APPENDIX G

Noise and Vibration Assessment

CAMBRIAN PARK VILLAGE NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The project site is located at the southeast corner of the intersection of Camden Avenue and Union Avenue, in the Cambrian Park neighborhood in southwestern San José, California. The site is currently occupied by the Cambrian Park Plaza shopping center. The proposed project would demolish the existing buildings and hardscape, remove all the existing landscaping, and construct a mixed-use project with two alternatives. Alternative 1 would consist of a hotel, apartment buildings with ground floor retail uses, an assisted living facility, townhomes, single-family homes, community park areas and promenades, a community garden, a fitness park area, and a playground. Alternative 2 would consist of the same land uses except the assisted living facility would be replaced with an office building.

Hotel

The proposed hotel building would be five stories in height (68 feet to the roof level), with retail uses at the ground floor and one level of below-grade parking. The hotel would provide up to 229 rooms and would include a restaurant with a rooftop deck dining area. The ground floor retail space would provide approximately 4,610 square feet for commercial uses. The parking garage would extend from the hotel site westward to the area beneath the apartments and retail area at the northwest corner of the site and would also serve these uses.

Apartments/Retail

The proposed apartment and retail uses are located in the northwestern portion of the site, with three six-story apartment buildings with ground floor retail uses located along the perimeter of the site on Camden Avenue and Union Avenue. The apartment buildings would provide 305 residential units on the second through sixth floors and would reach a maximum height of 80 feet to the roof level. Approximately 50,990 square feet of retail/restaurant uses would be provided on the ground floor of the buildings and in the interior courtyard. Surface parking and below-grading parking would be provided.

Assisted Living/Office Building

A five-story, approximately 184,060-square foot assisting living facility with its own underground parking garage and an interior courtyard area would be proposed along Union Avenue frontage at the west side of the project site. A project variant (Alternative 2) is proposed for this building for 160,000 square feet of office uses instead of assisted living.

Townhouses

The project proposes five three-story townhouse buildings, containing a total of 25 residential units. These would be located at the southwest corner of the site, with two buildings fronting on Union Avenue, on opposite sides of a proposed new street connecting Union Avenue to Camden Avenue that runs along the east/southeast boundary of the project site. The proposed townhouse units would have individual garages on the ground floor.

Single-Family Homes

The project would include 48 single-family homes, located on both sides of the proposed new street along the east/southeast boundary of the site.

Community Parks and Public Open Space

In addition to the private open space included with the proposed single-family homes, townhouses, apartments and assisted living units, the project provides several community park and open space areas. The total area of community parks and public open space is approximately 10.2 acres.

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 and groundborne vibration, summarizes applicable regulatory criteria, and discusses existing noise conditions in the project vicinity; 2) the General Plan Consistency Section discusses 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 measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

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.

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

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

> **5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
>
> **5.507.4.2 Performance method.** For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

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

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-1.3 Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land uses.

EC-1.6 Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

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 the southeast corner of the Camden Avenue and Union Avenue intersection in San José. Figure 1 show the project site plan overlaid on an aerial image of the site vicinity. As shown on Figure 1, the project site is surrounded by residential and commercial land uses. Single- and multi-family residential buildings are located adjacent to the project site to the south and east, to the southwest opposite Union Avenue, and to the north opposite Camden Avenue. There is a commercial building located adjacent to the project site to the east, as well as commercial buildings opposite Union Avenue to the west and opposite Camden Avenue to the north. State Route 85 is located approximately 0.5 miles to the south of the site.

A noise monitoring survey was performed to quantify and characterize ambient noise levels at the site and in the project vicinity between Tuesday, March 6, 2018 and Thursday, March 8, 2018. 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 than 2018 conditions. An update to the 2018 noise monitoring survey was not completed in 2020 because resultant noise levels would not be representative of typical conditions.

The 2018 monitoring survey included three long-term noise measurements (LT-1 through LT-3) and four short-term measurements (ST-1 through ST-4), as shown in Figure 1. The long-term noise measurements capture peak-noise periods, such as traffic noise in the early mornings and late afternoons, and the daily trends in noise levels. The short-term attended noise measurements are done to identify and capture mid-day noise sources that occur during quieter parts of the day in order to have a good baseline to compare noise activities to, such as operational and construction activities from the project. The noise environment at the site and at the nearby land uses in the project vicinity results primarily from vehicular traffic along Union Avenue and Camden Avenue. The weather conditions during the monitoring period were mostly clear skies, little to no wind, and no rain, which were ideal conditions for noise monitoring.

