FARMSTEAD AT LONG MEADOW RANCH LODGING PROJECT NOISE AND VIBRATION ASSESSMENT ST. HELENA, CALIFORNIA

September 8, 2016
Updated December 3, 2019

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INTRODUCTION

Long Meadow Ranch (LMR) is seeking a revised use permit to allow the expansion of the current LMR Farmstead Restaurant and General Store operations to include lodging, which will be constructed on the adjacent 10-acre parcel fronting on Mills Lane. The proposed lodging would include 65 guest rooms and suites spread amongst 10 buildings. In addition to the lodging buildings, the property will have a small reception and administrative center located at the lodging entrance opposite La Fata Street, a multi-purpose building on the northeast side of the property, and a wellness center at the southeast side of the property. Access to the new lodging facilities will initially be from La Fata Street with right-hand turns onto Mills Lane being restricted until Mills Lane is realigned and signaled, per the Highway 29 Specific Plan.

This report evaluates the project's potential to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency – Noise and Land use Compatibility section discusses noise and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

SETTING

Fundamentals of Environmental Noise

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

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

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

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

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

Effects of Noise

Sleep and Speech Interference

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

to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

Annoyance

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

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous vibration levels produce.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess

groundborne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background

The State of California and the City of St. Helena have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines. The CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

(e) For a project located within an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels;

(f) For a project within the vicinity of a private airstrip, if the project would expose people residing or working in the project area to excessive noise levels.

Pursuant to recent court decisions, the impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration are not included in the Impacts and Mitigation Section of this report. Checklist item (a) is discussed with respect to the compatibility of the project with noise levels at the site in a separate section addressing the consistency of the project with the policies set forth in the City's General Plan. Items (a) through (d) are applicable in the assessment of potential impacts resulting from the proposed project at off-site receptors. Items (e), and (f) are not applicable because the project is not located within an airport land use plan, is not within two miles of an airport, and is not in the vicinity of a private air strip.

2016 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn}/CNEL in any habitable room.

St. Helena General Plan Update 2040. The Public Health, Safety, and Noise Chapter of the St. Helena General Plan Update 2040 identifies policies and implementing actions related to noise that are applicable in this assessment.

Policies

PS2.1 Preserve the current low levels of noise in St. Helena to maintain the City's rural atmosphere.

PS2.2 Maintain a citywide environment that balances various City objectives while minimizing the impact of highway, railroad, and industrial noise. The City should manage both indoor and outdoor noise levels to protect health and safety. A combination of noise standards and existing noise levels should be used to determine impacts and mitigation measures.

PS2.3 Minimize potential noise impact conflicts between land uses by regulating incompatible land uses. Encourage noise-generating uses to reduce their impacts while promoting land use patterns that avoid conflicts. Employ compatibility guidelines, interior noise level criteria, the City's noise standards, and noise contour maps to determine the compatibility of land uses.

PS2.4 Require a reduction and/or control of the use of machinery, mechanical systems and other noise-making equipment and sources in and near residential areas where the noise impacts would be considered intrusive to adjacent residential property, unless consistent with the right-to-farm.

PS2.5 An increase in average noise levels of 5 dBA or greater is considered to be significant and to constitute a noise impact by the noise source in question for the purpose of environmental analyses.

The following implementing actions contained in the St. Helena General Plan Update 2040 are also relevant to this project:

Implementing Actions

PS2.A Consider the environmental impact of transportation-related noise and other noise sources in the review of any new projects and approval of subdivision plans and requests for changes in the zoning ordinance.

PS2.B Enforce the Land Use Compatibility Standards presented in the State of California's General Plan guidelines when siting new uses. These standards identify the acceptability of a project based on levels of noise exposure.
PS2.C Adopt and enforce Title 24 Standards for all types of new residential construction, including single family dwellings, duplexes, apartments, and dormitories.

• An interior maximum noise level of LAdn-45 dBA in all habitable rooms for all dwelling units;
• A maximum allowable interior noise level for bedrooms of an hourly LAeq-35 dBA;
• A maximum noise level of LAdn-60 dBA for residential exterior activity areas;
• If interior noise standards are met by requiring windows to be closed, cooling and outside air exchange must also be provided in the building's design.

PS2.D Require an acoustical study, prepared by a qualified acoustical consultant for:
• All proposed projects that are likely to be exposed to noise levels greater than the standards;
• All proposed projects that would generate noise where impacts on other uses would be greater than the standards;
• Any project exposed to outdoor noise at or above a day-night average sound level (Ldn) of 60 or for any noise source that could create such outdoor noise levels for adjacent uses; and
• Any project exposed to or that creates noise which may exceed the adopted City standards.

PS2.E Require new developments to implement noise mitigation measures when built in close proximity to noise sources, such as State Route 29 and the railroad tracks. These developments should consider the exterior and interior noise environment.

PS2.F Require construction operations to use noise suppression devices and techniques and limit noisy construction activities that can be heard at the property line to the least noise-sensitive times, as per the City's noise ordinance.

PS2.G Include appropriate noise attenuation techniques in the design of all new arterial streets. Such techniques could include the use of site planning, building orientation, buffer distances, quiet pavement surfaces, and the use of correctly engineered acoustical barriers and berms where necessary. Adopt the noise standard for intrusive noise at residences given in Table 9.4.

PS2.H Amend the City's noise ordinance to regulate intrusive noise sources, such as the use of machinery and equipment, landscaping and property maintenance devices, animals, and idling buses or trucks in or near uses sensitive to noise.

