationary sources, or agricultural operations exceeding, or estimated to exceed, levels specified in Table HS-2 shall require transportation planning, traffic calming, site planning, buffering, sound insulation, or other methods to reduce noise exposure in outdoor activity areas and interior spaces to the levels specified in Table HS-2.

HS.I-71 Locate industrial and other noise-generating land uses away from noise-sensitive land uses and/or require substantial noise sources to be completely enclosed within buildings or structures.

## EVALUATION CRITERIA WITH THRESHOLDS OF SIGNIFICANCE

Table 4.12-7 summarizes both the evaluation criteria and significance thresholds used to address potential impacts to noise.

**TABLE 4.12-7**  
**Evaluation Criteria with Significance Threshold – Noise**

Evaluation Criteria	As Measured by	Significance Threshold	Sources of Criteria
NO-1. Will Project operation generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Projected noise levels as measured at the receiving land use based on applicable state or local regulation.	Operational noise levels exceeding 60 dBA $L_{dn}$ . Operational noise levels during the daytime exceeding 55 dBA $L_{eq}$ or 70 dBA $L_{max}$ . Operational noise levels during the night exceeding 50 dBA $L_{eq}$ or 65 dBA $L_{max}$ . Operational noise levels exceeding 60 dBA $L_{eq}$ .	CEQA Guidelines Appendix G, Checklist Item XII (a) Solano County General Plan Solano County Code Vallejo General Plan Vallejo Municipal Code
NO-2. Will the Project operation activities result in generation of excessive ground-borne vibration levels?	Projected vibration levels at receiving land use.	Greater than 0.2 inch/sec. peak particle velocity.	CEQA Guidelines Appendix G, Checklist Item XI (b) Federal Transit Administration vibration damage criteria (e.g., minor cracking) for non-engineered timber and masonry buildings
NO-3. Will the Project result in a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?	Projected noise levels at receiving land uses with the Project compared to ambient noise levels.	a) Greater than 5 dBA $L_{dn}$ increase and remaining below “normally acceptable” noise levels for affected use, or b) greater than 3 dBA $L_{dn}$ increase exceeding the “normally acceptable” level of the affected use.	CEQA Guidelines Appendix G, Checklist Item XI (c) Solano County General Plan Vallejo General Plan

Evaluation Criteria	As Measured by	Significance Threshold	Sources of Criteria
NO-4. Will the Project result in a temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?	Projected noise levels at receiving land uses with the Project compared to ambient noise levels.	Hourly average noise levels exceeding 60 dBA $L_{eq}$ , and the ambient noise level by at least 5 dBA $L_{eq}$ , for a period greater than one year.	CEQA Guidelines Appendix G, Checklist Item XI (d)

**METHODOLOGY**

Noise impacts resulting from the Project were assessed based on a description of the activities proposed as part of the Project and proposed hours of operation. Future noise levels were calculated at nearby receptors and assessed with respect to applicable regulatory criteria (refer to Appendix H for the noise monitoring results). The following project-specific details were assumed:

On-Site Quarry Operations

The Project would extend the life of the Quarry by 35 years, maintain the annual saleable aggregate product at 3.0 million tons, and expand the boundaries of the quarry pit to include an additional 98 acres to the east, north and west of the existing mining area, increasing the quarry pit to 211 acres. Areas of active mining would be increased along the east, north, and west slopes of the quarry pit plus the quarry floor itself. The maximum elevation of the mining depth for the Project would be 0 feet above msl. Portions of the expanded mining area would be within the view of residential receptors along Sky Valley Lane when overburden and rock are removed from the upper benches of the expanded mining areas. As the mining progresses downward to the quarry floor, the top of the slope would shield the activities from the receptors located along Sky Valley Lane. Some mining activities would remain visible at receptors located to the west (e.g., Turnberry Way). Receptors located north, northwest, and southwest of the quarry would continue to be shielded by intervening topography.

