SRM SAN JOSE ASSISTED LIVING ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The San José Senior Living project would demolish the existing, approximately 47,124 square foot (sf) single-story, multi-tenant office building and surface parking lot located at 3315 Almaden Expressway and construct a four-story (up to 53 feet tall), approximately 195,840-sf senior living facility. The facility would offer housing for seniors who are independent, require help with day-to-day activities or memory care assistance, but do not require intensive medical or nursing care.

The proposed facility would have a total of 195 units, 166 of which would be senior living units and the remaining 29 units for memory care. It is anticipated that the units would have capacity for 230 adult residents. The building would have approximately 17,465 square feet of indoor amenity space including a living area, dining area, bistro, theater, activity room, fitness center, and salon. The proposed building would be situated around over 8,800 sf of outdoor common amenity space, which would include courtyards, garden areas, seating areas, dining areas, barbeque areas, and landscaping.

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

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 DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL 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 DNL with open windows and 65-70 dBA DNL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first

row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL 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 DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL 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 DNL of 60-70 dBA. Between a DNL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL 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 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	Virtually no risk of damage to normal 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 dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

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

Regulatory Background - Noise

The State of California, Santa Clara County, and the City of San José have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, California Building Code, Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan, and the City of San José General Plan are used to assess the potential significance of impacts. 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; or

(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.

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the DNL noise level resulting from the project at noise-sensitive land uses of 3 dBA or greater would be considered a significant impact when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dBA DNL or greater would be considered a significant impact when projected noise levels would remain within those considered acceptable for the affected land use.

2019 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan adopted by the Santa Clara County Airport Land Use Commission contains standards for projects within the vicinity of San José International Airport, which are relevant to this project:

4.3.2.1 Noise Compatibility Policies

Policy N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (2022 Aircraft Noise Contours).

Policy N-4 No residential or transient lodging construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL, and there are no outdoor patios or outdoor activity areas associated with the residential portion of a mixed-use residential project or a multi-unit residential project. (Sound wall noise mitigation measures are not effective in reducing noise generated by aircraft flying overhead.)

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 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 San José. The following policies are applicable to the proposed project:

EC-1.1 Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state, and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

- The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to

demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

- The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1). The acceptable exterior noise level objective is established for the City, except in the environs of the San José International Airport and the Downtown, as described below:

    - For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding by buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation techniques to achieve the 60 dBA DNL standard for noise from sources other than aircraft and elevated roadway segments.

Table EC-1: Land Use Compatibility Guidelines for Community Noise in San José

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 55 60 65 70 75 80
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]	
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	
3. Schools, Libraries, Museums, Meeting Halls, Churches	
4. Office Buildings, Business Commercial, and Professional Offices	
5. Sports Arena, Outdoor Spectator Sports	
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters	

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

Normally Acceptable:

- Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable:

- 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.

EC-1.2 Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable;" or

- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

EC-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

- Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

EC-1.11 Require safe and compatible land uses within the Mineta San José International Airport noise zone (defined by the 65 CNEL contour as set forth in State law) and encourage aircraft operating procedures that minimize noise.

Regulatory Background – Vibration

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies to achieve the goal of minimizing vibration impacts on people, residences, and business operations in the City of San José. The following policies are applicable to the proposed project:

EC-2.3 Require new development to minimize continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A

continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

Existing Noise Environment

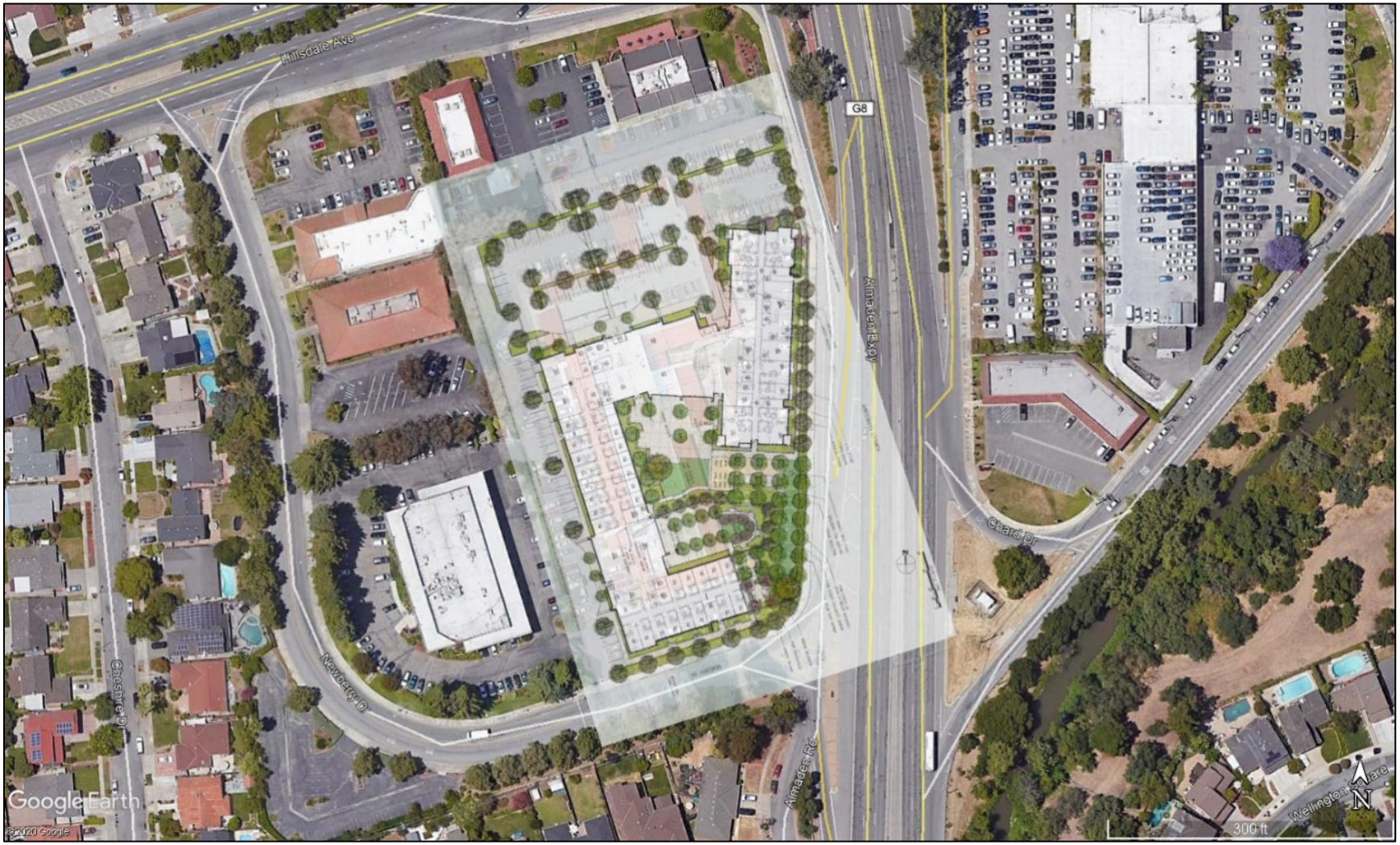
The project site is located at 3315 Almaden Expressway in San José, California. Figure 1 shows the project site plan overlaid on an aerial image of the site vicinity. The project site is bordered by office and commercial land uses to the west and north. Almaden Expressway and commercial land uses border the site to the east, and Newberry Drive and residential land uses border the site to the south. Other noise-sensitive land uses in the project vicinity include single-family residences along Cheshire Drive to the west and single-family residences along Wellington Square to the southeast.

