APPENDIX E

NOISE IMPACT ANALYSIS

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SCREENCHECK DRAFT

NOISE IMPACT ANALYSIS

SOUTHERN LAS TRAMPAS LAND USE PLAN AMENDMENT

EAST BAY REGIONAL PARK DISTRICT

LSA

October 2018

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NOISE IMPACT ANALYSIS

SOUTHERN LAS TRAMPAS LAND USE PLAN AMENDMENT

EAST BAY REGIONAL PARK DISTRICT

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LIST OF ABBREVIATIONS AND ACRONYMS

CNEL	Community Noise Equivalent Level
dB	decibels
dBA	A-weighted decibels
EBRPD	East Bay Regional Park District
EVMA	emergency vehicle and maintenance access
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Hz	frequency
in/sec	inches per second
L_{01}, L_{10}, L_{50}, L_{90}	fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, or 90 percent of a stated time period
Las Trampas	Las Trampas Wilderness Regional Preserve
L_{dn}	day/night average noise level
L_{eq}	equivalent continuous noise level
L_{max}, L_{min}	maximum/minimum noise level
LUDP	Las Trampas Regional Wilderness Land Use Development Plan
LUPA	Land Use Plan Amendment
L_V	velocity in decibels
PPV	peak particle velocity
rms	root mean square
USEPA	U.S. Environmental Protection Agency
vdB	vibration levels from noise

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NOISE IMPACT ANALYSIS

INTRODUCTION

LSA Associates, Inc. (LSA) has completed a Noise Impact Analysis for the proposed Southern Las Trampas Wilderness Regional Preserve (Las Trampas) Land Use Plan Amendment (LUPA) Project (project) within the East Bay Regional Park District (EBRPD or Park District). The LUPA would formally incorporate approximately 760 acres from five parcels into Las Trampas, which would expand the amount of open parkland in Las Trampas to a total of approximately 4,876 acres. The project is in the southern portion of Las Trampas in south-central Contra Costa County, on the western periphery of the San Ramon Valley within the City of San Ramon, Town of Danville, and unincorporated areas. A regional location map is included in Figure 1.

This Noise Impact Analysis examines potential impacts from noise sources in the project vicinity, including local roadways, through noise monitoring and analysis. Noise monitoring was conducted using the Larson Davis SoundTrack LxT sound level meter to assess the ambient noise environment on the project sites. Construction and operational noise levels were analyzed. Once operational, the project would generate noise through sources, such as parking lot activities and vehicle trips.

PROJECT DESCRIPTION

Project Goals and Objectives

The 2018 LUPA would serve as an amendment to the 1993 Las Trampas Land Use Development Plan. The main purposes of the 2018 LUPA are to:

- Formally append and open approximately 760 acres within five parcels into Las Trampas: Chen, Elworthy, Peter's Ranch, Faria, Podva;
- Evaluate one new staging area off of Bollinger Canyon Road located on the Chen parcel. The District is considering two locations for the staging area; however the Chen parcel is the District’s preferred location. Therefore, this analysis focuses on the Chen parcel location for the proposed staging area;
- Evaluate two six-car trailhead lots off of Bollinger Canyon Road located on the Faria parcel; and
- Evaluate approximately 4.5 miles of proposed trail connections including defining final trail alignments, appropriate trail use and routine maintenance requirements.

The LUPA would be consistent with the District’s guiding policy document, the 2013 Master Plan, which provides for the preparation of land use plans to: direct the long-term development and management of individual parks; identify major facility development; and establish appropriate land use designations in accordance with the vision of the East Bay Regional Park District.

The LUPA would serve as a supplement to the Las Trampas Regional Wilderness Land Use Development Plan (LUDP) adopted in November 1993, and the Las Trampas Regional Wilderness Resource Analysis adopted in August 1991. The Resource Analysis described and analyzed important

natural and man-made resources in the parklands and identified resource and land planning issues for the LUDP. The LUDP provided policies and implementation measures for Las Trampas Regional Wilderness, Little Hills Regional Recreation Area, and the western end of the Las Trampas to Mount Diablo Regional Trail. The Peter's Ranch parcel acquired prior to the 1993 LUDP was briefly mentioned in the LUDP as the southern non-contiguous parcel.

Project Background

The project area consists of five parcels that would be appended to Las Trampas and includes three that the District currently owns: Peter's Ranch, Chen, and Elworthy. The Elworthy parcel is currently open to the public, and park visitors can access the Elworthy parcel from a 0.5-mile trail connector through a 182-acre Elworthy private property scenic easement. A 12-car staging area on the Elworthy scenic easement was constructed by the developer prior to District acceptance of the Elworthy parcel, and was opened to the public in 2015. The Peter's Ranch and Chen parcels are currently landbanked and are not open to the public.

Two additional parcels, Podva and Faria, would be dedicated to the District as mitigation for residential development projects. Thirty acres of the 96-acre Podva parcel would be under a conservation easement. The developer is providing to the District an approximately one-mile trail through the Podva parcel that connects to trails within Las Trampas, as well as a trailhead with on-street parking.

The entire 144-acre Faria dedication would be under a conservation easement, with the exception of a trail connector to the Calaveras Ridge Trail; a trail loop on the western portion; and carve-outs for two six-car trailhead parking which would be set aside for the District to develop additional public access points in the future. The long-term management plans associated with the conservation easements placed on these properties would be incorporated and referenced in the LUPA.

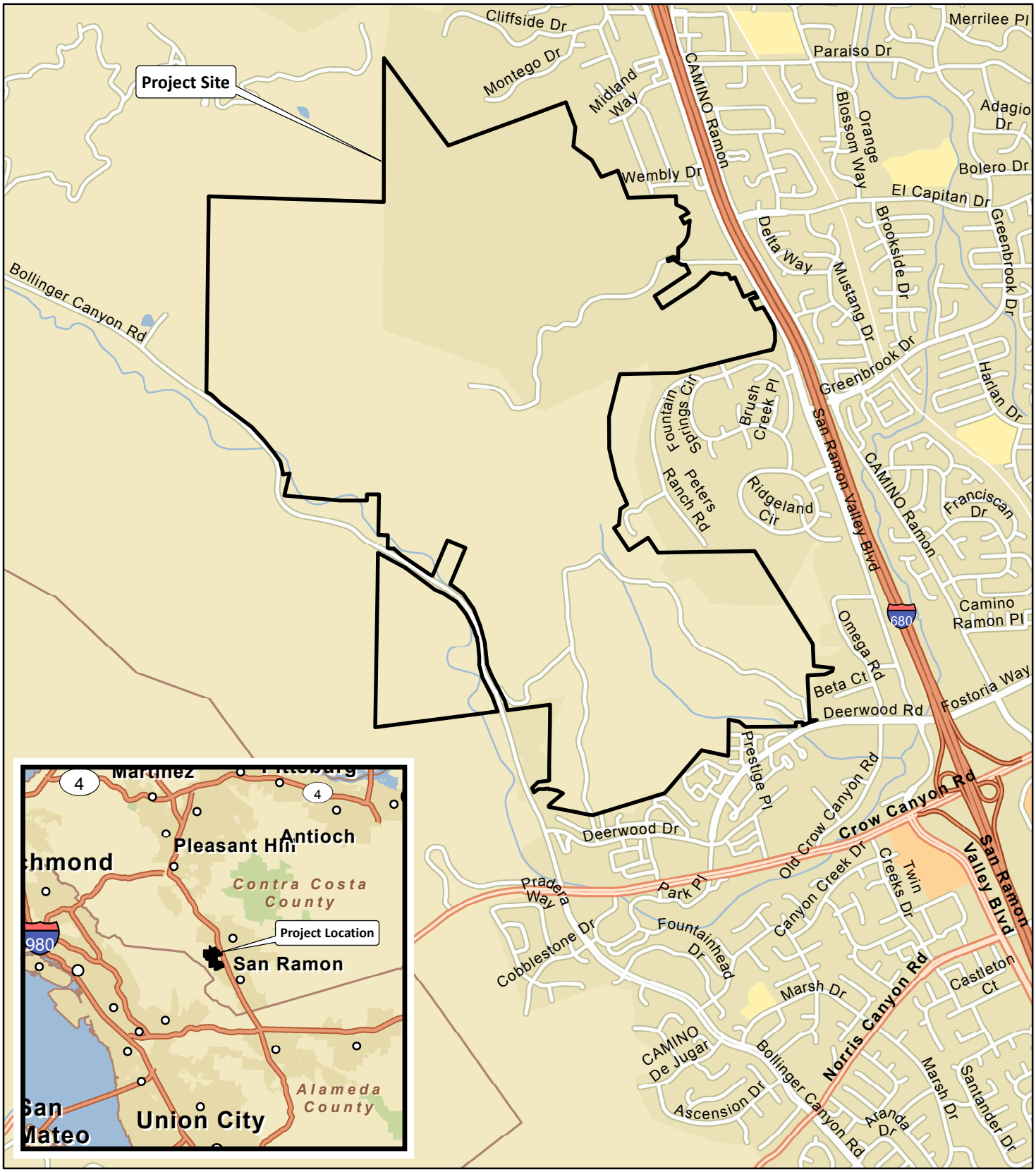
A project overview map is included in Figure 2 and the Chen Staging Area is shown in Figure 3.

Las Trampas is open between 8:00 a.m. and 5:30 p.m. during January 1 through February 13 and November 2 through December 31, between 8:00 a.m. and 6:00 p.m. during February 14 through March 8, between 8:00 a.m. and 7:00 p.m. during March 8 through May 20 and September 4 through November 1, and between 8:00 a.m. and 8:00 p.m. during May 21 through September 3.

Proposed Project

The project proposes to open to the public approximately two miles of narrow (single-track) trails and 2.5 miles of emergency vehicle and maintenance access (EVMA) roads for a total of approximately 4.5 miles of new trails. New trail construction would involve the use of mechanized equipment, such as a mini excavators and manual labor using hand tools.

The proposed project would divide the project area into natural and recreation/staging units, as defined by the District's 2013 Master Plan. The proposed project would designate the vast majority of the project area as a natural unit in which the land would remain undeveloped with the exception of recreational trails. Public infrastructure would be concentrated in the remaining land comprising of one staging area and two small trailhead lots.



LSA

FIGURE 1

N

0 1000 2000
FEET

SOURCE: ESRI StreetMap North America (2012).