PS2.I Incorporate right-to-farm legal provisions relative to noise in all newly created deeds where agricultural activities may pose noise impacts in the future. Require similar language in deeds for properties similarly impacted by the Harold Smith & Son gravel plant operations.

St. Helena Municipal Code. The Municipal Code does not quantitatively regulate noise levels, but authorized the chief of police to review complaints of "unnecessary noise" as defined in Chapter 8.24. Similarly, noise that can be heard at the property line of any parcel that is generated by commercial activities, between the hours of 10:00 pm and 7:00 am is prohibited, unless permitted by the chief of police.

Construction activities are limited to the hours between 8:00 am and 5:00 pm Monday through Saturday. Construction is not allowed on Sundays and Holidays (federal and Local). Delivery of materials/equipment and cleaning and servicing of machines/equipment are limited to between 7:00 am and 6:00 pm Sundays and Holidays (federal and Local). Noise generated by contracted landscape maintenance activities is limited to the hours between 8:00 am and 5:00 pm Monday through Saturday and prohibited on Sundays and Holidays (federal and Local).

Existing Noise Environment

Ambient noise levels at the site and at noise-sensitive land uses in the project vicinity were measured by Illingworth & Rodkin, Inc. between July 1, 2016 and July 6, 2016. The noise survey included one-long term noise measurement and four short-term noise measurements as shown on Figure 1. Weather conditions during the survey were good for noise monitoring with clear skies, calm winds, and seasonable temperatures.

The long-term noise measurement (LT-1) was made along the northwest property line of the project site, approximately 600 feet from the center of Main Street and adjacent to Charter oak Avenue residential properties that border the site. Figures 2 - 7 display the measured noise data over a daily basis. Hourly average noise levels typically ranged from 44 to 53 dBA L_{eq} during the daytime period (7:00 a.m. to 10:00 p.m.) and from 38 to 48 dBA L_{eq} at night (10:00 p.m. to 7:00 a.m.). Hourly average noise levels during the 9:00 p.m. hour on Monday, July 4, 2016 reached 68 dBA L_{eq} because of fireworks. The day-night average noise level at LT-1 typically ranged from 50 to 52 dBA L_{dn} with the exception of Monday, July 4, 2016 when the L_{dn} reached 56 dBA L_{dn} because of the sounds attributable to fireworks during the 9:00 p.m. hour.

Four short-term noise measurements were also made on Friday, July 1, 2016 and Tuesday July, 6, 2016 to complete the noise monitoring survey. A 20-minute short-term noise measurement was made at site ST-1 between 6:50 p.m. and 7:10 p.m. on Friday, July 1, 2016 to quantify noise levels produced by a wedding reception held the event lawn east of the Farmstead restaurant. The wedding reception had live, amplified music provided by a bluegrass band known as the "Town Howlers". The sounds of distant traffic, mechanical equipment, and the amplified music ranged from 46 to 49 dBA, and the sound of the music was barely audible above the sounds produced by the distant traffic and mechanical equipment. Voices on the public address system were measured to range from 48 to 50 dBA, and the cheering of the crowd reached 53 to 54 dBA as the wedding party was introduced. The average noise level during the 20-minute measurement was 48 dBA L_{eq}. Ambient traffic noise levels were monitored at sites ST-2, ST-3, and ST-4 on Tuesday July, 6, 2016. Average traffic noise levels were 45 to 48 dBA L_{eq} depending on the distance between the measurement site and Main Street. Table 4 summarizes the results of the short-term noise measurements.

TABLE 4 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: 300 feet from the center of the stage at the event lawn. (7/1/2016, 18:50-19:10)	60[1]	53	49	48	47	48
ST-2: 820 feet from the center of Main Street. (7/6/2016, 13:40-13:50)	52	49	47	45[2]	43	45
ST-3: 600 feet from the center of Main Street. (7/6/2016, 14:00-14:10)	54	51	47	45	43	46
ST-4: 350 feet from the center of Main Street. (7/6/2016, 14:20-14:30)	58[3]	55	49	47	45	48

Notes:

1. A motorcycle along Main Street produced the maximum noise level of 60 dBA.
2. PG&E Substation produced noise levels ranging from 44 to 45 dBA.
3. Barking dogs at the nearby vet generated maximum noise levels reaching 58 dBA. After the measurement was complete, the Napa Valley Wine Train warning whistle generated maximum noise levels ranging from 80 to 82 dBA.