Due to Shelter-in-Place restrictions implemented by the State of California[1] at the time of this study, traffic volumes along the surrounding roadways were substantially lower and not representative of typical conditions. A noise monitoring survey was not completed to document ambient noise levels during this time period because resultant noise levels would not be representative of typical conditions.

In order to establish the environmental baseline for the project, noise data contained in the City of San José General Plan and noise measurements from a prior project were reviewed. A review of these data indicates that the noise environment in the project vicinity is primarily the result of vehicular traffic along Almaden Expressway. The General Plan noise contour information show that noise levels at the project site typically range from 70 to 75 dBA DNL, as shown in Figure 2. These data were confirmed through a review of noise data collected at a similar site along Almaden Expressway in 2016.[2] Noise measurements made by Illingworth & Rodkin, Inc. revealed that, at a distance of 90 feet east of the Almaden Expressway centerline, hourly average noise levels typically ranged from 67 to 75 dBA L_{eq} during the day and from 57 to 71 dBA L_{eq} at night. The day-night average noise level from Thursday, April 28, 2016 through Tuesday, May 3, 2016 ranged from 72 to 74 dBA DNL.

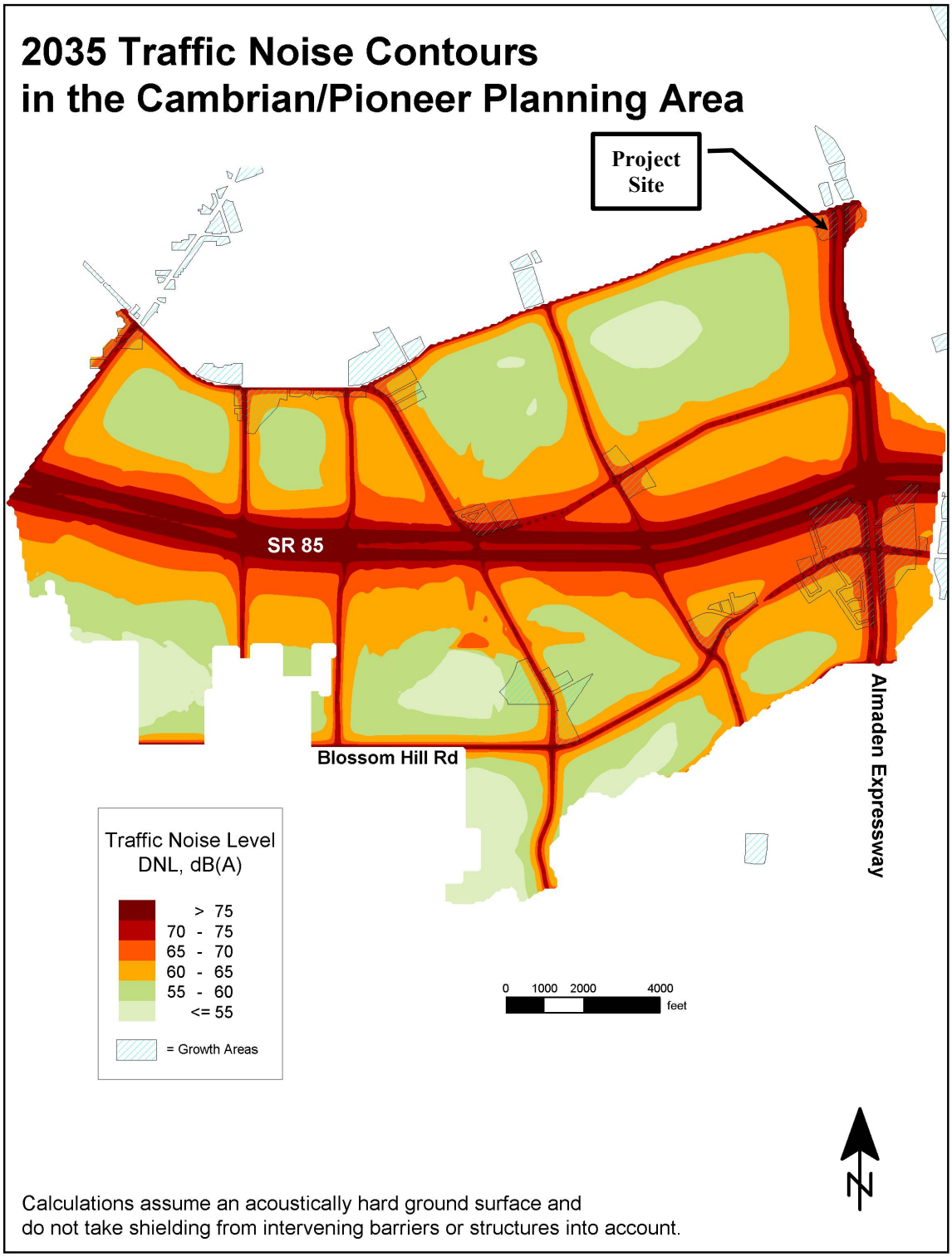
[1] Cal. Exec. Order No. N-33-20, (Mar. 19, 2020).
[2] Illingworth & Rodkin, Inc., "Holden Assisted Living Facility Project Noise and Vibration Assessment," June 2016.

FIGURE 1 Aerial Image Showing Site Plan



Source: Google Earth 2020.

FIGURE 2 Project Site in Relation to 2035 Noise Contours



Source: Illingworth & Rodkin, Inc., "Envision San Jose 2040 General Plan Comprehensive Update Environmental Noise Assessment," December 2010.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The Environmental Leadership Chapter in the Envision San José 2040 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 San José. 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 60 dBA DNL or less for the proposed residential uses (Table EC-1).

- The City's standard for interior noise levels in residences is 45 dBA DNL.

The future noise environment at the project site would continue to result primarily from vehicular traffic along Almaden Expressway and the surrounding local roads. The traffic study completed for the proposed project included peak hour trips generated by the proposed project. During both peak AM and PM hours, the net trips generated by the proposed project would be less than the existing land use located at the site. Therefore, the project would not contribute to a noise level along the surrounding roadways. To estimate future traffic noise levels, a review of the traffic volumes contained in the *Draft Program EIR for the Envision San José 2040 General Plan,*[3] was made. Traffic noise levels along Almaden Expressway are expected to increase by 1 dBA by the year 2035. Therefore, future noise levels would be 75 dBA DNL at a distance of 90 feet from the centerline of Almaden Expressway.

Future Exterior Noise Environment

The site plan shows a large courtyard surrounded by the building to the north, to the south, and to the west. The northern section of the courtyard includes an outdoor barbeque, seating area, and bocce ball court on synthetic turf. The southern section of the courtyard includes a seating area and memory lane feature for memory care. This southern section is surrounded by an eight-foot screen fence, which attaches to the building at both ends. Along the eastern edge of the courtyard area is a bocce ball court with DG paving, a vegetable garden, and an orchard tree plaza. A six-foot perimeter fence runs along the eastern and southern boundary of the outdoor use area, attaching to the building at both ends. Both of the proposed fences would have a three-inch gap between the ground and the bottom of the fence. Aside from this gap, the fences are assumed to be solid from the bottom edge to the top edge.

