LABCON II PROJECT
NOISE AND VIBRATION ASSESSMENT

Lakeville Business Park, Parcels 2 through 8
Petaluma, California

July 26, 2022

♦ ♦ ♦

Prepared for:

Greg LeDoux & Associates, Inc
48 West Sierra Avenue
Cotati, CA

Prepared by:

Fred M. Svinth, INCE, Assoc. AIA
ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 East Cotati Avenue
Cotati, CA 94931
(707) 794-0400

Job No.: 22-055

INTRODUCTION AND SUMMARY

This report presents the results of an environmental noise assessment completed for the proposed 175,000 SF industrial/manufacturing facility for Labcon North America to be located on Parcels 2 thru 8 of the Lakeville Business Park in the City of Petaluma (see Figure 1). The proposed project is located immediately south of and adjacent to an existing warehouse facility for Labcon (approximately 40,000 SF), with Steris occupying an adjacent 39,000 SF tenant space. Steris will continue to occupy their current space in support of Labcon in the sterilization process of finished products. The new building will be connected to the existing building at the southwest corner to allow for weather safe transfer of goods, materials, and personnel between the new and existing buildings.

The purpose for this noise assessment is to evaluate the compatibility of the development with respect to the environmental noise levels at the project site and evaluate noise impacts upon sensitive receptors in the area from this development. The Setting Section of this report presents the fundamentals of environmental noise and vibration, describes regulatory criteria that are applicable in the project's assessment, and summarizes the results of a survey of the existing noise environment at the project site and vicinity.

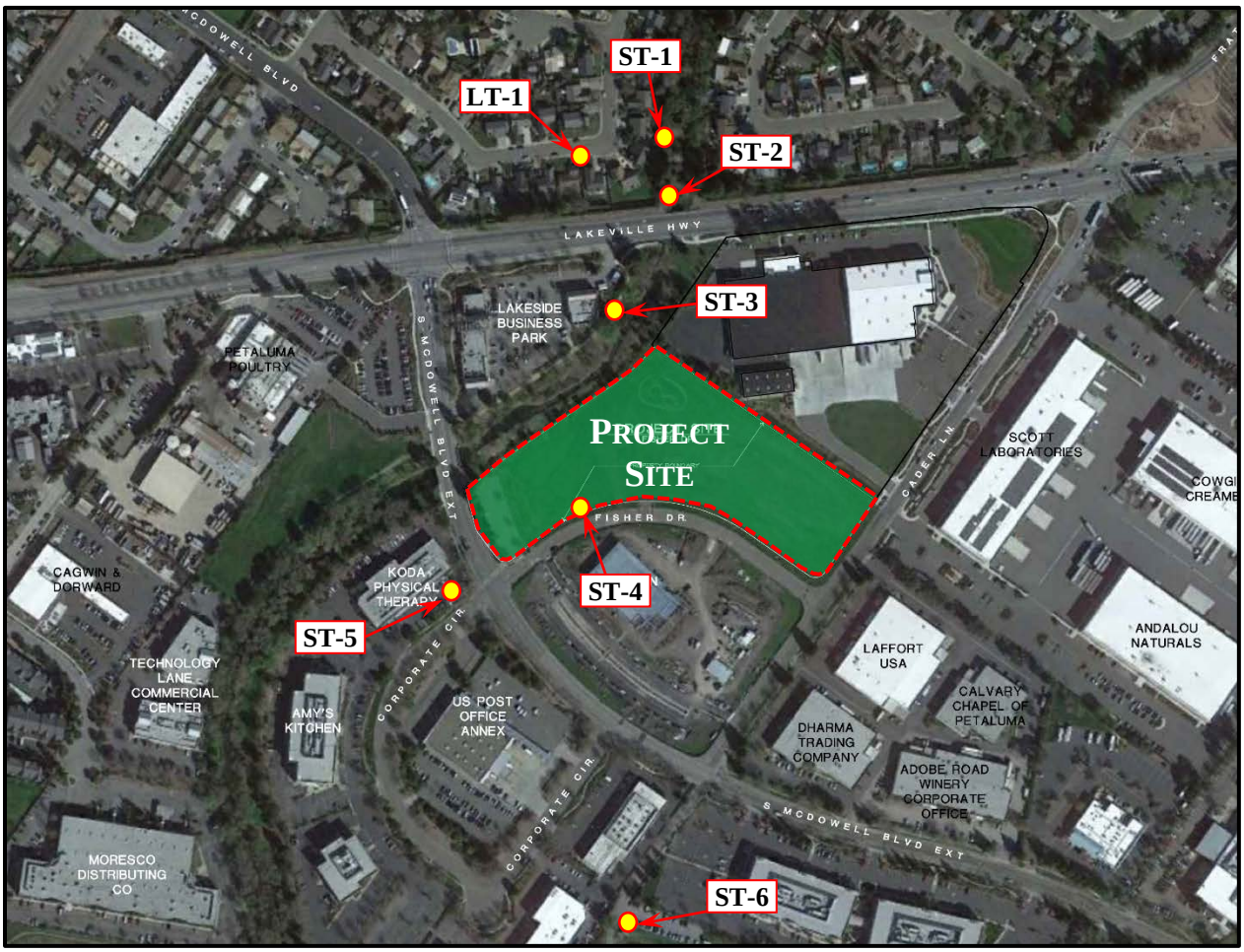


Figure 1: Project Site, Vicinity and Measurement Locations

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.

