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September 3, 2019

Olivia Ervin
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VIA E-MAIL: **OErvin@m-group.us**

SUBJECT: **Noise and Vibration Impacts from In-N-Out Restaurant Proposed at 2532 Santa Rosa Avenue, Santa Rosa, CA.**

Dear Olivia:

This letter addresses the noise and vibration impacts resulting from the construction and operation of the proposed In-N-Out Burger restaurant in Santa Rosa, California. Illingworth and Rodkin, Inc. prepared the environmental noise and vibration assessment[1] which addressed noise and vibration impacts from the Yolanda Apartments residential development, approved on July 9, 2019, and the currently under review In-N-Out restaurant proposed at 2532 Santa Rosa Avenue. This letter addresses these same impacts but does not include the construction or operation impacts associated with the residential development.

This letter includes a discussion of noise and land use compatibility of the proposed In-N-Out, utilizing policies in the City's General Plan, and a discussion of noise and vibration impacts with the presentation of mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses. For a description of the fundamentals of environmental noise and vibration, a summary of applicable regulatory criteria, and a discussion of the ambient noise monitoring survey completed to document existing noise conditions, please review the environmental noise and vibration assessment.[1]

General Plan Consistency Analysis

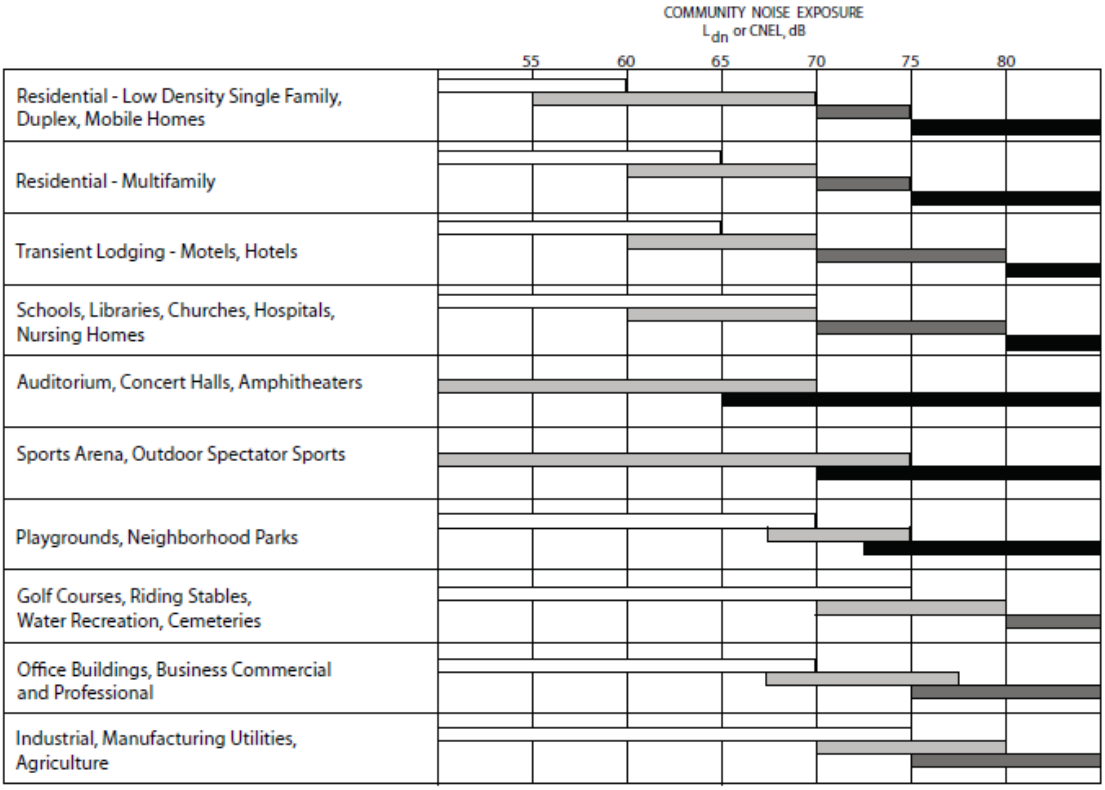
This section addresses the Noise and Land Use compatibility for consistency with the policies set forth in City of Santa Rosa's General Plan and Municipal Code.

[1] 325 Yolanda Avenue Environmental Noise and Vibration Assessment, Illingworth and Rodkin, Inc.; January 17, 2019

As seen in Figure 12-1 of the City of Santa Rosa General plan, the normally acceptable exterior noise level objective is 70 dBA L_{dn} or less for commercial spaces such as a restaurant. Future traffic noise levels at the site were calculated based on the results of the noise monitoring survey[1], considering the traffic noise increases anticipated under future conditions.

Figure 12-1

Land Use Compatibility Standards



LEGEND:

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: City of Santa Rosa General Plan 2035

Future Exterior Noise Environment

Outdoor seating associated with the In-N-Out restaurant would be located primarily along the south side of the restaurant building. Proposed seating would be between 100 and 225 feet east of the center of Santa Rosa Avenue. At this distance, exterior noise levels are calculated to be between 63 and 68 dBA L_{dn}, falling below the City of Santa Rosa's normally acceptable noise limit of 70 dBA L_{dn} for restaurant uses.

Future Interior Noise Environment

The In-N-Out restaurant would be exposed to an exterior hourly equivalent noise level of 67 dBA L_{eq}. Standard commercial construction would provide at least 25 dBA of noise reduction in interior spaces with windows in the closed position. Standard construction with the inclusion of a forced-air mechanical ventilation system would be sufficient for the restaurant to comply with the Cal Green Code standard of 50 dBA $L_{eq\ (1\text{-}hr)}$.

Noise Impacts and Mitigation Measures

This section provides a discussion of each project impact, and presents mitigation measures where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

Permanent Noise from On-Site Operations

Noise generating on-site operational components of the project would include mechanical equipment such as heating, ventilation, air-conditioning, and refrigeration (HVAC) units and a trash compactor, deliveries, restaurant drive thru activities, parking lot activities, and outdoor dining activities. Site plans show a proposed wall varying between 6 and 9 feet tall along the northern, eastern, and southern sides of the site. The wall would attenuate noise levels from on-site operations and has been taken into account in this analysis. Sections 17-16.030 and 17-16.120 of the City of Santa Rosa Municipal Code establish a nighttime residential threshold of 50 dBA L_{eq} (5 dBA above the ambient base noise level of 45 dBA) and nighttime commercial threshold of 60 dBA L_{eq}. This analysis assesses all operational components of the project against these criteria.

<u>HVAC Equipment</u>

Typical commercial HVAC units are anticipated to generate noise levels of 50 to 60 dBA at 50 feet. Provided plans show that proposed HVAC units will be located on the roof near the center of the building. Parapet walls are typically constructed out of materials with a minimum surface weight of 3 lbs./ft^2 and are effective as noise barriers. A parapet wall along the building's perimeter is expected to provide a reduction of noise levels from rooftop equipment of approximately 10 dBA. HVAC equipment noise would be anticipated to be 36 to 46 dBA L_{eq} 80 feet north at the Mattress Discounters, and 30 to 40 dBA L_{eq} at the Quality Motors auto shop 150 feet to the south. This would meet the nighttime commercial threshold of 60 dBA L_{eq}. The nearest potentially impacted residences are mobile homes located 175 feet northeast of the proposed equipment location. The approved Yolanda Apartments will be located 315 feet southeast of the proposed equipment location. HVAC noise levels at the mobile homes are anticipated to reach 29 to 39 dBA

L_{eq}. HVAC noise levels at the Yolanda Apartments are anticipated to reach 24 to 34 dBA L_{eq}. This would not exceed the 50 dBA L_{eq} nighttime limit for residential uses. Due to shielding from the parapet wall and equipment positioning, noise from HVAC equipment is not anticipated to exceed the 50 dBA L_{eq} limit at any nearby receptors. This is a **less-than-significant** impact.