To assess the effectiveness of the proposed fences to reduce future noise levels at the courtyard, the Federal Highway Administration's (FHWA) Traffic Noise Model, version 2.5, (TNM) was used to model the outdoor use area. Traffic volumes along Almaden Expressway were included in the model, as well as the proposed building, and topographic information for the project site and

[3] City of San José, *Draft Program Environmental Impact Report for the Envision San José 2040 General Plan*, State Clearinghouse Number 2009072096, File Number: PP09-011, June 2011.

surrounding area. A vehicle distribution along Almaden Expressway of 96% autos, 2% medium trucks, and 2% heavy trucks were used, along with posted speed limits.

With the eight-foot screen fence around the memory care courtyard and the six-foot perimeter fence, the future exterior noise levels at the northern and southern sections of the courtyard would be below 60 dBA DNL. The bocce ball court, vegetable garden, and orchard plaza along the eastern boundary of the courtyard would be exposed to future exterior noise levels of 66 dBA DNL with the proposed fences.

While the proposed fences with three-inch gaps at the base of the barriers would be adequate for reducing the majority of courtyard to below 60 dBA DNL, the outdoor uses along the eastern boundary would exceed 60 dBA DNL by 6 dBA with the proposed fences. This would fall within the City's "conditionally acceptable" threshold range. The City could permit these exterior noise levels under a conditional approval. Several barrier heights were modeled in TNM, and the noise level results at the bocce ball, vegetable garden, and orchard plaza are shown in Table 4 for each modeled barrier height.

TABLE 4 Summary of TNM Results Along the Eastern Boundary of the Courtyard

Receptor	TNM Noise Level Results for Various Perimeter Fence Heights			
	6-foot Fence	8-foot Fence	10-foot Fence	12-foot Fence
Eastern Boundary of Courtyard	66 dBA DNL	63 dBA DNL	61 dBA DNL	60 dBA DNL

According to the TNM results summarized in Table 4, a 12-foot barrier would be required along the eastern perimeter of the project site to meet the City's 60 dBA DNL threshold at the outdoor uses located along the eastern boundary of the courtyard.

Future Interior Noise Environment

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 DNL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA DNL, 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.

The site plan shows residential units located on each floor and along each building façade. The units along the eastern building façade with direct line-of-sight to Almaden Expressway would be set back from the centerline of the roadway by 115 to 175 feet. The ground-level units along this façade would have partial shielding from the proposed six-foot perimeter fence. The ground-level units would be exposed to future exterior noise levels ranging from 64 to 66 dBA DNL, assuming

the height of the perimeter fence to be six feet. The units on floors 2 through 4 would be exposed to future exterior noise levels ranging from 71 to 74 dBA DNL, which would not include partial shielding from the six-foot perimeter fence. Future interior noise levels would be up to 51 dBA DNL at ground-level units and up to 59 dBA DNL at units on the upper floors, assuming windows to be partially open.

Units along the northern and southern façades would have some direct exposure to Almaden Expressway, with partial shielding provided from the proposed building. For units along the northern façade with direct-line-of-sight to Almaden Expressway, setbacks from the centerline would range from 115 to 170 feet, while setbacks along the southern façade would range from 150 to 280 feet. At these setbacks, the units along the northern façade with direct line-of-sight to Almaden Expressway would be exposed to future exterior noise levels ranging from 68 to 74 dBA DNL. Units along the southern façade would be exposed to future exterior noise levels ranging from 63 to 74 dBA DNL. Future interior noise levels would be up to 59 dBA DNL at units along the northern and southern façades, assuming windows to be partially open.

The remaining units along the northern façade, which are shielded from Almaden Expressway by the proposed building, and the units along the western façade would have some exposure to Hillsdale Avenue and other local roadways; however, setbacks from Hillsdale Avenue would be 345 feet or more, and the units exposed to traffic noise along Newberry Drive would be partially shielded by existing surrounding buildings. These units along the northern and western façades would be exposed to future exterior noise levels ranging from below 60 to 63 dBA DNL. Future interior noise levels would range from below 45 to 48 dBA DNL, assuming windows to be partially open.

Units located around the courtyard would be partially shielded by the proposed building. These units would be exposed to future exterior noise levels ranging from below 60 to 69 dBA DNL. Future interior noise levels would range from below 45 to 54 dBA DNL, assuming windows to be partially open.

The future interior noise levels would exceed the 45 dBA DNL threshold and would require noise insulation features.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA DNL or less:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units on the project site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.

- Preliminary calculations indicate that residential units nearest to Almaden Expressway along the eastern façade would require windows and doors with a minimum rating of 31

STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

- Residential units located along the northern façade, southern façade, and surrounding the courtyard with direct line-of-sight to Almaden Expressway would require windows and doors with minimum STC ratings of 28 to 31 with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the design phase pursuant to requirements set forth in the State Building Code. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce residential interior noise levels to 45 dBA DNL or lower. Treatments would include, but are not limited to, sound-rated windows and doors, sound-rated wall constructions, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA DNL or less.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

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

- **Temporary or Permanent Noise Increases in Excess of Established Standards.** A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan at existing noise-sensitive receptors surrounding the project site.

    - Temporary Noise Increase. A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. The City of San José considers large or complex projects involving substantial noise-generating activities and lasting more than 12 months significant when within 500 feet of residential land uses or within 200 feet of commercial land uses or offices.

    - Permanent Noise Increase. A significant permanent noise level increase would occur if project-generated traffic would result in: a) a noise level increase of 5 dBA

DNL or greater, with a future noise level of less than 60 dBA DNL, or b) a noise level increase of 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

- Operational Noise in Excess of Standards. A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan.

- **Generation of Excessive Groundborne Vibration.** A significant impact would be identified if the construction of the project would generate excessive vibration levels at surrounding receptors. For sensitive historic structures, including ruins and ancient monuments or buildings that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

- **Excessive Aircraft Noise.** A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a substantial temporary increase in ambient noise levels due to project construction activities. **This is a significant impact.**

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.

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

Construction is expected to begin in August 2021 and end by April 2023. Construction hours would be 7:00 a.m. to 5:00 p.m. Monday through Friday. Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The construction of the proposed project would involve grading, excavation to lay

foundations, trenching, building erection, and paving. The hauling of imported and exported soil and materials would generate truck trips on local roadways as well.

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 50 feet are shown in Tables 5 and 6. Table 5 shows the average noise level ranges, by construction phase, and Table 6 shows the maximum noise level ranges for different construction equipment. Most construction noise falls within the range of 80 to 90 dBA at 50 feet from the source.

The U.S. Department of Transportation, Federal Highway Administration's, Roadway Construction Noise Model (RCNM v. 1.1) was used to model construction noise levels produced by construction equipment operating at the project site. The inputs to the model were based on estimates for the number and type of equipment anticipated by the applicant. The typical hourly average construction-generated noise levels were calculated considering the distance from the center of the construction site to the nearest receptors, assuming that all equipment per phase would be operating simultaneously.