I:\EBR1702\GIS\Maps\Figure 1_Project Location and Regional Vicinity Map.mxd (12/21/2017)

Las Trampas LUPA Tech Studies

Project Location and Regional Vicinity Map

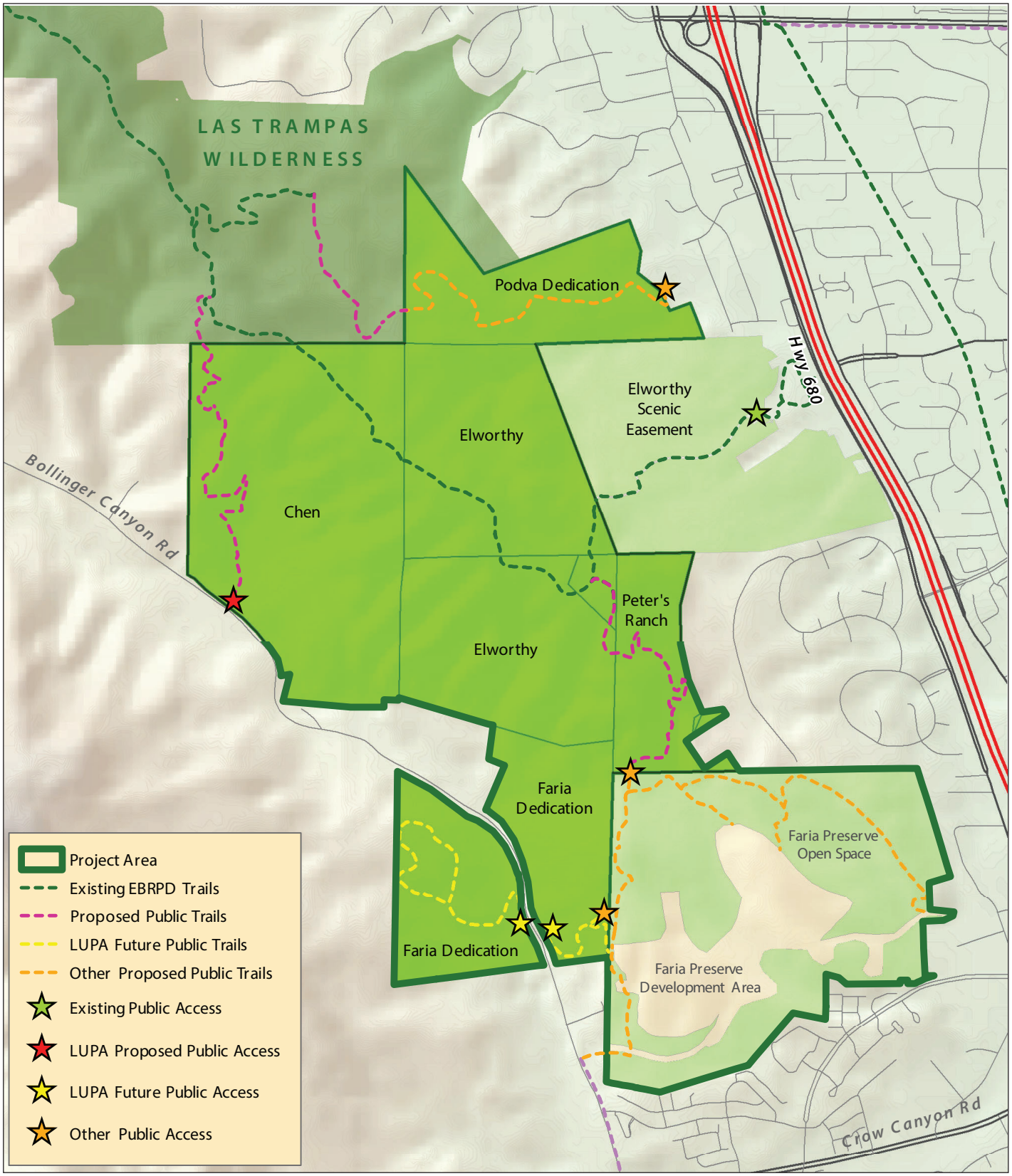


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FIGURE 2

0 0.25 0.5
MILES

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Las Trampas LUPA Tech Studies
Overview Map

SOURCE: EBRPD, AUGUST 2018.

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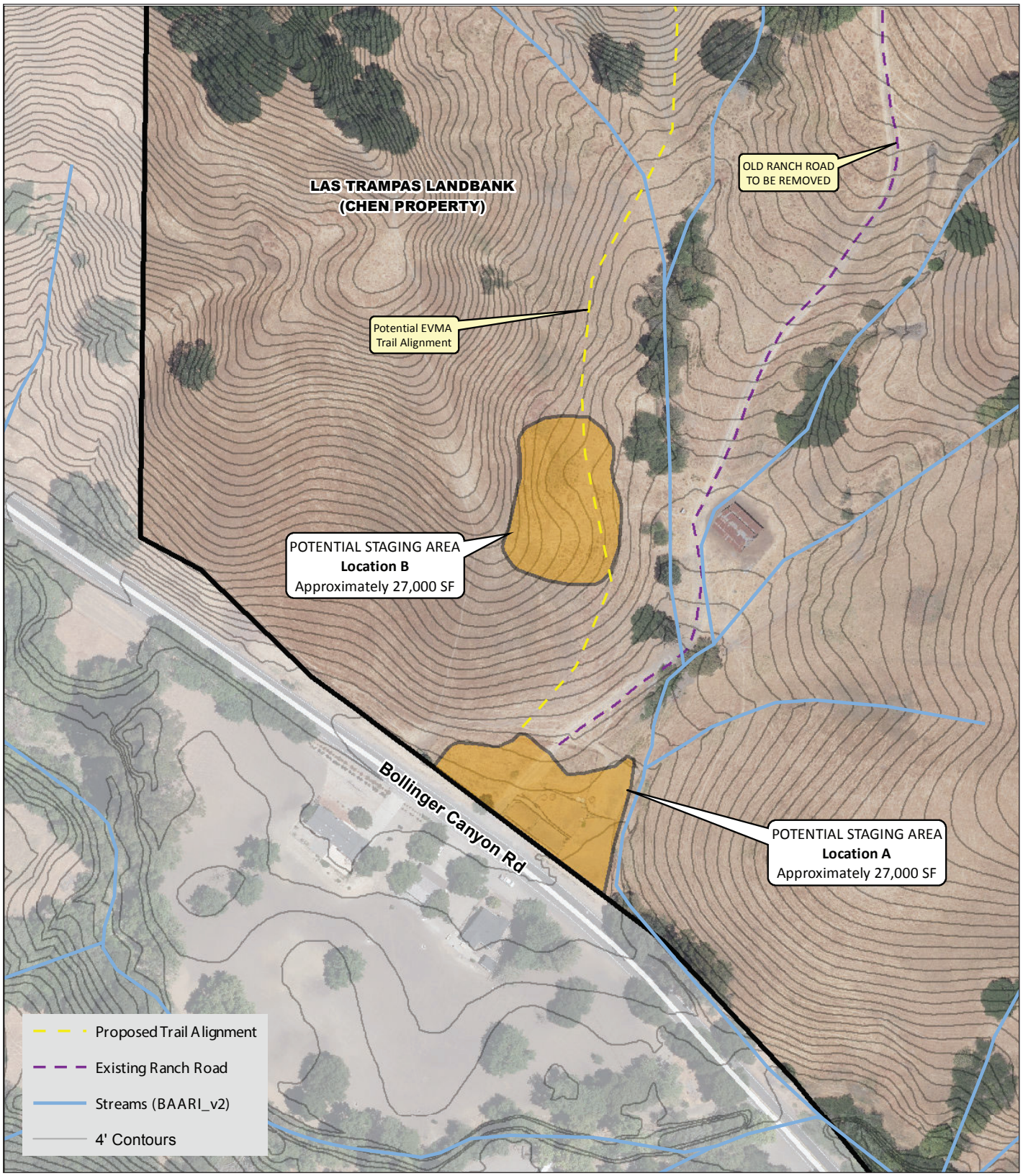

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FIGURE 3

0 100 200
FEET

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Las Trampas LUPA Tech Studies
Chen Staging Area

SOURCE: EBRPD, AUGUST 2018.

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Proposed project elements would include the following actions:

- Develop a staging area on the Chen property to serve as the southern gateway to Las Trampas, with all-weather, compacted gravel parking to accommodate up to 25 vehicles, benches, restroom, trail connections, information signs and landscaping. The District is considering two locations for the staging area; however the Chen parcel is the District's preferred location. Therefore, this analysis focuses on the Chen parcel location for the proposed staging area;

- Develop one 1.1-mile access road to allow pedestrian, bicycle, equestrian and maintenance and emergency vehicle access into Las Trampas from existing roads and trails and connecting to Bollinger Canyon Road via the Chen property;

- Develop one 0.5-mile access road to allow pedestrian, bicycle, equestrian and maintenance and emergency vehicle access into Las Trampas from the Podva property;

- Develop one 0.8-mile narrow trail segment of the Calaveras Ridge Trail on the Peter's Ranch property, connecting future City of San Ramon public trails on an adjacent property to existing trails on the Elworthy property;

- Develop two small parking trailhead areas to accommodate up to six cars on the Faria parcel with fencing, gates, and signs stating park regulations and hours; and

- Develop two trails to allow pedestrian, bicycle and equestrian access into Las Trampas from the six-car trailhead lots.

SUMMARY OF FINDINGS

This Noise Impact Analysis found that construction of the proposed project could result in short-term noise impacts on adjacent single-family residential uses; however, construction noise would be short-term and implementation of the recommended best management practices for project construction would reduce the construction noise impacts to the extent feasible. In addition, the proposed project would not result in any significant permanent noise level impacts.

BACKGROUND

This section provides background information on the evaluation of noise impacts including the characteristics of sound, measurement of sound, physiological effects of noise, and the regulatory framework for this analysis.

Characteristics of Sound

Noise is usually defined as unwanted sound and consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, or sleep. To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves,

combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be measured precisely with instruments. The project analysis defines the noise environment of the project area in terms of sound intensity and the project's effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units (e.g., inches or pounds), decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) are 10 times more intense than 1 dB; 20 dB are 100 times more intense than 1 dB; and 30 dB are 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 A-weighted decibels (dBA) (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dBA for each doubling of distance in a hard-site environment, and the sound decreases 4.5 dBA for each doubling of distance in a relatively flat environment with absorptive vegetation.

There are many ways to rate noise for various time periods, an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average level (L_{dn}) based on dBA. CNEL is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as evening hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable.

Other noise rating scales that are important when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating

conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half of the time the noise level exceeds this level, and half of the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater since this level has been found to be the lowest audible change perceptible to humans in outdoor environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB, which is only noticeable in laboratory environments. The last category includes changes in noise levels of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure (typically more than 8 hours, as defined by the Occupational Safety and Health Administration [OSHA]) to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions (thereby, affecting blood pressure and functions of the heart and the nervous system). In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dB, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dB, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 to 165 dB will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas.

Table 1 lists “Definitions of Acoustical Terms,” and Table 2 displays “Common Sound Levels and Their Noise Sources.”

Table 1: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. 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 report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dB to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that 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: Harris, Cyril M., *Handbook of Acoustical Measurements and Noise Control*, 1991.

Table 2: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Evaluation [a]
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle a few feet away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Reference Level
Average Office	60	Quiet	½ as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	¼ as loud
Large Transformer	45	Quiet	
Average Residence Without Stereo Playing	40	Faint	⅛ as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing
	0	Very Faint	

Note:
[a] The threshold of hearing is the baseline.
Source: Compiled by LSA, 2015.

Characteristics of Groundborne Vibration

Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. As the vibration propagates from the foundation throughout the remainder of the building, the vibration of floors and walls may be perceptible from the rattling of windows or a rumbling noise. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. When assessing annoyance from groundborne noise, vibration is typically expressed as root mean square (rms) velocity in units of decibels of 1 micro-inch per second.

To distinguish vibration levels from noise levels, the unit is written as “VdB.” Human perception to vibration starts at levels as low as 67 VdB and sometimes lower. Annoyance due to vibration in residential settings starts at approximately 70 VdB. Groundborne vibrations are almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of the building, the motion does not provoke the same adverse human reaction.

Common sources of groundborne vibration include trains and construction activities such as blasting, pile driving and operating heavy earthmoving equipment. Typical vibration source levels

from construction equipment are shown in Table 3. Although the table gives one level for each piece of equipment, it should be noted that there is a considerable variation in reported ground vibration levels from construction activities. The data provides a reasonable estimate for a wide range of soil conditions. In extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. For buildings considered of particular historical significance or that are particularly fragile structures, the damage threshold is approximately 96 VdB; the damage threshold for other structures is 100 VdB.[1]

Regulatory Framework

The federal, State, and local framework for noise standards is outlined below. The City of Los Altos has established standards in the General Plan and in the Municipal Code for land use projects that could potentially expose sensitive receptors to excessive noise levels.

U.S. Environmental Protection Agency

In 1972 Congress enacted the Noise Control Act. This act authorized the U.S. Environmental Protection Agency (USEPA) to publish descriptive data on the effects of noise and establish levels of sound *requisite to protect the public welfare with an adequate margin of safety.* These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table 4. The USEPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dBA. The "(24)" signifies an L_{eq} duration of 24 hours. The USEPA activity and interference guidelines are designed to ensure reliable

Table 3: Typical Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft (in/sec)	Approximate VdB at 25 feet
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Vibratory roller		0.210	94
Hoe ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Notes: PPV= peak particle velocity; in/sec= inches per second
Source: Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment*. May.