Trash Compactor

The trash and recycling enclosure is proposed to be located in the loading dock and drive-through area, approximately 80 feet from the nearest mobile homes to the northeast. The proposed orientation of the enclosure will maximize its noise reduction, with 8-foot concrete walls on the northern and eastern sides, and with the access doors located on the southern and western sides, facing away from the residences. The enclosure along with the 6 to 9-foot concrete wall along the northern property line will provide substantial noise reduction. Trash compactors typically generate maximum noise levels of 52 to 57 dBA at 80 feet, depending on the power rating and enclosure characteristics. Noise levels from the trash compactor are calculated to be approximately 32 to 37 dBA at the mobile homes to the northeast. This would be below the ambient noise level. This is a **less-than-significant** impact.

Loading Area

Truck deliveries result in intermittent noises during loading/unloading activities and circulation. A previous In-N-Out location studied by Illingworth & Rodkin, Inc. received on average one delivery per day, unloading at the site between approximately 7:00 a.m. and 9:00 a.m. each morning. Deliveries were unloaded using a hand operated pallet jack (no engine noise or beeping when backing up). The site plan shows the loading area would be near the drive-through and trash compactor, about 100 feet from the residences to the northeast. Loading area noise (from unloading of products) would be shielded by the 6 to 9-foot concrete wall along the northern property line. Intermittent noises emanating from the loading area are anticipated to be 45 dBA at the nearest residences and 46 dBA at the nearest commercial use to the north. Noise generated by intermittent loading/unloading activities would not substantially increase hourly average or daily-average noise levels at the nearest noise-sensitive receptors. It is assumed that site access would be from Santa Rosa Avenue or Yolanda Avenue, which could bring delivery trucks within about 80 feet of residences across Santa Rosa Avenue to the west. Accounting for noise propagation due to distance and shielding provided by the concrete wall along the northern property line, maximum noise levels of trucks circulating through the site would be about 50 to 55 dBA L_{max} at the nearest residences. Based on results of the noise monitoring survey, this would be less than existing maximum and hourly average levels produced by traffic on Santa Rosa Avenue, and therefore is not expected to cause a significant increase in ambient noise levels or to cause discomfort or annoyance to listeners at any nearby property lines. This is a **less-than-significant** impact.

Drive Thru Operations

The proposed In-N-Out restaurant will be open from 10:00 a.m. to 1:00 a.m. Sunday through Thursday and from 10:00 a.m. to 1:30 a.m. on Friday and Saturday. The drive-through aisle would begin along the southern property line approximately 125 feet east of the centerline of Santa Rosa Avenue and wrap around the In-N-Out site perimeter. The major noise sources attributed to the

drive-through would include amplified speech emanating from the speaker, idling cars, cars circulating along the drive-through aisle, and less frequently, engines starting.

Based on the measurements conducted by Illingworth & Rodkin, Inc. at an existing In-N-Out in San Jose, the drive-through speaker and patron voices would result in maximum sound levels ranging from 44 to 51 dBA L_{max} at the nearest residences, mobile homes approximately 60 feet northeast of the drive-through speaker. Drive-through speaker noise would result in levels ranging from 38 to 48 dBA L_{max} at the nearest approved Yolanda Apartments building located 120 feet southeast. Idling vehicles typically produce noise levels of between 52 to 54 dBA L_{max} at 30 feet from the source. The noise produced by vehicles idling while in the drive-through lane would result in maximum noise levels of between 47 and 49 dBA L_{max} at the mobile homes and Yolanda Apartments buildings located approximately 20 feet from the section of drive-through along the shared property line

Maximum noise generated by drive-through operations would be audible at the nearest residences during periods with low ambient traffic noise or during occasional loud activities such as circulating vehicles with loud stereos or engines. Maximum noise levels resulting from the drive-through would not cause the ambient average noise level to exceed the 50 dBA L_{eq} set in the City of Santa Rosa Municipal Code and would be lower than noise levels generated by traffic on Yolanda Avenue and Santa Rosa Avenue. This is a **less-than-significant** impact.

Parking Lot

A surface parking lot is proposed for the site, located in the space to the south and east of the restaurant. Access to the restaurant parking lot would be provided from Santa Rosa Avenue and from Yolanda Avenue. Noise sources associated with the use of the parking lot would include vehicular circulation, loud engines, car alarms, squealing tires, door slams, and human voices. The typical sound of a passing car at 15 mph would be about 50 to 60 dBA L_{max} at a distance of 50 feet. The noise of an engine start is similar. Door slams typically produce noise levels lower than engine starts. The hourly average noise level resulting from all these noise-generating activities in a small parking lot would reach 40 dBA L_{eq} at a distance of 50 feet from the parking area.

The nearest residential land uses are mobile homes located 25 feet north of the closest restaurant parking lot space and 120 feet northeast of the center of the parking lot. These residences would experience hourly average noise levels of 38 dBA L_{eq} from parking activities at the closest spaces and 24 dBA L_{eq} from the activities at the center. Maximum noise levels would range from about 44 to 54 dBA L_{max} at the closest spaces and 34 to 44 L_{max} at the center. The Yolanda Apartments development will be further away from noise sources than the mobile homes, therefore experiencing lower noise levels. Parking lot activity noise would not exceed the City's nighttime 50 dBA L_{eq} limit at residences. This is a **less-than-significant** impact.

Outdoor Seating

Outdoor seating will be provided south of the restaurant building. The primary noise source attributed to outdoor seating is the sound of voices while people are eating. Normal conversation typically generates noise levels of 60 to 65 dBA at a distance of 3 feet. At the nearest residences,

mobile homes located about 120 feet from the proposed seating area, noise from restaurant patron conversations would be 28 to 33 dBA and would not generally be distinguishable from ambient. This is a **less-than-significant** impact.

Permanent Noise Increases from Project Traffic

Traffic data provided by the project's traffic study[2] for the combined residential and restaurant project was reviewed to calculate potential traffic noise level increases attributable to the project along roadways serving the site. Roadways evaluated in the analysis included Yolanda Avenue, Santa Rosa Avenue, Hearn Avenue, and Petaluma Hill Road. Based on a comparison between traffic volumes under the existing plus project (Baseline) scenario and existing conditions, the traffic noise increase on the surrounding roadways attributable to the project would be 0 to 1 dBA L_{eq}. Day-night average (L_{dn}) noise level increases would be anticipated to be similar. The impact of the restaurant alone would be even lower than that calculated for the restaurant and residential combined. This is a **less-than-significant** impact.

Temporary Noise Increases from Project Construction

Neither the City of Santa Rosa nor the State of California specify quantitative thresholds for the impact of temporary increases in noise due to construction. The threshold for speech interference indoors is 45 dBA. The project would be considered to generate a significant temporary construction noise impact if project construction activities exceeded 60 dBA L_{eq} at nearby residences or exceeded 70 dBA L_{eq} at nearby commercial land uses and exceeded the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year.

Project construction is anticipated to occur over a period of 6 months and would include site preparation, grading and excavation, trenching, building erection, and paving. The hauling of excavated materials and construction materials would generate truck trips on local roadways as well. Pile driving is not anticipated in any phase of construction of the project.