Based on the RCNM output, hourly average noise levels due to activities during busy construction periods would range from about 81 to 86 dBA L_{eq} at 50 feet. The nearest commercial land uses are located 85 feet northwest, 115 feet northeast, and 130 feet southeast and west of the center of the site, respectively. At the nearest commercial receptor 85 feet southwest, noise levels produced by construction activities at the site would range from 63 to 79 dBA L_{eq}. At distances of 115 to 130 feet, construction noise levels would be 7 to 8 dBA less than the levels referenced at 50 feet. Construction noise levels would exceed 70 dBA L_{eq} at unshielded commercial receptors within 250 feet of the center of the site. The nearest residential land use is located approximately 150 feet west of the center of the project site. Construction noise levels at the residential property boundary would range from 58 to 74 dBA L_{eq} at 150 feet.

Ambient noise levels at the surrounding land uses would be substantially increased during various times throughout the duration of construction, which is estimated to be approximately 21 months. Per Policy EC-1.7 of the City's General Plan, the temporary construction impact would be significant because the project would involve substantial noise-generating activities continuing for more than 12 months.

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

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

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

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

TABLE 6 Construction Equipment 50-foot Noise Emission Limits

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

Mitigation Measure 1a:

The potential short-term noise impacts associated with construction of the project would be mitigated by the implementation of General Plan Policy EC-1.7. This policy states:

> Construction operations within the City will be required to use available noise suppression devices and techniques and continue to limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:
>
> - Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.
>
> For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

The following standard noise control measures shall be implemented:

- Construction will be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday for any on-site or off-site work within 500 feet of any residential unit. Construction outside of these hours may be approved through a development permit based on a site-specific "construction noise mitigation plan" and a finding by the Director of Planning, Building and Code Enforcement that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential uses.

- The contractor shall use "new technology" power construction equipment with state-of-the-art noise shielding and muffling devices. All internal combustion engines used on the project site shall be equipped with adequate mufflers and shall be in good mechanical condition to minimize noise created by faulty or poorly maintained engines or other components.

- The unnecessary idling of internal combustion engines shall be prohibited.

- Staging areas and stationary noise-generating equipment shall be located as far as possible from noise-sensitive receptors, such as residential uses (a minimum of 200 feet).

- The surrounding neighborhood shall be notified early and frequently of the construction activities.

- A "noise disturbance coordinator" shall be designated to respond to any local complaints about construction noise. The disturbance coordinator would determine the cause of the

noise complaints (e.g., beginning work too early, bad muffler, etc.) and institute reasonable measures warranted to correct the problem. A telephone number for the disturbance coordinator would be conspicuously posted at the construction site.

A "construction noise logistics plan," in accordance with Policy EC-1.7, would be required. Typical construction noise logistics plan would include, but not be limited to, the following measures to reduce construction noise levels as low as practical:

- Utilize 'quiet' models of air compressors and other stationary noise sources where technology exists.

- Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment.

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment when located within 200 feet of adjoining sensitive land uses. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receptor and if the barrier is constructed in a manner that eliminates any cracks or gaps.

- If stationary noise-generating equipment must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used. Any enclosure openings or venting shall face away from sensitive receptors.

- Ensure that generators, compressors, and pumps are housed in acoustical enclosures.

- Locate cranes as far from adjoining noise-sensitive receptors as possible.

- During final grading, substitute graders for bulldozers, where feasible. Wheeled heavy equipment are quieter than track equipment and should be used where feasible.

- Substitute nail guns for manual hammering, where feasible.

- Substitute electrically-powered tools for noisier pneumatic tools, where feasible.

- The Construction Noise Logistic Plan, inclusive of the above shall be signed by a qualified acoustical specialist verifying that the implementation measures included in this Plan meets the reduction to noise levels as required by this mitigation measure.

With the implementation of GP Policy EC-1.7, Municipal Code requirements, and the above measures, the temporary construction noise impact would be reduced to a **less-than-significant** level.

Impact 1b: **Permanent Noise Level Increase.** The proposed project is not expected to cause a substantial permanent noise level increase at the existing residential land uses in the project vicinity. **This is a less-than-significant impact.**

According to Policy EC-1.2 of the City's General Plan, a significant permanent noise level increase would occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA DNL or more where ambient noise levels exceed the "normally acceptable" noise level standard. The City's General Plan defines the "normally acceptable" outdoor noise level standard for the residential land uses to be 60 dBA DNL. Where ambient noise levels are at or below the "normally acceptable" noise level standard, noise level increases of 5 dBA DNL or more would be considered significant. For reference, a 3 dBA DNL noise level increase would be expected if the project would double existing traffic volumes along a roadway, and a 5 dBA DNL noise increase would occur if traffic volumes tripled.

The project's trip generation estimates were reviewed to evaluate the potential increase in traffic noise levels attributable to the project. The proposed project would result in a net increase of 43 daily trips, yet there would be 16 less trips during the AM peak hour and 3 less trips during the PM peak hour, as compared to the trips produced by the existing land uses. The minor increase in the number of daily trips would not measurably increase traffic noise levels along roadways serving the site given the substantially higher traffic volumes along these roadways. The project would not result in doubling of the traffic, and therefore, the proposed project would not result in a significant permanent noise level increase. This is a less-than-significant impact.

Mitigation Measure 1b: **None required.**

Impact 1c: **Noise Levels in Excess of Standards.** The proposed project could generate noise levels in excess of standards established in the City's General Plan, but the incorporation of standard conditions of project approval would result in a **less-than-significant** noise impact.

Various mechanical equipment for heating, ventilation, and cooling purposes, exhaust fans, and other similar equipment would likely be located on the roof of the proposed building. Noise levels received at nearby sensitive land uses would depend on system design level specifications, including the equipment location, type, size, capacity, and enclosure design. These details are typically not available until later phases of the project design and development review process. Roof plans indicate that 4-foot mechanical screens are proposed to shield the proposed equipment.

Based on measurements of rooftop equipment at similar facilities in the region, noise levels of 50 to 60 dBA could be expected at a distance of 50 feet from the largest pieces of equipment. Noise levels generated by smaller mechanical equipment would be much lower, ranging from 40 to 50 dBA at 50 feet from the equipment and/or ventilation openings. Based on these credible worst-case estimates, noise levels generated by the operation of project mechanical equipment could reach 54 dBA L_{eq} at the nearest residential property line to the south if unshielded and 49 dBA L_{eq} or less at the nearest residential property line to the south if fully shielded. The DNL, assuming 24-hour per day operation of the rooftop mechanical equipment, could reach 60 dBA assuming unshielded conditions and reach 55 dBA assuming shielded conditions.