Table 4: Summary of USEPA Noise Levels

Effect	Level	Area
Hearing loss	$L_{eq}(24) \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq}(24) \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq}(24) \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency, 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. March.

[1] Harris, C.M., 1998. *Handbook of Acoustical Measurements and Noise Control.*

speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor L_{dn} of 55 dBA are summarized in Table 5. At 55 dBA L_{dn}, 95 percent sentence clarity (intelligibility) may be expected at 11 feet, and no community reaction. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

Table 5: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 1.4 feet 99 percent sentence intelligibility (average) at 3.2 feet 95 percent sentence intelligibility (average) at 11.5 feet
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below "vigorous action."
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency, 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. March.

State of California

The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the *State Noise Insulation Standard*, it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL. The proposed project would not include any new buildings; therefore, these regulations are not applicable to the proposed project and are provided for informational purposes only.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses.

East Bay Regional Park District

Master Plan. The EBRPD's 2013 Master Plan[2] contains policies for achieving the highest standards of service in resource conservation, management, interpretation, public access, and recreation. The goal of the Master Plan is to maintain a careful balance between the need to protect and conserve resources and the need to provide opportunities for recreational use of the parklands. The Master Plan also contains the following policies relating to providing parking and trailheads at convenient locations, which are applicable to the proposed project.

- Policy PA4: The District will provide access to parklands and trails to suit the level of expected use. Where feasible, the District will provide alternatives to parking on or use of neighborhood streets. The District will continue to advocate and support service to the regional park system by public transit.

- Policy PA5: The District will cooperate with local and regional planning efforts to create more walkable and bikeable communities, and coordinate park access opportunities with local trails and bike paths developed by other agencies to promote green transportation access to the Regional Parks and Trails.

Park Rules and Regulations: Ordinance 38. The EBRPD addresses noise in Section 908, Declaration of Noise Policy, in the EBRPD's Park Rules and Regulations: Ordinance 38.[3] The ordinance requires that devices such as radio, television sets, and similar devices shall not be used within the sleeping quarters of campgrounds of the District between the hours of 10:00 p.m. and 7:00 a.m. daily. In addition, the ordinance requires that the operation of sound-amplifying equipment shall only occur between the hours of 10:00 a.m. and 8:00 p.m. daily.

Contra Costa County

General Plan. Contra Costa County addresses Noise in the Noise Element.[4] The Noise Element sets noise and land use compatibility guidelines, as shown in Table 6 below. The Noise Element also contains goals and policies that seek to maintain appropriate noise conditions throughout the County. The following policies from the Noise Element are applicable to the proposed project.

- Policy 11-1: New projects shall be required to meet acceptable exterior noise level standards as established in the Noise and Land Use Compatibility Guidelines contained in Table 6. These guidelines, along with the future noise levels shown in the future noise contours maps, should be used by the county as a guide for evaluating the compatibility of "noise sensitive" projects in potentially noisy areas.

- Policy 11-2: The standard for outdoor noise levels in residential areas is a DNL of 60 dB. However, a DNL of 60 dB or less may not be achievable in all residential areas due to economic or aesthetic constraints. One example is small balconies associated with multi-family housing. In this case, second and third story balconies may be difficult to control to the goal. A common outdoor use area that meets the goal can be provided as an alternative.

2 East Bay Regional Parks District, 2013. *East Bay Regional Park District Master Plan 2013.* July 16.
3 East Bay Regional Parks District, 2016. *Ordinance 38 – Rules and Regulations.* Revised April 2016.
4 Contra Costa, County of, 2010. *Contra Costa County General Plan 2005 – 2020.* July.

- Policy 11-3: If the primary noise source is train passbys, then the standard for outdoor noise levels in residential areas is a DNL of 70 dB. A higher DNL is allowable since the DNL is controlled by a relatively few number of train passbys that are disruptive outdoors only for short periods. Even though the DNL may be high, during the majority of the time the noise level will be acceptable.

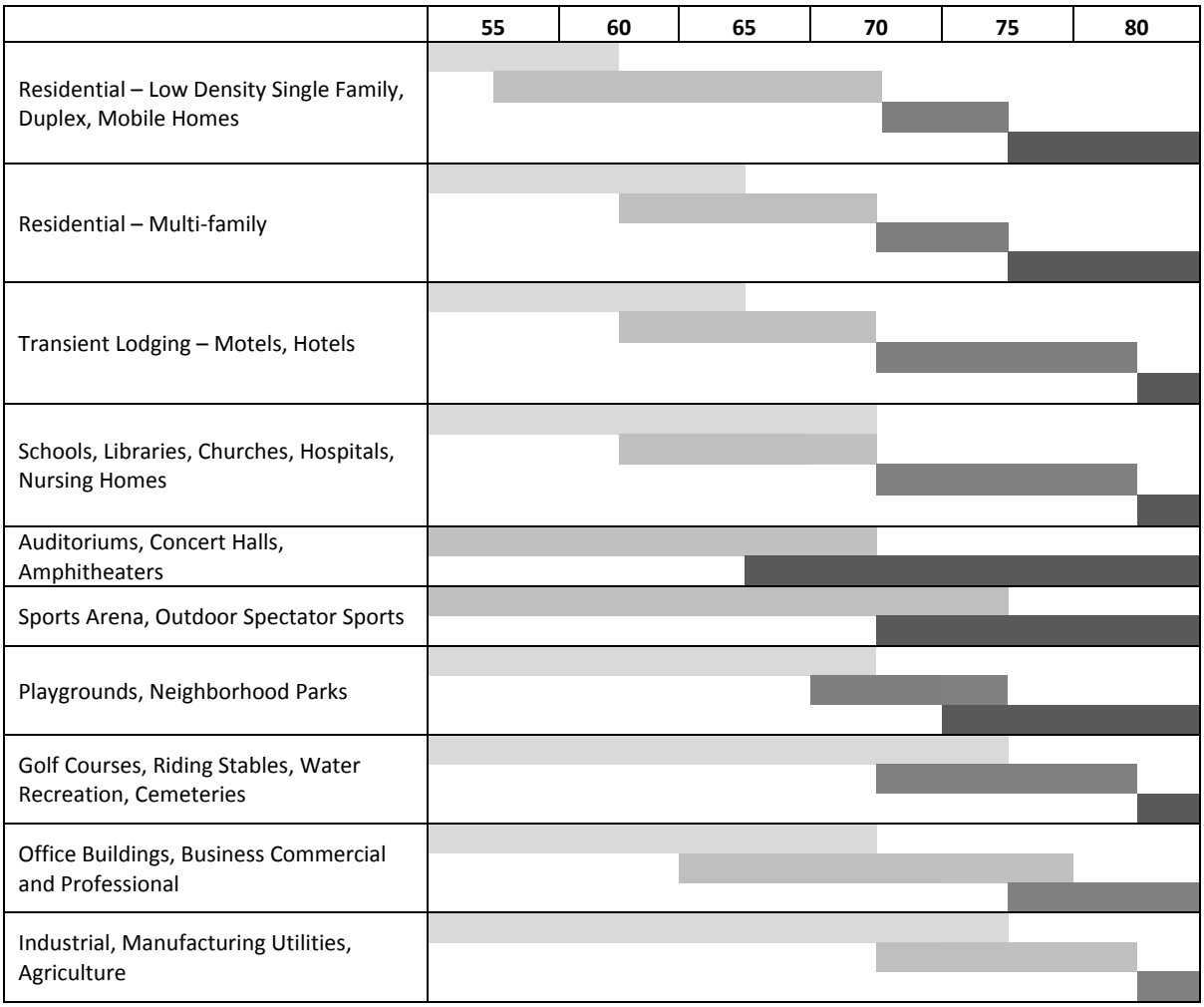
- Policy 11-6: If an area is currently below the maximum "normally acceptable" noise level, an increase in noise up to the maximum should not be allowed necessarily.

- Policy 11-7: Public projects shall be designed and constructed to minimize long-term noise impacts on existing residents.

- Policy 11-8: Construction activities shall be concentrated during the hours of the day that are not noise-sensitive for adjacent land uses and should be commissioned to occur during normal work hours of the day to provide relative quiet during the more sensitive evening and early morning periods.

- Policy 11-11: Noise impacts upon the natural environment, including impacts on wildlife, shall be evaluated and considered in review of development projects.

Table 6: Community Noise Exposure L_{dn} or CNEL, dB



Source: Contra Costa County, 2010.

Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved meet conventional construction standards, without any special noise insulation requirements.
Conditionally Acceptable	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.
Normally Unacceptable	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.
Clearly Unacceptable	New construction or development clearly should not be undertaken.

City of San Ramon

General Plan. The City of San Ramon addresses Noise in the Noise Element.[5] The Noise Element sets noise and land use compatibility guidelines, as shown in Table 7 below. The Noise Element also contains implementing policies that are designed to help the City achieve an acceptable noise environment for the present and future residents of San Ramon. The following policies from the Noise Element are applicable to the proposed project.

- Implementing Policy 10.1-I-1: Minimize vehicular and stationary noise sources and noise emanating from intermittent activities.

- Implementing Policy 10.1-I-2: All projects that are exposed to noise greater than "normally acceptable" levels indicated in Table 7 shall be required to submit a noise analysis. Applicable noise attenuation measures shall be implemented with the DNL reduced to 45 dB in all habitable rooms.

- Implementing Policy 10.1-I-3: Acoustical and vibration studies shall be prepared by qualified professionals in accordance with industry-accepted methodology. All applicable and feasible vibration reduction measures shall be incorporated into project plans.

- Implementing Policy 10.1-I-4: Alternatives to sound walls such as building orientation and landscaped buffers shall be considered during the design process. If deemed appropriate, sound walls shall be well-designed and appropriately sited.

- Implementing Policy 10.1-I-5: New development shall minimize their noise impacts on adjacent properties through appropriate means, including, but not limited to, the following actions:

    - Screen and control noise sources, such as parking and loading facilities, outdoor activities and mechanical equipment,

    - Increase setbacks for noise sources from adjacent dwellings,

    - Retain or install fences, walls, and landscaping that serve as noise buffers,

    - Use soundproofing materials and other building practices or materials,

    - Encourage the use of commute alternatives,

    - Control hours of operation, including deliveries and trash pickup, to minimize noise impacts, and

    - Buffer noise along highways and arterial roadways through natural noise buffers and if necessary, install sound walls when compatible with neighborhood aesthetics and character.

- Implementing Policy 10.1-I-7: Implement the City's noise control standards to ensure appropriate regulation of common residential, commercial, and industrial noise sources.

[5] San Ramon, City of, 2015. *City of San Ramon General Plan 2035.* April 28.

- Implementing Policy 10.1-I-8: Require new noise sources to use best available and practical control technology to minimize noise from all sources.

- Implementing Policy 10.1-I-14: Construction activities are exempt from the standards set forth in Table 7, but must implement all practical noise attenuation measures and practices to limit adverse impacts on nearby land uses.

- Implementing Policy 10.1-I-7: For purposes of city analyses of noise impacts, and for determining appropriate noise mitigation, a significant increase in ambient noise levels is assumed if the project causes ambient noise levels to exceed the following:

    - The ambient noise level is less than 60 dB L_{dn} and the project increases noise levels by 5 dB or more.