The Project would use the same mining techniques as currently used and approved under the existing Use Permit and Mining and Reclamation Plan for the Quarry. The types of on-site facilities would remain the same and would not be expanded for the purposes of processing additional material. However, some existing facilities would be modified with new technology or equipment replaced to meet market demand. The existing noise-generating equipment that would be modified as part of the Project includes recycled asphalt pavement (RAP) handling equipment at both existing asphalt plants, and a three-bin aggregate mixing system at the aggregate processing facilities. The RAP includes dual hoppers, transfer conveyor belt, screen conveyor belt, vibrating screen, feed conveyor belt, holding hopper, and pug mill feed conveyor. This equipment would allow for a certain percentage of virgin material currently used in the asphalt mix to be replaced with recycled material. The recycled asphalt from existing onsite stockpiles would be used to make this product. The minor modifications to equipment proposed as part of the Project would be in well-shielded areas and would replace other noise-generating activities. There would be a no-net change in noise levels from the proposed equipment modification in the processing areas. In addition, over time the existing equipment may need to be replaced with newer equipment due to age or new technologies that are not fully developed or known at this time. Table 4.12-8 summarizes the proposed regular operational hours. In addition to these regular hours, aggregate processing would be allowed to operate up to 7 days a week and 24 hours a day, depending on customer requirements and market conditions.

**TABLE 4.12-8  
Regular Hours of Operation**

Facility or Operation	Season	Operational Days	Operational Hours
Aggregate Sales	Construction	Monday-Friday	5:30 a.m. – 4:00 p.m.
	Off Season	Monday-Friday	6:00 a.m. – 4:00 p.m.
Concrete Plant Sales	Year Around	Monday-Friday	5:30 a.m. – 4:00 p.m.
Asphalt Plants	Year Around	Monday-Friday	7:00 a.m. – 3:30 p.m.
Aggregate Processing	Construction	Monday-Friday	24 hours/day
	Off Season	Monday-Friday	6:00 a.m. – 10:30 p.m.
Aggregate Mining	Construction	Monday-Friday	6:00 a.m. – 10:30 p.m.
	Off Season	Monday-Friday	6:00 a.m. – 2:30 p.m.

Groundborne Vibration

A blast event was monitored at Lake Herman Quarry on April 30, 2010 to document existing ground vibration levels and air-blast overpressures at locations representative of nearby receptors. The blasting event occurred at 11:10 a.m. Weather conditions during the blast consisted of clear skies, an air temperature of approximately 70° F., and calm to light winds from the west.

According to the blaster’s report, approximately 11,860 pounds of explosives were distributed amongst fourteen 6 ¾-inch diameter holes. The holes were drilled to depths ranging from 65 to 70 feet on the east face of the quarry. A 16-foot x 18-foot grid was used to space the holes and a maximum of 900 pounds of explosives were used per hole.

The assessment of groundborne vibration levels associated with blasting assumed that measured vibration levels resulting from a typical blast at the quarry would be representative of the vibration levels associated with future blasting events. Existing vibration levels were adjusted to reflect the change in distance relative to the nearest receptors and compared to appropriate thresholds.

**IMPACTS AND MITIGATION MEASURES**

**Impact:** **NO-1. Will Project operations generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?**

**Analysis:** *Less than Significant*

Noise levels from project operations were calculated at the nearest noise-sensitive receptors to the west (Turnberry Way single-family residences, 3,200 feet from on-site support facilities, 3,800 feet from near edge of quarry pit), which currently have direct line-of-sight to some quarrying activities, and at the nearest noise-sensitive receptors to the east (Sky Valley Lane, single-family residence, 5,200 feet from on-site support facilities, 3,100 feet from near edge of quarry pit), which would at times have direct line-of-sight to aggregate mining activities when these activities occur at the top of the quarry pit. These receptor positions were considered to be the most affected receptors for the analysis because of their relative proximity to Lake Herman Quarry and that intervening topography would not provide additional shielding during worst-case operations. Receptors located to the north, northwest, southwest, southeast, and northeast would be

subject to lower operational noise levels because of increased distance from the source and/or shielding provided by intervening terrain.