Table 1: Definitions of Acoustical Terms Used in this Report

Term	Definitions
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.
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. The hourly Leq used for this report is denoted as dBA Leq[h].
Day-Night Level, L_{dn}	The equivalent noise level for a continuous 24-hour period with a 10-decibel penalty imposed during nighttime and morning hours (10:00 pm to 7:00 am).
Community Noise Exposure Level, CNEL	CNEL is the equivalent noise level for a continuous 24-hour period with a 5-decibel penalty imposed in the evening (7:00 pm to 10:00 pm) and a 10-decibel penalty imposed during nighttime and morning hours (10:00 pm to 7:00am)
L_1, 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.
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.

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. 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.

Table 2: Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
	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), Caltrans, November 2009.

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 additional decibel increases the percentage of the population highly annoyed by about 3 percent. 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 is the Peak Particle Velocity (PPV), and another is the Root Mean Square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. In this section, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. 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.

Table 3: Reaction of People and Damage to Buildings for Continuous Vibration Levels

Vibration Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.006 to 0.019	Threshold of perception, Possibility of intrusion	Vibration unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk of "architectural" damage to normal dwellings such as plastered walls or ceilings.
0.4 to 0.6	Vibrations considered unpleasant by people subjected to continuous vibrations	Vibration at this level would cause "architectural" damage and possibly minor structural damage.

Source: Transportation Related Earthborne Vibrations (Caltrans Experiences), Technical Advisory, Vibration TAV-02-01-R9601, California Department of Transportation, February 20, 2002.

Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors or stacked dishes. The rattling sound can give rise to exaggerated vibration

complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generate the highest construction related ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the peak particle velocity descriptor (PPV) has been routinely used to measure and assess ground-borne 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.

REGULATORY BACKGROUND

This section describes the relevant guidelines, policies, and standards established by Federal and State Agencies and the City of Petaluma. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

Federal Government

Federal Transit Administration. The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[1] which limit daytime construction noise to 80 dBA L_{eq} at residential land uses and to 90 dBA L_{eq} at commercial and industrial land uses.

State of California

State CEQA Guidelines. 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) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies,

[1] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

(b) Generation of excessive groundborne vibration or groundborne noise levels,

(c) For a project located within the vicinity of a private airstrip or 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.

2019 California Building Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2019 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). The sections that pertain to this project are as follows:

5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.

5.507.4.2 Performance method. For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The performance method, which establishes the acceptable interior noise level, is the method typically used when applying these standards.

City of Petaluma General Plan 2025

Section 10.2 of the City of Petaluma's Health and Safety Element includes objectives and policies applicable to the proposed project. The City's objective is to, "Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by minimizing the increase of noise levels in the future." Industrial and Manufacturing land uses are considered "normally acceptable" up to 75 dBA L_{dn} or CNEL, and the existing site adjacent commercial and office buildings are considered "normally acceptable" up to 70 dBA L_{dn} or CNEL and the existing single-family homes opposite Lakeville Hwy are considered "normally acceptable" up to 60 dBA L_{dn} or CNEL.

The following General Plan policies are applicable to the proposed residential project.

Policy A: Continue efforts to incorporate noise considerations into land use planning decisions and guide the locations and design of transportation facilities to minimize the effects of noise on adjacent land uses.

Policy C: Ensure that the City's Noise Ordinance and other regulations:

- Require that applicants for new noise-sensitive development in areas subject to noise levels greater than 65 dB CNEL obtain the services of a professional acoustical engineer to provide a technical analysis and design of mitigation measures.
- Require placement of fixed equipment, such as air conditioning units and condensers, inside or in the walls of new buildings or on rooftops of central units to reduce noise impacts on any nearby sensitive receptors.

Policy D: Continue to require control of noise or mitigation measures for any noise-emitting construction equipment or activity. The City's Noise Ordinance establishes controls on construction-related noise.

Policy E: As part of development review, use Figure 10-2: Land Use Compatibility Standards to determine acceptable uses and installation requirements in noise-impacted areas.

Policy F: Discourage the use of sound walls anywhere except along Highway 101 and/or along the NWPRA corridor without findings that such walls will not be detrimental to community character. When sound walls are deemed necessary, integrate them into the streetscape.