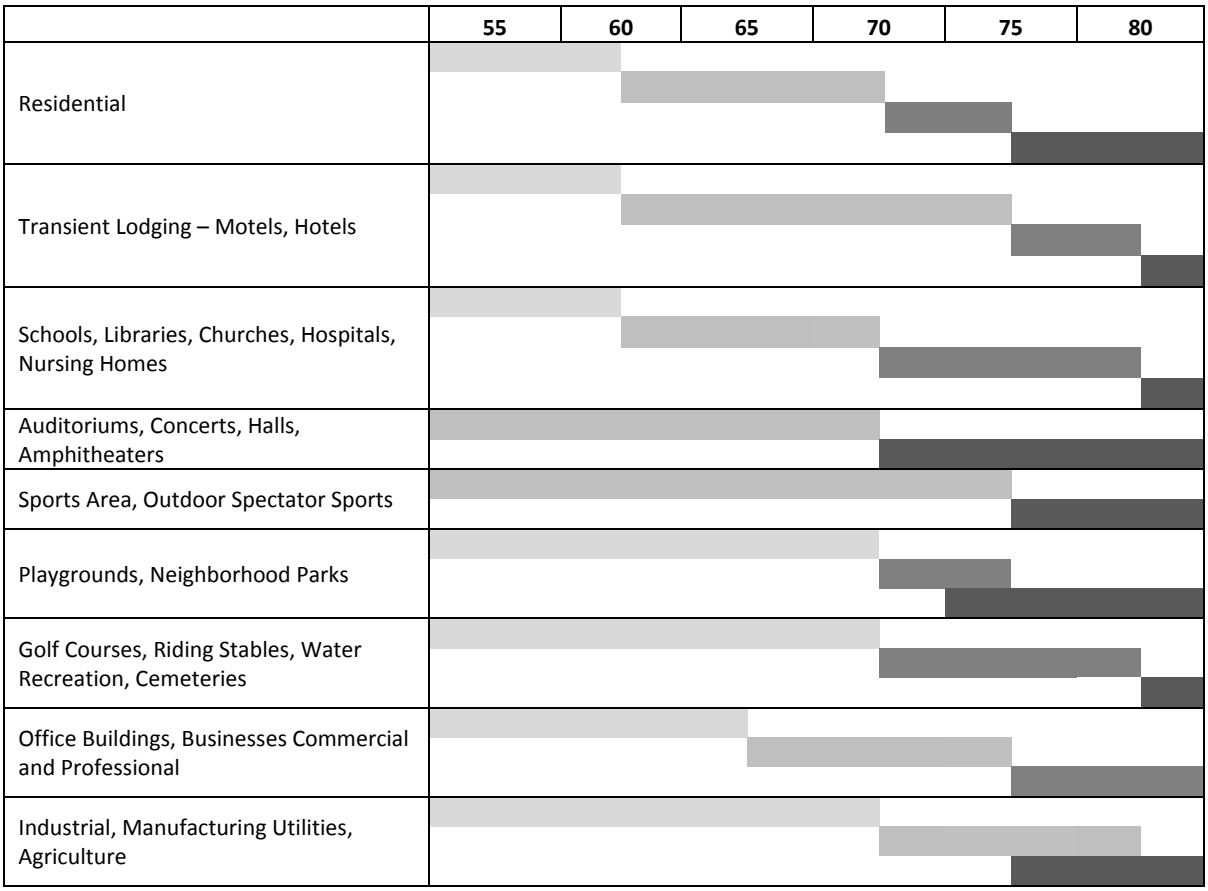
    - The ambient noise level is 60-65 dB L_{dn} and the project increases noise levels by 3 dB or more.

    - The ambient noise level is greater than 65 dB L_{dn} and the project increases noise levels by 1.5 dB or more.

Municipal Code. The City of San Ramon also addresses noise in the City's Municipal Code.[6] Chapter V – Noise Control permits construction noise when activities occur between the hours of 7:30 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays and Sundays. No construction is allowed on federal holidays.

[6] San Ramon, City of, 2017. *San Ramon, CA Code of Ordinances.* May 26.

Table 7: Community Noise Exposure L_{dn} or CNEL, dB



Source: City of San Ramon, 2015.

Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved meet conventional Title 24 construction standards. No special noise insulation requirements.
Conditionally Acceptable	New construction or development shall be undertaken only after a detailed noise analysis is made and noise reduction measures are identified and included in the project design.
Normally Unacceptable	New construction or development is discouraged. If new construction is proposed, a detailed analysis is required, noise reduction measures must be identified, and noise insulation features included in the design.
Clearly Unacceptable	New construction or development should not be undertaken.

Town of Danville

General Plan. The Town of Danville addresses Noise in the Resources and Hazards Element.[7] The Resources and Hazards Element sets noise and land use compatibility guidelines, as shown in Table 7 below. The Resource and Hazards Element also contains policies that are designed to protect existing and future residents of Danville from hazards and nuisance associated with excessive levels of noise by maintaining or reducing noise intrusion levels in all areas of the Town to acceptable levels. The following policies from the Resources and Hazards Element are applicable to the proposed project.

- Policy 27.01: Ensure that new residential development projects meet acceptable noise level guidelines, as shown in Table 8.

- Policy 27.02: Require acoustical studies for major residential and other development projects, as appropriate, and impose noise mitigation measures accordingly.

- Policy 27.03: Protect the noise environment in existing residential areas. Where acceptable noise levels in residential areas would be exceeded or further impacted as a result of new development or transportation improvements, require the use of noise mitigation measures, such as wall barriers, berms, mufflers, sound traps, and baffles to reduce noise intrusion.

- Policy 27.05: Open space should be used, wherever practical, to provide an adequate spatial separator between noise sources and sensitive land uses.

- Policy 27.07: Protect parks and recreational areas from excessive noise to permit the enjoyment of sports and other leisure time activities.

- Policy 27.08: Require noise monitoring as needed to determine changes in noise levels over time, measure the effectiveness of project conditions of approval, and to ensure that appropriate mitigation programs are developed.

- Policy 27.09: Generally maintain exterior noise levels below 60 L_{dn} in areas where outdoor use is a major consideration, such as in residential backyards. Where the Town determines that this level cannot be achieved after reasonable mitigation has been applied, higher standards may be permitted at the discretion of the Town Council. In such cases, indoor noise levels should not exceed an L_{dn} of 45 dB.

- Policy 27.12: Require the preparation of groundborne vibration studies by qualified professionals in accordance with industry-accepted methodology where heavy construction activities involving significant site grading, underground, or foundation work will occur within 50 feet of residential or other vibration sensitive uses.

- Policy 27.13: Utilize noise reduction measures during all phases of construction activity to minimize the exposure of neighboring properties to excessive noise levels.

[7] Danville, Town of, 2013. *The Town of Danville 2030 General Plan.* March 19.

Table 8: Land Use Compatibility Guidelines for Exterior Noise Levels

Land Use Category	Community Noise Equivalent Level (CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density, Single Family, Duplex, Mobile Homes	50-60	55-70	70-75	75-85
Residential – Multifamily	50-65	60-70	70-75	75-85
Transient Lodging – Motel, Hotels	50-65	60-70	70-80	80-85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-70	60-70	700-80	80-85
Auditoriums, Concert Halls, Amphitheaters	Not Applicable	50-70	Not Applicable	C
Sports Arenas, Outdoor Spectator Sports	Not Applicable	50-70	Not Applicable	C
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-70	Not Applicable	70-80	80-85
Office Buildings, Business Commercial and Professional	50-70	67.5-77.5	75-85	Not Applicable
Industrial, Manufacturing, Utilities, Agricultural	50-75	70-80	75-85	Not Applicable

Source: Town of Danville, 2013.

Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved 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 the noise reduction requirements is made and needed noise insulation features have been included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
Normally Unacceptable	New construction or development should 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 must be included in the design.
Clearly Unacceptable	New construction or development should generally not be undertaken.

Municipal Code. The Town of Danville also addresses noise in the Town's Municipal Code.[8] Chapter IV – Police Regulations permits construction noise when activities occur between the hours of 7:30 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 7:00 p.m. on Saturdays, Sundays, and holidays.

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

This section describes the existing noise environment in the project site vicinity. Noise monitoring, traffic modeling, and noise modeling were used to quantify existing and future noise levels at the project site.

Ambient Noise Levels

The primary noise source impacting the project area results from traffic on Bollinger Canyon Road. Other noise sources not related to vehicles include birds and airplanes. Noise from motor vehicles is generated by engine vibrations, the interaction between the tires and the road, and the exhaust systems. Airport related noise levels are primarily associated with aircraft engine noise made while

[8] Danville, Town of, 2017. *Danville, California Municipal Code.* April 4.

aircraft are taking off, landing, or running their engines while still on the ground. The Oakland International Airport is the closest airport and is located approximately 12 miles west of the project site. San Francisco International Airport is located approximately 22 miles southwest of the project. Aircraft noise is occasionally audible at the project site; however, no portion of the project site lies within the 65 dBA CNEL noise contours of these airports.

To assess existing noise levels, LSA conducted two short-term noise measurements on the project site on October 6, 2017. The short-term 15-minute noise measurements were recorded at different locations on the project site between 10:02 a.m. and 10:45 a.m. LSA also conducted one long-term noise measurement at the proposed staging area between October 6, 2017, and October 9, 2017. The long-term noise measurement captured hourly L_{eq} data as well as CNEL data, which incorporates the nighttime hours. Noise measurement data collected during the short-term and long-term noise monitoring is summarized in Table 9. The meteorological data conditions at the time of the short-term noise monitoring are shown in Table 10. Noise measurement sheets are provided in Appendix A.

As shown in Table 9, the short-term noise measurements indicate that ambient noise in the project site vicinity ranges from approximately 56.6 dBA to 58.5 dBA L_{eq}. The long-term noise measurement was 62.8 dBA L_{eq} and 65.9 dBA CNEL. Traffic on Bollinger Canyon Road was reported as the primary noise source.

Table 9: Ambient Noise Monitoring Results, dBA

Location Number	Location Description	Start Time	L_{eq}/ CNEL [a]	L_{max} [b]	L_{min} [c]	Primary Noise Sources
ST-1	North of Staging Area – northbound side	10:02 a.m.	56.6	75.5	29.3	Traffic on Bollinger Canyon Road, birds, aircraft overhead (screened out)
ST-2	South of LT-1 – northbound side	10:30 a.m.	58.5	75.4	30.9	Traffic on Bollinger Canyon Road, birds
LT-1	Proposed staging area across from 18515 Bollinger Canyon Road	11:00 a.m.	62.8/65.9	72.4	46.8	Traffic on Bollinger Canyon Road, birds, airplanes

Source: LSA (October 2017).

[a] L_{eq} represents the average of the sound energy occurring over the measurement time period for the short-term noise measurements. CNEL is the Community Noise Equivalent Level (CNEL) which is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as evening hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours).

[b] L_{max} is the highest sound level measured during the measurement time period.

[c] L_{min} is the lowest sound level measured during the measurement time period.

Table 10: Meteorological Conditions During Ambient Noise Monitoring

Location Number	Average Wind Speed (mph)	Maximum Wind Speed (mph)	Temperature (˚F)
ST-1	1.0	3.0	70
ST-2	1.0	3.0	70

Source: LSA (October 2017).

Vehicular Traffic Noise

Motor vehicles with their distinctive noise characteristics are a major source of noise in Contra Costa County. The amount of noise varies according to many factors, such as volume of traffic, vehicle mix (percentage of cars and trucks), average traffic speed, and distance from the observer. Major contributing roadway noise sources in the project vicinity include Bollinger Canyon Road and Crow Canyon Road, as well as other arterial and collector roadways throughout the County.

Existing roadway traffic noise levels in the project vicinity were assessed using the Federal Highway Administration (FHWA) highway traffic noise prediction model (FHWA RD-77- 108). This model uses a typical vehicle mix for urban/suburban areas in California and requires parameters, including traffic volumes, vehicle speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. Existing traffic noise contours along modeled roadway segments are shown in Table 11. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Appendix B provides the specific assumptions used in developing these noise levels and model printouts.

