ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 E. Cotati Ave
Cotati, CA 94931
Tel: 707-794-0400 *Fax: 707-794-0405*
www.illingworthrodkin.com *illro@illingworthrodkin.com*

M E M O

Date: November 3, 2023

To: **Collin Monahan**
Monahan Pacific Corp.
1101 Fifth Avenue, Suite #300
San Rafael, CA 94901
collin@monahanpacific.com

From: Fred M. Svinth
Illingworth & Rodkin, Inc.
429 E. Cotati Ave
Cotati, CA 94931

RE: Cotati Village Community - Cotati, CA

SUBJECT: Update to Noise and Vibration Assessment
Job#22-134

Illingworth & Rodkin, Inc. (I&R) prepared the Noise and Vibration Assessment for this project in 2022[1]. We understand that there have been relatively minor modifications to the project. This memo describes how these modifications apply to the Impacts identified in our Noise and Vibration Assessment.

Project Changes
Our review of the latest Project plans, dated 10/30/2023, indicate the primary changes are the orientation of Building E and the northern parking area. The current plan would reorient Building E from a north-south orientation to an east-west one and move it further south away from the existing residences at Cotati Cottages. There would be more parking in the northern portion of the site. Additionally, the pool and outdoor use area would be moved to the north, with greater acoustical shielding towards Hwy 116 and lesser towards the existing residences at Cotati Cottages. It also appears that the unit count per building has changed with more residences in building A, B and C and less in buildings D, E and F.

[1] Illingworth & Rodkin, Inc. *Cotati Village Community Noise and Vibration Assessment.* November 17, 2022

Changes to Noise Impacts

Impact 1a: The proposed change in the location and orientation of the pool and common outdoor use area will receive similar noise shielding from Hwy 116 traffic noise but will be farther from it and so will continue to be considered "normally acceptable" for multifamily residential land uses by the City of Cotati General Plan Noise Element. This is expected to remain a less-than-significant impact.

Impact 1b: Though there may be more residential units in Buildings A B and C and the unit numbering will have likely changed the exterior to Interior design measured described in our 2022 report will remain conceptually the same, where:

1. All apartments in Buildings A,B, and C which are adjacent to and/or with a clear view of traffic on Gravenstein Highway will need to be equipped with mechanical ventilation systems to supply fresh air to the units to allow residents to keep their windows closed for noise control, and
2. All the apartments in Buildings A,B, and C which are adjacent to and/or with a clear view of traffic on Gravenstein Highway, will need to be designed to maintain interior noise levels at or below 45 dBA Ldn with closed exterior doors and windows. Though the specific determination of sound isolation ratings of the exterior wall assemblies and window/door assemblies will be determined during the project design, we continue to expect that the windows and doors facing or with a view of Gravenstein Highway in these units will require STC ratings of between 30 and 32.

This is expected to remain a less-than-significant impact with the incorporation of noise control measures in the project design.

Impact 1c: The previous determination of Interior Non-Residential Noise and Land Use Compatibility is expected to remain the same with the proposed plan changes. This is expected to remain a less-than-significant impact.

Impact 2: Project Operational Noise Generation is expected to remain the same with the proposed plan changes. This is expected to remain a less-than-significant impact.

Impact 3: Project-Generated Traffic Noise is expected to remain the same with the proposed plan changes. This is expected to remain a less-than-significant impact.

Impact 4: Because buildings D, E and F will be built further from existing residences at Cotati Cottages, these residences would be exposed to even lower levels of construction generated groundborne vibration. This is expected to remain a less-than-significant impact.

Impact 5: Buildings D, E and F will be built further from the existing Cotati Cottages. Thererefore while these residences, while still be exposed to a substantial temporary increase in ambient noise levels, these increases would be expected to be lower and of shorter duration. This is expected to remain a less-than-significant impact with the implementation of the standard "best practice" controls from Action N1h as contained in Policy N 1.15 of the City General Plan.

Conclusion

In summary, the modified Project would not result in any increase in the noise impacts outlined in I&R's Noise and Vibration Assessment.

COTATI VILLAGE COMMUNITY NOISE AND VIBRATION ASSESSMENT

Gravenstein Highway at Alder Avenue Cotati, California

November 14, 2022

♦ ♦ ♦

Prepared for:

Monahan Pacific Corp.
1101 Fifth Avenue, Suite #300
San Rafael, CA 94901

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.: 22-134

INTRODUCTION AND SUMMARY

This report presents the results of an environmental noise assessment completed for the proposed 176-unit Cotati Village Community mixed-use apartment development at the northeast corner of the Gravenstein Highway and Alder Avenue intersection in Cotati (see Figure 1). 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. 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.