Policy G: In making a determination of impact under the California Environmental Quality Act (CEQA) consider an increase of four or more dBA to be "significant" if the resulting noise level would exceed that described as normally acceptable for the affected use in Figure 10-3: Land Use Compatibility for Community Noise Environments.

City of Petaluma Implementing Zoning Ordinance. Section 21.040 A of the City of Petaluma Implementing Zoning Ordinance contains the following regulations which are generally applicable to operational (non-traffic) related noise in the City:

3. **Noise Regulations Generally.**

a. The following specific acts, subject to the exemptions provided in Section 21.040(A)(5), are declared to be public nuisances, and are prohibited:

1) The operation or use of any of the following before 7:00 a.m. or after 10:00 p.m. daily (except Saturday, Sunday and State, Federal or Local Holidays, when the prohibited time shall be before 9:00 a.m. and after 10:00 p.m.):

2) A hammer or any other device or implement used to repeatedly pound or strike an object.

3) An impact wrench, or other tool or equipment powered by compressed air.

4) Any tool or piece of equipment powered by an internal-combustion engine such as, but not limited to, chain saw, backpack blower, and lawn mower. Except as specifically included in this Ordinance, motor vehicles, powered by an internal combustion engine and subject to the State of California vehicle code, are excluded from this prohibition.

5) Any electrically or battery powered tool or piece of equipment used for cutting, drilling, or shaping wood, plastic, metal, or other materials or objects, such as but not limited to a saw, drill, lathe or router.

6) Any of the following: the operation and/or loading or unloading of heavy equipment (such as but not limited to bulldozer, road grader, back hoe), ground drilling and boring equipment, hydraulic crane and boom equipment, portable power generator or pump, pavement equipment (such as but not limited to pneumatic hammer, pavement breaker, tamper, compacting equipment), pile-driving equipment, vibrating roller, sand blaster, gunite machine, trencher, concrete truck, and hot kettle pump and the like.

7) Construction, demolition, excavation, erection, alteration or repair activity.

8) Operating or permitting the operation of powered model vehicles including but not limited to cars, aircraft and boats.

9) Using or operating for any purpose any loudspeaker, loudspeaker system or similar device in such a manner as to create a noise disturbance. Any permit issued pursuant to PMC Section 13.28.050 (amplified sound permit within a public park) is exempt from this section.

10) The use of truck/tractor trailer "Jake Brakes" on any public street under the jurisdiction of the City of Petaluma Police Department.

b. In the case of urgent necessity and in the interest of public health and safety, the Noise Control Officer may issue a permit for exemption from the requirements with subsection 21.040(A)(3). Such period shall not exceed ten (10) working days in length but may be renewed for successive periods of thirty (30) days or less, not to exceed a total of 90 days while the emergency continues. Requests for exemptions beyond 90 days shall require public

hearing approval. The Noise Control Officer may limit such permit as to time of use and/or permitted action, depending upon the nature of the emergency and the type of action requested.

c. The operation of any licensed motor vehicle in violation of the State Vehicle Code or the operation of stereo, public address or other such amplified equipment on or within a motor vehicle in violation of the State Vehicle Code.

d. Continued or repeated operation of a Public Address System between the hours of 10:00 a.m. and 7:00 p.m. daily shall not exceed a decibel level of 5 dBA above the measured ambient of the area in which this activity is occurring. Unless specifically approved by the City of Petaluma (i.e., Use Permit, Parks Director, Exception or Exemption from this Code Sec.) no Public Address System shall be permitted during the hours of 7:00 p.m. to 10:00 a.m.

4. **Noise Measurement**: Utilizing the "A" weighting scale of a sound level meter and the "slow" meter response (use "fast" response for impulsive type sounds), the ambient noise level shall first be measured at a position or positions at any point on the receptor's property which can include private and public property. In general, the microphone shall be located four to five feet above the ground; ten feet or more from the nearest reflective surface where possible. If possible, the ambient noise shall be measured with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance such that the noise from the source is at least 10dB below the ambient in order that only the ambient level will be measured.

a. If the measured ambient level is greater than 60dB, the Maximum Noise Exposure standard shall be adjusted in 5dB increments for each time period as appropriate to encompass or reflect the measured ambient noise level. In no case shall the maximum allowed threshold exceed 75dB after adjustments are made.

b. In the event the measured ambient noise level is 70dB or greater, the maximum allowable noise level shall be increased to reflect the maximum ambient noise level. In this case, adjustments for loudness and time as contained in Table 21.1 shall not be permitted.

c. No person shall cause or allow to cause, any source of sound at any location within the incorporated City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which when measured on the property where the noise disturbance is being experienced within public or private open/outdoor spaces, exceeds the noise level of Table 21.1.