Table 11: Existing Traffic Noise Levels Without Project

Roadway Segment	ADT	Centerline to 70 dBA CNEL (feet)	Centerline to 65 dBA CNEL (feet)	Centerline to 60 dBA CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Bollinger Canyon Road - North of Chen Staging Area	1,650	< 50	< 50	< 50	59.1
Bollinger Canyon Road - Chen Staging Area to Faria Trailhead	1,650	< 50	< 50	< 50	59.1
Bollinger Canyon Road - Faria Trailhead to Deerwood Drive	1,650	< 50	< 50	< 50	59.1
Bollinger Canyon Road - Deerwood Drive to Crow Canyon Drive	1,590	< 50	< 50	< 50	57.6
Bollinger Canyon Road - South of Crow Canyon Drive	2,190	< 50	< 50	< 50	54.5
Deerwood Drive - East of Bollinger Canyon Road	390	< 50	< 50	< 50	50.1
Crow Canyon Drive - West of Bollinger Canyon Road	8,210	< 50	65	141	66.0
Crow Canyon Drive - East of Bollinger Canyon Road	9,700	< 50	81	161	64.5

Source: LSA (December 2017).
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels

Existing Sensitive Land Uses in the Project Area

Certain land uses are considered more sensitive to noise than others. Examples of these include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. The project site is located within and area that is predominantly open parkland and is surrounded by residential uses. The closest sensitive receptor includes the single-family residence located approximately 40 feet west of the proposed staging area. In addition, other single-family residences would be located approximately 75 feet from proposed trails.

METHODOLOGY

Evaluation of noise impacts associated with the proposed project includes the following:

- Determine the short-term construction noise levels at off-site noise sensitive uses and compare to the County of Contra Costa, City of San Ramon, and Town of Danville General Plan and Municipal Code Ordinance requirements;
- Determine the long-term noise levels at off-site noise sensitive uses and compare the levels to the County of Contra Costa, City of San Ramon, and Town of Danville pertinent noise standards; and
- Determine the required mitigation measures to reduce long-term on-site noise impacts from all sources.

THRESHOLD OF SIGNIFICANCE

The proposed project would have a significant noise effect if it would substantially increase the ambient noise levels in the project vicinity or conflict with adopted environmental plans and goals of applicable regulatory agencies, including, as appropriate, Contra Costa County, the City of San Ramon, and the Town of Danville. For the purposes of this analysis, the project would result in a significant noise impact if it would:

- Expose 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;
- Expose persons to or generate excessive groundborne vibration or groundborne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or
- Result in noise impacts associated with proximity to nearby airports.

PROJECT IMPACTS

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The project would result in short-term noise impacts due to construction and long-term impacts related to project operations, as described below.

Land Use Compatibility

The dominant source of noise in the project vicinity is traffic on Bollinger Canyon Road. As shown in Table 9, the long-term noise monitoring at the staging area measured 65.9 dBA CNEL. Contra Costa County, City of San Ramon, and Town of Danville set forth normally acceptable noise level standards for land use compatibility and outdoor exposure of new projects. The normally acceptable exterior noise level for recreational uses is up to 70 dBA CNEL under Contra Costa County, City of San Ramon, and Town of Danville noise standards. As identified above, the long-term noise monitoring identified noise levels of 65.9 dBA CNEL which indicates noise levels on the site would be below 70 dBA CNEL. In addition, noise levels would attenuate based on distance from Bollinger Canyon Road. Therefore, noise levels of 65.9 CNEL would only occur at the staging area and noise levels along the proposed trails would be expected to be much lower. Therefore, the project's noise environment is consistent with Contra Costa County, City of San Ramon, and Town of Danville noise and land use compatibility standards.

Permanent Increase in Ambient Noise

The proposed project is located in a relatively quiet area with noise levels falling within the normally acceptable exterior noise level for park land uses and the conditionally acceptable exterior noise level for the adjacent residential uses according to Contra Costa County, City of San Ramon, and Town of Danville noise compatibility guidelines, as there are no substantial noise generators in the area and existing pass-through traffic levels produce moderate levels of noise. Implementation of the proposed project could expose existing nearby residences to noise generated from mobile source noise and stationary source noise. Mobile source noise would be attributable to the additional trips that would be a result of the proposed project. Stationary source noise would noise generated by parking lot activities and recreationalists using the trails.

Mobile Source Noise

To assess traffic noise impacts, the traffic noise levels along major roadway segments within the project vicinity were projected using FHWA modeling to predict traffic noise level conditions with and without the proposed project. FWHA modeling was based on existing traffic conditions, FWHA modeling results are summarized in Table 12. The table includes projected traffic noise levels as measured at 50 feet from the centerline of the outermost traveled lane along the modeled roadway segments. The model does not account for existing sound walls or terrain features that could reduce traffic noise levels at adjacent land uses, but rather assumes a reasonable worst-case direct line-of-sight over hard surface to the modeled traffic noise sources. Appendix B provides the specific assumptions used in developing these noise levels and model printouts.

Table 12: Existing Traffic Noise Levels Without and With Project

Roadway Segment	Existing Volumes					Existing Plus Future Projects Volumes				
	Without Project		With Project			Without Project		With Project		
	ADT	L_{dn} (dBA) 50 feet from Centerline of Outermost Lane	ADT	L_{dn} (dBA) 50 feet from Centerline of Outermost Lane	Increase from Baseline Conditions	ADT	L_{dn} (dBA) 50 feet from Centerline of Outermost Lane	ADT	L_{dn} (dBA) 50 feet from Centerline of Outermost Lane	Increase from Baseline Conditions
Bollinger Canyon Road - North of Chen Staging Area	1,650	59.1	1,650	59.1	0.0	1,650	59.1	1,650	59.1	0.0
Bollinger Canyon Road - Chen Staging Area to Faria Trailhead	1,650	59.1	2,080	60.1	1.0	1,650	59.1	1,865	59.6	0.5
Bollinger Canyon Road - Faria Trailhead to Deerwood Drive	1,650	59.1	2,300	60.5	1.4	2,065	60.0	2,715	61.2	1.2
Bollinger Canyon Road - Deerwood Drive to Crow Canyon Drive	1,590	57.6	2,235	59.1	1.5	2,875	60.2	3,520	61.1	0.9
Bollinger Canyon Road - South of Crow Canyon Drive	2,190	54.5	2,340	54.8	0.3	3,310	56.3	3,460	56.5	0.2
Deerwood Drive - East of Bollinger Canyon Road	390	50.1	390	50.1	0.0	390	50.1	390	50.1	0.0
Crow Canyon Drive - West of Bollinger Canyon Road	8,210	66.0	8,330	66.1	0.1	8,520	66.2	8,640	66.2	0.0
Crow Canyon Drive - East of Bollinger Canyon Road	9,700	64.5	10,070	64.7	0.2	10,130	64.7	10,500	64.9	0.2

Source: LSA (December 2017).
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels

Table 12 shows a minor change in the traffic noise levels associated with the implementation of the proposed project. The largest increases in traffic-related noise as a result of the project would be along Bollinger Canyon Road, with a 1.5 dBA increase between Deerwood Drive and Crow Canyon Drive and a 1.4 dBA increase between Faria Trailhead and Deerwood Drive. These noise level increases would be less than the 3 dBA increase considered to be perceptible by the human ear in an outdoor environment and the resulting noise levels would be 59.1 and 60.5 dBA respectively, which would be in the normally acceptable and conditionally acceptable ranges at the nearby residential land uses. Therefore, no significant traffic noise impacts would occur for off-site land uses. As a result, no mitigation is required to address traffic-related noise.

Stationary Source Noise

Implementation of the proposed project could expose existing nearby sensitive receptors to noise generated from parking lot activities at the staging area and small parking areas on and off street. Parking noises, including engine sounds, car doors slamming, car alarms, and people conversing, could occur as a result of the proposed project at the project site. Typical parking lot activities, such as people conversing or doors slamming, generates noise levels of approximately 60 dBA to 70 dBA L_{max} at 50 feet.

The staging area would include parking for up to 25 vehicles and would include benches, a restroom, trail connections, information signs, and landscaping. The two small parking trailhead areas on the Faria parcel would each include parking for up to six cars and would include fencing, gates, and signs stating park regulations and hours.

As discussed above, the closest sensitive receptor includes the single-family residence located approximately 40 feet west of the proposed staging area. At 40 feet, there would be an increase of approximately 2 dBA from the reduced distance compared to the noise reference level measured at 50 feet. Therefore, based on distance attenuation, the closest receptor may be subject to parking lot noise levels of approximately 62 dBA to 72 dBA L_{max}.

The staging area is located within the jurisdiction of the Contra Costa County; therefore, County of Contra Costa noise standards were used to evaluate potential noise impacts associated with the proposed staging area. The County of Contra Costa addresses noise in terms of community noise equivalent levels; therefore, to analyze the 24-hour noise impact of the proposed project, park open-hours were used. Between January 1 and May 20 and September 4 through December 31, noise levels with the project would be approximately 66.0 dBA CNEL at the nearest residential property line. Between May 21 and September 3, noise levels with the project would be approximately 66.1 dBA CNEL at the nearest residential property line. Table 13 identifies noise levels with and without implementation of the proposed project. Calculations are provided in Appendix C.

Table 13: Operational Noise Levels With and Without Project at Nearest Receptor

	Existing Noise Levels	Parking Lot Noise Levels	Existing Plus Project Noise Levels	Noise Level Increase
January 1 – February 13 (8:00 a.m. – 5:30 p.m.)	65.9 dBA CNEL	72 dBA L_{max}	66.0 dBA CNEL	0.1 dBA
February 14 – March 8 (8:00 a.m. – 6:00 p.m.)	65.9 dBA CNEL	72 dBA L_{max}	66.0 dBA CNEL	0.1 dBA
March 8 – May 20 (8:00 a.m. – 7:00 p.m.)	65.9 dBA CNEL	72 dBA L_{max}	66.0 dBA CNEL	0.1 dBA
May 21 – September 3 (8:00 a.m. – 8:00 p.m.)	65.9 dBA CNEL	72 dBA L_{max}	66.1 dBA CNEL	0.2 dBA
September 4 – November 1 (8:00 a.m. – 7:00 p.m.)	65.9 dBA CNEL	72 dBA L_{max}	66.0 dBA CNEL	0.1 dBA
November 2 – December 31 (8:00 a.m. – 5:30 p.m.)	65.9 dBA CNEL	72 dBA L_{max}	66.0 dBA CNEL	0.1 dBA

Source: LSA (December 2017).
Note: CNEL is the Community Noise Equivalent Level (CNEL) which is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as evening hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours).

As shown in Table 13 above, due to the intermittent nature of parking lot activity, when averaged over a 24-hour period, noise levels associated with parking lot activity would result in a minimal increase of 0.1 to 0.2 dBA. This noise level is well below the 3 dBA increase considered to be perceptible by the human ear in an outdoor environment and less than the established significance criteria of a 3 dBA permanent increase in ambient noise levels. Noise levels would remain within the conditionally acceptable exterior noise level for residential land uses under Contra Costa County, City of San Ramon, and Town of Danville's land use compatibility standards. Maximum noise levels from cars passing were recorded at approximately 72 dBA to 75 dBA L_{max}, therefore door slamming noise levels ranging from 65 dBA to 72 dBA would be consistent with existing noise levels and would not result in a substantial increase in noise. Therefore, this impact would be considered less than significant.

In addition, Las Trampas Preserve is an existing open space use and park visitors would generate noise intermittently while visiting the proposed project, but would not generate noise levels that would exceed the applicable standards. In addition, the proposed trails are located approximately 75 feet from the nearest sensitive receptors. Voices from trail users may be audible at the nearest residences on occasion, but due to the distance and the minimal noise generated by hikers, the noise impact would be expected to be minimal. Therefore, the proposed project would not expose persons to noise in excess of local standards.