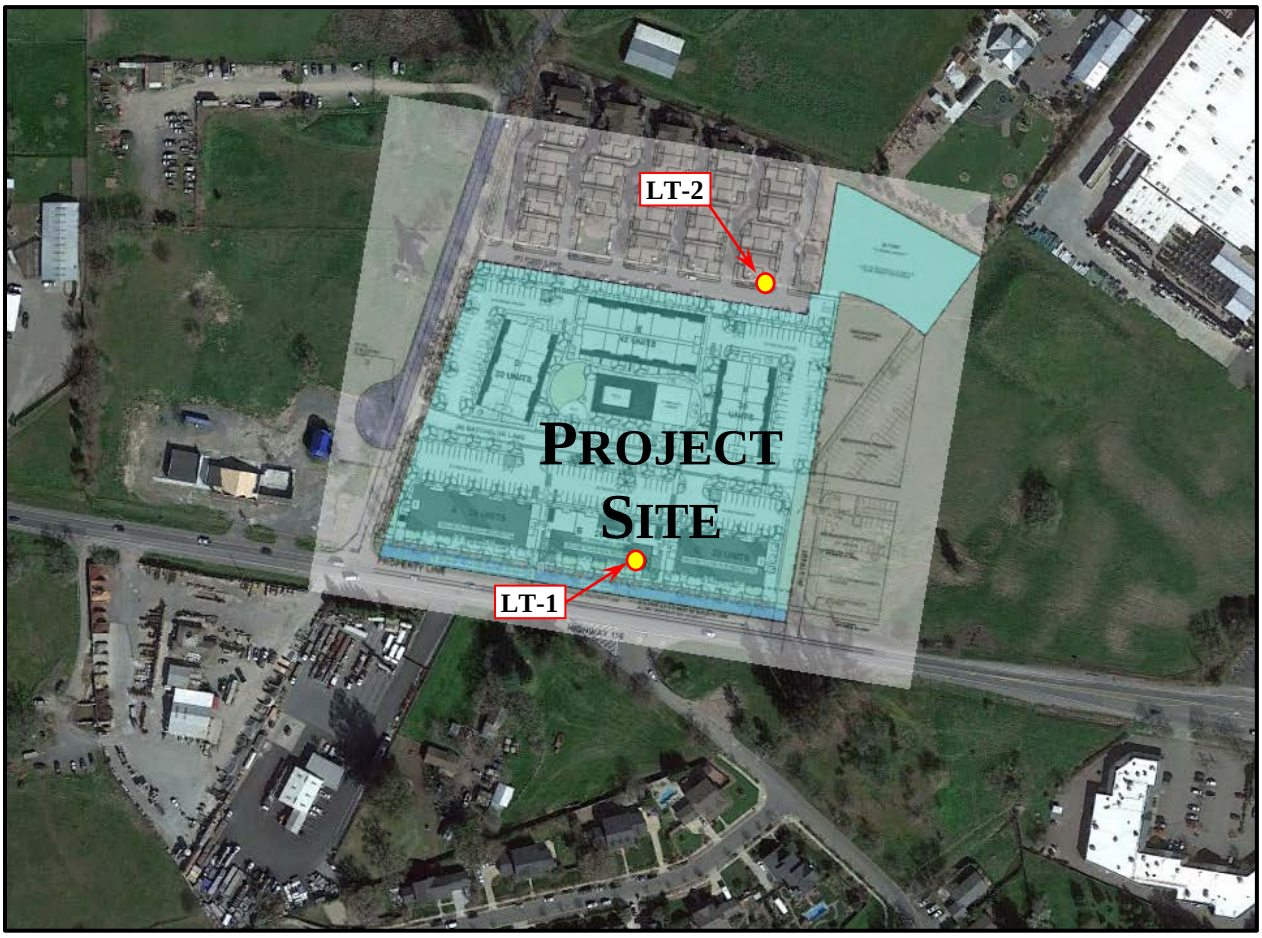


Figure 1: Project Site, Vicinity and Measurement Locations

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.

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 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.

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.

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.

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

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

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,
(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 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.

California Building Cal Green Code, Title 24, Part 11. The Green Building Standards of the State of California Code of Regulations (Title 24, Part 11) establishes mandatory exterior sound transmission control standards for new non-residential buildings as set forth in the 2019 California Green Building Standards Code Sections 5.507.4.1 and 5.507.4.2 Exterior noise transmission as follows[1]:

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 in the following locations:

1. Within the 65 CNEL noise contour of an airport.

[1] Exception: Buildings with few or no occupants and where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

Exceptions:

1. L_{dn} or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
2. L_{dn} or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.

2. Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source as determined by the General Plan Noise Element.

5.507.4.1.1 Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB L_{eq}-1-hr during any hour of operation shall have exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance method. For buildings located as defined in Sections A5.507.4.1 or A5.507.4.1.1, 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}-1Hr) of 50 dBA in occupied areas during any hour of operation.

5.507.4.2.1 Site features**.** Exterior features such as sound walls or earth berms may be utilized as appropriate to the project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of compliance. An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

City of Cotati General Plan (adopted 3.24.15) The Noise Element of the City of Cotati's General Plan provides the following Goal, Policies, and Implementation Measures which are relevant to the proposed project:

GOAL N-1	Create a Pleasant Sound Environment by Minimizing Exposure to Harmful and Annoying Noise.
OBJECTIVE N-1A	Minimize Noise Levels to Enhance the Quality of Existing and Future Land Uses

Policy N 1.1: Ensure the noise compatibility of existing and future uses when making land use planning decisions.