FIGURE 1 Noise Measurement Locations

Source: Google Earth

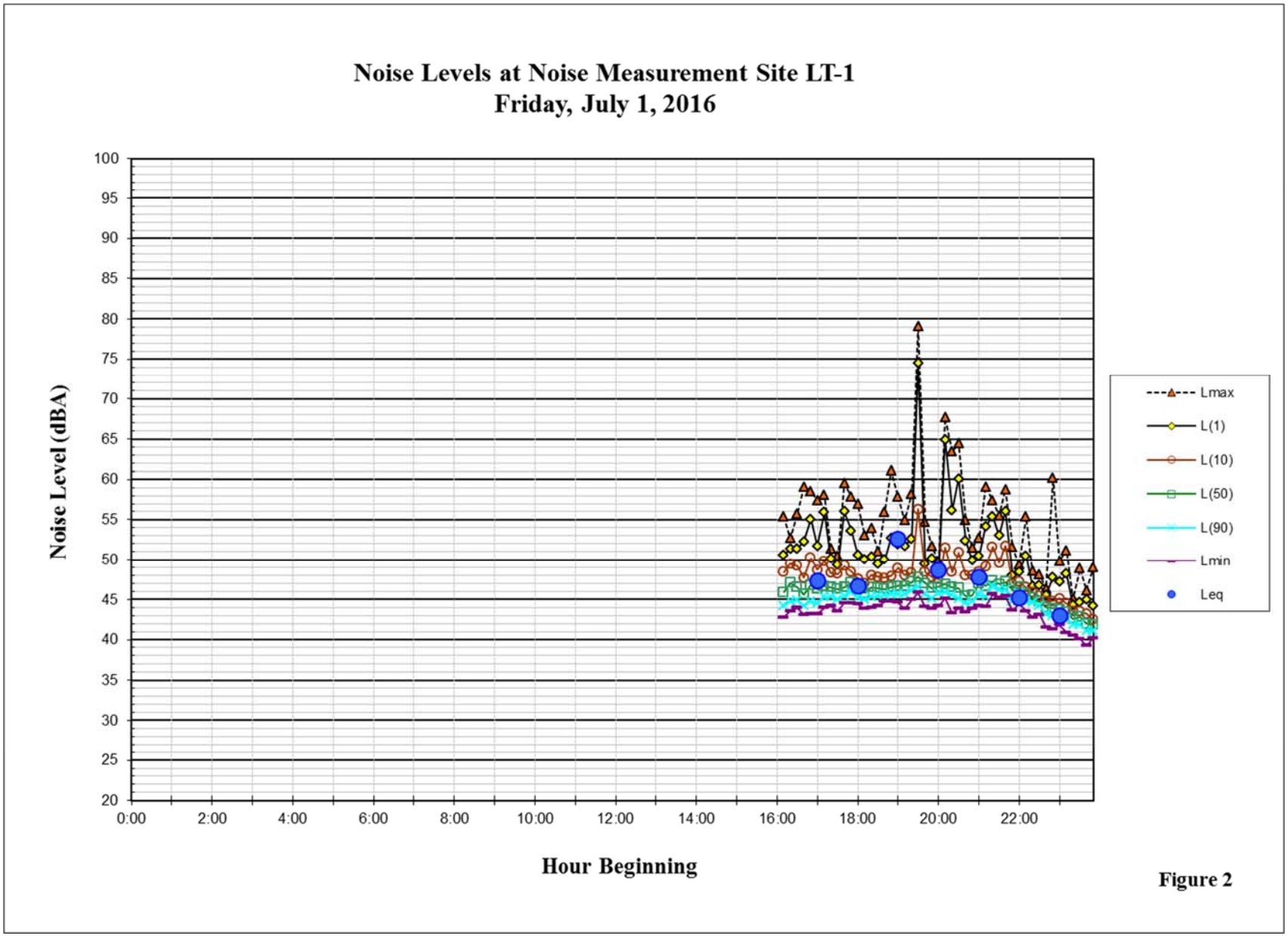
Noise Levels at Noise Measurement Site LT-1
Friday, July 1, 2016
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq

Figure 2

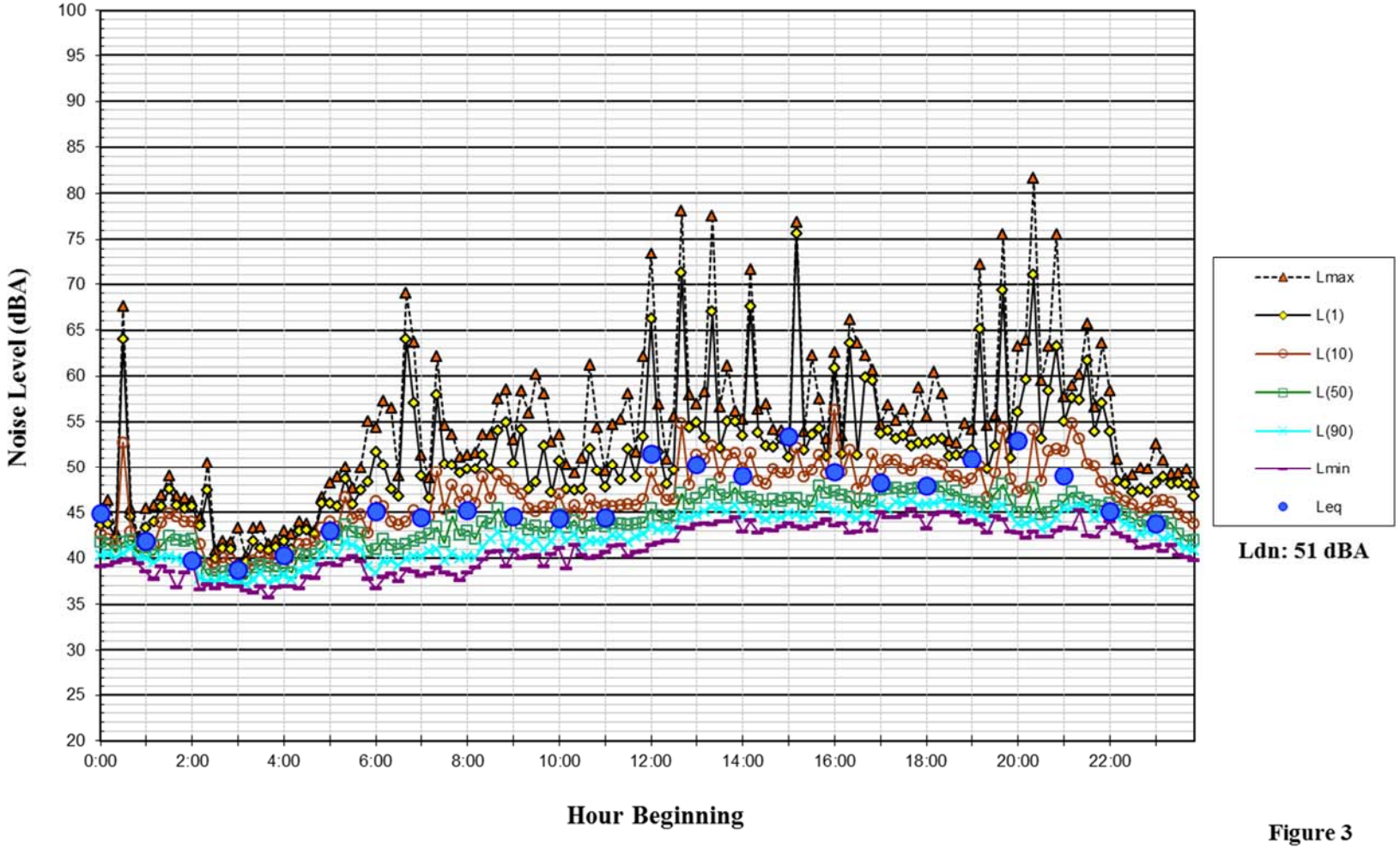
Noise Levels at Noise Measurement Site LT-1
Saturday, July 2, 2016
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq
Ldn: 51 dBA