The project also proposes an emergency generator to be located within a 9.5-foot enclosure north of the proposed building. Generators typical of senior housing projects of this size are often rated at 250 kW or less and generally produce noise levels of 89 dBA at 23 feet, if housed in a weather enclosure, or noise levels ranging from 75 to 81 dBA at 23 feet, if housed in a Level 1 or Level 2 sound enclosure. During emergencies, the noise produced by the operation of the generator would be exempt from City noise restrictions; however, generators are typically tested for a period of about one hour per month to ensure functionality in case of a power outage. Assuming the emergency generator would be tested during a one hour period during the daytime, the day-night average noise level at 23 feet would be 75 dBA DNL, assuming a weather enclosure, or would range from 61 to 67 dBA DNL assuming a Level 1 or Level 2 sound enclosure. The proposed 9.5-foot enclosure would provide an additional 5 dBA of attenuation at 23 feet. Therefore, the testing of the emergency generator would produce noise levels of approximately 58 dBA DNL at the nearest commercial property line 100 feet to the north, assuming a weather enclosure, or would range from 44 to 50 dBA DNL assuming a Level 1 or Level 2 sound enclosure. As proposed, the testing of the generator would produce noise levels below 60 dBA DNL at the commercial property line. Generator noise levels would be about 16 to 17 dBA less (41 to 42 dBA DNL assuming a weather enclosure, or 27 to 34 dBA DNL with a Level 1 or Level 2 sound enclosure) at Cheshire Drive or Wellington Square residences, which have direct line-of-sight to the generator enclosure, and would be well below the City's 55 dBA DNL threshold for residential land uses. Pembridge Drive residential land uses would be fully shielded from the proposed generator by the intervening project building. The DNL produced by the testing of the generator would not measurably increase ambient DNL noise levels due to traffic along Almaden Expressway on days where testing occurs. No equipment is anticipated for a project of this scale that would make meeting the applicable noise limits with standard noise control measures difficult. As a project condition of approval, mechanical equipment shall be selected and designed to reduce noise levels to meet the City's 55 dBA DNL noise level requirement at the nearby noise-sensitive land uses. A qualified acoustical consultant shall be retained to review mechanical noise as these systems are selected to determine specific noise reduction measures necessary to reduce noise to comply with the City's General Plan and Municipal Code noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and installation of noise barriers, such as enclosures and parapet walls, to block the line-of-sight between the noise source and the nearest receptors. Other alternate measures may be optimal, such as locating equipment in less noise-sensitive areas, such as along the building façades farthest from adjacent neighbors, where feasible. In addition, in order to reduce the potential for annoyance, it is recommended that adjacent land uses be notified of the proposed testing schedule. Regular testing of the generator should occur between the hours of 10:00 a.m. and 4:00 p.m. and avoid noise-sensitive morning and evening hours. Compliance with the City's General Plan and Municipal Code noise limits would result in a less-than-significant impact.

Mitigation Measure 1c: None required.

Impact 2: **Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels are not expected to exceed 0.2 in/sec PPV at the nearest buildings of conventional construction. **This is a less-than-significant impact.**

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 demolition, site preparation work, foundation work, and new building framing and finishing. Foundation construction techniques involving impact or vibratory pile driving, which can cause excessive vibration, are not anticipated as part of the project.

According to Policy EC-2.3 of the City of San José General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction.

Table 7 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet and summarizes the vibration levels at the nearest adjacent buildings surrounding the site. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

Construction vibration received at off-site buildings would be dependent on the distance between individual pieces of equipment on the project site and the off-site building. For example, a vibratory roller operating near the project site boundary would generate the worst-case vibration levels for the building sharing that property line. Construction vibration impacts are assessed based on the potential for damage to buildings on receiving land uses, not at receptors at the nearest property lines. Therefore, the distances used to propagate construction vibration levels (as shown in Table 7) were estimated under the assumption that each piece of equipment could operate along the nearest boundary of the project site, representing the worst-case scenario.

Based on the Historical Resources Inventory for the City of San José,[4] the nearest historic building in the project vicinity is at 2434 Almaden Expressway, which is approximately one mile north of the project site. Construction equipment would not generate vibration levels in excess of the City's 0.08 in/sec PPV vibration threshold at this distance. All other structures surrounding the site are assumed to be of normal conventional construction and would be 35 feet or more from areas of the site where heavy equipment would be used. At a minimum distance of 35 feet, vibration levels generated by proposed construction equipment would be 0.145 in/sec PPV and below the 0.2 in/sec PPV threshold.

[4] https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/historic-preservation/historic-resources-inventory

TABLE 7 Construction Vibration Levels at Nearby Buildings

Equipment		PPV (in/sec)				
		Source Level (25 ft)	West Commercial (35 ft)	North Commercial (40 ft)	South Residential (100 ft)	East Commercial (185 ft)
Clam shovel drop		0.202	0.140	0.120	0.044	0.022
Hydromill (slurry wall)	in soil	0.008	0.006	0.005	0.002	0.001
	in rock	0.017	0.012	0.010	0.004	0.002
Vibratory Roller		0.210	0.145	0.125	0.046	0.023
Hoe Ram		0.089	0.061	0.053	0.019	0.010
Large bulldozer		0.089	0.061	0.053	0.019	0.010
Caisson drilling		0.089	0.061	0.053	0.019	0.010
Loaded trucks		0.076	0.052	0.045	0.017	0.008
Jackhammer		0.035	0.024	0.021	0.008	0.004
Small bulldozer		0.003	0.002	0.002	0.001	0.000

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, FTA Report No. 0123, September 2018, as modified by Illingworth & Rodkin, Inc., April 2020.

Vibration levels would potentially be perceptible within 100 feet of the site. The use of standard administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby residences and businesses, perceptible vibration can be kept to a minimum.

Mitigation Measure 2: None required.

Impact 3: Excessive Aircraft Noise. The project site is located approximately 5 miles from the nearest airport, and the proposed project would not expose people residing or working at the site to excessive aircraft noise. **This is a less-than-significant impact.**

Norman Y. Mineta San José International Airport is a public-use airport located approximately 5 miles north of the project site. Figure 3 shows that the project site lies well outside the 2037 60 dBA CNEL noise contour of the airport, according to the City's new Airport Master Plan Environmental Impact Report.[5] This means that future exterior noise levels due to aircraft would not exceed 60 dBA CNEL/DNL. According to Policy EC-1.11 of the City's General Plan, the required safe and compatible threshold for exterior noise levels would be at or below 65 dBA CNEL/DNL for aircraft. Similarly, Reid-Hillview Airport is located approximately 6 miles from the project site, and this airport produces considerably less environmental noise, as compared to Norman Y. Mineta San José International Airport. Noise levels produced by Reid-Hillview Airport aircraft are insignificant at the site and would be clearly compatible with the proposed land use. This is a less-than-significant impact.