Policy N 1.2: Require development and infrastructure projects to be consistent with the Land Use Compatibility for Community Noise Environments standards indicated in Table N-1 to ensure acceptable noise levels at existing and future uses.

Policy N 1.3: Require development to mitigate excessive noise through best practices, including building location and orientation, building design features, placement of noise-generating equipment away from sensitive receptors, shielding of noise-generating equipment, placement of noise-tolerant features between noise sources and sensitive receptors, and use of noise-minimizing materials such as rubberized asphalt.

Policy N 1.4: Require mixed-use projects to minimize noise exposure within the indoor areas of nearby residential areas through the use of noise attenuating building materials, engineering techniques, and site design practices. Site Design practices may include locating mechanical equipment, loading bays, parking lots, driveways, and trash enclosures away from residential uses and providing noise attenuating screening features onsite.

TABLE N-1: LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENT						
LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE, L_{DN}					
	55	60	65	70	75	80
Single Family Residential						
Multi-Family Residential, Hotels, and Motels						
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds						
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches						
Office Buildings, Business Commercial, and Professional						
Auditoriums, Concert Halls, Amphitheaters						
Industrial, Manufacturing, Utilities and Agriculture						

	NORMALLY ACCEPTABLE Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special insulation requirements.
	CONDITIONALLY ACCEPTABLE: Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.
	UNACCEPTABLE: New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Policy N 1.5: Control non-transportation related noise from site specific noise sources.

Policy N 1.6: Support noise-compatible land uses along existing and future roadways, highways, and freeways.

Policy N 1.7: The following criteria shall be used to determine the significance, for projects required by the California Environmental Quality Act to analyze noise impacts, of noise impacts for development, transportation, and other projects that increase noise:

Stationary and Non-Transportation Noise Sources

- A significant impact will occur if the project results in an exceedance of the noise level standards contained in this Noise Element, or the project will result in an increase in ambient noise levels by more than 3 dB.

Transportation Noise Sources

- Where existing traffic noise levels are less than 60 dB L_{dn} at the outdoor activity areas of noise-sensitive uses, a +5 dB L_{dn} increase in roadway noise levels will be considered significant; and
- Where existing traffic noise levels range between 60 and 65 dB L_{dn} at the outdoor activity areas of noise-sensitive uses, a +3 dB L_{dn} increase in roadway noise levels will be considered significant; and
- Where existing traffic noise levels are greater than 65 dB L_{dn} at the outdoor activity areas of noise-sensitive uses, a +1.5 dB L_{dn} increase in roadway noise levels will be considered significant.

Policy N 1.8: Ensure that new development does not result in indoor noise levels for sleeping areas in excess of 45 dBA Ldn.

Policy N 1.11: Require acoustical studies and mitigation measures, where necessary, for new developments and transportation improvements that affect noise sensitive uses such as schools, hospitals, libraries, group care facilities, convalescent homes, and residential areas.

Policy N 1.15: Require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to the building. A vibration limit of 0.30 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

Action N1a: Update the Land Use Code to ensure that the noise standards are consistent with this Noise Element, including Tables N-1 and N2, and to require new residential, mixed-use with a residential component, and other noise-sensitive development to be designed to minimize noise exposure to noise sensitive users through incorporation of site planning and architectural techniques such as:

- *Locating dwellings as far from noise generators as possible.*
- *Locating noise sensitive interior spaces, such as bedrooms, away from noise generators.*
- *Orienting buildings to shield noise sensitive outdoor spaces from noise generators.*
- *Use of sound walls should be avoided or minimized, through alternative measures such as berms, setbacks, or other measures, to the maximum extent feasible and appropriate.*

Action N1b: Review land use and development proposals, including use permits, for compliance with the noise requirements established in this element, including the standards established in Tables N-1 and N-2. Where necessary, require mitigation measures to achieve the noise standards identified in Tables N-1 and N-2 and, where applicable to minimize exposure of sensitive uses to existing or potential vibration levels to the maximum feasible extent.

Action N1c: Require an acoustical study for all new discretionary projects, including development and transportation, with potential noise impacts. The study shall include mitigation measures necessary to ensure compliance with this Noise Element and relevant noise standards in the Land Use Code.

Action N1h: During the environmental review process, determine if proposed construction will constitute a significant impact on nearby residents and require mitigation measures in addition to the standard "best practice" controls. Suggested "best practices" for control of construction noise:

- *Construction period shall be less than twelve months.*
- *Noise-generating construction activities, including truck traffic coming to and from the construction site for any purpose, shall be limited to between the hours of 7:00 am and 7:00 pm on weekdays and 9:00 am and 5:00 pm on Saturdays (if allowed through specific project conditions of approval). No construction shall occur on Sundays or holidays.*
- *All equipment driven by internal combustion engines shall be equipped with mufflers, which are in good condition and appropriate for the equipment.*
- *The construction contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists.*
- *At all times during project grading and construction, stationary noise---generating equipment shall be located as far as practicable from sensitive receptors and placed so that emitted noise is directed away from residences.*
- *Unnecessary idling of internal combustion engines shall be prohibited.*
- *Construction staging areas shall be established at locations that will create the greatest distance between the construction related noise sources and noise---sensitive receptors nearest the project site during all project construction.*
- *The required construction related noise mitigation plan shall also specify that haul truck deliveries are subject to the same hours specified for construction equipment.*
- *Neighbors located adjacent to the construction site shall be notified of the construction schedule in writing.*