The closest noise sensitive uses are residences located 25 feet north of the project boundary on Squire Lane and 135 feet west of the project boundary across Santa Rosa Avenue. Residences to the north of project site would be exposed to a maximum noise level of 91 dBA L_{max} and hourly average level of 90 dBA L_{eq} during site preparation and grading located adjacent to shared property lines. Residences to the north and west would be exposed to maximum noise levels of 69 to 82 dBA L_{max} and typical hourly average noise levels of 65 to 80 dBA L_{eq} during all other phases of construction located adjacent to shared property lines. Approved but not yet constructed residential use would be located east of the site at 325 Yolanda Avenue. Construction noise levels at 325 Yolanda Avenue are not anticipated to be of concern as construction of the In-N-Out is anticipated to finish prior to occupancy. Noise levels would be lower as construction moved away from shared property lines or into shielded areas. Construction noise could exceed 60 dBA L_{eq} at residences and 70 dBA L_{eq} at commercial areas. This is a **potentially significant** temporary impact.

[2] Draft Report, Traffic Impact Study for the Yolanda Mixed-Use Project; W-Trans, February 7, 2019.

Mitigation Measure 1(c) from the January 17, 2019 noise assessment[1] includes a list of best construction management practices. Implementation of **Mitigation Measure 1(c)** would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance, reducing this impact to a less than significant level.

Generation of Excessive Groundborne Vibration due to Construction

City of Santa Rosa's General Plan does not specify a construction vibration limit. Based on the thresholds provided by Caltrans, a construction vibration limit of 0.5 in/sec PPV would minimize damage at buildings of commercial construction and a construction vibration limit of 0.3 in/sec PPV would minimize damage at older residential structures. A significant impact would occur if buildings adjacent to the proposed construction site were exposed to vibration levels in excess of 0.5 in/sec PPV for commercial structures or 0.3 in/sec PPV for older residential structures.

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site demolition work, preparation work, excavation of below-grade levels, foundation work, and new building framing and finishing. Pile driving is not anticipated for this project.

Table 1 presents typical vibration levels that could be expected from construction equipment at distances of 10 and 25 feet, representative of distances to the nearest surrounding structures. Construction activities, such as use of saws, excavators, scrapers and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

TABLE 1 Vibration Source Levels for Construction Equipment

Equipment		PPV at 10 ft. (in/sec)	PPV at 25 ft. (in/sec)
Clam shovel drop		0.553	0.202
Hydromill (slurry wall)	In soil	0.022	0.008
	In rock	0.047	0.017
Vibratory Roller		0.575	0.210
Hoe Ram		0.244	0.089
Large bulldozer		0.244	0.089
Caisson drilling		0.244	0.089
Loaded trucks		0.208	0.076
Jackhammer		0.096	0.035
Small bulldozer		0.008	0.003

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, September 2018, expanded by Illingworth & Rodkin, Inc., July 2019.

As indicated in Table 1, heavy vibration generating construction activity, such as use of vibratory rollers or clam shovel drops, would have the potential to produce vibration levels of 0.50 in/sec PPV or more at structures within 12 feet of the project site. Heavy construction would have the potential to exceed 0.3 in/sec PPV within about 18 feet. The majority of heavy construction would

occur at and adjacent to the building envelope. The site was previously graded, and only minimal site grading, landscaping, and paving is anticipated to occur near shared property lines.

The nearest existing structure is Quality Motors on 2620 Santa Rosa Avenue, located 10 feet south of the project site. Use of high vibration generating construction equipment, such as vibratory rollers, near the southern site boundary would have the potential to cause vibration levels that exceed the 0.5 in/sec PPV thresholds at this structure. This is a **potentially significant** impact. Again, the site was previously graded and heavy construction near shared property lines is not anticipated to occur. However, as a precautionary measure, mitigation measures are recommended. Implementation of **Mitigation Measure 2** would reduce vibration at commercial structures immediately adjacent to the site to levels below the limit of 0.50 in/sec PPV. Construction located more than 12 feet from commercial structures would not be anticipated to exceed 0.5 in/sec PPV.

At the nearest residential structures, located 25 feet north of project construction, vibration levels are anticipated to be 0.21 in/sec PPV or less during all construction activities. Vibration levels may be perceptible to occupants but would be below the 0.3 in/sec PPV vibration limit. Construction vibration would not be anticipated to cause architectural or structural damage to the nearest residential buildings and would not be considered excessive. As construction moves away from the shared property lines, vibration levels would be even lower.

Mitigation Measure 2: The following mitigation measures would reduce this impact to a less-than-significant level at commercial structures located immediately adjacent to the project site to the south.

- Avoid using vibratory rollers and tampers within 15 feet of commercial structures.
- Avoid dropping heavy objects or materials within 15 feet of commercial structures.

Implementation of the above measures would reduce this impact to a less-than-significant level.

♦ ♦ ♦

This concludes the summary of noise and vibration impacts due to construction and operation of the In-N-Out restaurant at 2532 Santa Rosa Avenue in Santa Rosa, California. If you have any questions or comments regarding this analysis, please do not hesitate to call.

Sincerely yours,

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325 YOLANDA AVENUE ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

Santa Rosa, California

January 17, 2019

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INTRODUCTION

The project proposes to construct an In-and-Out restaurant and multi-family residential apartments on an approximately 10.4 acre lot located at 325 Yolanda Avenue. The In-and-Out restaurant would include a single drive-through lane and parking and would be located on the west side of the site. The 252 multi-family residential apartments would front Yolanda Avenue. The residential apartments would be contained within eleven (11) three-story buildings and four (4) two-story buildings. The residential complex also includes a pool, clubhouse and leasing center.

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

SETTING

Fundamentals of Environmental Noise

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

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

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA

are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

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

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

Effects of Noise

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 dB 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 to 17 dB with open windows. With standard construction and closed windows in good condition, the noise attenuation factor is around 20 dB for an older structure and 25 dB for a newer dwelling. Sleep and speech interference is therefore of concern when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

TABLE 1 Definition of Acoustical Terms Used in this Report

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

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

TABLE 2 Typical Noise Levels in the Environment

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

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

Fundamentals of Groundborne Vibration

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

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause 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. 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 paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. 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.

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

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

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

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

Regulatory Background – Noise

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

2018 State CEQA Guidelines. The CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) 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.

Checklist items (a) and (b) are applicable to the proposed project. The project would not expose people residing or working in the project area to excessive aircraft noise levels; therefore, item (c) is not carried further in this analysis.

CEQA does not define what noise level increase would be considered substantial. Typically, project-generated noise level increases of 3 dBA L_{dn} or greater would be considered significant where exterior noise levels would exceed the compatible noise level standard (60 dBA L_{dn} for residential land uses and 70 dBA L_{dn} for industrial land uses). Where noise levels would remain at or below the compatible noise level standard with the project, noise level increases of 5 dBA L_{dn} or greater would be considered significant.

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

2016 California Green Building Standards Code (Cal Green Code). The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2016 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). Section 5.507 states that either the prescriptive (Section 5.507.4.1) or the performance method (Section 5.507.4.2) shall be used to determine environmental control at indoor areas. The prescriptive method is very conservative and not practical in most cases; however, the performance method can be quantitatively verified using exterior-to-interior calculations. For the purposes of this report, the performance method is utilized to determine consistency with the Cal Green Code. 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 Santa Rosa General Plan. The Noise and Safety Element of the City of Santa Rosa's General Plan identifies policies that are intended to "maintain an acceptable community noise level to protect the health and comfort of people living, working and/or visiting in Santa Rosa, while maintaining a visually appealing community." Multi-family residential uses are considered to be normally acceptable in areas with a noise environment of L_{dn} of 65 dBA or less, conditionally acceptable in areas exposed to an L_{dn} of 60 to 70 dBA, normally unacceptable in

areas exposed to an L_{dn} of 70 to 75 dBA, and unacceptable in areas exposed to an L_{dn} of 75 dBA or more (see Figure 12-1).