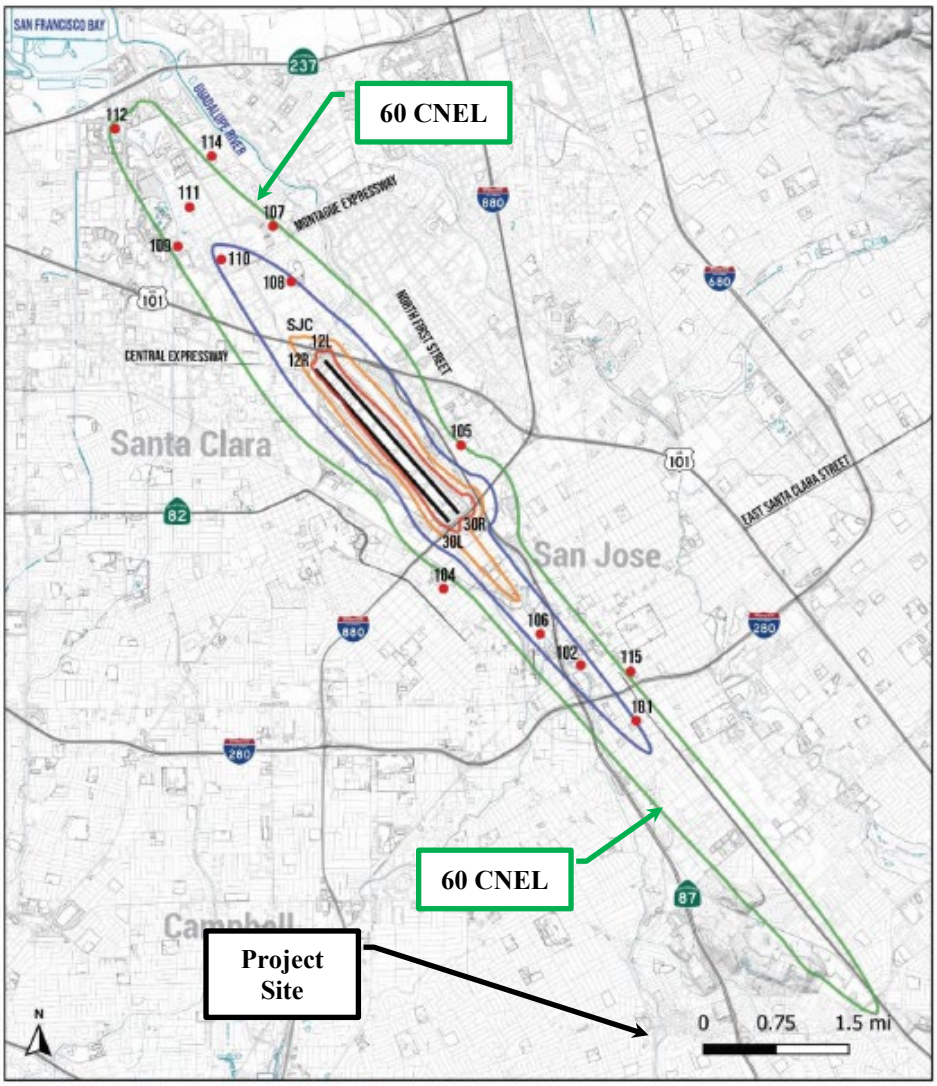
Mitigation Measure 3: None required.

[5] David J. Powers & Associates, Inc., Integrated Final Environmental Impact Report, Amendment to Norman Y. Mineta San Jose International Airport Master Plan, April 2020.

FIGURE 3 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

SAN JOSE INTERNATIONAL AIRPORT | Environmental Impact Report FINAL | October 2019



NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

- Noise Monitoring Station
- 101 Site ID
- Runway
- 75 dBA and Greater CNEL Contour
- 70 dBA and Greater CNEL Contour
- 65 dBA and Greater CNEL Contour
- 60 dBA and Greater CNEL Contour

Figure 5 Scenario 2: With Project 2037 Noise Contour Map

Source: BridgeNet International 2019

Appendix A
Noise Data Summaries

Noise Levels at Noise Measurement Site LT-1
~ 90 Feet From the Center of Almaden Expressway at Southwest Portion of Site
Thursday, April 28, 2016

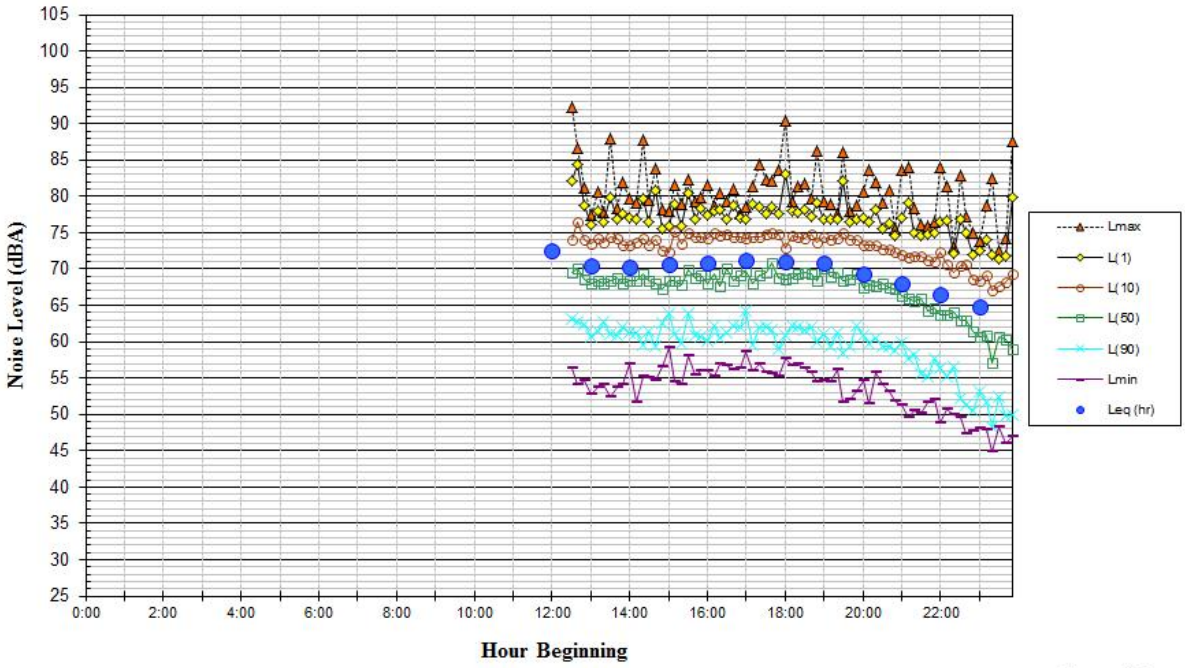
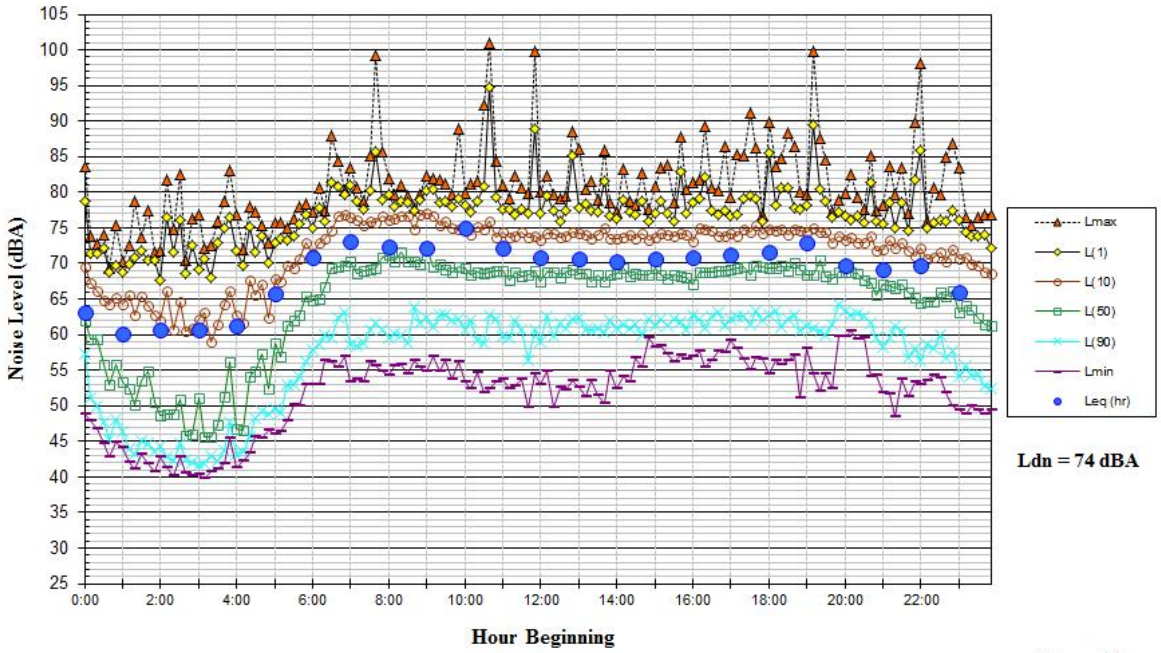