- *The construction contractor shall designate a "noise disturbance coordinator" who will be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and institute reasonable measures as warranted to correct the problem. A telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.*

EXISTING NOISE ENVIRONMENT

The proposed project is located at the northeast corner of the Gravenstein Highway and Alder Avenue intersection in Cotati and is bordered by a townhome style multifamily development to the north, vacant land and Hwy 101 beyond to the east, agricultural, industrial and single-family residential uses beyond Gravenstein Hwy to the south, and vacant land and commercial uses beyond Alder Avenue to the west. The existing noise environment on the project site results primarily from vehicular traffic on Gravenstein Highway, with distant noise from Hwy 101 contributing to background sound levels. Other sources of noise in the area include commercial, agricultural and residential noise in the project vicinity.

Noise monitoring surveys were conducted on the site and surrounding areas between 3 pm on Thursday September 15th, 2022, and 3 pm on Saturday September 17th, 2022, to quantify the existing noise environment on the project site. The noise monitoring survey included two long-term noise measurements shown as LT-1 and LT-2 in Figure 1. The noise measurements were conducted with Larson Davis Laboratories (LDL) Type I Model 820 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 made on the trunk of a tree at a height of 12 feet above grade and approximately 100 feet from the centerline of Gravenstein Hwy (see Figure 1). This location represents the approximate setback of the closest (southern) facades of Buildings A, B and C to Gravenstein Hwy. 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, following.

A review of Chart 1 indicates that the noise levels at site LT-1 followed a diurnal pattern characteristic of traffic noise, with the average daytime noise levels ranging from 62 to 68 dBA L_{eq} and the average hourly nighttime noise levels ranging from 53 to 66 dBA L_{eq}. The overall average Day/Night noise Level (L_{dn}) for the 48-hour monitoring period at position LT-1 was 68 dBA, with the full day (Friday 9/16/22) L_{dn} at 69 dBA.

Long-term noise measurement LT-2 was made on the trunk of a tree at a height of 12 feet above grade in the existing multi-family residential neighborhood north of the project site across Ford Lane from the project site and approximately 570 feet north of the Gravenstein Hwy centerline (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 2, following.

A review of Chart 2 indicates that the noise levels at site LT-2 also followed a diurnal pattern characteristic of more distant traffic noise and noise contributions from local traffic, parking and weekend use of the adjacent park. The average daytime noise levels at this monitoring location ranged from 49 to 61 dBA Leq and the average hourly nighttime noise levels ranged from 46 to 58 dBA Leq. The overall average Day/Night noise Level (L_{dn}) for the 48-hour monitoring period at position LT-2 was 58 dBA, with the full day (Friday 9/16/22) L_{dn} at 59 dBA.