The following policies are applicable to the proposed project:

NS-B-1 Do not locate noise-sensitive uses in proximity to major noise sources, except residential is allowed near rail to promote future ridership.

NS-B-2 Encourage residential developers to provide buffers other than sound walls, where practical. Allow sound walls only when projected noise levels at a site exceed land use compatibility standards.

NS-B-3 Prevent new stationary and transportation noise sources from creating a nuisance in existing developed areas. Use a comprehensive program of noise prevention through planning and mitigation, and consider noise impacts as a crucial factor in project approval.

NS-B-4 Require new projects in the following categories to submit an acoustical study, prepared by a qualified acoustical consultant:

- All new projects that could generate noise whose impacts on other existing uses would be greater than those normally acceptable.

- All new projects proposed for areas with existing noise above 60 dBA L_{dn}. Mitigation shall be sufficient to reduce noise levels below 45 dBA L_{dn} in habitable rooms and 60 dBA L_{dn} in private and shared recreational facilities. Additions to existing housing units are exempt.

NS-B-5 Pursue measures to reduce noise impacts primarily through site planning. Engineering solutions for noise mitigation, such as sound walls, are the least desirable alternatives.

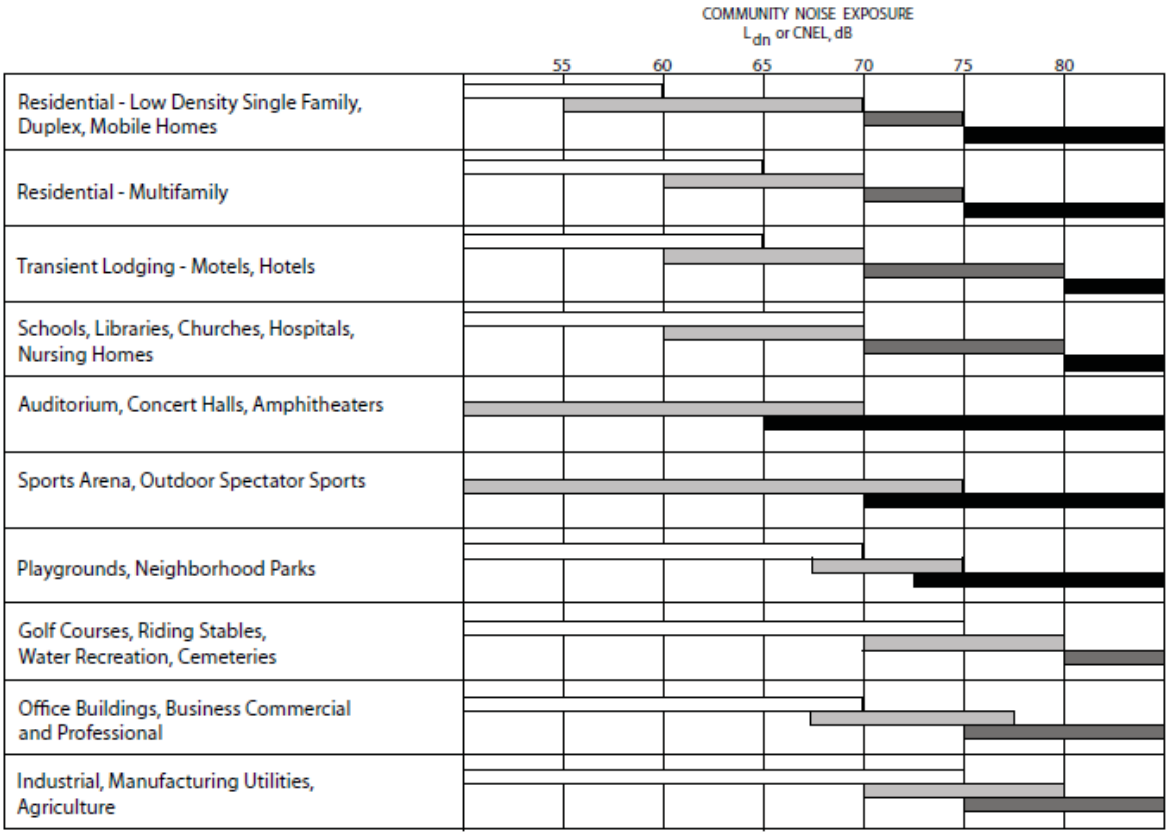
NS-B-9 Encourage developers to incorporate acoustical site planning into their projects. Recommended measures include:
- Incorporating buffers and/or landscaped earth berms;
- Orienting windows and outdoor living areas away from unacceptable noise exposure;
- Using reduced-noise pavement (rubberized-asphalt);
- Incorporating traffic calming measures, alternative intersection designs, and lower speed limits; and
- Incorporating state-of-the-art structural sound attenuation and setbacks.

NS-B-10 Work with private enterprises to reduce or eliminate nuisance noise from industrial and commercial sources that impact nearby residential areas. If progress is not made within a reasonable time, the City shall issue abatement orders or take other legal measures.

NS-B-14 Discourage new projects that have potential to create ambient noise levels more than 5 dBA L_{dn} above existing background, within 250 feet of sensitive receptors.

Figure 12-1

Land Use Compatibility Standards



LEGEND:

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: Environmental Science Associates, 2001

City of Santa Rosa Municipal Code.

17-16.030 Ambient base noise level criteria. The following criteria will be used as a base (ambient noise level) from which noise levels can be compared.

Zone	Time	Sound Level A (decibels) Community Environment Classification
R1 and R2	10 p.m. to 7 a.m.	45
R1 and R2	7 p.m. to 10 p.m.	50
R1 and R2	7 a.m. to 7 p.m.	55
Multi-family	10 p.m. to 7 a.m.	50
Multi-family	7 a.m. to 10 p.m.	55
Office & Commercial	10 p.m. to 7 a.m.	55
Office & Commercial	7 a.m. to 10 p.m.	60
Intensive Commercial*	10 p.m. to 7 a.m.	55
Intensive Commercial	7 a.m. to 10 p.m.	65
Industrial	Anytime	70

17-16.120 Machinery and equipment. It is unlawful for any person to operate any machinery, equipment, pump, fan, air-conditioning apparatus or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient base noise level by more than five decibels.

17-16.170 Regulations generally (Amplified Sound). The commercial and noncommercial use of sound-amplifying equipment shall be subject to the following regulations.

A. The only sounds permitted shall be either music or human speech, or both.
B. The operation of sound-amplifying equipment shall only occur between the hours of nine a.m. and six p.m. each day except on Sundays and legal holidays. No operation of sound-amplifying equipment for commercial purposes shall be permitted on Sundays or legal holidays. The operation of sound-amplifying equipment for noncommercial purposes on Sundays and legal holidays shall only occur between the hours of 10 a.m. and six p.m. The City Manager or his or her designee may waive the provisions of this subsection upon a determination that a particular event will not cause an unreasonable disturbance to neighboring uses.
C. Sound level emanating from sound-amplifying equipment shall not exceed 15 decibels above the ambient base noise level.
D. Notwithstanding the provisions of subsection (C), sound-amplifying equipment shall not be operated within 200 feet of churches, schools or hospitals.
E. In any event, the volume of sound shall be so controlled that it will not be unreasonably loud, raucous, jarring, disturbing or a nuisance to reasonable persons of normal sensitiveness within the area of audibility.