Figure A1

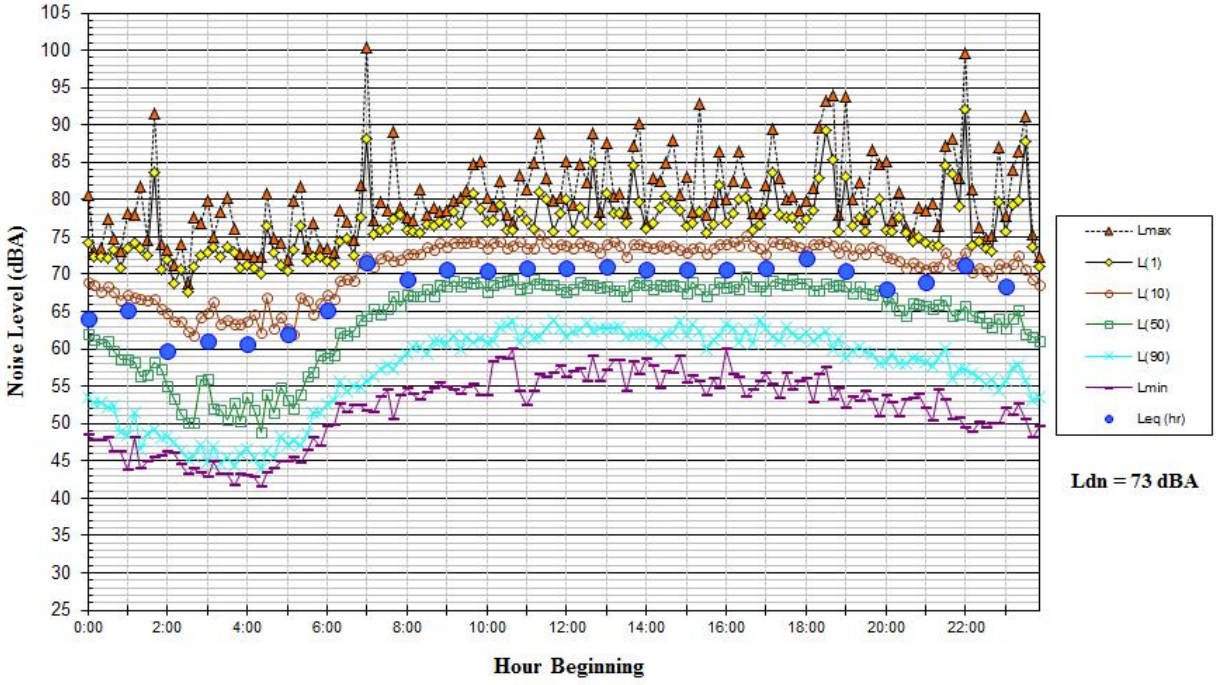
Noise Levels at Noise Measurement Site LT-1
~ 90 Feet From the Center of Almaden Expressway at Southwest Portion of Site
Friday, April 29, 2016



Ldn = 74 dBA

Figure A2

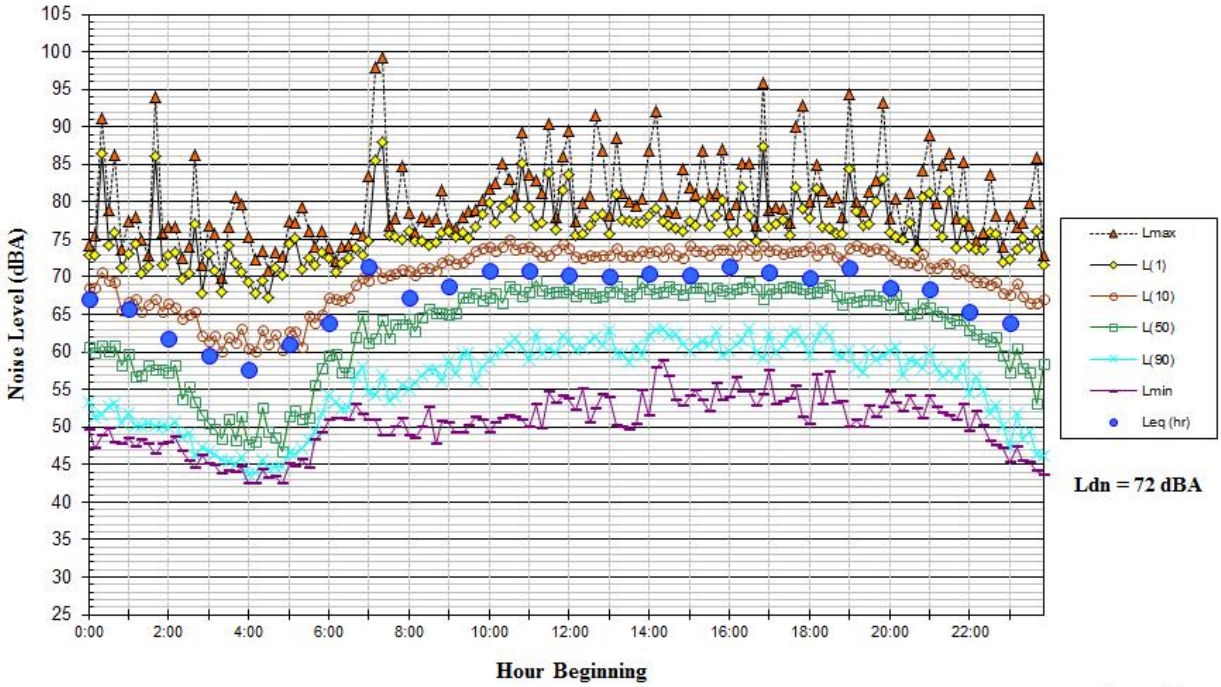
Noise Levels at Noise Measurement Site LT-1
~ 90 Feet From the Center of Almaden Expressway at Southwest Portion of Site
Saturday, April 30, 2016