TABLE 21.1: Maximum Exterior Noise Exposure (dBA)

Category Description	Noise Metric[1]	Nighttime Hours (10:00 pm to 7:00 am M-F, 10:00 pm to 8:00 am S, S and Holidays)	Daytime Hours (7:00 am to 10:00 pm M-F, 8:00 am to 10:00 pm S, S and Holidays)
General Plan Ambient	L_{eq}	60 dBA	60 dBA
Cumulative period of 15 min. or more in one hour	L_{25}	65 dBA	70 dBA
Cumulative period of 5 min. or more in one hour	L_{08}	70 dBA	75 dBA
Cumulative period of 1 min. or more in one hour	L_{02}	75 dBA	80 dBA

Note 1: The noise metric column was added by Illingworth& Rodkin, Inc. to provide a measurable hourly noise level to compare with the Table 21.1 noise categories. These levels equate to the sound level exceeded n% of the time in any hour. For example, the L_{25} is the value exceeded 25% of the time or 15 minutes in any hour. These levels, which are used to evaluate noise events which occur during a given daytime or nighttime hour, differ from the CNEL metric used for the General Plan Noise and Land Use Compatibility standards, which is used to evaluate noise events over a 24-hour period.

EXISTING NOISE ENVIRONMENT

The proposed project is located on Parcels 2 thru 8 of the Lakeville Business Park at the northwest corner of the Cader Lane and Fisher Drive intersection. The project site is bordered by the existing Labcon facility to the north, a commercial center to the northwest across Adobe Creek, an office building to the west across South McDowell Blvd, vacant land to the south across Fischer Drive and Industrial uses to the east across Cader Lane. Noise sensitive uses in the project vicinity are single family homes on the north side on Lakeville Hwy, outdoor restaurant dining areas in the commercial center opposite Adobe Creek, the Calvary Chapel Church in the industrial park east of the site, and multifamily residences to the west beyond existing industrial uses. The existing noise environment on the project site and site area results primarily from vehicular traffic on Lakeville Hwy, South McDowell Blvd. and Cader Lane. Other sources of noise in the area include commercial and industrial uses, seasonal sounds from water flows in Casa Grande Creek and the associated riparian habitat, and overhead noise from general aviation aircraft using the Petaluma Airport.

A noise monitoring survey was conducted on the site and surrounding areas between 10 am on Tuesday April 26th, 2022, and 10 am on Thursday April 28th, 2022, to quantify the existing noise environment on the project site and surround areas. The noise monitoring survey included one long-term noise measurement as indicated as LT-1 in Figure 1 and six short-term measurements indicated as ST-1 through ST-6 in Figure 1. The noise measurements were conducted with Larson Davis Laboratories (LDL) Type I Model LXT Sound Level Meters. All meters were equipped with ½-inch pre-polarized condenser microphones and windscreens and were calibrated with a Larson Davis Model CA250 precision acoustic calibrator prior to and following the measurement survey.