Figure 3

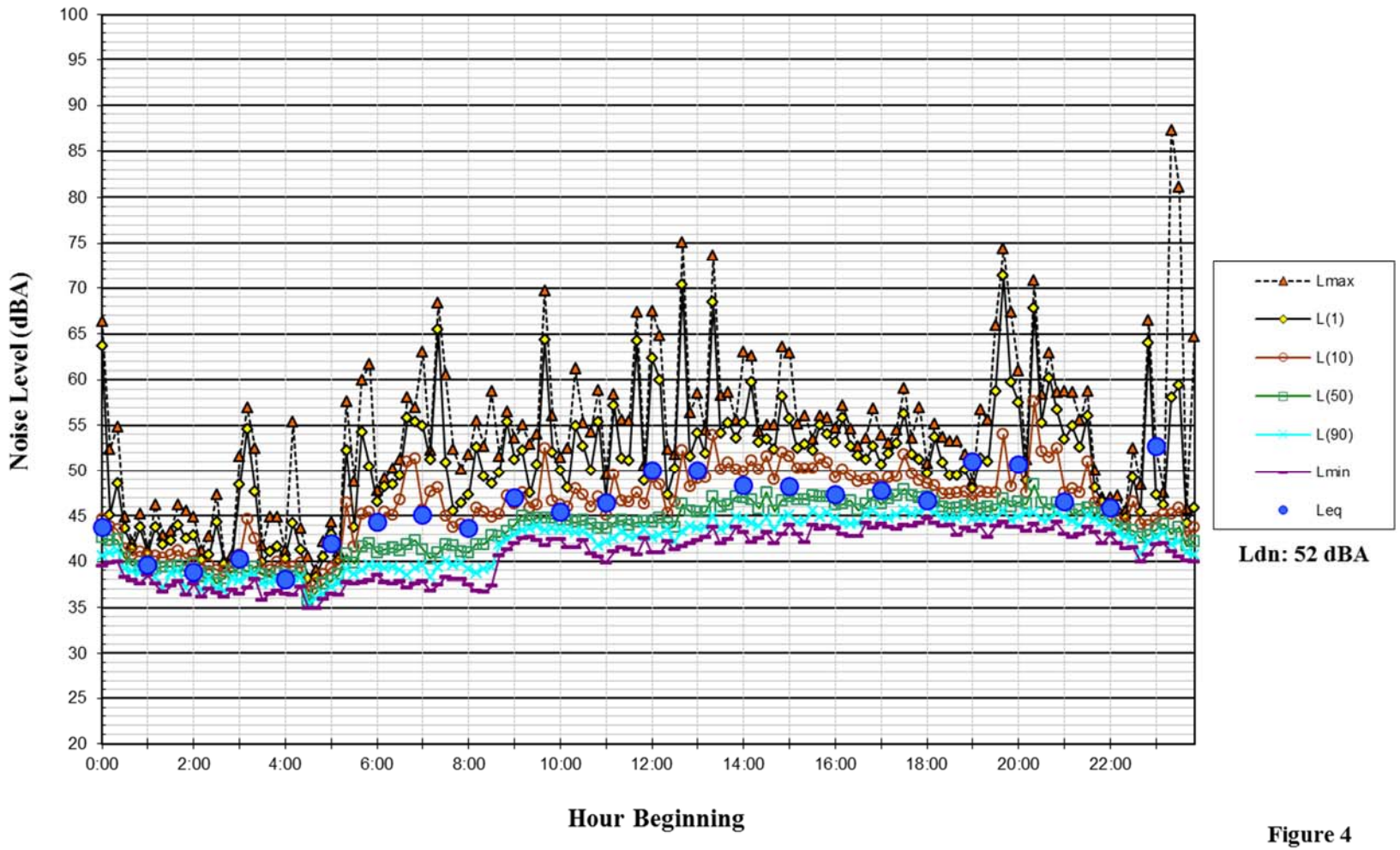
Noise Levels at Noise Measurement Site LT-1
Sunday, July 3, 2016
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq
Ldn: 52 dBA