Existing Noise Environment

The project site is located to the northeast of intersection of Yolanda Avenue and Santa Rosa Avenue. A noise monitoring survey was performed in the vicinity of the site beginning on Monday, August 6, 2018 and concluding on Friday, August 10, 2018. The monitoring survey included two long term and four short-term measurements, as shown in Figure 1.

Long-term noise measurement LT-1 was made approximately 30 feet north of the center of Yolanda Avenue. The primary noise source at this location was traffic along Yolanda Avenue. Hourly average noise levels ranged from 68 to 73 dBA L_{eq} during daytime hours, and from 56 to 71 dBA L_{eq} at night. The day-night average noise level was 73 dBA L_{dn}. The daily trend in noise levels at LT-1 is shown on Figure 2.

Measurement LT-2 was located 50 feet from the centerline of Santa Rosa Avenue. The primary noise source at this location was the traffic on Santa Rosa Avenue. Hourly average noise levels at this location ranged from 67 to 74 dBA L_{eq} during the day and from 59 to 68 dBA L_{eq} at night. The day-night average noise level was 73 dBA L_{dn}. The daily trend in noise levels at LT-2 is shown on Figure 3.

Table 3 summarizes the results of the short-term noise measurements.

TABLE 4 Summary of Short-Term Noise Measurement Data, August 6 & 8, 2018

ID	Location (Start Time)	Measured Noise Levels, dBA					Primary noise source
		L_{10}	L_{50}	L_{90}	L_{eq}	L_{dn}	
ST-1	370 feet from Santa Rosa Avenue (8/6/18, 1:10 pm to 1:20 pm)	55	52	51	53	54	Traffic on Santa Rosa Avenue and US 101
ST-2	150 feet from Santa Rosa Avenue (8/6/18, 1:30 p.m. to 1:40 p.m.)	55	55	52	57	59	Traffic on Santa Rosa Avenue and US 101
ST-3	30 feet from Yolanda Avenue (8/8/18, 10:20 a.m. to 10:30 a.m.)	77	68	56	72	74	Helicopter noise, traffic on Yolanda Avenue
ST-4	McDonald's parking lot (8/8/18, 10:40 a.m. to 10:50 a.m.)	63	58	54	60	63	Parking lot noise, traffic

FIGURE 1 Noise Measurement Locations

FIGURE 2 Daily Trend in Noise Levels at LT-1

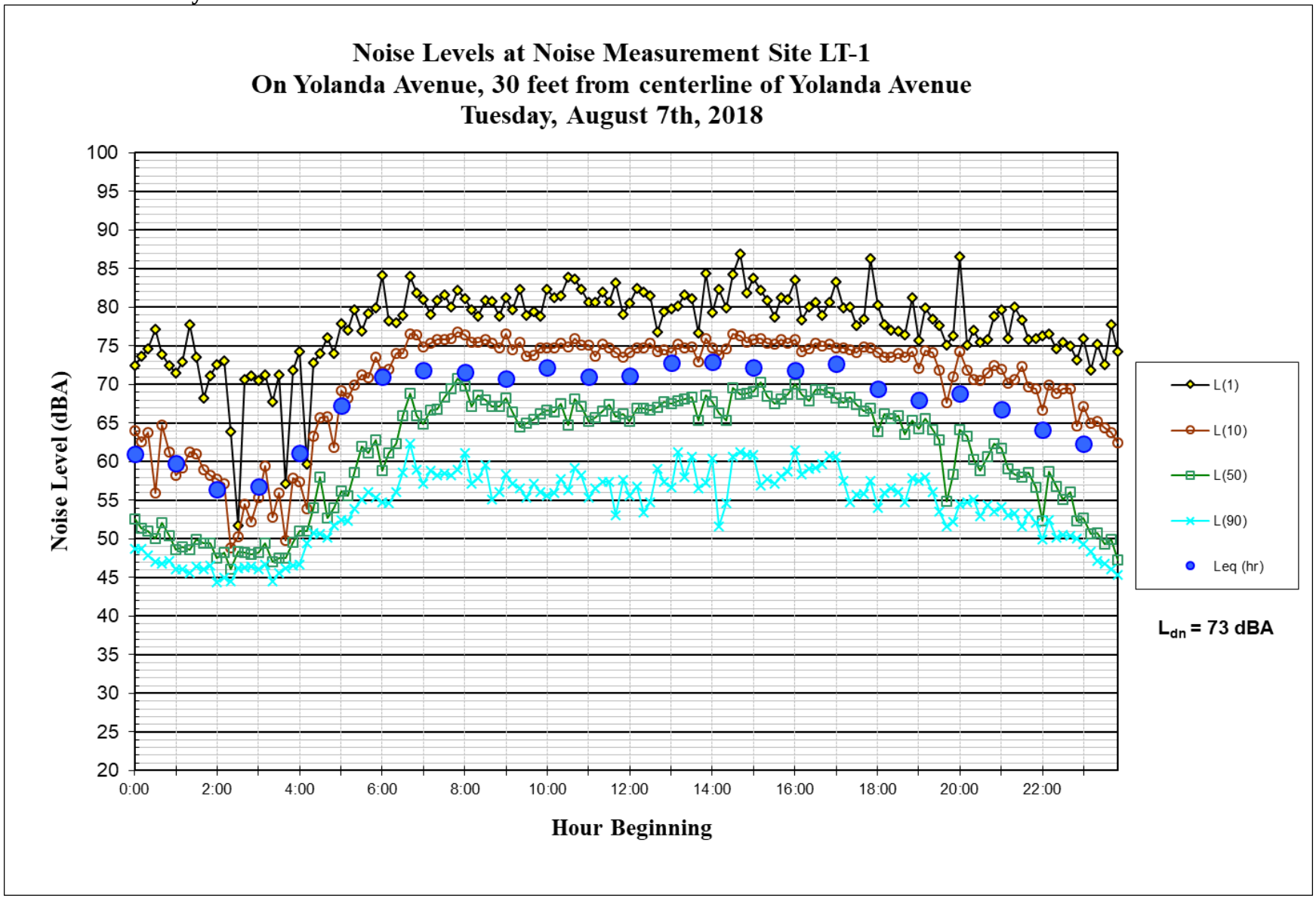
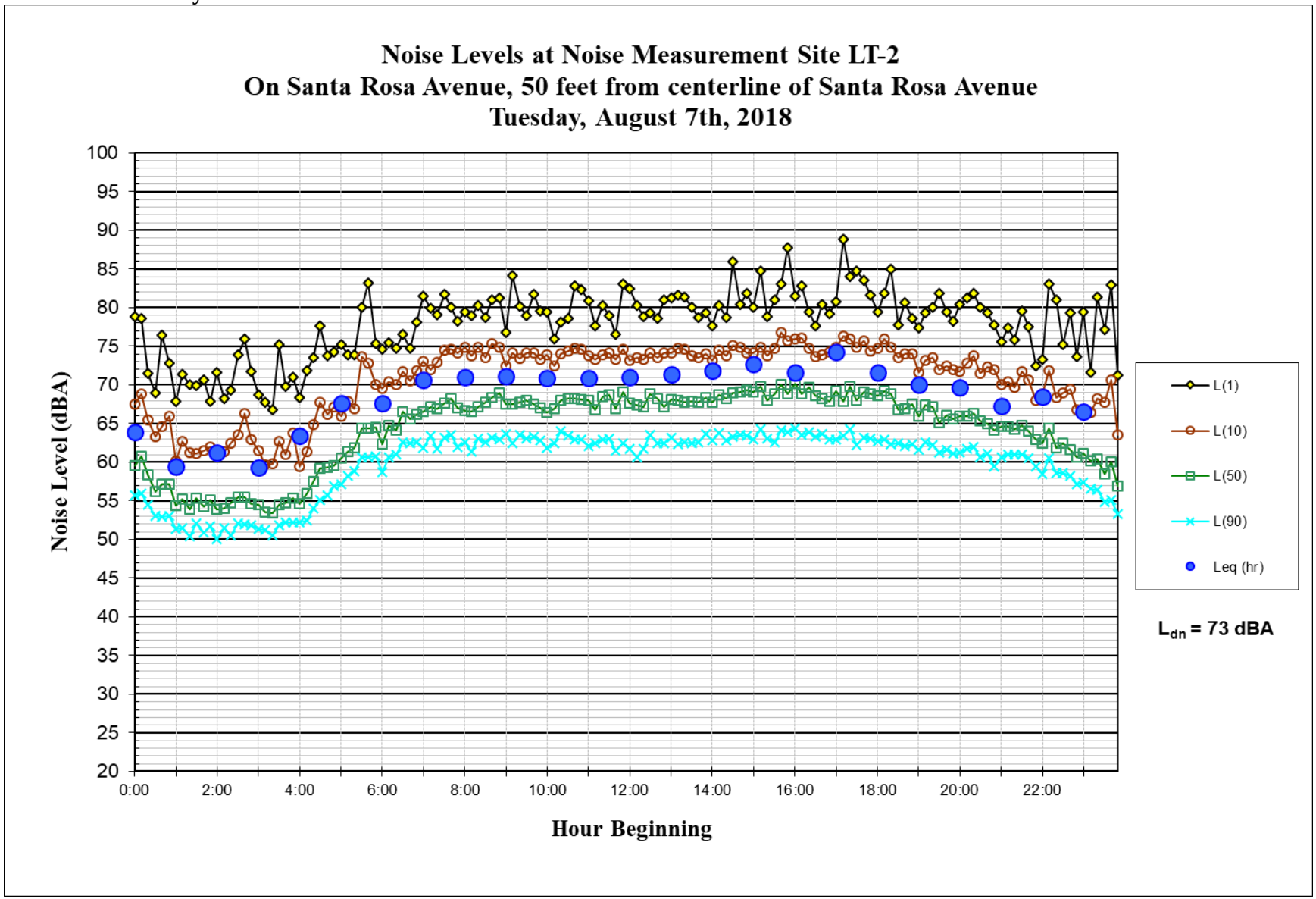