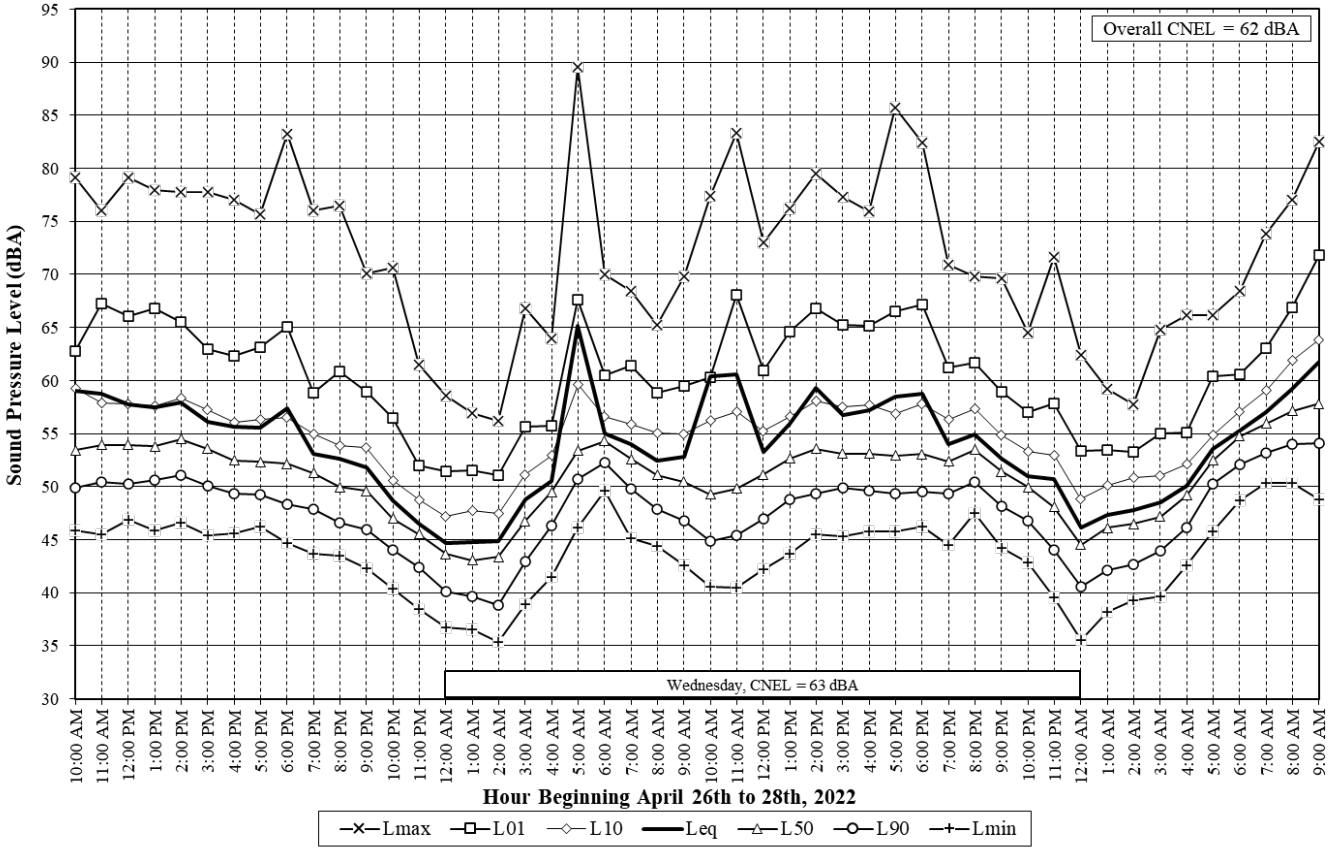
Long-term noise measurement, LT-1, was located on the northern property line on a light pole a height of 12 feet above grade on the southern side of Casa Verde Circle approximately 200 feet north of the centerline of Lakeville Hwy (see Figure 1). The measured noise levels at this location, including the energy equivalent noise level (L_{eq}), maximum (L_{max}), minimum (L_{min}), and the noise levels exceeded 10, 50 and 90 percent of the time (indicated as L_{10}, L_{50} and L_{90}) are shown on Chart 1.

A review of Chart 1 indicates that the noise levels at site LT-1 followed a diurnal pattern characteristic of traffic noise, with sound level increases du to local traffic and neighborhood activities in the morning noontime and early evening hours. The average daytime noise levels measured ranged from 52 to 62 dBA L_{eq} and the average hourly nighttime noise levels ranged from 45 to 65 dBA L_{eq}. The overall Community Noise Equivalent Level (CNEL) for the 48-hour monitoring period was 62 dBA, with the full day (Wednesday 4/27/22) CNEL at 63 dBA.

Six short-term (10-minute duration) noise measurements (ST-1 through ST-6) were made on the site and at location representative of neighboring uses at heights of 5 feet above grade simultaneously the long-term noise monitors between 9:50 am and 1 pm on Tuesday April 26th, 2022. These measurements were used to determine the existing ambient noise levels on the site and in surrounding areas.

The first two short term measurements (see ST-1 and ST-2 on Figure 1) were made on the bike path adjacent to Casa Grande Creek north of Lakeville Hwy at respective setbacks of 200 feet and 75 feet from the roadway centerline to document noise levels which would occur in the residential areas north of Lakeville Hwy which are not acoustically protected by the currently installed sound wall. Sound levels measured at this location were dominated by traffic noise on Lakeville Hwy.

Chart 1: Measured Noise Levels at LT-1



The third short term measurement (see ST-3 on Figure 1) was made at on the walking path between the outdoor dining patio of the Pub Republic restaurant and Casa Grande Creek south of Lakeville Hwy. Sound levels measured at this location were primarily a result of traffic noise on Lakeville Hwy and noise from the adjacent commercial parking lot.

The fourth short term measurement (see ST-4 on Figure 1) was made along Fisher Drive opposite the project site, because there was little traffic on this roadway the primary noise Sound levels measured at this location included primarily included noise from distant traffic, with occasional sound from birds and distant airplanes.

The fifth short term measurement (see ST-5 on Figure 1) was made at the northeastern corner of the intersection of S. McDowell Blvd. and Corporate Circle opposite the project site and at the setback of the existing buildings from S. McDowell Blvd (approximately 70 feet from the centerline). Sound levels measured at this location were primarily due to traffic on S. McDowell Blvd with influences from traffic on Corporate Circle and distant airplanes.