Groundborne Vibration and Groundborne Noise

Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors. Vibration energy propagates from a source, through intervening soil and rock layers, to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as the motion of building

surfaces, rattling of items on shelves or hanging on walls, or as a low-frequency rumbling noise. The rumbling noise is caused by the vibrating walls, floors, and ceilings radiating sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of groundborne vibration are construction activities (e.g., pavement breaking and operating heavy-duty earthmoving equipment), and occasional traffic on rough roads. In general, groundborne vibration from standard construction practices is only a potential issue when within 25 feet of sensitive uses. Groundborne vibration levels from construction activities very rarely reach levels that can damage structures; however, these levels are perceptible near the active construction site. With the exception of old buildings built prior to the 1950s or buildings of historic significance, potential structural damage from heavy construction activities rarely occurs. When roadways are smooth, vibration from traffic (even heavy trucks) is rarely perceptible.

The streets surrounding the project area are paved, smooth, and unlikely to cause significant groundborne vibration. In addition, the rubber tires and suspension systems of buses and other on-road vehicles make it unusual for on-road vehicles to cause groundborne noise or vibration problems. It is, therefore, assumed that no such vehicular vibration impacts would occur and, therefore, no vibration impact analysis of on-road vehicles is necessary. Additionally, once constructed, the proposed project would not contain uses that would generate groundborne vibration.

Construction Vibration

The nearest sensitive receptor is the single-family residence located approximately 40 feet west of the staging area. This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and will assess the potential for building damages using vibration levels in PPV (in/sec) because vibration levels calculated in RMS are best for characterizing human response to building vibration, while vibration level in PPV is best used to characterize potential for damage. The Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment*[9] guidelines indicate that a vibration level up to 102 VdB (an equivalent to 0.5 in/sec in PPV) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 in/sec in PPV).

Table 14 shows the PPV and VdB values at 25 feet from a construction vibration source. As shown in Table 14, bulldozers and other heavy-tracked construction equipment (except for pile drivers and vibratory rollers) generate approximately 87 VdB of groundborne vibration when measured at 25 feet, based on the Transit Noise and Vibration Impact Assessment. At this level, groundborne vibration would result in potential annoyance to residences and workers, but would not cause any damage to the buildings. Construction vibration, similar to vibration from other sources, would not have any significant effects on outdoor activities (e.g., those outside of residences and commercial/ office buildings in the project vicinity). Outdoor site preparation for the project is expected to use a

[9] Federal Transit Administration, 2006. Office of Planning and Environment. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06. May.

bulldozer and loaded truck. The greatest levels of vibration are anticipated to occur during the site preparation phase. All other phases are expected to result in lower vibration levels. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary) because vibration impacts occur normally within the buildings. The formula for vibration transmission is provided below.

$$L_v dB\ (D) = L_v dB\ (25\ ft) - 30\ Log\ (D/25)$$

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Table 14: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 feet	
	PPV (in/sec)	L_V (VdB) [a]
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer [b]	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks	**0.076**	**86**
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment* (Federal Transit Administration, 2006).
[a] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
[b] Equipment shown in **bold** is expected to be used on site.
µin/sec = micro-inches per second
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The main trail/road from the Chen staging area will be constructed using heavy equipment and even narrow trails may include use of a small excavator. For typical construction activity, the equipment with the highest vibration generation potential is the large bulldozer, which would generate 87 VdB at 25 feet. The closest residential structure is located 40 feet from the project construction boundary. Based on distance attenuation, the closest residences would experience vibration levels of up to 81 VdB (0.044 PPV [in/sec]). This vibration level at the closest residential structure from construction equipment or would not exceed the FTA threshold of 94 VdB (0.2 in/sec PPV) for building damage when bulldozers and loaded trucks operate within 50 feet of the project construction boundary. This level is also below the FTA's "barely perceptible" human response criteria of 0.04 PPV for transient sources of vibration events. In addition, trails would be constructed mostly with hand tools which would not be a significant source of vibration. Therefore, groundborne vibration impacts from project-related construction activities would be considered less-than-significant.

Temporary Increase in Ambient Noise

The proposed project is located approximately 40 feet from single-family residences. Construction activities associated with the LUPA could result in substantial temporary or periodic increases in ambient noise levels at staging, parking, access, and trail sites throughout the Las Trampas Preserve. Maximum construction noise would be short-term, generally intermittent depending on the construction phase, and variable depending on receiver distance from the active construction zone. The duration of noise impacts generally would be from one day to several days depending on the phase of construction. The level and types of noise impacts that would occur during construction are described below.

Short-term noise impacts would occur during grading and site preparation activities. Table 15 lists typical construction equipment noise levels (L_{max}) recommended for noise impact assessments, based on a distance of 50 feet between the equipment and a noise receptor, obtained from the FHWA Roadway Construction Noise Model. Construction-related short-term noise levels would be higher than existing ambient noise levels currently in the project area but would no longer occur once construction of the project is completed.

Two types of short-term noise impacts could occur during construction of the proposed project. The first type involves construction crew commutes and the transport of construction equipment and materials to the site for the proposed project, which would incrementally increase noise levels on Bollinger Canyon Road leading to the sites. As shown in Table 15, there would be a relatively high single-event noise exposure potential at a maximum level of 79 dBA L_{max} with trucks passing at 50 feet.

The second type of short-term noise impact is related to noise generated during excavation, grading, and construction on the project site. Construction is performed in discrete steps, or phases, each with its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase.

Table 15 lists maximum noise levels recommended for noise impact assessments for typical construction equipment, based on a distance of 50 feet between the equipment and a noise receptor. Typical maximum noise levels can range up to 87 dBA L_{max} at 50 feet during the noisiest construction phases, when pile driving and rock drills are not used. It is not anticipated that construction of project would require the use of rock drills or pile drivers. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because earthmoving machinery is the noisiest construction equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings.

Table 15: Noise Emission Reference Levels and Usage Factors

Equipment Description	Acoustical Usage Factor [a]	Predicted L_{max} at 50 feet (dBA, slow) [b]	Actual Measured L_{max} at 50 feet (dBA, slow) [c]
All Other Equipment > 5 HP	50	85	N/A [d]
Backhoe	40	80	78
Compactor (ground)	20	80	83
Compressor (air)	40	80	78
Concrete Mixer Truck	40	85	79
Concrete Pump Truck	20	82	81
Crane	16	85	81
Dozer	40	85	82
Dump Truck	40	84	76
Excavator	40	85	81
Flat Bed Truck	40	84	74
Front-End Loader	40	80	79
Generator	50	82	81
Gradall	40	85	83
Grader	40	85	N/A
Grapple (on backhoe)	40	85	87
Man Lift	20	85	75
Paver	50	85	77
Pickup Truck	40	55	75
Pneumatic Tools	50	85	85
Pumps	50	77	81
Roller	20	85	80
Scraper	40	85	84
Sheers (on backhoe)	40	85	96
Tractor	40	84	N/A
Vacuum Excavator (Vac-Truck)	40	85	85
Vacuum Street Sweeper	10	80	82
Ventilation Fan	100	85	79
Welder/Torch	40	73	74

Source: *Highway Construction Noise Handbook*, Table 9.1 (Federal Highway Administration 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.

[a] Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power.

[b] Maximum noise levels were developed based on Specification (Spec.) 721.560 from the Central Artery/Tunnel (CA/T) program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.

[c] The maximum noise level was developed based on the average noise level measured for each piece of equipment during the CA/T program in Boston, Massachusetts.

[d] Since the maximum noise level based on the average noise level measured for this piece of equipment was not available, the maximum noise level developed based on Spec 721.560 would be used.

dBA = A-weighted decibels
HP = horsepower
L_{max} = maximum instantaneous noise level
kVA = kilovolt-amperes
N/A = not applicable
RCNM = Roadway Construction Noise Model
VMS = variable message sign

The nearest sensitive receptor is the single-family residence located approximately 40 feet west of the staging area. Project construction would result in short-term noise impacts on this adjacent receptor. The main trail/road from the Chen staging area will be constructed using heavy equipment and even narrow trails may include use of a small excavator. At a distance of 40 feet, there would be an increase of approximately 2 dBA compared to the noise reference level calculated as 50 feet from the active construction area. Therefore, the closest sensitive receptor may be subject to short-term construction noise reaching 89 dBA L_{max} when construction is occurring at the staging area boundary. Based on this maximum noise level and assuming a crane, forklift, tractor, welder, and air compressor would be operating simultaneously, construction of the proposed project would result in noise levels of approximately 84 dBA L_{eq} at the nearest sensitive receptor. This noise level would be higher than the existing measured ambient noise levels of approximately 56.6 dBA to 58.5 dBA L_{eq}. However, the total construction period would be approximately 6 months and construction equipment would operate at various locations within the approximately 0.75-acre staging area project site and would only generate this maximum noise level when operations occur at the boundary of the staging area closest to the receptor.

In addition, the proposed trails would be constructed mostly with hand tools. The proposed trails are located approximately 75 feet from the nearest sensitive receptors. Therefore, based on the distance between receptors from the trails and the type of construction activities, construction of the trails would not be expected to result in the exposure of sensitive receptors to noise levels in excess of standards.

Construction noise is permitted by Contra Costa County when activities occur during the hours of the day that are not noise-sensitive for adjacent land uses and should be commissioned to occur during normal work hours of the day to provide relative quiet during the more sensitive evening and early morning periods. Construction noise is also permitted by the City of San Ramon when activities occur between the hours of 7:30 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays and Sundays. No construction is allowed on federal holidays. In addition, construction noise is permitted by the Town of Danville when activities occur between the hours of 7:30 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 7:00 p.m. on Saturdays, Sundays, and holidays.

- As discussed above, construction noise would result in a temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Implementation of best management practices for project construction, as identified below, would reduce potential construction period noise impacts for the indicated sensitive receptors. Equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

- Place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the active project site.

- Prohibit extended idling time of internal combustion engines.

- All noise producing construction activities shall be limited to the hours of 7:30 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays and Sundays. No construction activity shall be allowed on holidays.

- Designate a "disturbance coordinator" at EBRPD who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler) and would determine and implement reasonable measures warranted to correct the problem.

Excessive Airport Noise

The proposed project is not located within 2 miles of a public or public use airport. The Oakland International Airport is the closest airport and is located approximately 12 miles west of the project site. San Francisco International Airport is located approximately 22 miles southwest of the project. Aircraft flyover noise is occasionally audible at the project sites, due to the flightpath of the regional airports in the vicinity; however, no portion of the project sites lies within the 65 dBA CNEL noise contours of any public airport nor does any portion of the project sites fall within 2 miles of any private airfield or heliport. Therefore, the proposed project would not result in the exposure of sensitive receptors to the excessive noise levels form aircraft noise sources.

CONCLUSION

As described in the analysis above, construction of the proposed project would result in short-term noise impacts on adjacent single-family residential uses; however, construction noise would be short-term and implementation of the recommended best management practices for project construction would reduce the construction noise impacts to the extent feasible. In addition, the proposed project would not result in a substantial increase in traffic volumes, therefore, the proposed project would not result in generate a substantial long-term traffic noise level increase. Implementation of the proposed project would also generate on-site stationary noise sources associated with parking lot activities. However, the proposed project would not result in any permanent increase of 3 dBA or more in ambient noise levels at the existing sensitive receptors in the project vicinity that are currently exposed to noise levels above the County of Contra Costa, City of San Ramon, and Town of Danville normally acceptable threshold for that type of land use.

APPENDIX A

NOISE MEASUREMENT SHEETS

Noise Measurement Survey

Project Number: ERB1702
Project Name: Las Trampas

Test Personnel: J.T. Stephens
Equipment: LD Lxt

Site Number: ST-1 Date: 10/6/17

Time: From 10:02 am To 10:17 a.m.