Long-term noise measurement LT-1 was made at the north corner of the Wyrick Avenue and Bercaw Lane intersection, approximately 20 feet northeast of the Wyrick Avenue centerline and approximately 50 feet northwest of the Bercaw Lane centerline. This location was selected to quantify noise levels near the closest residential receptors. The primary noise source at this location was vehicular traffic on the adjacent roadways. Hourly average noise levels at this location ranged from 53 to 64 dBA L_{eq} during the day and from 42 to 56 dBA L_{eq} at night. The day-night average noise level on Wednesday, March 7, 2018 was 60 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figure 2.

Long-term noise measurement LT-2 was made at the west end of the site's Dollar Tree parking lot, approximately 35 feet east of the Union Avenue centerline. This location was selected to quantify noise levels due to traffic along Union Avenue. Hourly average noise levels at this location ranged from 65 to 71 dBA L_{eq} during the day and from 52 to 67 dBA L_{eq} at night. The

[1] Cal. Exec. Order No. N-33-20, (Mar. 19, 2020).

day-night average noise level on Wednesday, March 7, 2018 was 70 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figure 3.

Long-term noise measurement LT-3 was made in front of 1977 Camden Avenue, approximately 55 feet north of the roadway centerline. This location was selected to quantify noise levels due to traffic along Camden Avenue. Hourly average noise levels at this location ranged from 65 to 74 dBA L_{eq} during the day and from 57 to 72 dBA L_{eq} at night. The day-night average noise level on Wednesday, March 7, 2018 was 73 dBA DNL. The daily trend in noise levels at LT-3 is shown in Figure 4.

Short-term noise measurements ST-1 through ST-4 were conducted on Thursday, March 8, 2018 in ten-minute intervals starting at 11:30 a.m. and concluding at 12:40 p.m. ST-1 was made at the northwest corner of the Union Avenue and Chelsea Drive intersection, approximately 75 feet west of the Union Avenue centerline. This location was selected to quantify noise levels due to traffic along Union Avenue and to quantify noise levels at nearby residential receptors. The 10-minute average noise level measured at this location was 67 dBA L_{eq}. Short-term noise measurement ST-2 was made along the site's southern fence line by the multi-family apartments, approximately 250 feet east of the Union Avenue centerline. This location was selected to quantify noise levels at the adjacent residential land uses. The 10-minute average noise level measured at this location was 52 dBA L_{eq}. Short-term noise measurement ST-3 was made at the northwest corner of the Camden Avenue and Taper Avenue intersection, approximately 80 feet north of the Camden Avenue centerline. This location was selected to quantify noise levels due to traffic along Camden Avenue and to quantify noise levels at nearby residential receptors. The 10-minute average noise level measured at this location was 65 dBA L_{eq}. Short-term noise measurement ST-4 was made along the site's eastern fence line by the single-family residences, approximately 520 feet south of the Camden Avenue centerline. This location was selected to quantify noise levels at the adjacent residential land uses. The 10-minute average noise level measured at this location was 51 dBA L_{eq}. Table 4 summarizes the results of the short-term measurements.

TABLE 4 Summary of Short-Term Noise Measurement Data (dBA)

Noise Measurement Location	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: Union Ave and Chelsea Dr intersection. (3/8/2018, 11:30 a.m. - 11:40 a.m.)	77	74	71	65	54	67
ST-2: Along site's southern fence line. (3/8/2018, 11:50 a.m. - 12:00 p.m.)	68	62	54	50	43	52
ST-3: Camden Ave and Taper Ave intersection. (3/8/2018, 12:10 p.m. - 12:20 p.m.)	76	72	68	64	56	65
ST-4: Along site's eastern fence line. (3/8/2018, 12:30 p.m. - 12:40 p.m.)	60	58	54	50	48	51

Source: Illingworth & Rodkin, Inc., March 2018.

FIGURE 1 Noise Measurement Locations

Source: Google Earth, September 2020 and Kenneth Rodrigues & Partners, Inc., July 2020.