The sixth short term measurement (see ST-6 on Figure 1) was made at the entrance to the Schollenberger Park walking path from the parking lot. Sound levels measured at this location were due to distant traffic on Lakeville Hwy and S. McDowell Blvd and parking lot activity with influences from distant airplanes.

The results of the measurements at the short-term positions are shown in Table 4. The CNEL levels assigned to these measurement locations are approximated by correlating the measured L_{eq} levels at the short-term positions with those measured simultaneously at the long-term positions.

Table 4: Summary of Short-Term Noise Measurement Data, dBA

Noise Measurement Location	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}	CNEL
ST-1: Casa Grande Creek bike path 200 ft. north of Lakeville Hwy centerline	65	64	61	55	50	57	**62**[1]
ST-2: Casa Grande Creek bike path 75 ft. north of Lakeville Hwy centerline	77	76	72	67	57	69	**73**[1]
ST-3: Walking path behind Pub Republic outdoor dining patio	69	64	61	57	53	58	**58**[1]
ST-4: Fisher Drive roadway frontage	60	59	57	55	52	55	**61**[1]
ST-5: Corporate Circle at S. McDowell Blvd.	76	74	67	61	55	64	**71**[1]
ST-6: Schollenberger Park entrance	60	56	53	49	47	50	**57**[1]

[1] The CNEL at ST-1, ST-2 and ST-3 are estimated by correlation to the corresponding measurements at LT-1

FUTURE NOISE ENVIRONMENT

The future noise environment in the project vicinity would continue to result from traffic along the adjacent roadways. An analysis of the traffic volumes reported in the Draft Traffic Impact Analysis for the project[2] for the Existing, Existing plus Approved Projects and Cumulative conditions and these same conditions with Project generated traffic added indicates that, with or without traffic from the proposed project under Existing plus Approved Projects and Cumulative conditions traffic noise levels on the roadways surrounding the project site with increase by 1 dBA or less. Thus, exterior noise levels due to roadway traffic under future conditions with or without the project would not increase by more than 1 dBA above the sound levels documented in the existing noise survey.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas of nonresidential uses during any hour of operation.

The future noise environment at the site would continue to result primarily from vehicular traffic along nearby Lakeville Hwy and local roadways. Noise calculations considering the project site plan and the results traffic study completed for the proposed project indicate that with project and cumulative traffic on-site noise levels at the project facades would be 67 dBA CNEL along N. Mc Dowell Blvd, up to 62 dBA CNEL along Fisher Drive and Cader Lane and at or below 60 dBA CNEL at the north facing facades removed for these roadways. These levels would be considered "normally acceptable" for industrial and manufacturing use by the City's General Plan noise standards.

Based the relationship of hourly average (L_{eq}) noise levels to day night average (CNEL) noise levels determined in the noise measurement survey, daytime hourly average noise levels at the exterior of the proposed building would be below 65 dBA L_{eq}. Standard construction materials for nonresidential uses would provide at least 25 dBA of noise reduction in interior spaces would satisfy the *Cal Green Building Code* performance method noise limit of 50 dBA $L_{eq(1\text{-}hr)}$.

[2] TJKM, *Draft Traffic Impact Analysis Report Labcon North America Warehouse Addition,* June 29, 2022

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to less-than-significant levels.

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

1 A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan at existing noise-sensitive receptors surrounding the project site.
   a) While the City of Petaluma does not establish noise level thresholds for construction activities, this analysis considers that a substantial temporary noise level increase would occur where noise from construction activities at adjacent land uses in the project vicinity which continue for a period of one year or more and/or exceed the FTA (see page 6) daytime construction noise limits of 80 dBA L_{eq} at residential uses and 90 dBA L_{eq} at commercial and industrial uses.
   b) A substantial permanent noise increase would occur if the noise level increase resulting from the project is 4 dBA or more or introduce a new sound source which exceeds the City's Zoning Ordinance noise limits.
   c) A significant impact would be identified for a proposed land use if it would be exposed to noise levels exceeding established guidelines or standards for noise and land use compatibility.
2. A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.
3. A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would not be exposed to a temporary increase in ambient noise levels for a period of more than one year due to project construction and would not exceed the FTA's recommended construction noise level limits at existing noise-sensitive land uses surrounding the site. With the implementation of the City's Standard Permit Condition, this temporary noise increase would be reduced to a **less-than-significant** level.

Construction of the project is anticipated to begin in July 2023 and end in June 2024, for a total construction period of 11 months. The site is currently vacant. Construction activities would include site preparation, grading, building construction, architectural coating, and paving. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating. The hauling of fill material or other construction materials would also generate truck trips on local roadways. Construction activities are typically carried out in stages. During each stage of construction, there would be a different mix of equipment operating. Construction noise levels would vary by stage and vary within stages based on the amount of equipment in operation and location where the equipment

is operating. Typical construction noise levels at 50 feet are shown in Table 5, which gives the average noise level ranges by construction phase. Most demolition and construction noise ranges from 80 to 90 dBA at 50 feet from the source.