Figure 4

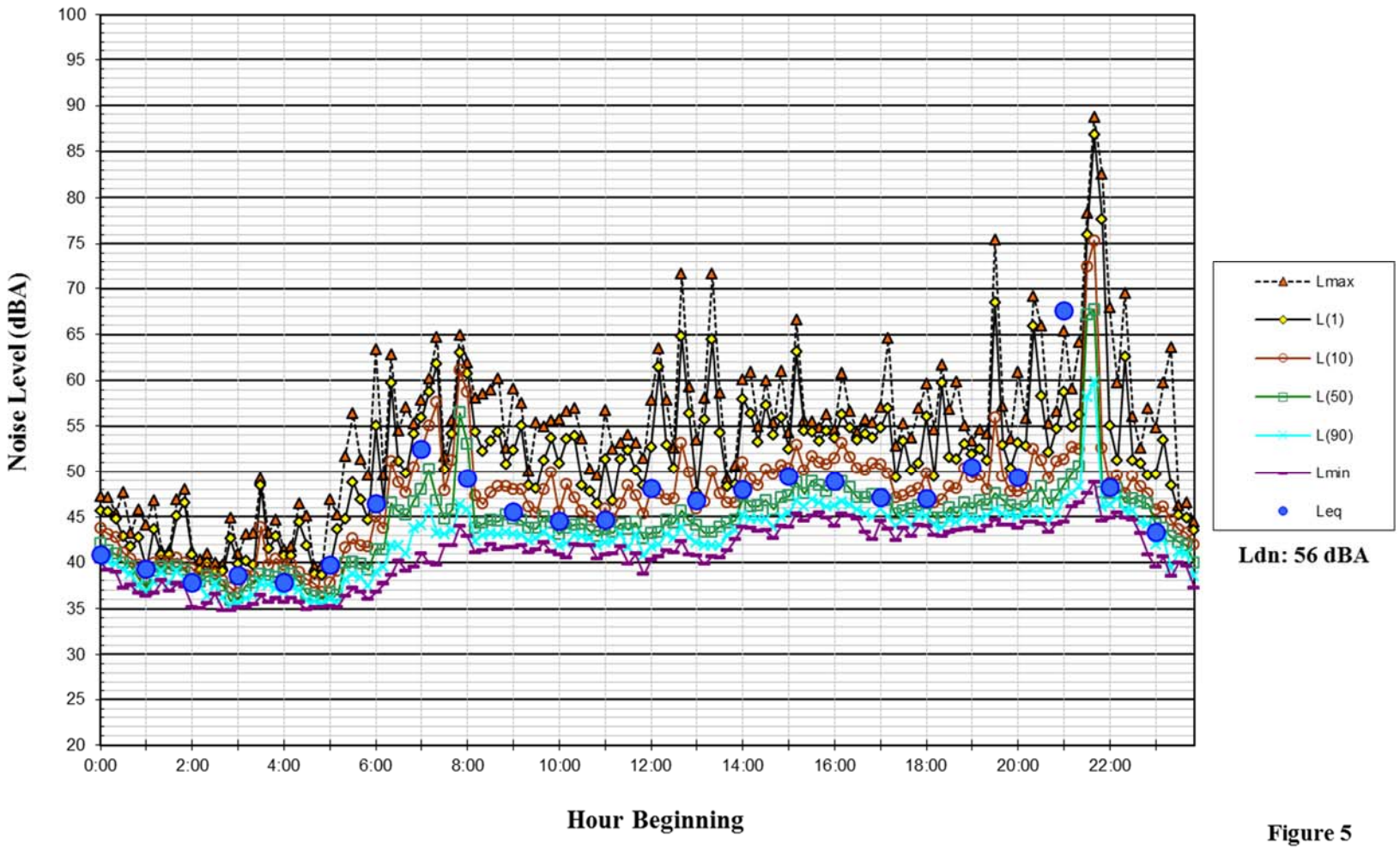
Noise Levels at Noise Measurement Site LT-1
Monday, July 4, 2016
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq
Ldn: 56 dBA

Figure 5

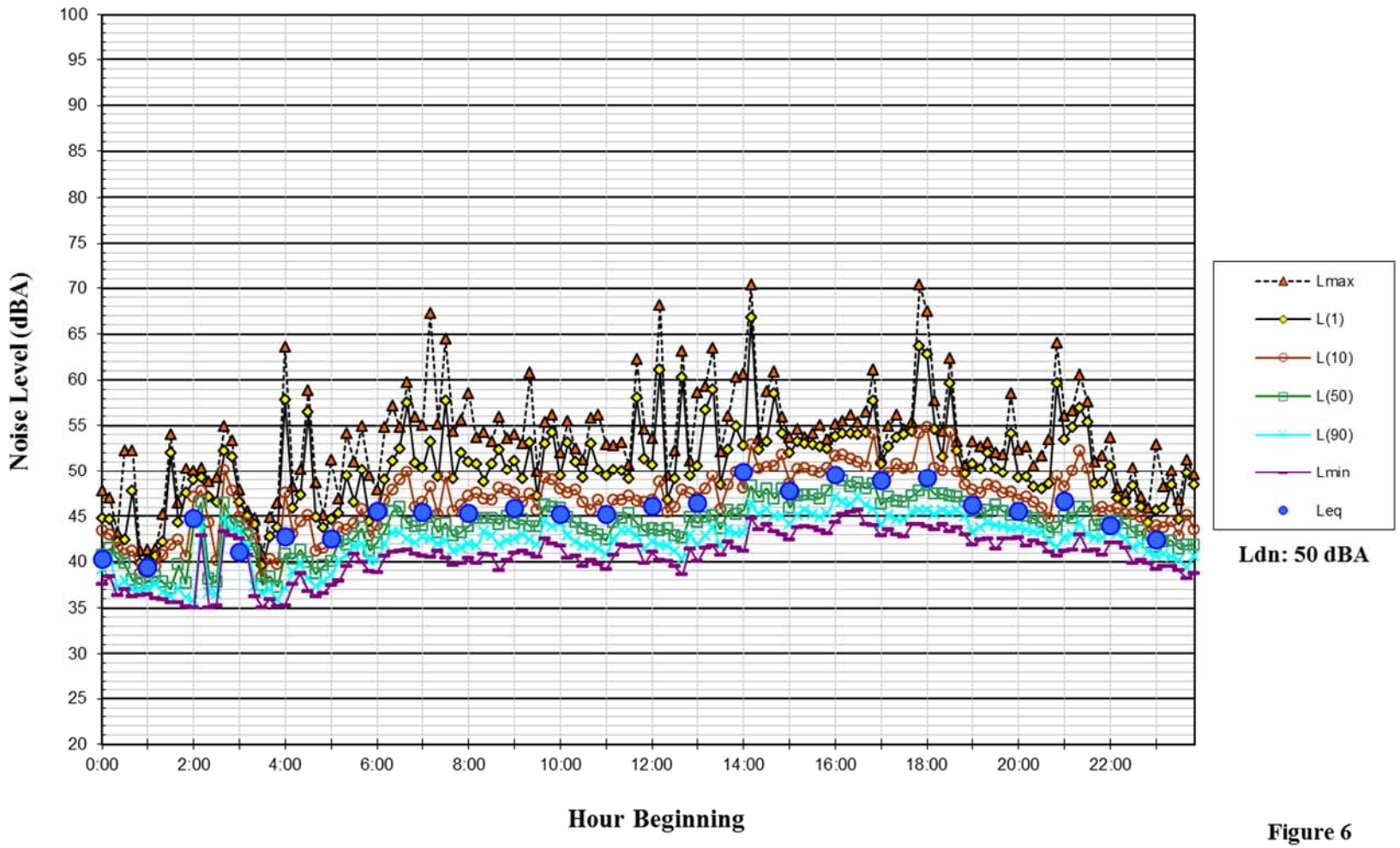
Noise Levels at Noise Measurement Site LT-1
Tuesday, July 5, 2016
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq
Ldn: 50 dBA