Chart 1: LT-1 Hourly Noise Measurement Data

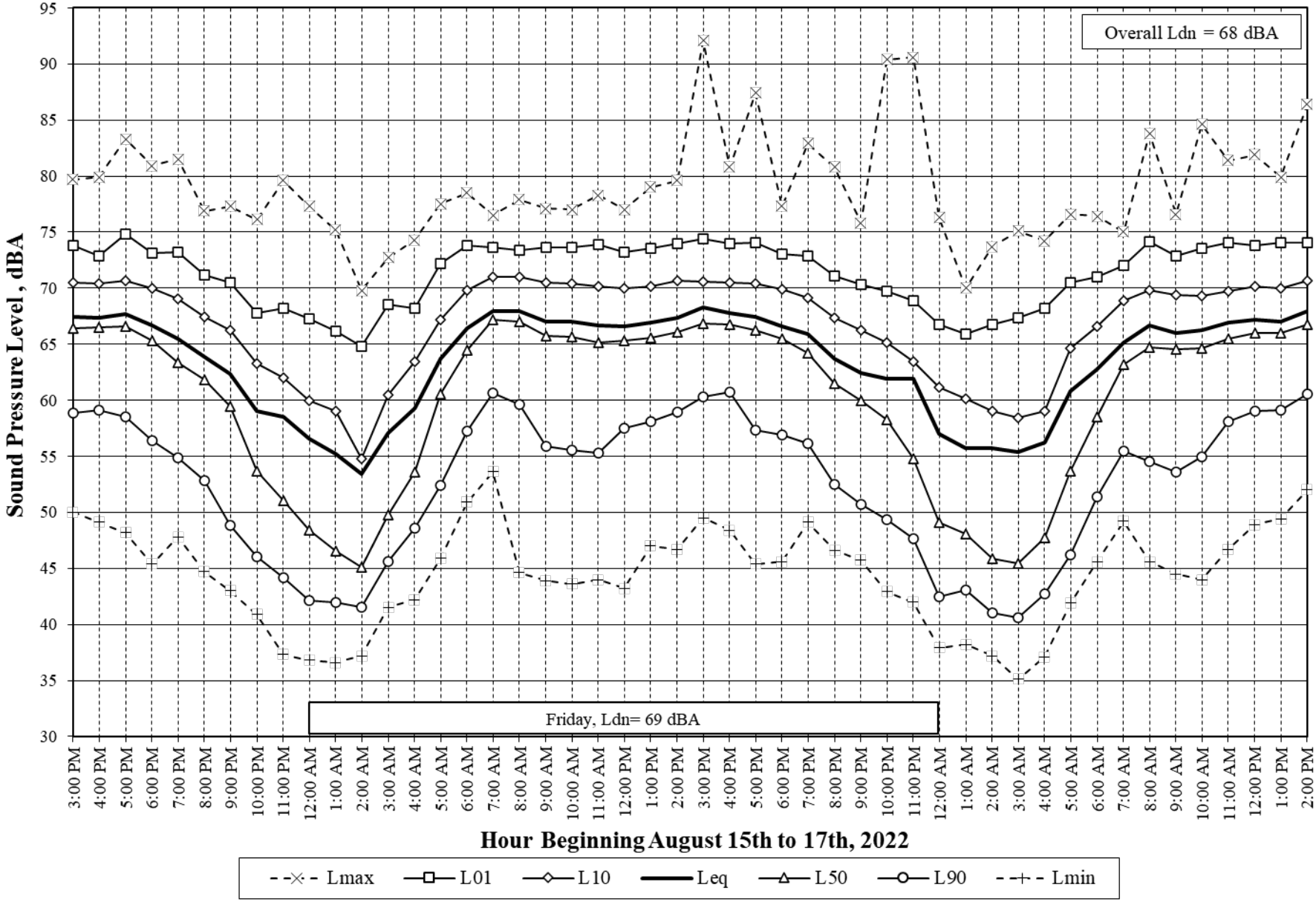
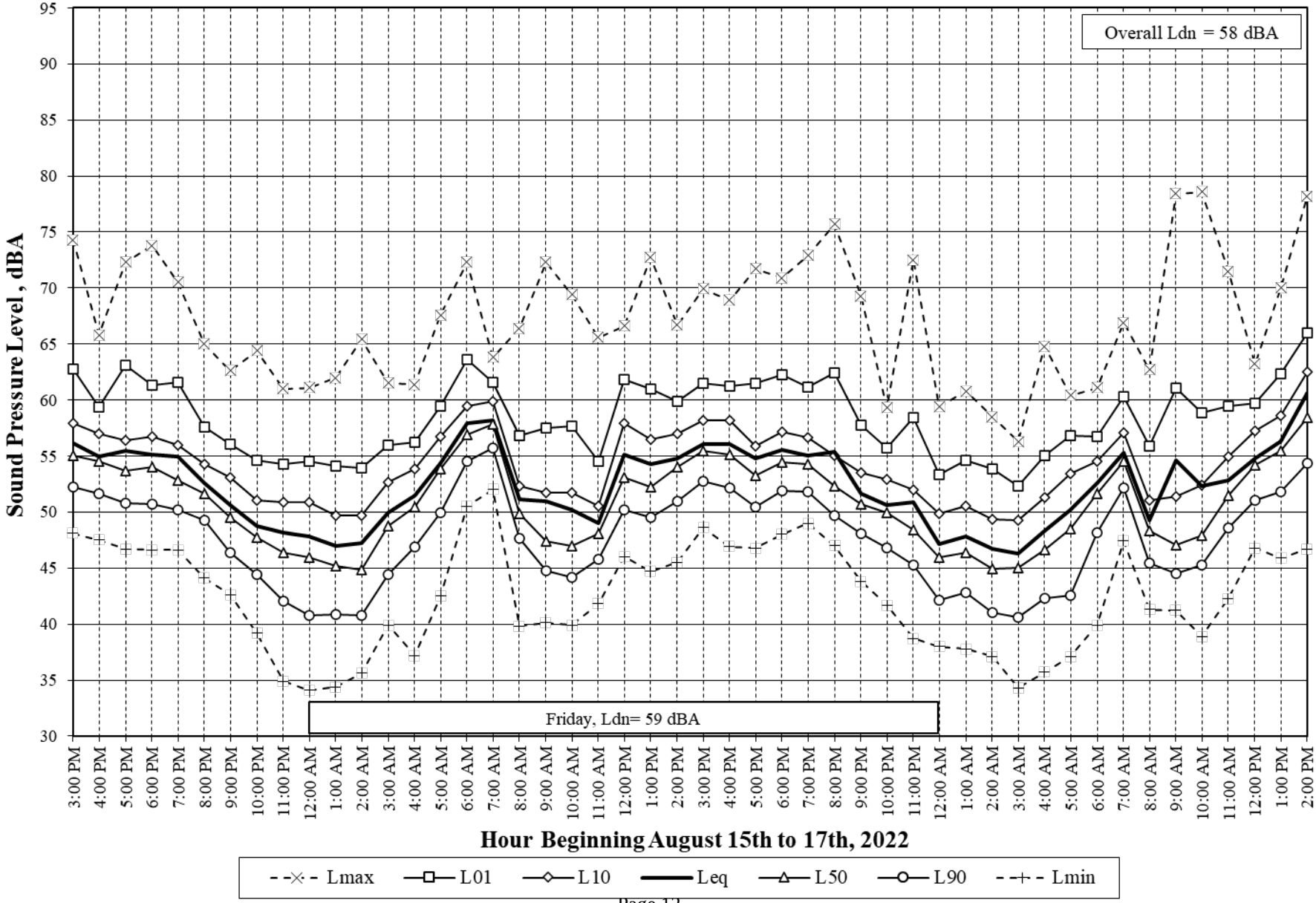