FIGURE 3 Daily Trend in Noise Levels at LT-2



GENERAL PLAN CONSISTENCY ANALYSIS

The impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration are not considered under CEQA. This section addresses Noise and Land Use Compatibility for consistency with the policies set forth in the City's General Plan.

Noise and Land Use Compatibility

The Noise and Safety Element of City of Santa Rosa's General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of Santa Rosa. The applicable General Plan policies were presented in detail in the Regulatory Background section and are summarized below for the proposed project:

- The City's acceptable exterior noise level objective is 65 dBA L_{dn} or less for multi-family residential uses

- The City's acceptable exterior noise level objective is 70 dBA L_{dn} for the proposed restaurant or commercial uses.

- The City's standard for interior noise levels in residences is 45 dBA L_{dn}.

- 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 non-residential uses during any hour of operation.

Future Exterior Noise Environment

The primary sources at the project site will continue to be vehicular traffic on Yolanda Avenue and Santa Rosa Avenue. Based on traffic volumes provided in the Traffic Impact Study[1], future traffic noise levels along Santa Rosa Avenue and Yolanda Avenue are anticipated to increase by 1 dBA and 3 dBA over existing levels, respectively, resulting from a combination of project traffic and increases in traffic over time not attributable to the project. Future traffic noise levels at the site were calculated based on the results of the noise monitoring survey, taking into account the traffic noise increases anticipated under future conditions.

The residential component of the project fronts Yolanda Avenue and is setback approximately 400 feet from the center of Santa Rosa Avenue. Common outdoor use areas would include a pool, a playground and seating area, a dog run area, and a bocce court. All of these outdoor use areas would be setback and well shielded from the surrounding roadways and would have noise exposures below 50 dBA L_{dn}. Noise levels would be below the City of Santa Rosa's acceptable noise limit of 65 dBA L_{dn} for exterior spaces in multi-family residential areas. All apartment units will also have private balconies. Balconies fronting Yolanda Avenue, located approximately 75 feet from the center of the roadway, would be exposed to future traffic noise

[1] Draft Report, Traffic Impact Study for the Yolanda Mixed-Use Project; W-Trans, October 30, 2018.

levels of approximately 71 dBA L_{dn}. These noise levels would be considered "normally unacceptable" by the City of Santa Rosa; however, all occupants would have access to the common outdoor use areas as described above. Balconies proposed throughout the remainder of the site would be exposed to exterior noise levels of 60 dBA L_{dn} or less and would be anticipated to meet the City's acceptable noise limit of 65 dBA L_{dn}.

The outdoor seating area associated with the In-N-Out restaurant would be located about 250 feet from the center of Santa Rosa Avenue. At this distance, exterior noise levels are calculated to be approximately 63 dBA L_{dn}. This noise level would be below the City of Santa Rosa's acceptable noise limit of 70 dBA L_{dn} for restaurant uses.

Future Interior Noise Environment

The exterior noise level exposures of building façades are summarized in Table 5. As summarized in Table 5, exterior noise levels would be 71 dBA L_{dn} at south facing residential façades fronting Yolanda Avenue, 67 dBA L_{dn} at east and west facing façades of residences fronting Yolanda Avenue, 61 dBA L_{dn} at west facing residential façades closest to Santa Rosa Avenue, and 60 dBA L_{dn} or less at residential façades throughout the remainder of the site. The In-N-Out restaurant would be exposed to an exterior hourly equivalent noise level of 67 dBA L_{eq}.

Interior noise levels would vary depending upon the design of the buildings (relative window area to wall area) and the selected construction materials and methods. Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA L_{dn}, the inclusion of adequate forced-air mechanical ventilation can reduce interior noise levels to acceptable levels by allowing occupants the option of closing the windows to control noise. Where noise levels exceed 65 dBA L_{dn}, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound-rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

TABLE 5 Calculated Exterior Noise Levels at Building Façades

Façade	**Building #**	**Calculated Noise Levels (dBA)**		**Recommended Sound Rated Construction[2] for 45 dBA L_{dn} threshold**
		Exterior	Interior with Windows Open	
South	1, 13, 14, 15	71 L_{dn}	56 L_{dn}	STC 28 and Forced-air[1]
East/West	1, 13, 14, 15	67 L_{dn}	52 L_{dn}	STC 26 and Forced-air[1]
West	2, 4	61 L_{dn}	46 L_{dn}	Forced-air[1]
West	In-N-Out	67 L_{eq}	52 L_{eq}	Forced-air[1]

[1] Assumes forced-air mechanical ventilation is provided to allow occupants the option of keeping windows closed to control noise.
[2] Analysis assumes window area to be 40% of the façade area or less and wall with STC 39 rating or greater.

The minimum STC[2] ratings required to achieve the 45 dBA L_{dn} and 50 dBA L_{eq} thresholds are also summarized in Table 5. The analysis assumes that the façade area is made up of 40% windows or less. Where STC rated windows are recommended, windows are assumed to be in the closed position, requiring forced-air ventilation to allow occupants the option of keeping windows closed.