The predominant noise source attributable to future operations would be unshielded aggregate mining activities. Data contained in Illingworth & Rodkin, Inc. files indicate that average noise levels generated by aggregate mining activities would be approximately 80 dBA  $L_{eq}$  at a distance of 100 feet. Maximum instantaneous noise levels would be about 5 dBA higher (85 dBA  $L_{max}$ ) at the same distance. Noise levels are calculated to be about 33 dBA lower at the nearest receptors to the east and approximately 35 dBA lower at the nearest receptors to the west assuming a standard attenuation rate of 6 dB per doubling of distance from the noise source and assuming an additional 1 dB of attenuation per 1,000 feet due to atmospheric absorption. Aggregate mining activities are calculated to result in worst-case noise levels of 50 dBA  $L_{max}$  and 45 dBA  $L_{eq}$  at the most affected residential receptors in the Turnberry Way vicinity, and 52 dBA  $L_{max}$  and 47 dBA  $L_{eq}$  at the most affected residential receptor along Sky Valley Lane.

Noise from the remaining sources on site (i.e., operations at the concrete plant, asphalt plants, and aggregate processing area would generally remain shielded from the nearest receptors to the west or east by intervening terrain. Operational noise levels from the concrete plant, asphalt plants, and aggregate processing area were added to the noise from unshielded aggregate mining activities to calculate overall operational noise levels. These data are summarized in Tables 4.12-9 and 4.12-10.

Overall noise levels from the Project would not exceed the noise level limits established in the Solano County General Plan, City of Vallejo General Plan, or City of Vallejo Municipal Code at most affected receptor locations west or east of Lake Herman Quarry. Operational noise levels would also be in compliance with the established noise level limits at receptors located to the north, northwest, southwest, southeast, and northeast because of increased distance from the source and/or shielding provided by intervening terrain. This is a less than significant impact.

**TABLE 4.12-9  
Worst-Case Operational Noise Levels (dBA) at Most-affected Receptors to West**

Noise Source	Season	Operational Hours	$L_{max}$	$L_{eq}$	$L_{dn}$
Concrete Plant	Year Around	5:30 a.m. – 4:00 p.m.	46	37	37
Asphalt Plants	Year Around	7:00 a.m. – 3:30 p.m.	46	35	31
Aggregate Processing and Sales	Construction	Processing - 24 hours/day Sales - 5:30 a.m. – 4:00 p.m.	40	36	42
	Off Season	Processing – 6:00 a.m. – 10:30 p.m. Sales - 6:00 a.m. – 4:00 p.m.	40	36	37
Aggregate Mining	Construction	6:00 a.m. – 10:30 p.m.	50	45	46
	Off Season	6:00 a.m. – 2:30 p.m.	50	45	44

Noise Source	Season	Operational Hours	L <sub>max</sub>	L <sub>eq</sub>	L <sub>dn</sub>
<b>Overall Operations</b>	<b>Construction</b>	<b>24 hours/day</b>	<b>50</b>	<b>46</b>	<b>48</b>
	<b>Off Season</b>	<b>5:30 a.m. – 10:30 p.m.</b>	<b>50</b>	<b>46</b>	<b>45</b>
<b>Applicable Vallejo Noise Limits</b>	<b>Daytime</b>		<b>--</b>	<b>60</b>	<b>60</b>
	<b>Nighttime</b>		<b>--</b>	<b>60</b>	
<b>Exceeds Noise Limits?</b>			<b>No</b>	<b>No</b>	<b>No</b>