Chart 2: LT-2 Hourly Noise Measurement Data



FUTURE NOISE ENVIRONMENT

The future noise environment on the project site would continue to result primarily from traffic on Gravenstein Hwy. Based on a review of the future versus existing traffic volumes for this roadway without the project from the project traffic report[2], we have calculated the future noise environment on the project site and surroundings will increase by 3 dBA over existing noise conditions. Thus, the future noise levels due to roadway traffic would be 72 dBA L_{dn} at the facades of Buildings A, B, and C closest to Gravenstein Hwy.

SIGNIFICANCE CRITERIA

Appendix G of the CEQA Guidelines states that a project would normally be considered to result in significant noise impacts if noise levels conflict with adopted environmental standards or plans or if noise generated by the project would substantially increase existing noise levels at sensitive receivers over a permanent or temporary basis. 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. A substantial permanent noise increase would occur if the noise level increase resulting from the project is 1.5 dBA where existing traffic noise levels are greater than 65 dBA L_{dn}, 3 dBA L_{dn} where existing traffic noise levels are between 60 and 65 dBA L_{dn}, and 5 dBA L_{dn} where existing traffic noise levels are less than 60 dBA L_{dn} as established by the Cotati General Plan. A substantial temporary noise level increase would occur where noise from construction activities exceeds 60 dBA L_{eq} and the ambient noise environment by at least 5 dBA L_{eq} at adjacent land uses in the project vicinity for a period of one year or more. Vibration levels generated during demolition or construction activities would be significant if they cause cosmetic or structural damage to adjacent buildings.

NOISE IMPACTS AND MITIGATION MEASURES

Impact 1a: **Exterior Residential Noise and Land Use Compatibility.** Residential uses developed at portions of the project site would be exposed to normally and conditionally acceptable noise levels. **This is a less-than-significant impact.**

Current project drawings indicate that residential uses on the site will be in the upper two floors of three-story buildings A, B and C fronting Gravenstein Highway and an in all three floors of the buildings D, E and F which will be on the northern half of the site between Batchelor Lane (an on-site roadway) and Ford Lane (an off-site roadway). Project plans show that the common outdoor use area for the project, which will include a play area pool and community center, will be in the central portion of the site north of Batchelor Lane and between Buildings D, E, and F.

A review of the site plan shows that this central common open space will be as close as 300 feet from the centerline of Gravenstein Highway and will received partial acoustical shielding from intervening project structures. Based on a consideration of partial noise shielding and the results of our measurement survey and future noise projections, sound levels in the project common open space areas are expected to be between 63 and 64 dBA L_{dn} under future conditions. Such exterior noise levels are considered “normally acceptable” for multifamily residential land uses by the City of Cotati General Plan Noise Element.

Mitigation Measure 1a: None Required.

[2] W-Trans, “Draft Report, Transportation Impact Study for the Cotati Village Project”, 09/8/2022

Impact 1b: **Interior Residential Noise and Land Use Compatibility.** The interiors of residences on portions of the project site that would be exposed to "conditionally acceptable" noise levels such that the interior noise levels may exceed the City and State required 45 dBA L_{dn} level. **This is a less-than-significant impact with the incorporation of noise control measures in the project design.**

Interior noise levels within residential buildings of normal construction are typically 15 dBA lower than exterior noise levels with the windows partially open. With the windows closed, standard residential construction typically provides 20 to 25 decibels of exterior to interior noise reduction. Considering this, where exterior day-night average noise levels are 65 dBA L_{dn} or less, interior noise levels can typically be maintained below the City and State interior noise standard of 45 dBA L_{dn} with the incorporation of forced air mechanical ventilation systems to provide adequate fresh air when residents wish to keep their windows closed for noise control. Where noise levels exceed 65 dBA L_{dn}, forced-air mechanical ventilation systems and sound-rated building elements are normally required.