Based on preliminary calculations, residential units fronting Yolanda Avenue (Buildings 1, 13, 14, and 15) and easternmost units (Buildings 2 and 4) would achieve the 45 dBA L_{dn} interior standard with the inclusion of forced-air mechanical ventilation and windows and doors with STC ratings of 26 to 28. Standard construction with the inclusion of forced-air mechanical ventilation would be sufficient for the In-N-Out restaurant to comply with the Cal Green Code standard of 50 dBA $L_{eq\ (1\text{-}hr)}$.

Recommended Conditions of Approval

For consistency with the General Plan, the following Conditions of Approval are recommended for consideration by the City:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential buildings, so that windows can be kept closed to control noise.

- Provide sound rated windows to Buildings 1, 14, and 15 to maintain interior noise levels at acceptable levels. Preliminary calculations show that sound-rated windows with minimum STC Ratings of 26 to 28 would be satisfactory for units to achieve acceptable interior noise levels. The specific determination of what noise insulation treatments are necessary shall be conducted on a room-by-room basis during final design of the project.

[2] **Sound Transmission Class (STC)** A single figure rating designed to give an estimate of the sound insulation properties of a partition. Numerically, STC represents the number of decibels of speech sound reduction from one side of the partition to the other. The STC is intended for use when speech and office noise constitute the principal noise problem.

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 provide a compatible project in relation to adjacent noise sources and land uses.

Significance Criteria

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

1. **Temporary or Permanent Noise Increases in Excess of Established Standards:** A significant impact would be identified in the following cases:

    a. Operational Noise in Excess of Standards. A significant noise impact would be identified if the project operations would generate noise levels that would exceed applicable noise standards presented in the Santa Rosa General Plan or Municipal Code.

    b. Permanent Noise Increase. A significant permanent noise increase would occur if project traffic resulted in an increase of 3 dBA L_{dn} or greater at noise-sensitive land uses where existing or projected noise levels would equal or exceed the noise level considered satisfactory for the affected land use (60 dBA L_{dn} for single-family residential areas) and/or an increase of 5 dBA L_{dn} or greater at noise-sensitive land uses where noise levels would continue to be below those considered satisfactory for the affected land use.

    c. Temporary Noise Increase. A significant temporary noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA L_{eq} at the property lines shared with residential land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase at adjacent residential land uses. Hourly average noise levels exceeding 70 dBA L_{eq} at the property lines shared with residential land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase at adjacent commercial land uses.

2. **Generation of Excessive Groundborne Vibration:** A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to buildings.

Impact 1: **Temporary or Permanent Noise Increases in Excess of Established Standards.** The project would not result in a substantial permanent traffic noise level increase at existing noise-sensitive land uses in the project vicinity. However, on-site operational noise could exceed City limits and existing noise-sensitive land uses would be exposed to construction noise levels in excess of the temporary noise increase significance thresholds for a period of more than one year. **This is a potentially significant impact.**

a) Permanent Noise from On-Site Operational Noise

Noise generating on-site operational components of the project would include mechanical equipment, restaurant drive thru activities, parking lot activities, and outdoor restaurant patio activities. The City of Santa Rosa Municipal Code Section 17-16.030 defines an ambient base noise levels of 55 dBA L_{eq} from 7:00 a.m. to 7:00 p.m., 50 dBA L_{eq} from 7:00 p.m. to 10:00 p.m., and 45 dBA L_{eq} from 10:00 p.m. to 7:00 a.m. for single-family residential areas. Commercial ambient base noise levels are 10 dBA higher. Mechanical equipment noise is limited to not exceed the ambient base noise level by more than 5 dBA. Sound-amplifying equipment (drive-thru speaker) is limited to not exceed the ambient base noise level by more than 15 dBA. This analysis assesses all operational components of the project against the most conservative nighttime residential threshold of 50 dBA L_{eq} (5 dBA above the ambient base noise level of 45 dBA).

Mechanical Equipment

The proposed project would include mechanical equipment such as heating, ventilation, and air conditioning systems (HVAC). Detailed information on the location and specific equipment to be used were not available at the time of analysis. Typical residential HVAC units are anticipated to generate noise levels of 50 to 60 dBA at 50 feet from the equipment, depending on the equipment selected. Shielding from equipment enclosures and surrounding structures would provide 10 to 15 dBA of reduction.

Existing residences adjoin the project site to the north, as close as about 10 feet from the closest proposed project buildings. Assuming a worst-case scenario with unshielded HVAC equipment placed outdoors at ground level adjacent to the proposed buildings, mechanical equipment noise associated with Buildings 6 and 9 could reach noise levels as high as 60 to 70 dBA L_{eq} at residences to the north and would exceed the 50 dBA L_{eq} limit. Mechanical equipment located 150 feet or further from residences or in shielded areas would be anticipated to meet the 50 dBA L_{eq} limit. Noise generated by mechanical equipment at nearby commercial uses would be anticipated to meet the nighttime commercial threshold of 60 dBA L_{eq}. This is a **potentially significant impact**.

Inclusion of **Mitigation Measure 1** would reduce this impact to less-than-significant level.

Drive Thru Operations

Project specific hours of operation were not provided. Most In-N-Out restaurants in the Bay Area are open from 10:30 a.m. to 1:00 a.m. Sunday through Thursday and from 10:30 a.m. to 1:30 a.m. on Friday and Saturday. The drive-through is proposed on the western portion of the

project site, adjacent to Santa Rosa Avenue. The major noise sources attributed to the drive-through would include amplified speech emanating from the speaker, idling cars, cars circulating along the drive-through aisle, and less frequently, engines starting.

Based on the measurements conducted by our firm at an existing In-N-Out Burger in San Jose, the drive-through speaker and patron voices would result in maximum sound levels ranging from 39 to 46 dBA L_{max} at the nearest residential property line (approximately 280 feet from the drive-through speaker). Idling vehicles typically produce noise levels of between 52 to 54 dBA L_{max} at 30 feet from the source. Considering the attenuation received from the increased distance from the drive-through lane, the noise level produced by vehicles idling while in the drive-through lane would result in maximum noise levels of between 36 and 38 dBA at the nearest residences.

Maximum noise generated by restaurant activities would be audible at the nearest residences during periods with low ambient traffic noise or during occasional loud activities such as circulating vehicles with loud stereos or engines. Maximum noise levels resulting from the drive-through would fall below the City of Santa Rosa's regulatory criteria and would be lower than noise levels generated by traffic on Yolanda Avenue and Santa Rosa Avenue. This is a **less-than-significant** impact.

Parking Lot

A surface parking lot is proposed to the south of the restaurant. Parking is also provided to residences throughout the site. Access to the restaurant parking lot would be provided to the from Santa Rosa Avenue and to the residential portion of the project from Yolanda Avenue. Noise sources associated with the use of the parking lot would include vehicular circulation, louder engines, car alarms, squealing tires, door slams, and human voices. The typical sound of a passing car at 15 mph would be about 50 to 60 dBA L_{max} at a distance of 50 feet. The noise of an engine start is similar. Door slams typically produce noise levels lower than engine starts. The hourly average noise level resulting from all these noise-generating activities in a small parking lot would reach 40 dBA L_{eq} at a distance of 50 feet from the parking area.

The nearest residential land uses are located 120 feet east of the restaurant parking lot. These residences would experience hourly average noise levels of 32 dBA L_{eq} from parking activities. Maximum noise levels would range from about 42 to 52 dBA L_{max}. Parking lot activity noise would not exceed the City's nighttime 50 dBA L_{eq} limit at residences. This is a **less-than-significant** impact.