FIGURE 2 Daily Trend in Noise Levels at LT-1

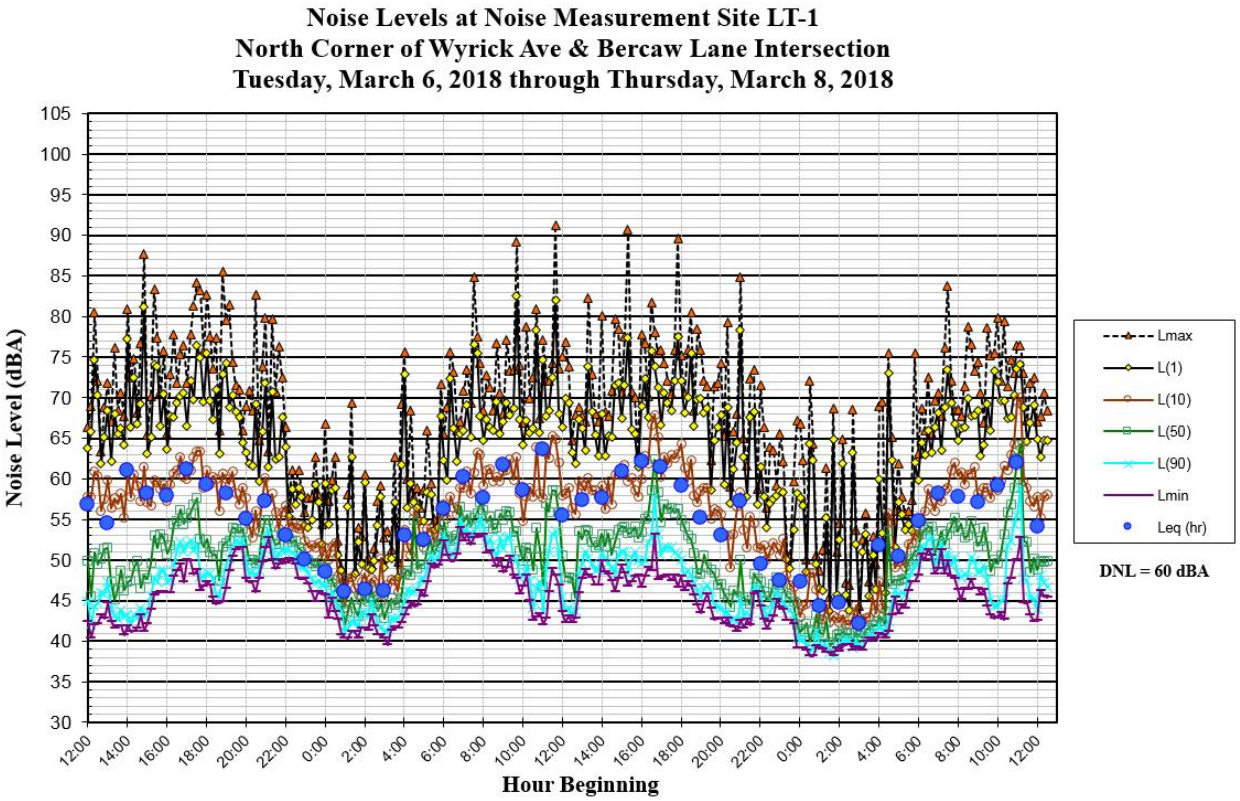


FIGURE 3 Daily Trend