Residential units in Buildings A, B and C adjacent to and/or with a clear view of Gravenstein Highway traffic will be exposed to exterior noise levels of up to 72 dBA L_{dn} under future conditions. Considering this, the following noise control measures are assumed to be included in the final project design:

Exterior to Interior Noise Control Design Measures:

1. To allow all the residents of the apartments in Buildings A,B, and C which are adjacent to and/or with a clear view of traffic on Gravenstein Highway to keep their windows closed for noise control. These apartment units, are identified in the Design Review Application drawings as:
   - Units A200, A201, A202, A204, A206, A208, A210, A212, A213, A300, A301, A302, A304, A306, A308, A310, A312 and A313 in Building A,
   - Units B101, B111, B200, B201, B202, B204, B206, B208, B210, B211, B300, B301, B302, B304, B306, B308, B310, and B311 in Building B, and
   - Units C200, C201, C202, C204, C206, C208, C209, C300, C301, C302, C304, C306, C308, and C309 in Building C,

   The apartments will be equipped with a mechanical ventilation systems to supply fresh air to the units such as an acoustically rated straight air transfer duct such as the Fresh 80, 90 or 100-dB units by Fresh Ventilation (or equal) or a standard central air conditioning and/or a central heating system with adequate fresh air supply, which is equipped with a 'summer switch' to allow the fan to circulate air without cooling or heating operation, or other systems satisfactory to the local building official, which provide adequate mechanical ventilation to the residences with closed windows.

2. The exterior wall assemblies & window/door STC ratings of the apartments in Buildings A,B, and C, listed above, which are adjacent to and/or with a clear view of traffic on Gravenstein Highway, will be designed to maintain interior noise levels at or below 45 dBA Ldn with closed exterior doors and windows. Based on typical residential construction, it is expected that the windows and doors facing or with a view of Gravenstein Highway in these units will require STC ratings of between 30 and 32, however the specific determination of sound isolation ratings of the exterior wall assemblies and window/door assemblies will be determined during the project design.

Mitigation Measure 1b: No additional measures required

Impact 1c: **Interior Non-Residential Noise and Land Use Compatibility.** The interiors of the commercial (non-residential) uses in Buildings A, B and C would be exposed to an L_{dn} level of 72 dBA. Following the State of California *Cal Green* Building Code standard, exterior sound transmission control must be incorporated in the design of these buildings using either the prescriptive (section 5.507.4.1) or performance (section 5.507.4.2) analysis methods. **This is a less-than-significant impact.**

Under the performance method wall, window and roof-ceiling assemblies facing noise sources need to be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\text{-}1Hr}$) of 50 dBA in occupied areas during any hour of operation. A review of the noise measurement of existing conditions indicates that the existing peak hour L_{eq} level is 67 dBA. Considering a possible increase of 3 dBA over existing noise conditions under future traffic conditions, the future peak hour $L_{eq\ -1Hr}$ level is expected to be 70 dBA. Considering this, the exterior façades of the non-residential uses in Buildings A, B and C will need to reduce the exterior to interior noise level by 20 dBA to meet the 50 dBA L_{eq}-$_{1Hr}$ standard.

A review of building elevations indicates that storefront glazing may be used extensively at the commercial retail spaces. Though some of this glazing is expected to be spandrel glass, under worst case condition without spandrel conditions (full glazing), storefront glazing systems with a minimum STC rating of 26 would meet the interior hourly equivalent noise level ($L_{eq\text{-}1Hr}$) limit of 50 dBA during any hour of operation of these businesses. Because an STC rating of 26 is typical of standard operable thermal insulating glazing systems, and standard fixed storefront glazing systems meet, and many exceed, this rating, this report finds that the interior hourly equivalent noise level ($L_{eq\text{-}1Hr}$) limit of 50 dBA during any hour of operation with a standard, non-STC rated, thermally insulating fixed storefront glazing system.

Mitigation 1c: None Required.

Impact 2: **Project Operational Noise Generation** Noise due to the use and occupation of the project residences on adjacent noise sensitive uses is not expected to significantly increase or alter the existing noise environment at these uses. **This is a less-than-significant impact.**

The proposed project would place new residential uses within 75 feet of an existing multi-family housing development to the north and within 280 feet of an existing family-family housing development to the south. The occupation and use of the proposed homes is expected to result in the typical noises associated with residential development, including voices of the new residents, home maintenance activities, barking dogs and children. The Heating Ventilation and Air Conditioning (HVAC) and other mechanical equipment associated with the multifamily residential development will also add noise the existing environment. Based on noise measurements made at similar projects the outdoor condensing units at the proposed residences may produce constant sound levels of 47 to 50 dBA L_{eq} at 50 feet and could operate continuously during both daytime and nighttime hours. Considering these noise levels and distances to the adjacent residential uses it is clear that noise from the project HVAC equipment would be at or below ambient noise levels at these adjacent residences. Additionally, though noise resulting from occupation of the new residences may noticeably change the noise environment in some adjacent residential areas, these sources are not expected to increase noise levels in any surrounding areas by four or more dBA and the noise associated with the proposed residences is not incompatible with the surrounding land uses. Therefore, project operation is not judged to result in a noise impact.

Mitigation 2: None Required.

Impact 3: **Project-Generated Traffic Noise.** The proposed project would not substantially increase noise levels on a permanent basis at noise sensitive uses in the vicinity. **This is a less-than-significant impact.**

A significant impact would be identified if traffic generated by the project would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if the project traffic on area roadways where to result in a noise level increase of 5 dBA L_{dn} or greater at the multi-family homes north of the project site, or by 1.5 dBA L_{dn} or greater at the single-family homes south of the project site. The traffic report for the development indicated that the project would generate an average of 2,275 trips per day, including 110 trips during the a.m. peak hour and 178 during the p.m. peak hour. An analysis of the traffic report indicates there are currently 1348 am peak hour trips and 1251 pm peak hour trips on Gravenstein Highway in front of the site. Considering these traffic volumes, project traffic would result in a less than 1 dBA increase in noise levels on the Gravenstein Highway. An additional review shows that, though Alder Avenue will not access Gravenstein Highway under future conditions, under existing conditions project traffic on Alder Avenue, would result in a 3 dBA or less increase in noise levels on Alder Avenue.