Site Location: North of Staging Area – Northbound side

Primary Noise Sources: Traffic on Bollinger Canyon Road, birds
Aircraft overhead (screened out)

Comments: Very quiet. With no breeze 35-38 dBA With breeze ~41 dBA

Adjacent Roadways: Bollinger Canyon – 2 lane road – 10 auto , 3 medium trucks

File:	61
L_{eq}	56.6
L_{max}	75.5
L_{min}	29.3
L_{50}	38.9
L_{90}	33.0

Atmospheric Conditions	
Average Wind Velocity (mph)	1.0
Maximum Wind Velocity (mph)	3.0
Temperature (F)	70
Relative Humidity (%)	

Noise Measurement Survey

Project Number: ERB1702
Project Name: Las Trampas

Test Personnel: J.T. Stephens
Equipment: LD Lxt

Site Number: ST-2 Date: 10/6/17

Time: From 10:30 am To 10:45 a.m.

Site Location: South of LT-1 – Northbound side

Primary Noise Sources: Traffic on Bollinger Canyon Road, birds

Comments: Very quiet other than vehicle pass-bys

Adjacent Roadways: Bollinger Canyon – 2 lane road – 17 auto , 1 medium trucks

File:	62
L_{eq}	58.5
L_{max}	75.4
L_{min}	30.9
L_{50}	38.3
L_{90}	33.1

Atmospheric Conditions	
Average Wind Velocity (mph)	1.0
Maximum Wind Velocity (mph)	3.0
Temperature (F)	70
Relative Humidity (%)	

Noise Measurement Survey

Project Number: ERB1702
Project Name: Las Trampas

Test Personnel: J.T. Stephens
Equipment: Quest Noise Pro NXM070024

Site Number: LT-1 Date: 10/6 – 10/9/17

Time: From 11:00 am To 12:00 p.m.

Site Location: Proposed staging area across from 18515 Bollinger Canyon Road

Primary Noise Sources: Traffic on Bollinger Canyon Road, birds, airplanes

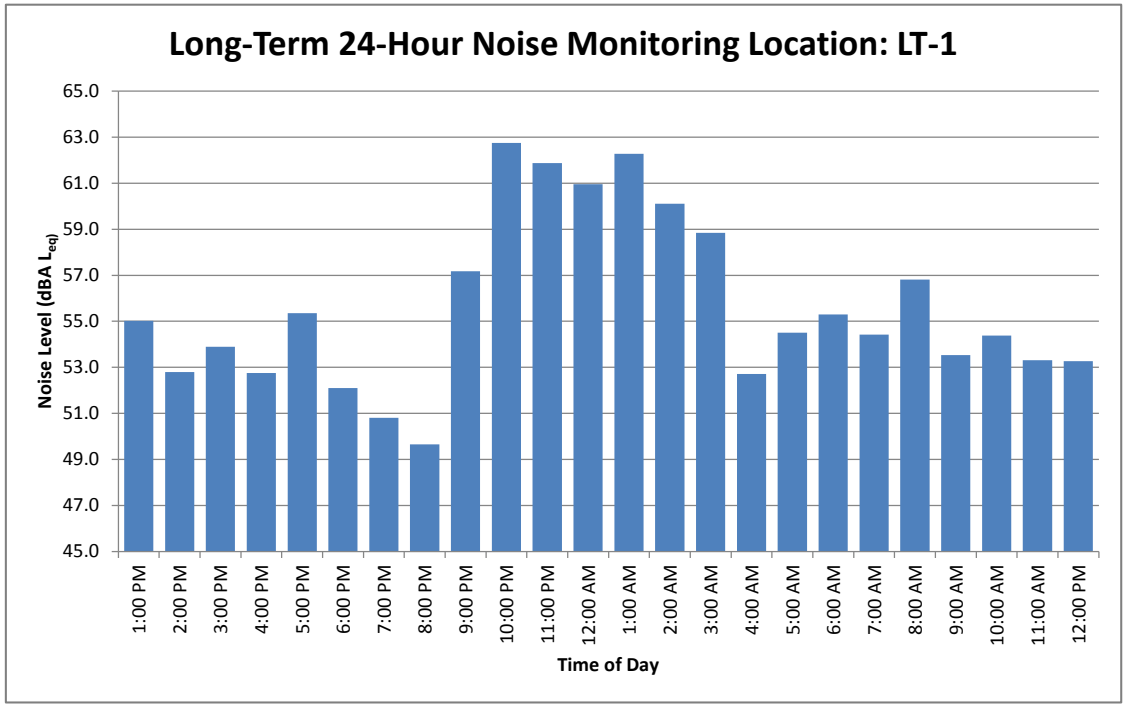
Comments: 3 single-family homes across street

Adjacent Roadways: Bollinger Canyon – 2 lane road

		Hourly Leq	
13	1:00 PM	55.0	317407.8973
14	2:00 PM	52.8	190414.6951
15	3:00 PM	53.9	245426.3188
16	4:00 PM	52.8	188640.3496
17	5:00 PM	55.4	343054.7121
18	6:00 PM	52.1	161939.3336
19	7:00 PM	50.8	120490.7595
20	8:00 PM	49.6	92175.27782
21	9:00 PM	57.2	521779.6948
22	10:00 PM	62.8	18853934.24
23	11:00 PM	61.9	15377313.72
0	12:00 AM	61.0	12453308.98
1	1:00 AM	62.3	16918564.86
2	2:00 AM	60.1	10244968.27
3	3:00 AM	58.8	7667986.679
4	4:00 AM	52.7	1869901.29
5	5:00 AM	54.5	2819734.918
6	6:00 AM	55.3	3388649.901
7	7:00 AM	54.4	277243.0564
8	8:00 AM	56.8	479450.8693
9	9:00 AM	53.5	225834.4749
10	10:00 AM	54.4	274242.8736
11	11:00 AM	53.3	214226.6523
12	12:00 PM	53.3	212470.5171

Ldn	65.9
Peak Leq	62.8

Daytime	
Min	49.6
Max	57.2
Evening	
Min	
Max	
Night	
Min	52.7
Max	62.8



APPENDIX B

FHWA NOISE MODEL OUTPUT

TABLE Existing Traffic Volumes-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - North of Chen Staging Area
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1650 SPEED (MPH): 45 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.0

TABLE Existing Traffic Volumes-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Chen Staging Area to Faria Trailhead
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1650 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.0

TABLE Existing Traffic Volumes-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Faria Trailhead to Deerwood Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1650 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.0

TABLE Existing Traffic Volumes-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Deerwood Drive to Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1590 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 57.63

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	83.5

TABLE Existing Traffic Volumes-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - South of Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2190 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 54.48

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	69.0

TABLE Existing Traffic Volumes-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Deerwood Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 390 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 50.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing Traffic Volumes-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - West of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8210 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.03

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	65.4	140.5	302.4

TABLE Existing Traffic Volumes-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9700 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.53

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	81.1	160.5	338.9

TABLE Existing Plus Project Traffic Volumes-01

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - North of Chen Staging Area
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1650 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.0

TABLE Existing Plus Project Traffic Volumes-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Chen Staging Area to Faria Trailhead
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2080 SPEED (MPH): 45 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	56.5	121.2

TABLE Existing Plus Project Traffic Volumes-03

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Faria Trailhead to Deerwood Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2300 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.50

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	60.4	129.6

TABLE Existing Plus Project Traffic Volumes-04

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Deerwood Drive to Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2235 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.11

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.7

TABLE Existing Plus Project Traffic Volumes-05

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - South of Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2340 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 54.77

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	71.7

TABLE Existing Plus Project Traffic Volumes-06

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Deerwood Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 390 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 50.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing Plus Project Traffic Volumes-07

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - West of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8330 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.09

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	66.1	141.9	305.4

TABLE Existing Plus Project Traffic Volumes-08

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10070 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.69

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	82.7	164.4	347.3

TABLE Existing Plus Future Projects Traffic Volumes -01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - North of Chen Staging Area
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1650 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.0

TABLE Existing Plus Future Projects Traffic Volumes -02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Chen Staging Area to Faria Trailhead
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1650 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.0

TABLE Existing Plus Future Projects Traffic Volumes -03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Faria Trailhead to Deerwood Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2065 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.03

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	56.3	120.7

TABLE Existing Plus Future Projects Traffic Volumes -04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Deerwood Drive to Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2875 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.20

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	57.7	123.8

TABLE Existing Plus Future Projects Traffic Volumes -05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - South of Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3310 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 56.28

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	88.5

TABLE Existing Plus Future Projects Traffic Volumes -06

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Deerwood Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 390 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 50.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing Plus Future Projects Traffic Volumes -07

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - West of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8520 SPEED (MPH): 45 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.19

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL 70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	67.1	144.0	310.0

TABLE Existing Plus Future Projects Traffic Volumes -08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10130 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.72

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	83.0	165.0	348.7

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - North of Chen Staging Area
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1650 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	104.0

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Chen Staging Area to Faria Trailhead
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1865 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.59

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	52.6	112.8

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Faria Trailhead to Deerwood Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2715 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 61.22

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	67.4	144.8

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - Deerwood Drive to Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3520 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 61.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	66.0	141.6

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Bollinger Canyon Road - South of Crow Canyon Drive
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3460 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 56.47

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	90.9

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Deerwood Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 390 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 50.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - West of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8640 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.25

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	67.7	145.4	312.9

TABLE Existing Plus Future Projects Plus Project Traffic Volumes-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 01/30/2018
ROADWAY SEGMENT: Crow Canyon Drive - East of Bollinger Canyon Road
NOTES: Southern Las Trampas Land Use Plan Amendment - Existing Plus Future Projects Plus Project Traffic Volumes

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10500 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 36 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.87

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	84.6	168.8	357.1

APPENDIX C

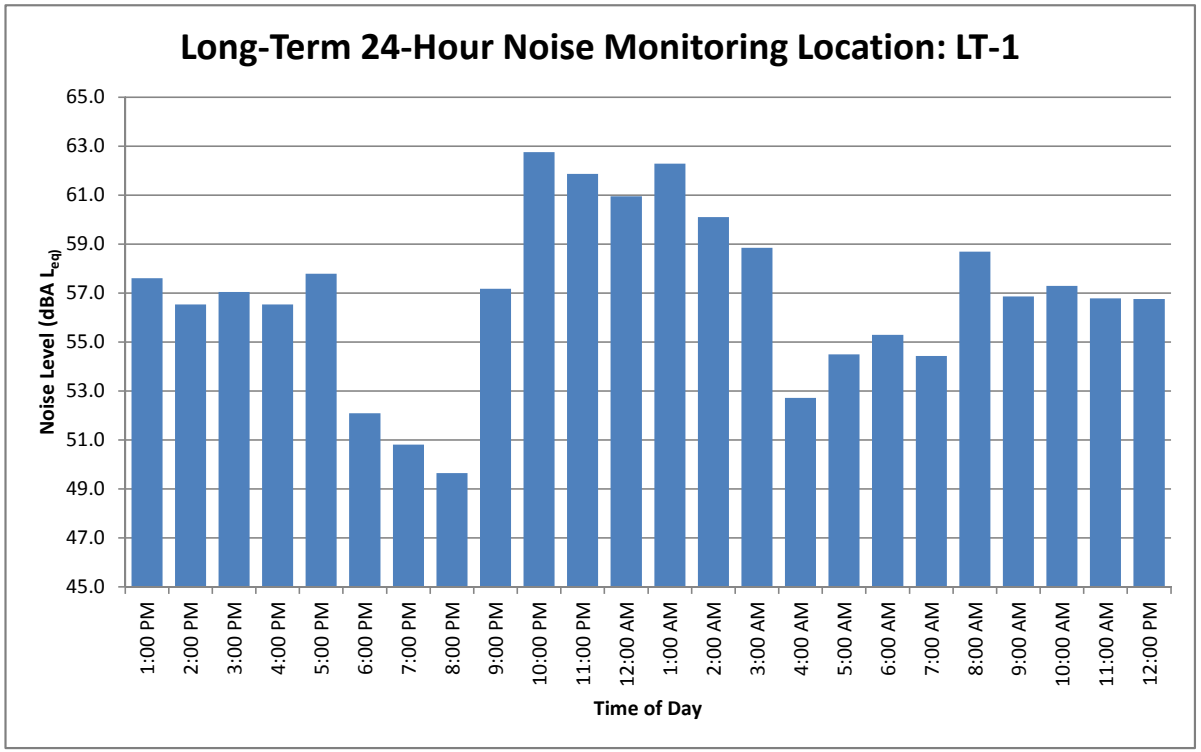
STATIONARY SOURCE NOISE CALCULATIONS

January 1 – February 13 and November 2 – December 31 (8:00 a.m. to 5:30 p.m.)