Outdoor Restaurant Patio

Outdoor patio seating will be provided south of the restaurant building. The primary noise source attributed to outdoor patio seating is the sound of voices while people are eating. Normal conversation typical generates noise levels of 60 to 65 dBA at a distance of 3 feet. At the nearest residences, located about 120 feet from the proposed patio seating area, noise from restaurant patron conversations would be 28 to 33 dBA and would not generally be distinguishable from ambient. This is a **less-than-significant** impact.

b) Permanent Noise Increases from Project Traffic

A significant permanent noise increase would occur if traffic or activities generated by the project would substantially increase noise levels at sensitive receptors in the project vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA L_{dn} or greater, with a future noise level of less than 60 dBA L_{dn}, or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater.

Traffic data provided by the project's traffic study[1] was reviewed to calculate potential traffic noise level increases attributable to the project expected along roadways serving the site. Roadways evaluated in the analysis included Yolanda Avenue, Santa Rosa Avenue, Hearn Avenue, and Petaluma Hill Road. Based on a comparison between traffic volumes under the existing plus project (Baseline) scenario and existing conditions, the traffic noise increase on the surrounding roadways attributable to the project would be 0 to 1 dBA L_{eq}. Day-night average (L_{dn}) noise level increases would be anticipated to be similar. This increase would not typically be noticeable and would be below the 3 dBA and 5 dBA L_{dn} thresholds of significance. This is a **less-than-significant** impact.

c) Temporary Noise Increases from Project Construction

Neither the City of Santa Rosa nor the State of California specify quantitative thresholds for the impact of temporary increases in noise due to construction. The threshold for speech interference indoors is 45 dBA (see Setting Section, Effects of Noise). Assuming a 15 dB exterior-to-interior reduction for standard residential construction with windows open and a 25 dB exterior-to-interior reduction for standard commercial construction, assuming windows closed, this would correlate to an exterior threshold of 60 dBA L_{eq} at residential land uses and 70 dBA L_{eq} at commercial land uses. Therefore, the project would be considered to generate a significant temporary construction noise impact if project construction activities exceeded 60 dBA L_{eq} at nearby residences or exceeded 70 dBA L_{eq} at nearby commercial land uses and exceeded the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year.

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 (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Project construction is anticipated to occur over a period of 18 months and would include demolition of existing structures and pavement, site preparation, grading and excavation, trenching, building erection, and paving. The hauling of excavated materials and construction materials would generate truck trips on local roadways as well. Pile driving is not anticipated in any phase of construction of the project.

Construction activities would be carried out in stages. Construction of apartment buildings would occur first, while construction of the In-N-Out restaurant would begin after a few months. The

entire project site would be graded in one single grading and excavation phase. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 6 and 7. Table 6 shows the average noise level ranges, by construction phase and Table 7 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise falls with the range of 80 to 90 dBA at a distance of 50 feet from the source. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain can provide an additional 5 to 10 dBA noise reduction at distant receptors.

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

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

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

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

TABLE 7 Construction Equipment 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)1,2	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:

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

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

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

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

Table 8 shows the anticipated project specific construction noise levels calculated using the Federal Highway Administration (FHWA) software - Roadway Construction Noise Model (RCNM). At 50 feet from the noise source, maximum instantaneous noise levels generated by project construction equipment are calculated to range from 78 to 90 dBA L_{max} and hourly average noise levels are calculated to range from 74 to 85 dBA L_{eq}.

TABLE 8 Calculated Construction Noise Levels for Each Phase of Construction

Construction Phase	At Distance of 50 ft.	
	L_{eq}, dBA	**L_{max}, dBA**
Demolition (20 days)	85	90
Site Preparation (10 days)	83	85
Grading/Excavation (30 days)	84	85
Trenching (10 days)	78	81
Building-Exterior (300 days)	78	81
Building-Interior (20 days)	74	78
Paving (20 days)	80	80

The closest noise sensitive uses are residences located 25 feet north of the project boundary on Squire Lane and residences on Yolanda Avenue 75 feet from the southern project boundary. During the demolition phase, a concrete saw would be used to demolish the existing on-site warehouse. The closest residences are 200 feet or greater from the warehouse and would be exposed to typical hourly average noise levels of 73 dBA L_{eq} with occasional maximum noise levels of up to 78 dBA L_{max}. Residences to the north of project site would be exposed to a maximum noise level of 91 dBA L_{max} and hourly average level of 90 dBA L_{eq} during site preparation and grading. Residences to the north and south would be exposed to maximum noise levels of 75 to 82 dBA L_{max} and typical hourly average noise levels of 71 to 80 dBA L_{eq} during all other phases of construction located adjacent to shared property lines. Noise levels would be lower as construction moved away from shared property lines or into shielded areas. Construction noise could exceed 60 dBA L_{eq} at residences and 70 dBA L_{eq} at commercial areas and the ambient noise environment by 5 dBA L_{eq}, for a period greater than one year. This is a **potentially significant** temporary impact.

Implementation of **Mitigation Measure 1** would reduce this impact to less-than-significant level.

Mitigation Measure 1: The following mitigation measures would reduce this impact to a less-than-significant level.

a) Permanent Noise from On-Site Operational Noise

Prior to the issuance of building permits, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's requirements. A qualified acoustical consultant shall be retained by the project applicant to review mechanical noise as the equipment systems are selected in order to determine specific noise reduction measures necessary to reduce noise to comply with the City's 50 dBA L_{eq} residential noise limit at the shared property lines. Noise reduction measures could include, but are not limited to, selection of equipment that emits

low noise levels and/or installation of noise barriers such as enclosures and parapet walls to block the line of sight between the noise source and the nearest receptors.

b) Permanent Noise Increases from Project Traffic

None needed.

c) Temporary Noise Increases from Project Construction

Implementation of the following measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance.

- Construction activities shall be limited to allowable construction hours (typically 7:00 am to 7:00 pm on weekdays). No construction activities are permitted on Sundays and holidays.

- Limit use of the concrete saw to a distance of 50 feet or greater from residences, where feasible. Construct temporary noise barriers to screen stationary noise-generating equipment, such as the concrete saw, when located near adjoining sensitive land uses. Temporary noise barriers could reduce construction noise levels by 5 dBA.

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

- Unnecessary idling of internal combustion engines should be strictly prohibited.

- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.

- Designate a "disturbance coordinator" who would be 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. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

Impact 2: **Generation of Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels would not exceed 0.3 in/sec PPV at the nearest structures. **This is a less-than-significant impact.**

City of Santa Rosa's General Plan does not specify a construction vibration limit. Based on the thresholds provided by Caltrans (see Table 3), a construction vibration limit of 0.3 in/sec PPV would minimize damage at buildings of normal conventional construction. A significant impact would occur if buildings adjacent to the proposed construction site were exposed to vibration levels in excess of 0.3 in/sec PPV.

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site demolition work, preparation work, excavation of below-grade levels, foundation work, and new building framing and finishing.

Table 9 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Construction activities, such as use of saws, excavators, scrapers and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

TABLE 9 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)
Clam shovel drop		0.202
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller		0.210
Hoe Ram		0.089
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, September 2018.

The nearest existing structures are residences located 25 feet north of the project construction. Pile driving is not anticipated for this project. At a distance of 25 feet vibration levels from construction are anticipated to be 0.21 in/sec PPV or less. Vibration levels may be perceptible to occupants but would be below the 0.3 in/sec PPV vibration limit. Construction vibration would not be anticipated to cause architectural or structural damage to the nearest buildings and would not be considered excessive. As construction moves away from the shared property lines, vibration levels would be even lower. This is a **less-than-significant** impact.

Mitigation Measure 2: None required.