Mitigation 3: None Required.

Impact 4: **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 100 feet or more from the nearest residential units to north, but activities near the northern project perimeter could occur at distances of as close as 50 feet from these residences. Construction activities near the southern project perimeter could occur at distances of as close as 300 feet from the single-family homes to the south.

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 40 and 60 feet. Jackhammers typically generate vibration levels of 0.017 to 0.009 in/sec PPV, drilling typically generates vibration levels of 0.044 to 0.024 in/sec PPV, and vibratory rollers generate vibration levels of 0.104 to 0.056 in/sec PPV at distances of 40 to 60 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 (jackhammers and 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 40 ft. (in/sec)	PPV at 60 ft. (in/sec)
Clam shovel drop		0.100	0.054
Hydromill (slurry wall)	in soil	0.004	0.008
	in rock	0.008	0.017
Vibratory Roller		0.104	0.056
Hoe Ram		0.044	0.024
Large bulldozer		0.044	0.024
Caisson drilling		0.044	0.024
Loaded trucks		0.038	0.020
Jackhammer		0.017	0.009
Small bulldozer		0.004	0.004

Mitigation 4: None Required

Impact 5: **Construction Noise.** Noise levels generated by project construction activities would temporarily elevate ambient noise levels at sensitive land uses in the vicinity. Major noise generating construction activities would be limited to less than one construction season or less. **This is a less-than-significant impact.**

The construction of the project would generate noise and would temporarily increase noise levels at adjacent residential receivers. Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment operating on site, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction of the project would involve site improvements, such as the establishment of utilities, excavation of foundations, building erection, paving, and landscaping along with home construction. The hauling of excavated material and construction materials would 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 noise levels which during the construction of housing at 50 feet are shown in Table 6, which gives the average noise level ranges by construction phase. Site work and housing construction noise ranges from of 65 to 88 dBA at 50 feet from the source.

The nearest noise sensitive uses will be 40 to 60 feet from close-in on-site work and home construction. Average noise levels produced by work at this distance would range from 80 to 90 dBA. Construction activities at this distance would range from 73 to 90 dBA, with an average level of 82 dBA. Home building activities at this distance would range from 63 to 90 dBA with an average level of 77 dBA. These noise levels drop off at a rate of about 6 dBA per doubling of

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

distance between the noise source and receptor, such that noise levels produced during most site construction activities, which would occur at distances of 300 feet or more from adjacent noise sensitive uses, would produce average noise levels of 66 dBA or less during site work activities and 61 dBA or less during home building activities.

TABLE 6: Typical Ranges of L_{eq} Construction Noise Levels at 50 Feet, dBA

Construction Stage	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	84
Excavation	88	75	89	79	88	78
Foundations	81	81	78	78	88	88
Erection	81	65	87	75	79	78
Finishing	88	72	89	75	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.

A review of the construction schedule indicates that though the project would take less than 1 year to complete, with site work occurring for about 50 days and building construction occurring for about 250 days. Based on this timetable, the construction noise levels at various distances discussed above, and a consideration that once intervening structures are built, they would provide some degree of noise attenuation at the surrounding residences, we expect that the existing residences adjacent to the project site would not be exposed to construction related noise levels exceeding 60 dBA L_{eq} for a period of greater than one year.

The following standard "best practice" controls from Action N1h as contained in Policy N 1.15 of the City General Plan are assumed to be included in the project:

- Noise-generating construction activities, including truck traffic coming to and from the construction site for any purpose, shall be limited to between the hours of 7:00 am and 7:00 pm on weekdays and 9:00 am and 5:00 pm on Saturdays (if allowed through specific project conditions of approval). No construction shall occur on Sundays or holidays.
- All equipment driven by internal combustion engines shall be equipped with mufflers, which are in good condition and appropriate for the equipment.
- The construction contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists.
- At all times during project grading and construction, stationary noise---generating equipment shall be located as far as practicable from sensitive receptors and placed so that emitted noise is directed away from residences.
- Unnecessary idling of internal combustion engines shall be prohibited.
- Construction staging areas shall be established at locations that will create the greatest distance between the construction related noise sources and noise---sensitive receptors nearest the project site during all project construction.
- The required construction related noise mitigation plan shall also specify that haul truck deliveries are subject to the same hours specified for construction equipment.
- Neighbors located adjacent to the construction site shall be notified of the construction schedule in writing.
- The construction contractor shall designate a "noise disturbance coordinator" who will be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and institute reasonable measures as warranted to correct the problem. A

telephone number for the disturbance coordinator shall be conspicuously posted at the construction site.

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

Mitigation Measure 5: No additional measures required