		Hourly Leq	
13	1:00 PM	57.6	576523.5099
14	2:00 PM	56.5	450279.5676
15	3:00 PM	57.0	506093.024
16	4:00 PM	56.5	450592.1204
17	5:00 PM	57.8	601933.1147
18	6:00 PM	52.1	161939.3336
19	7:00 PM	50.8	120490.7595
20	8:00 PM	49.6	92175.27782
21	9:00 PM	57.2	521779.6948
22	10:00 PM	62.8	18853934.24
23	11:00 PM	61.9	15377313.72
0	12:00 AM	61.0	12453308.98
1	1:00 AM	62.3	16918564.86
2	2:00 AM	60.1	10244968.27
3	3:00 AM	58.8	7667986.679
4	4:00 AM	52.7	1869901.29
5	5:00 AM	54.5	2819734.918
6	6:00 AM	55.3	3388649.901
7	7:00 AM	54.4	277243.0564
8	8:00 AM	58.7	738902.4298
9	9:00 AM	56.9	485599.5603
10	10:00 AM	57.3	536091.0985
11	11:00 AM	56.8	476890.0995
12	12:00 PM	56.8	473916.3656

Ldn	66.0
Peak Leq	62.8

Daytime	
Min	49.6
Max	58.7
Evening	
Min	
Max	
Night	
Min	52.7
Max	62.8

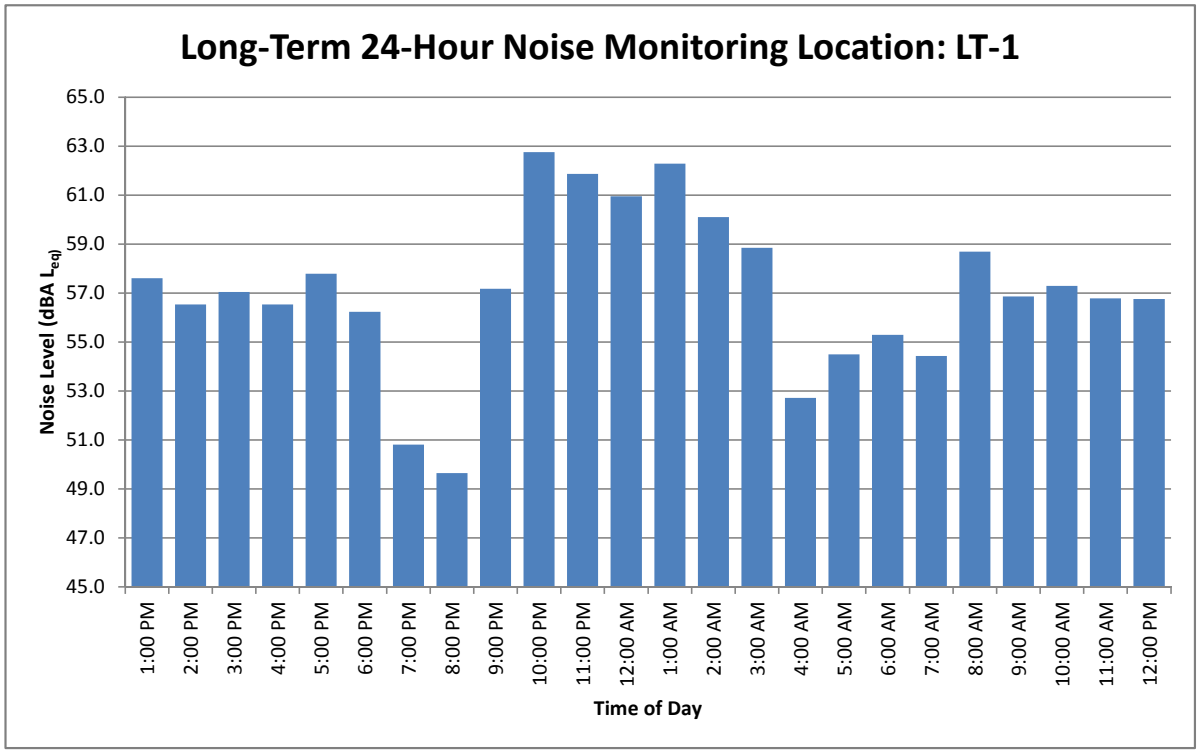


February 14 – March 8 (8:00 a.m. to 6:00 p.m.)

		Hourly Leq	
13	1:00 PM	57.6	576523.5099
14	2:00 PM	56.5	450279.5676
15	3:00 PM	57.0	506093.024
16	4:00 PM	56.5	450592.1204
17	5:00 PM	57.8	601933.1147
18	6:00 PM	56.2	420694.9714
19	7:00 PM	50.8	120490.7595
20	8:00 PM	49.6	92175.27782
21	9:00 PM	57.2	521779.6948
22	10:00 PM	62.8	18853934.24
23	11:00 PM	61.9	15377313.72
0	12:00 AM	61.0	12453308.98
1	1:00 AM	62.3	16918564.86
2	2:00 AM	60.1	10244968.27
3	3:00 AM	58.8	7667986.679
4	4:00 AM	52.7	1869901.29
5	5:00 AM	54.5	2819734.918
6	6:00 AM	55.3	3388649.901
7	7:00 AM	54.4	277243.0564
8	8:00 AM	58.7	738902.4298
9	9:00 AM	56.9	485599.5603
10	10:00 AM	57.3	536091.0985
11	11:00 AM	56.8	476890.0995
12	12:00 PM	56.8	473916.3656

Ldn	66.0
Peak Leq	62.8

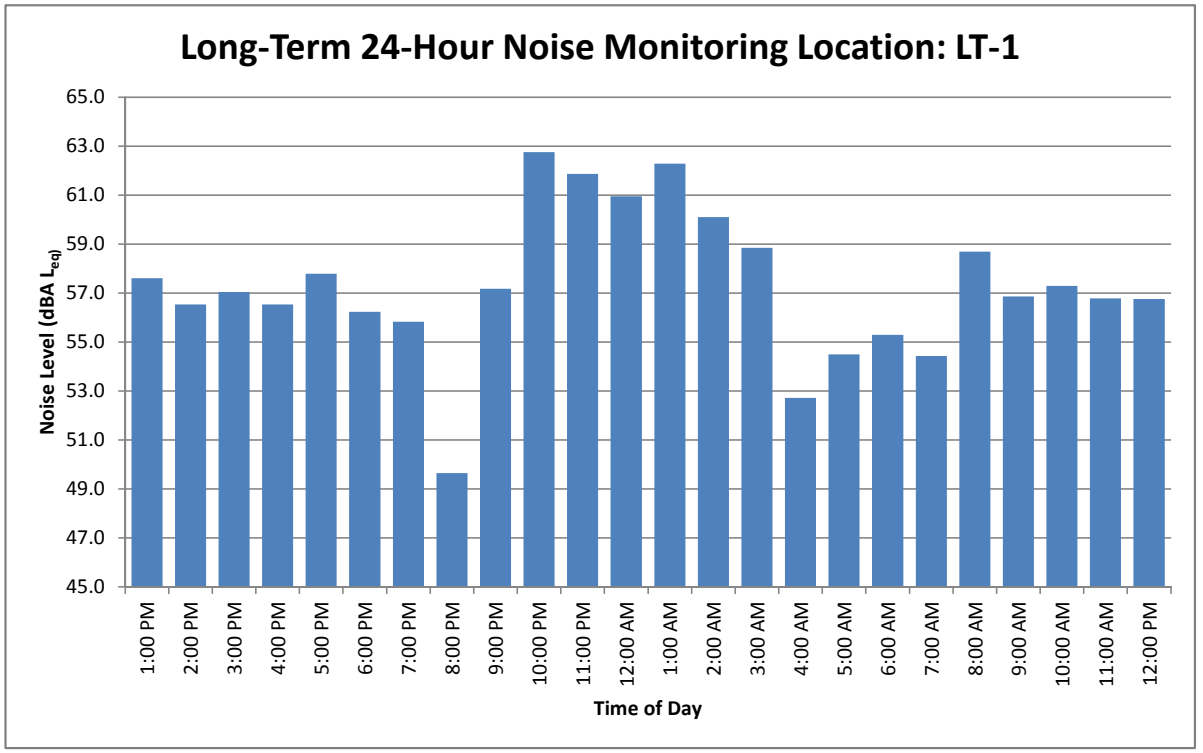
Daytime	
Min	49.6
Max	58.7
Evening	
Min	
Max	
Night	
Min	52.7
Max	62.8



March 8 – May 20 and September 4 – November 1 (8:00 a.m. to 7:00 p.m.)

		Hourly Leq	
13	1:00 PM	57.6	576523.5099
14	2:00 PM	56.5	450279.5676
15	3:00 PM	57.0	506093.024
16	4:00 PM	56.5	450592.1204
17	5:00 PM	57.8	601933.1147
18	6:00 PM	56.2	420694.9714
19	7:00 PM	55.8	383221.0615
20	8:00 PM	49.6	92175.27782
21	9:00 PM	57.2	521779.6948
22	10:00 PM	62.8	18853934.24
23	11:00 PM	61.9	15377313.72
0	12:00 AM	61.0	12453308.98
1	1:00 AM	62.3	16918564.86
2	2:00 AM	60.1	10244968.27
3	3:00 AM	58.8	7667986.679
4	4:00 AM	52.7	1869901.29
5	5:00 AM	54.5	2819734.918
6	6:00 AM	55.3	3388649.901
7	7:00 AM	54.4	277243.0564
8	8:00 AM	58.7	738902.4298
9	9:00 AM	56.9	485599.5603
10	10:00 AM	57.3	536091.0985
11	11:00 AM	56.8	476890.0995
12	12:00 PM	56.8	473916.3656
		Ldn	66.0
		Peak Leq	62.8

Daytime	
Min	49.6
Max	58.7
Evening	
Min	
Max	
Night	
Min	52.7
Max	62.8



May 21 – September 3 (8:00 a.m. to 8:00 p.m.)

		Hourly Leq	
13	1:00 PM	57.6	576523.5099
14	2:00 PM	56.5	450279.5676
15	3:00 PM	57.0	506093.024
16	4:00 PM	56.5	450592.1204
17	5:00 PM	57.8	601933.1147
18	6:00 PM	56.2	420694.9714
19	7:00 PM	55.8	383221.0615
20	8:00 PM	55.5	355116.75
21	9:00 PM	57.2	521779.6948
22	10:00 PM	62.8	18853934.24
23	11:00 PM	61.9	15377313.72
0	12:00 AM	61.0	12453308.98
1	1:00 AM	62.3	16918564.86
2	2:00 AM	60.1	10244968.27
3	3:00 AM	58.8	7667986.679
4	4:00 AM	52.7	1869901.29
5	5:00 AM	54.5	2819734.918
6	6:00 AM	55.3	3388649.901
7	7:00 AM	54.4	277243.0564
8	8:00 AM	58.7	738902.4298
9	9:00 AM	56.9	485599.5603
10	10:00 AM	57.3	536091.0985
11	11:00 AM	56.8	476890.0995
12	12:00 PM	56.8	473916.3656

Ldn	66.1
Peak Leq	62.8

Daytime	
Min	54.4
Max	58.7
Evening	
Min	
Max	
Night	
Min	52.7
Max	62.8