**TABLE 4.12-10  
Worst-Case Operational Noise Levels (dBA) at Most-affected Receptor to East**

Noise Source	Season	Operational Hours	L <sub>max</sub>	L <sub>eq</sub>	L <sub>dn</sub>
Concrete Plant	Year Around	5:30 a.m. – 4:00 p.m.	40	31	31
Asphalt Plants	Year Around	7:00 a.m. – 3:30 p.m.	40	29	25
Aggregate Processing and Sales	Construction	Processing - 24 hours/day Sales - 5:30 a.m. – 4:00 p.m.	34	30	36
	Off Season	Processing – 6:00 a.m. – 10:30 p.m. Sales - 6:00 a.m. – 4:00 p.m.	34	30	31
Aggregate Mining	Construction	6:00 a.m. – 10:30 p.m.	52	47	48
	Off Season	6:00 a.m. – 2:30 p.m.	52	47	46
<b>Overall Operations</b>	<b>Construction</b>	<b>24 hours/day</b>	<b>52</b>	<b>47</b>	<b>48</b>
	<b>Off Season</b>	<b>5:30 a.m. – 10:30 p.m.</b>	<b>52</b>	<b>47</b>	<b>46</b>
<b>Applicable Solano County Noise Limits</b>	<b>Daytime</b>		<b>70</b>	<b>55</b>	<b>60</b>
	<b>Nighttime</b>		<b>65</b>	<b>50</b>	
<b>Exceeds Noise Limits?</b>			<b>No</b>	<b>No</b>	<b>No</b>

Mitigation: No mitigation is necessary.

**Impact: NO-2. Will Project construction activities result in generation of excessive ground-borne vibration levels?**

Analysis: *Less than Significant*

Rock is loosened from the quarry face by blasting. Blasting generates airborne noise and groundborne vibration. With the project, blasting would continue to occur based on the demand for material. Noise and vibration levels generated by blasting would be expected to be similar to existing conditions. The nearest sensitive residences would be located over 3,000 feet east of the area of the quarry where blasting would occur. The nearest residential receptors to the north, west, and south would be over 4,000 feet from proposed quarry blasting areas.

While residents may be able to occasionally hear sounds from blasting events, these sounds would continue to occur on a fairly infrequent basis. Audible sounds from blasting events would not exceed typical maximum noise levels from other area noise sources, and these brief intermittent events would not be expected to substantially increase hourly average or daily average noise levels.

The distance separating receptors from the proposed blasting areas is sufficient that the vibration effects are less than significant. Future blasting events would not be expected to result in groundborne vibration levels substantially above 0.02 in/sec PPV (maximum vibration level measured at V-2 (refer to Figure 4.12-1), approximately 3,100 feet west of the quarry blast zone near Blue Rock Springs Golf Course). This level is below the 0.03 in/sec PPV human threshold for perceptibility, and well below the 0.2 in/sec PPV limit established by the Federal Transit Administration as a safe limit to avoid damage to non-engineered timber and masonry buildings. Therefore, the impact from ground-borne vibration is considered less than significant.

Mitigation: No mitigation is necessary.

**Impact: NO-3. Will the Project result in a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?**

Analysis: *Less than Significant*

As indicated in Tables 4.12-9 and 4.12-10, day-night average noise levels from proposed quarry operations are calculated to be 48 dBA  $L_{dn}$  during the construction season at most affected receptors to the west and east. Existing day-night average noise levels in the rear yards of the nearest Turnberry Way residences are estimated to range from about 53 to 55 dBA  $L_{dn}$ , including current quarry operations. The proposed project is calculated to increase day-night average noise levels in the rear yards of the nearest Turnberry Way residences by at most 1 dBA  $L_{dn}$ .

Existing day-night average noise levels at the nearest Sky Valley Lane residence range from about 49 to 52 dBA  $L_{dn}$ , including current quarry operations. The proposed project would generate a day-night average noise level of 48 dBA  $L_{dn}$  at this receptor and is calculated to increase existing day-night average noise levels by 2 to 3 dBA  $L_{dn}$ .

A substantial permanent increase in noise identified as increasing existing noise levels by 5 dBA  $L_{dn}$  or more where noise levels would remain below "normally acceptable" noise levels for affected use (60 dBA  $L_{dn}$ ). Noise levels are calculated to increase by at most 1 dBA  $L_{dn}$  at residential receptors west of the quarry, and by 2 to 3 dBA  $L_{dn}$  at the nearest receptors east of the quarry. Project-generated noise levels would not result in a substantial increase in existing day-night average noise levels at most affected receptors in the project vicinity and the impact is less than significant.