in Noise Levels at LT-2

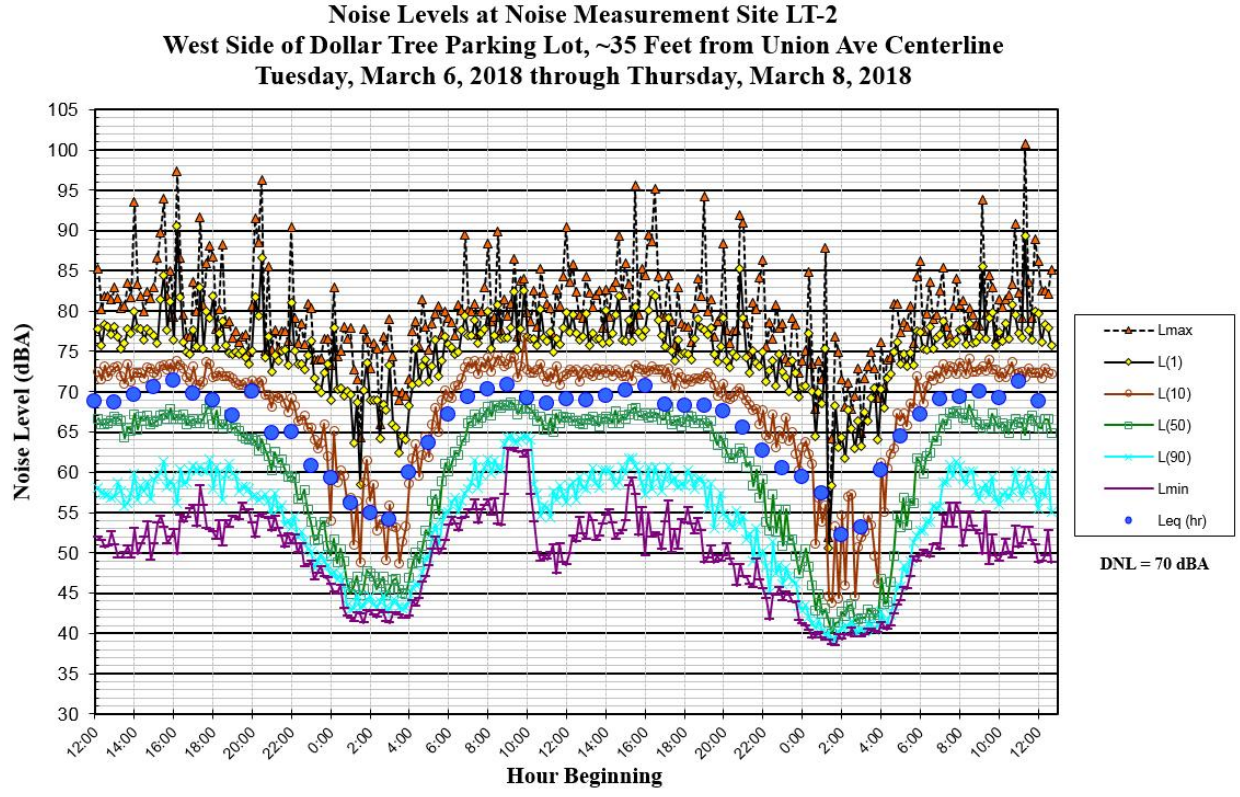
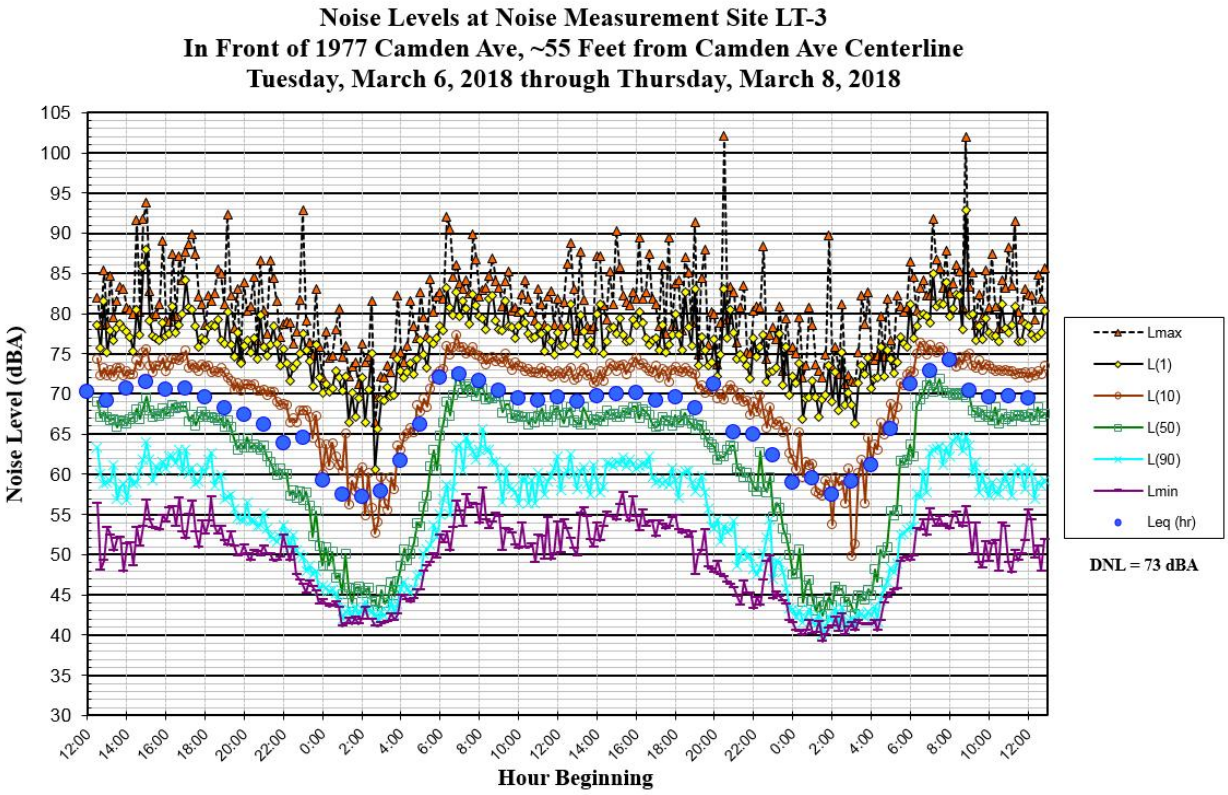