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

	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**
Ground Clearing	84	84	84	83	84	84
Excavation	89	79	89	71	88	78
Foundations	78	78	77	77	88	88
Erection	87	75	84	72	79	78
Finishing	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.

Noise impacts resulting from construction depend upon 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 areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day, when construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

The nearest noise sensitive uses to the project site are the single-family homes on the north side on Lakeville Hwy, the Pub Republic restaurant outdoor dining area in the commercial center opposite Adobe Creek, the Calvary Chapel Church in the industrial park east of the site, and multifamily residences to the west beyond existing industrial uses. The closest of these uses is the Pub Republic restaurant outdoor dining area, which would be approximately 150 feet from the edge of the project parking area and 200 feet from the perimeter of the proposed building. Considering these distances average noise levels due to site and building construction in this area would reach 77 to 80 dBA during the busiest construction periods.

These noise levels drop off at a rate of about 6 dBA per doubling of distance between the noise source and receptor. Considering that the single-family homes on the north side on Lakeville Hwy are over 375 feet from the site, the Calvary Chapel Church is over 425 feet from the site, and the nearest multifamily residences are over 1100 feet from the site, these uses may be exposed to respective levels of 69 to 72 dBA, 68 to 71 dBA, and 60 to 63 dBA during the busiest construction periods.

Based on the above levels, though noise sensitive uses in the site would be intermittently exposed to high levels of noise during periods of nearby construction they would not be exposed to average noise levels exceeding the FTA limits (80 dBA residential or 90 dBA commercial/Industrial) or be exposed to construction noise for one year or more. Therefore, though area uses would be intermittently exposed to high levels of noise during periods of

nearby construction, a significant noise impact would not result when the following standard controls are assumed to be included in the project:

- Pursuant to the Municipal Code, restrict noise-generating activities at the construction site or in areas adjacent to the construction site to the hours between 7:00 a.m. and 10:00 p.m., Monday through Friday and 9:00 a.m. to 10:00 p.m. on Saturday, Sunday and State, Federal or Local Holidays.
- Equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Locate stationary noise generating equipment (e.g., compressors) as far as possible from adjacent residential receivers.
- Acoustically shield stationary equipment located near residential receivers with temporary noise barriers.
- Utilize "quiet" air compressors and other stationary noise sources where technology exists.
- Designate a "disturbance coordinator" responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem.

With the implementation of these controls, and the limited duration of the noise generating construction period, the substantial temporary increase in ambient noise levels associated with construction activities would be less-than-significant.

Mitigation Measure 1a: No additional measures required

Impact 1b: **Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project would not result in a substantial permanent noise level increase. The proposed project would not exceed applicable standards at the existing noise-sensitive uses. **This is a less-than-significant impact.**

Project Traffic Increases

The traffic study included peak hour turning movements for existing traffic volumes and for project trips. The peak hour project trips were added to the existing volumes to generate an existing plus project traffic scenario. By comparing the existing plus project traffic scenario to the existing scenario, the project's contribution to the overall noise level increase was determined to be less than 1 dBA along the roadway segments adjacent to the site and in the project vicinity. Therefore, the project would not result in a permanent noise increase of 4 dBA or more at noise-sensitive receptors in the project vicinity.

Mechanical Equipment

The proposed project building will utilized rooftop and perhaps ground level mechanical equipment which could include a cooling tower, ventilation fans, central Heating, Ventilation, and Air Conditioning(HVAC) systems. Give the state of the current proposal detailed information on the location and specific equipment to be used are not available. However, based on experience with other industrial uses, it is expected that the project mechanical systems may generate noise levels of up to 5 to 60 dBA at 50 feet from individual pieces of equipment and up to 56 to 66 dBA at 50 feet with multiple pieced of equipment operating simultaneously equipment. Shielding from equipment enclosures and surrounding structures may provide up to 10 to 15 dBA of equipment noise reduction.

Considering the distance of the proposed building to the adjacent noise sensitive uses as noted previously, without the consideration of noise reduction from equipment enclosures or

surrounding structures, noise from rooftop mounted project mechanical equipment could reach a sound level of 45 to 55 dBA at the Pub Republic restaurant outdoor dining area in the commercial center opposite Adobe Creek, and 40 to 50 dBA at the single-family homes on the north side on Lakeville Hwy. This level of noise would not exceed the City's Zoning Ordinance noise limit of 60 dBA Leq or result in an noise level increase 4 dBA at these closest noise sensitive uses.