Mitigation: No mitigation is necessary.

**Impact: NO-4. Will the Project result in a temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?**

Analysis: *Less than Significant*

A dilapidated bridge across Sulphur Springs Creek exists to the southeast of the Quarry off of Sky Valley Road. This bridge would be replaced as part of the Project to allow for an emergency egress to the back side of the Quarry in the event of a wildfire. Some of the bridge supporting members would remain and 14 new 24-inch reinforced concrete piers would be added. Four additional abutments would be constructed, the existing wood deck would be removed and replaced with two railroad flat cars welded together, and the existing pilings would remain in place. It is anticipated that this project would be completed within approximately four weeks.

Noise generated by project-related construction activities would be a function of the noise levels generated by individual pieces of construction equipment, the type and amount of equipment operating at any given time, the timing and duration of construction activities, the proximity of nearby sensitive land uses, and the presence or lack of shielding at these sensitive land uses. Construction noise levels would vary on a day-to-day basis during each phase of construction depending on the specific task being completed. Each construction phase would require a different combination of construction equipment necessary to complete the task and differing usage factors for such equipment. Construction noise would primarily result from the operation of heavy construction equipment and the arrival and departure of heavy-duty trucks. Use of special impact tools such as vibratory and impact pile drivers are not proposed.

FHWA's Roadway Construction Noise Model (RCNM) was used to calculate the maximum and average noise levels anticipated during each phase of construction. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power. Vehicles and equipment anticipated during each phase of construction were input into RCNM to calculate noise levels at a distance of 1,800 feet, the approximate distance from the construction site to the nearest residence to the north along Sky Valley Road.

Bridge replacement activities are calculated to generate hourly average noise levels of approximately 50 dBA  $L_{eq}$  at the nearest residential land use located approximately 1,800 feet north of the construction site. Noise generated by construction activities would temporarily elevate ambient noise levels over a period of four weeks at the nearest noise sensitive receptors, but this would be considered a less-than-significant impact as noise levels would not exceed the noise level threshold of 60 dBA  $L_{eq}$  or the duration threshold of a period of one year or more.