FIGURE 4 Daily Trend in Noise Levels at LT-3



PLAN CONSISTENCY ANALYSIS – NOISE AND LAND USE COMPATIBILITY

The impacts of site constraints such as exposure to excessive levels of noise and vibration are not considered under CEQA. This section addresses the project's consistency with the policies set forth in the San José General Plan and California Green Building Code.

Noise and Land Use Compatibility Thresholds

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, hotel, and assisted living land uses, 65 dBA DNL or less for the proposed public park and playgrounds, and 70 dBA DNL or less for the proposed commercial and office uses (Table EC-1).

- The City's acceptable interior noise level objective is 45 dBA DNL or less for the proposed residences, hotel, and assisted living facility.

- The California Green Building Code limits interior noise levels within new non-residential land uses to an hourly equivalent noise level ($L_{eq\,(1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

Future Exterior Noise Environment

As described in the Existing Noise Environment Section of this document, the ambient noise environment at the project site ranges from 60 to 73 dBA DNL. The future noise environment at the project site would continue to result primarily from vehicular traffic along Union Avenue and Camden Avenue. Traffic data was gathered for the proposed project by *Hexagon Transportation Consultants, Inc*. According to this traffic data, the future cumulative plus project conditions for both alternatives are expected to increase traffic noise levels along S. Union Avenue and Camden Avenue by 1 dBA DNL or less. To estimate the future noise environment at the project site, this increase in noise levels due to increased traffic volumes is applied to the results of the existing measurements described above. Therefore, the future unmitigated noise levels would be up to 61 dBA DNL at 50 feet from the Bercaw Lane centerline (LT-1), up to 71 dBA DNL at 35 feet from the Union Avenue centerline (LT-2), and up to 74 dBA DNL at 55 feet from the Camden Avenue centerline (LT-3).

Noise Sensitive Land Uses

The project's noise sensitive land uses would include the six-story multi-family residential with ground floor commercial building (Building 1), the five-story assisted living building (Alternative 1) or office building (Alternative 2) proposed along Union Avenue (Building 3), the five-story hotel building along Camden Avenue (Building 2), and the proposed single-family residences and multi-family townhouses proposed along the southern and eastern borders of the project site. A

community park is also proposed on the interior of the site. No specific development plans were available at the time of this analysis, but the general locations of the noise sensitive buildings were identified from a review of the conceptual site plan. Typically, the exterior noise standards established by the City are evaluated at the center of each outdoor space, and are not applied to private decks or balconies.