Figure 6

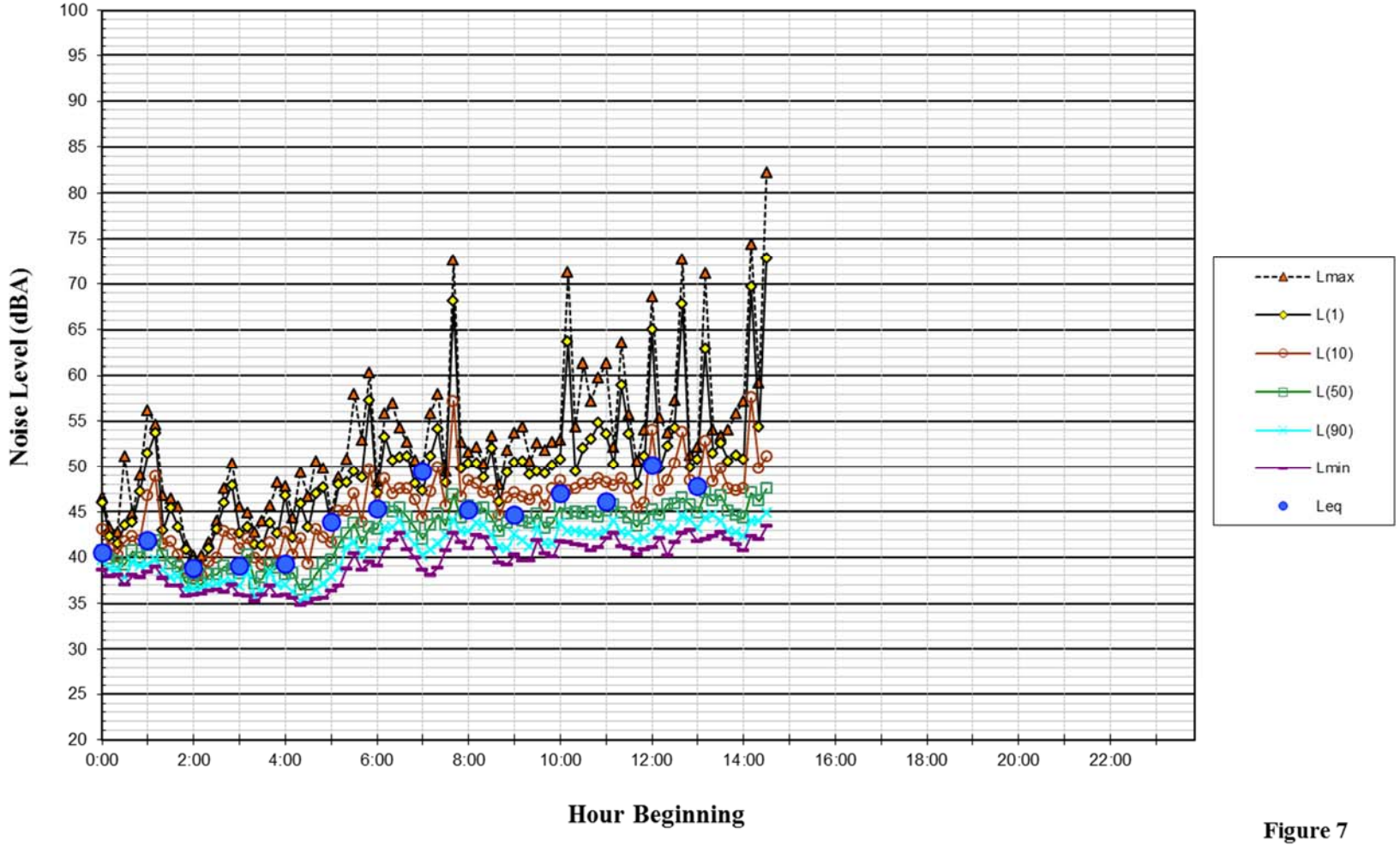
Noise Levels at Noise Measurement Site LT-1
Wednesday, July 6, 2016
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq