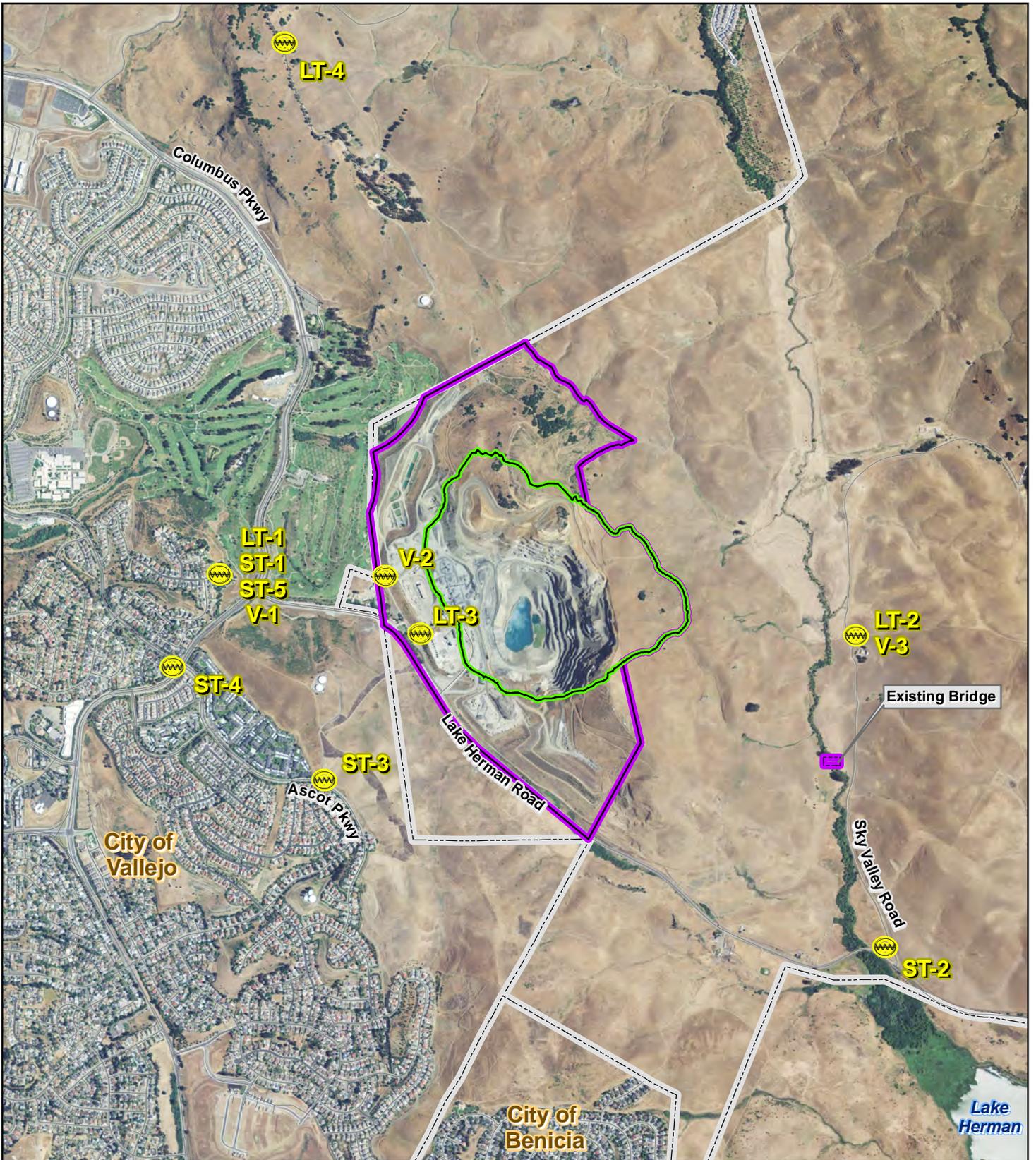
Mitigation: No mitigation is necessary.

## CUMULATIVE IMPACTS

**Impact:** **NO-C1. Will the Project's incremental effect to noise be cumulatively considerable, based on evaluation criteria 1 through 3?**

**Analysis:** *Less than Significant*

Traffic on roadways in the vicinity of Lake Herman Quarry will increase as a result of projected growth in the area. Future noise levels along Columbus Parkway, between Interstate 80 and Lake Herman Road, are projected to increase by 2.7 dBA  $L_{dn}$  over existing conditions under the cumulative traffic scenario. Noise levels along Columbus Parkway, between Lake Herman Road and Interstate 780, are projected to increase by 2.5 dBA  $L_{dn}$  over existing conditions under the cumulative traffic scenario. Traffic noise levels are anticipated to increase by 3.3 dBA  $L_{dn}$  over existing conditions under the cumulative scenario at receptors near Lake Herman Road, between Columbus Parkway and the Quarry entrance. The project would not contribute to the anticipated noise level increases as no additional project-generated traffic is expected. Therefore, the Project would not have a cumulatively considerable effect on the cumulative condition.



 Proposed Quarry Pit

 City Boundaries

 Project Area

 Noise and Vibration Monitoring Locations

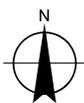
Paper Size 8.5" x 11" (ANSI A)

0 500 1,000 1,500 2,000

Feet

Map Projection: Lambert Conformal Conic  
Horizontal Datum: North American 1983

Grid: NAD 1983 StatePlane California II FIPS 0402 Feet



Solano County  
Lake Herman Quarry EIR

Job Number 1174109001  
Revision A  
Date 16 Apr 2013

Noise and Vibration  
Monitoring Locations

Figure 4.12-1

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