Building 1 and Building 3 would be located approximately 60 feet from the Union Avenue centerline and would be exposed to future exterior noise levels of approximately 69 dBA DNL. The conceptual site plan indicates that the outdoor use areas of Buildings 1 (residential/commercial) and 3 (assisted living or office) would be located within centralized courtyards of these buildings, at least 150 feet from the Union Avenue centerline, or shielded roof decks located away from area roadways. The courtyards and roof decks would be acoustically shielded by the buildings themselves (minimum 10 dBA of attenuation), and future exterior noise levels at these shielded courtyards would be expected to be 55 dBA DNL or less. Noise levels in the proposed courtyards of Buildings 1 and 3 would be compatible with the exterior noise levels objectives under both project alternatives (60 dBA DNL for residential and assisted living uses and 70 dBA DNL for commercial and office land uses).

The Building 2 (hotel) primary outdoor space would be located over 400 feet from the centerline of Camden Avenue and over 550 from the centerline of Union Avenue. In addition, this outdoor space would be shielded by intervening 4- to 6-story buildings proposed by the project. Assuming a future noise exposure of 73 dBA DNL at 75 feet from the Camden Avenue centerline and 69 dBA DNL at 60 feet from the Union Avenue centerline, and at least 10 dBA of acoustical shielding, exterior noise levels at the Building 2 outdoor space would be 57 dBA DNL or less. Similar noise levels would be expected at the adjacent roof deck. A second roof deck is proposed at the east end of Building 2 near Camden Avenue. Noise levels are calculated to reach 59 dBA DNL at the center of this roof deck assuming the attenuation of the traffic noise below provided by the building itself. Noise levels at the Building 2 outdoor spaces would be compatible with the exterior noise level objective for hotel uses (60 dBA DNL).

Single-family residences proposed nearest to Camden Avenue would have private outdoor use areas located as close as about 100 feet from the centerline of the road. When accounting for the acoustical shielding provided by the proposed residential building and adjacent commercial building, exterior noise levels in the rear yard of the single-family residences nearest to Camden Avenue would be about 65 dBA DNL, exceeding the 60 dBA DNL exterior noise level objective for residences by 5 dBA. The construction of a six-foot high noise barrier would result in acceptable noise levels at these rear yards. Noise levels in the remaining residential yards would meet the 60 dBA DNL noise level objective.

Community Park/Playground

The center of the community park would be located approximately 450 feet from the Union Avenue centerline and approximately 580 feet from the Camden Avenue centerline. Assuming a future noise exposure of 73 dBA DNL at 75 feet from the Camden Avenue centerline and 69 dBA DNL at 60 feet from the Union Avenue centerline, and at least 10 dBA of acoustical shielding, exterior noise levels at the center of the community park would be 56 dBA DNL or less. The playground proposed along the site's westernmost boundary, north of the townhouses, would be

exposed to future exterior noise levels of about 60 dBA DNL at the center of the playground, when accounting for distance from the roadway and acoustical shielding provided by adjacent buildings. The community park and playground would be exposed to noise levels below the City's acceptable exterior noise level threshold of 65 dBA DNL, and would be considered compatible with the proposed land use.

Future Interior Noise Environment

Interior noise levels would vary depending upon the design of the building (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 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, at the discretion of the residents, 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.

Noise Sensitive Land Uses

The City of San José requires that interior noise levels be maintained at 45 dBA DNL or less for residential, assisted living, and hotel land uses. The townhome residences along the southern border would be exposed to exterior traffic noise levels of up to 69 dBA DNL and the single-family residences along the eastern border would be exposed to exterior traffic noise levels of up to 59 dBA DNL. The six-story apartment building and the four-story assisted living facility under Alternative 1 would be exposed to exterior traffic noise levels of up to 69 dBA DNL and the hotel building would be exposed to exterior traffic noise levels of up to 73 dBA DNL.

For the single-family residences along the eastern border of the project site, the interior noise levels with standard construction and windows and doors partially open for ventilation would be up to 44 dBA DNL, which would be below the City's threshold for interior noise. For the remaining noise sensitive land uses, the interior noise levels with standard construction and windows and doors partially open for ventilation would range from 54 to 58 dBA DNL, which exceeds the City's threshold for interior noise. Interior noise levels in these residences with standard construction and windows closed would range from 44 to 48 dBA DNL, which would continue to exceed the City's interior noise threshold. Sound-rated construction materials would be required in some units to reduce interior noise to acceptable levels. Preliminary calculations assuming wood siding construction (STC 39) and a window to wall ratio of 40% or less show that sound-rated windows with minimum STC[2] Ratings of 32 to 34 would be satisfactory for units facing Union Avenue and/or Camden Avenue to achieve acceptable interior noise levels.