Figure 7

GENERAL PLAN CONSISTENCY ANALYSIS

The Public Health, Safety, and Noise Chapter of the St. Helena General Plan Update sets forth policies and implementing actions in order to prepare for and mitigate the adverse effects of noise. The applicable General Plan policies and implementing actions were presented in detail in the Regulatory Background section of this report. The City of St. Helena considers residential land uses to be completely compatible in noise environments less than 55 dBA L_{dn}. The completely compatible designation assumes that buildings of normal conventional construction would provide sufficient attenuation in order to achieve acceptable interior noise levels (45 dBA L_{dn} or less).

Based on the results of the ambient noise monitoring survey, existing noise levels at the portions of the site proposed for lodging are approximately 50 to 52 dBA L_{dn}. Traffic noise levels along Main Street, between Pope Street and Mills Lane, are not anticipated to measurably increase by 2030; therefore, the future noise environment is expected to remain at or below 52 dBA L_{dn}. The exterior noise environment would be considered to be completely compatible for the proposed land use. Interior noise levels, assuming that buildings are of normal conventional construction with no special noise insulation, would be less than 45 dBA L_{dn}, meeting the interior noise limits established in the General Plan and by the State Building Code. Additional noise controls or noise insulation are not required to conform to the applicable exterior or interior noise limits established in the General Plan and State Building Code.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Paraphrasing from the checklist questions in Appendix G of the CEQA Guidelines, a project would normally result in significant noise impact if it would cause traffic or other on-going sources of operational noise to result in a substantial permanent noise increase, if it would cause ambient noise levels at sensitive receivers to increase substantially during construction, or if it would generate excessive groundborne vibration levels. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- A significant impact would be identified if project generated traffic or operational noise sources would substantially increase noise levels at sensitive receivers in the vicinity. An increase in average noise levels of 5 dBA or greater is considered to be significant and to constitute a noise impact by the noise source in question for the purpose of environmental analyses.

- A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA L_{eq} at the property lines shared with residential land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase at adjacent residential land uses.

- A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

Impact 1: **Project-Generated Traffic Noise.** The proposed project would not result in a permanent noise level increase at existing noise sensitive land uses due to project-generated traffic. **This is a less-than-significant impact.**

A significant impact would result if traffic generated by the project would substantially increase noise levels at sensitive receptors in the vicinity. A substantial increase would occur if the noise level increase is 5 dBA L_{dn} or greater. The project's traffic study[1] provided traffic volume information for roadways serving the project site. No noise-sensitive land uses that would be affected by increased traffic noise associated with project vehicle trips are located along Mills Lane or La Fata Street. Noise-sensitive land uses do currently exist along Dowdell Lane. Traffic volume information for Dowdell Lane was reviewed to calculate the permanent noise increase attributable to project-generated traffic. Traffic volumes under the Existing Plus Project scenario were compared to the Existing scenario to calculate the relative increase in the hourly average traffic noise level (L_{eq}) attributable to the proposed project. The change in the L_{dn} would correspond to the change in the peak hour L_{eq}. Based on this review, traffic noise levels are calculated to increase by less than 1 dBA L_{dn}. This increase would not be considered to be substantial as it would not be measureable or perceptible and would result in a less-than-significant impact.

Mitigation Measure 1: **None required.**

Impact 2: **Operational Noise.** Mechanical equipment associated with the project could generate noise in excess of the City of St. Helena's noise standards. **This is a significant impact.**

The proposed project would likely include rooftop mechanical equipment, such as heating, ventilation, and air conditioning systems (HVAC) that would produce noise during operation. At the time of this analysis, specific mechanical equipment details were not available.

The City of St. Helena limits operational noise levels from new projects to 45 dBA L_{eq} during the daytime (7:00 a.m. to 7:00 p.m.), 40 dBA L_{eq} during the evening (7:00 p.m. to 10:00 p.m.), and 35 dBA L_{eq} during the night (10:00 p.m. to 7:00 a.m.) at the nearest residential property line or at the nearest affected location on the receiver's property. Maximum noise levels of any intrusive noise shall not exceed the L_{eq} limits by more than 10 dBA.

Typical air conditioning units and heat pumps for hotels produce noise levels of about 60 dBA at a distance of 50 feet. Since this type of equipment could run continuously during the daytime, evening, and nighttime, the 35 dBA L_{eq} noise limit would be the most appropriate regulatory threshold to ensure a conservative analysis. For the proposed project, the worst-case scenario would assume that mechanical equipment would be located approximately 300 feet from the

[1] Traffic Impact Report, Proposed Farmstead at Long Meadow Ranch Project, Crane Transportation Group, November 21, 2019.

residential property line. At a distance of 300 feet, project mechanical equipment could produce noise levels of 44 dBA L_{eq}, which would exceed the 35 dBA L_{eq} noise limit by up to 9 dBA L_{eq}.

Based on these findings, noise associated with the operation of mechanical equipment is expected to exceed the evening and nighttime noise limits established by the City of St. Helena at the nearest residences to the west, assuming a worst-case scenario with regard to the location of the equipment. This would be a significant impact.