Ldn = 73 dBA

Figure A3

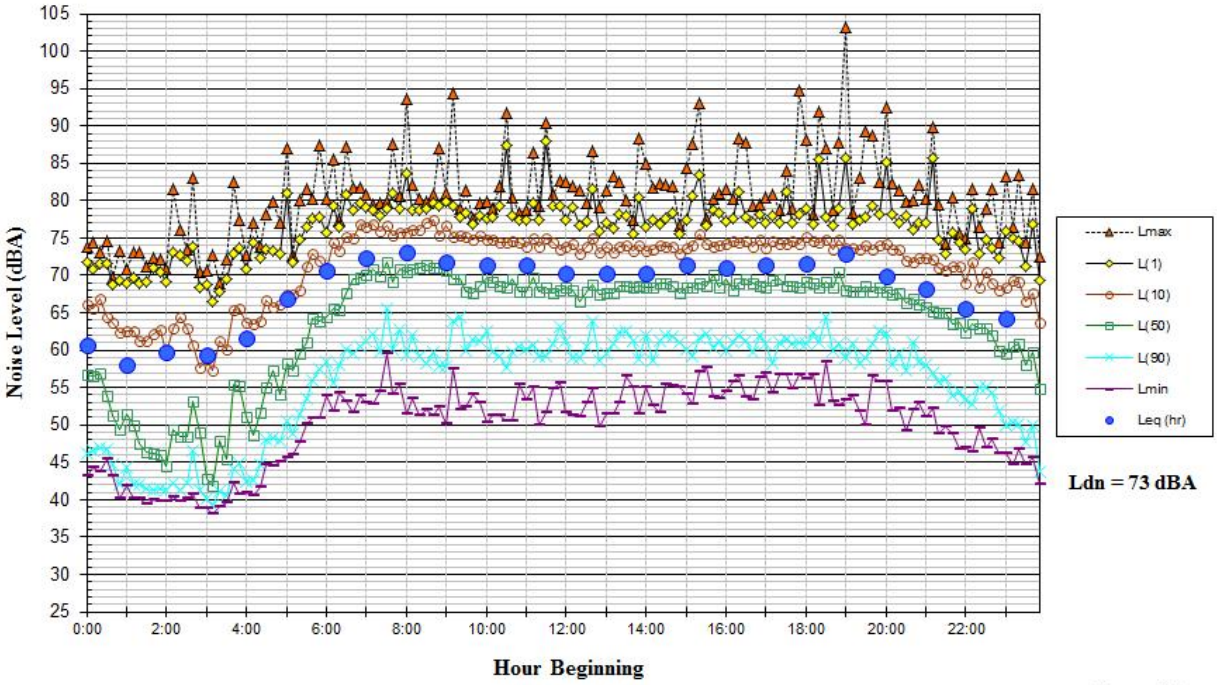
Noise Levels at Noise Measurement Site LT-1
~ 90 Feet From the Center of Almaden Expressway at Southwest Portion of Site
Sunday, May 1, 2016



Ldn = 72 dBA

Figure A4

Noise Levels at Noise Measurement Site LT-1
~ 90 Feet From the Center of Almaden Expressway at Southwest Portion of Site
Monday, May 2, 2016



Ldn = 73 dBA

Figure A5

Noise Levels at Noise Measurement Site LT-1
~ 90 Feet From the Center of Almaden Expressway at Southwest Portion of Site
Tuesday, May 3, 2016

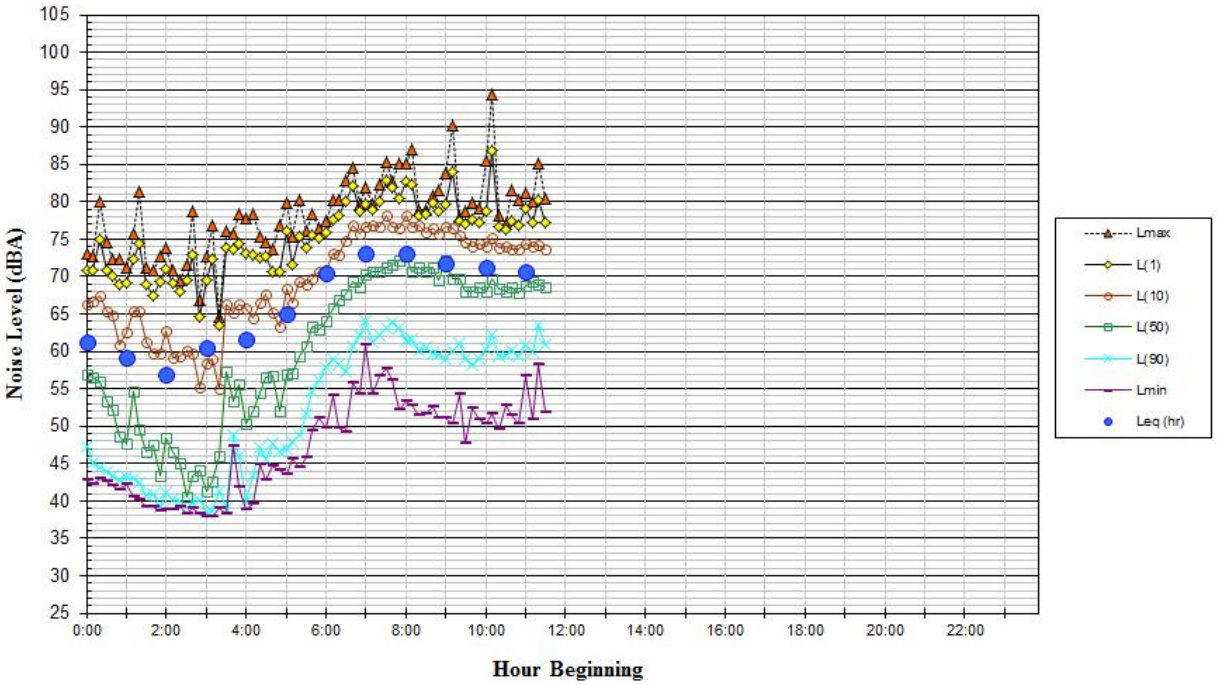


Figure A6

Appendix B
Qualifications of Technical Expert

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

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Cotati, California 94931

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MICHAEL S. THILL

Mr. Thill is a principal of the firm with 22 years of professional experience in the field of acoustics. His expertise includes performing field research, analyzing data, and noise modeling. He has conducted numerous field surveys in a variety of acoustical environments to quantify airborne noise levels, groundborne vibration levels, and hydro-acoustic noise levels. He has analyzed and summarized complex sets of data for inclusion into noise models. Mr. Thill has been trained, and is a regular user of FHWA's Traffic Noise Model (TNM), and is familiar with federal and State procedures for preparing highway noise study reports.

Mr. Thill has authored technical noise reports for various land use proposals including residential, commercial, educational, and industrial developments. He has managed the General Plan Update noise studies for several communities in California and has recommended policy language in order to maintain compatible noise levels community-wide. Some of his recent major projects have included the assessment of noise and vibration from data center projects, quarry expansion projects, groundwater recharge projects, and winery projects where operations and special events have been of concern in rural settings. He has vast experience explaining acoustical concepts and the results of his analyses in public forums to the general public and project decision-makers.

Mr. Thill has also led traffic noise investigations for major transportation projects including the Route 4 Bypass project (2003 to 2013) and the I-680/Route 4 Interchange project (2014 to 2015) in Contra Costa County, California. He managed the noise study reports the US Highway 101 and State Route 85 Express Lanes projects for the Santa Clara County Valley Transit Authority (2011 to 2013), proposed along 66 miles, combined, of project study area between Mountain View and Morgan Hill, California. In 2013, Mr. Thill led the analyses of noise impacts due to the Jennings Avenue Pedestrian and Bicycle Rail Crossing Project, and in 2015, Mr. Thill led the analysis of noise impacts and noise abatement for the US Highway 101 / Hearn Avenue Interchange Project in Santa Rosa, California.

PROFESSIONAL EXPERIENCE

2009 - Present Principal	Illingworth & Rodkin, Inc. Petaluma, California
2005 - 2009 Senior Consultant	Illingworth & Rodkin, Inc. Petaluma, California
1998 - 2005 Staff Consultant	Illingworth & Rodkin, Inc. Petaluma, California

EDUCATION

1998	University of California at Santa Barbara B.S., Major: Environmental Science

PROFESSIONAL SOCIETIES

Institute of Noise Control Engineering
Association of Environmental Professionals