Truck Deliveries

The site plan loading docks along the eastern side of the proposed building. Trucks maneuvering in these docks would generate a combination of engine, exhaust, and tire noise, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air brakes. Heavy (semi-tractor trailer type) trucks typically generate maximum instantaneous noise levels of 75 to 80 dBA when stopping/starting and maneuvering at a distance of 50 feet. The noise level of backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA L_{max} at a distance of 50 feet. Hourly average noise levels due to truck maneuvering would range from 70 to 75 dBA L_{eq} at 50 feet.

Due to the orientation of the proposed building, the only noise sensitive receptor with non-completely obscured line-of-sight to the loading docks where the truck maneuvering would occur would be the Calvary Chapel Church building to the east. All other noise sensitive receptors would be shielded from the truck loading area and would not be exposed to truck maneuvering noise. The Calvary Chapel Church building is approximately 630 feet from the center of the nearest truck dock. At this distance, hourly average noise levels due to heavy trucks maneuvering in the loading docks would be 45 to 53 dBA L_{eq}. This level of noise would not exceed the City's Zoning Ordinance noise limit of 60 dBA L_{eq} or result in an noise level increase 4 dBA at this closest noise sensitive use.

The site plan also shows a driveway around the proposed building which may be used by heavy delivery trucks. Typical maximum instantaneous noise levels generated by heavy trucks typically to ranges from 70 to 75 dBA when traveling at constant speeds. Considering this level under worst case conditions hourly average noise levels due to truck on the perimeter driveway could range from 65 to 70 dBA L_{eq} at 50 feet. The closest noise sensitive receptor to the perimeter driveways would be the Pub Republic restaurant outdoor dining area at about 180 feet from the driveway centerline. At this distance, hourly average noise levels from trucks on the perimeter driveway would be 54 to 59 dBA L_{eq}. This level of noise would not exceed the City's Zoning Ordinance noise limit of 60 dBA L_{eq} or result in an noise level increase 4 dBA at this closest noise sensitive use.

Mitigation Measure 1b: None required.

Impact 2: Exposure to Construction Generated Groundborne Vibration. Residences in the vicinity of the project site are not expected to be exposed to perceptible vibration levels from construction activities. **This is a less-than-significant impact.**

Construction activities would include site preparation work such as grading and the installation of utilities, foundation work, and new building framing. Construction techniques that generate the highest vibration levels, such as impact or vibratory pile driving, are not expected at this project. Construction activities would generally occur at distances of 150 to 200 feet or more from the nearest vibration sensitive uses.

For structural damage, the California Department of Transportation uses a vibration limit of 0.5 in/sec, PPV for buildings structurally sound and designed to modern engineering standards and 0.2 in/sec, PPV for buildings that are found to be structurally sound but where structural damage is a major concern.

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. Building framing, exterior and interior finishing, and landscaping activities are not anticipated to be sources of substantial vibration. Construction activities may extend over several construction seasons, but construction vibration would not be substantial for most of this time except during vibration generating activities (as discussed above).

Table 7 presents vibration source levels for typical construction equipment at distances of 150 and 200 feet. Jackhammers typically generate vibration levels of 0.0024 to 0.0015 in/sec PPV, drilling typically generates vibration levels of 0.006 to 0.004 in/sec PPV, and vibratory rollers generate vibration levels of 0.014 to 0.009 in/sec PPV at distances of 150 to 200 feet. Based on this, construction vibration levels would be well below the 0.50 in/sec PPV damage criteria at the closest residential structures.

In areas where vibration would not be expected to cause structural damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant given the intermittent and short duration of the phases that have the highest potential of producing vibration (vibratory rollers). By use of administrative controls such as notifying adjacent land uses of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration to hours with least potential to affect nearby residences, perceptible vibration can be kept to a minimum and as such would not result in a significant impact with respect to perception.

TABLE 7 Vibration Source Levels for Construction Equipment[3]

Equipment		PPV at 150 ft. (in/sec)	PPV at 200 ft. (in/sec)
Clam shovel drop		0.014	0.009
Hydromill (slurry wall)	in soil	0.001	0.0004
	in rock	0.001	0.001
Vibratory Roller		0.014	0.009
Hoe Ram		0.006	0.004
Large bulldozer		0.006	0.004
Caisson drilling		0.006	0.004
Loaded trucks		0.005	0.003
Jackhammer		0.0024	0.0015
Small bulldozer		0.0002	0.0001

Mitigation 2: None Required

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

Impact 3: **Excessive Aircraft Noise.** The noise environment attributable to aircraft is considered normally acceptable under City of Petaluma General Plan noise compatibility policies. This is a **less-than-significant** impact.

The project site is located about 1.5 miles from Petaluma Municipal Airport. And is outside of the 55 dBA CNEL airport noise contour as shown in Figure 3.9-2 of the City of Petaluma General Plan. The proposed project is compatible with the City's exterior noise standards for aircraft noise. This would be a less-than-significant impact.

Mitigation Measure 3: **None required.**