Mitigation Measure 2:

The following mitigation measures shall be included in the project to reduce the impact to a less-than-significant level:

- Mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's noise level requirements. A qualified acoustical consultant shall be retained to review mechanical noise as these systems are selected to determine specific noise reduction measures necessary to reduce noise to comply with the City's noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and/installation of noise barriers such as enclosures and parapet walls to block the line-of-sight between the noise source and the nearest receptors. Alternate measures may include locating equipment in less noise-sensitive areas, such as the rooftop of the hotel buildings away from the building's edge nearest the residences, where feasible.

Impact 3: **Construction Noise.** Noise generated by project construction activities would temporarily elevate ambient noise levels at sensitive land uses in the vicinity. Due to the proximity of existing residential land uses, there is a potential that construction noise levels would exceed 60 dBA L_{eq}, and the ambient by at least 5 dBA L_{eq}, for a period greater than one year. **This is a significant impact.**

Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction noise impacts primarily occur when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time. Typically, significant noise impacts do not result when standard construction noise control measures are enforced at the project site and when the duration of the noise generating construction period is limited to one construction season (typically one year) or less. Once construction moves indoors, minimal noise would be generated at off-site locations.

Construction activities for individual projects are typically carried out in stages. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 5 and 6. Table 5 shows the average noise level ranges, by

construction phase, and Table 6 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise falls with the range of 80 to 90 dBA at a distance of 50 feet from the source.

TABLE 5 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

TABLE 6 Construction Equipment 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact

Equipment Category	L_{max} Level (dBA)1,2	Impact/Continuous
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:

1 Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

2 Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

3 Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

Source: Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances, National Cooperative Highway Research Program, 1999.

Construction activities can generate high noise levels, especially during the construction of project infrastructure when heavy equipment is used. Maximum instantaneous noise levels from the majority of construction equipment ranges from about 73 to 85 dBA L_{max} at a distance of 50 feet. Demolition tools such as concrete saws and hoe rams can result in maximum instantaneous noise levels of about 90 dBA L_{max} at a distance of 50 feet from the noise source. Typical hourly average construction generated noise levels are about 81 to 88 dBA L_{eq} measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

For the proposed project, the larger equipment would be used for approximately 80 work days (Site Preparation – 10 days, Grading/Excavation – 30 days, Trenching – 20 days, and Paving – 20 days). The construction of the lodging units would utilize less heavy equipment and would last approximately 300 work days.

Hourly average noise levels are calculated to range from about 65 to 72 dBA L_{eq} at the nearest residential receptors located approximately 300 feet from the westernmost edge of the proposed lodging area of the site and from about 61 to 68 dBA L_{eq} when located approximately 500 feet from the center of the construction site. During project construction activities, ambient noise levels at Charter Oak Avenue residential land uses could be elevated by 15 to 20 dBA,

depending on the proximity of the portion of the site under construction to the sensitive receptor. Noise from temporary construction activities would exceed 60 dBA L_{eq} and the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive uses in the project vicinity for a period greater than one year, and the impact would be considered significant.

Mitigation Measure 3:

The St. Helena Municipal Code limits construction activities to the hours between 8:00 AM and 5:00 PM, Monday through Saturday. Construction is not allowed on Sundays and holidays (federal and local) if noise can be heard at the property line of any parcel of real property within the city limits. In accordance with Implementing Action PS2.F, noise suppression devices and techniques developed as part of a typical construction noise control plan would include, but not be limited to, the following measures:

- Use "quiet" models of air compressors and other stationary noise sources where technology exists;

- Equip all internal combustion engine-driven equipment with mufflers that are in good condition and appropriate for the equipment;

- Locate all stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from adjacent land uses;
- Locate staging areas and construction material areas as far away as possible from adjacent land uses;

- Prohibit all unnecessary idling of internal combustion engines;

- Notify all adjacent land uses of the construction schedule in writing;

- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem be implemented. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

The implementation of reasonable noise reduction measures during all phases of construction activity, in combination with the limitations on hours set forth in the St. Helena Municipal Code, would reduce the impact of temporary construction noise to a less-than-significant level.

Impact 4: **Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels resulting from activities at the project site would not exceed 0.3 in/sec PPV at the nearest residential and commercial land uses. **This is a less-than-significant impact.**

The construction of the project may generate vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site preparation work, foundation work, paving, and new building framing and finishing. The proposed project is not expected to require pile driving, which can cause excessive vibration.

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened. No ancient buildings or buildings that are documented to be structurally weakened border the project site. Therefore, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact.

The critical factors pertaining to the impact of construction vibration on existing sensitive receptors include the proximity of the existing structures to the project site, the structural soundness of the existing buildings, and the methods of construction used. Table 7 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

The nearest structures to the project site include the St. Helena Veterinary Hospital, approximately 30 feet northwest of the project property line, and wine storage warehouses opposite Mills Lane approximately 100 feet southeast of the site. Charter Oak Avenue residences are located a minimum distance of 60 feet from the project property line. At a minimum distance of 30 feet, vibration levels produced by vibratory construction equipment, such as a vibratory roller, would be 0.2 in/sec PPV or less. Vibration levels produced by a vibratory roller would be 0.08 in/sec PPV or less at a distance of 60 feet and 0.05 in/sec PPV or less at a distance of 100 feet. Vibration levels produced by construction activities occurring near the site boundaries would be expected to be 0.03 in/sec PPV or less, below the 0.3 in/sec PPV significance threshold used to assess the potential for cosmetic damage to structures. Vibration levels may at times be perceptible; however, intermittent, perceptible vibration levels would not be considered excessive. This is a less-than-significant impact.

TABLE 7 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Approximate L_v at 25 ft. (VdB)
Pile Driver (Impact)	upper range	1.158	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop		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

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

Mitigation Measure 4: None required.