[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.

Commercial/Office Land Uses

The State of California requires interior noise levels to be maintained at 50 dBA $L_{eq(1\text{-}hr)}$ or less during hours of operation at the proposed commercial retail on the ground floor. The proposed commercial uses include ground floor commercial uses in Building 1 and the proposed office uses located in Building 3 under Alternative 2. Commercial uses along Union Avenue would be as close as 60 feet from the roadway centerline and would be exposed to future exterior noise levels ranging from 63 to 69 dBA $L_{eq(1\text{-}hr)}$ during daytime hours. Commercial and office uses along Camden Avenue would be up to 75 feet from the roadway centerline and would be exposed to future exterior noise levels ranging from 64 to 73 dBA $L_{eq(1\text{-}hr)}$ during daytime hours. Standard commercial and office construction provides at least 25 dBA of outdoor to indoor noise reduction assuming that the building includes adequate forced-air mechanical ventilation systems so that the windows and doors may remain closed to control noise. Assuming standard commercial and office construction methods with the windows and doors closed, interior noise levels are calculated to range from 38 to 44 dBA $L_{eq(1\text{-}hr)}$ during daytime hours at the commercial uses (and office land uses proposed under Alternative 2) along Union Avenue and from 39 to 48 dBA $L_{eq(1\text{-}hr)}$ during daytime hours at the commercial uses along Camden Avenue. These interior noise levels would be below the Cal Green Code standard of 50 dBA $L_{eq(1\text{-}hr)}$.

Recommended Measures to Ensure General Plan Consistency

For consistency with the General Plan, the following Conditions of Approval are recommended to be implemented by the project applicant:

- Provide a minimum 6-foot noise barrier, as measured above the pad elevation, to acoustically shield the rear yard of the nearest single-family residence to Camden Avenue. The noise barrier shall be solid over the entire surface of the barrier and at its base (e.g., no cracks or gaps) and be constructed from barrier materials having a minimum surface weight of 3 lbs/ft^2. Suitable barrier materials include, but are not limited to, wood fence boards (one-inch nominal thickness), pre-cast concrete panels, or masonry.

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, so that windows can be kept closed to control noise in the noise sensitive land uses.

- Provide sound rated windows and doors to maintain interior noise levels at acceptable levels for noise sensitive land uses. Preliminary calculations assuming wood siding construction (STC 39) and a window to wall ratio of 40% or less show that sound-rated windows with minimum STC[3] Ratings of 32 to 34 would be satisfactory for units facing Union Avenue and/or Camden Avenue to achieve acceptable interior noise levels. The remaining residential and non-residential uses would be compatible with standard construction methods and windows in the closed position. The specific determination of

[3] **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.

what noise insulation treatments are necessary shall be conducted during final design of the project.

- The project applicant shall retain a qualified acoustical specialist to prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the final design phase of the project 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 confirm building treatments necessary to reduce residential interior noise levels to 45 dBA DNL or lower, and address and adequately control the noise from adjacent rooftop equipment. Treatments would include, but are not limited to, sound-rated windows and doors as specified above, sound-rated wall and window 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.

NOISE IMPACTS AND MITIGATION MEASURES

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

Significance Criteria

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

1. **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 or Municipal Code at existing noise-sensitive receptors surrounding the project site.

    a. 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.

    b. 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.

c. 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.

2. **Generation of Excessive Groundborne Vibration.** A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors.

3. **Excessive Aircraft Noise Levels.** 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 potentially significant impact.**

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.

The construction schedule assumed that the earliest possible start date would be August 2021 and the project would be built out over a period of approximately 28 months, or 581 construction workdays. Construction hours are assumed to be 7:00 a.m. to 7:00 p.m. Monday through Friday, in compliance with the Municipal Code allowable hours of construction.

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 with the range of 80 to 90 dBA at 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.

The noise-sensitive receptors (residences) to the east of the project site would have existing daytime ambient noise levels similar to the noise levels recorded at LT-1. Based on these data, the average hourly noise level during construction hours would range from 53 to 64 dBA L_{eq}. The residential and commercial receptors to the south and west of the project site would have existing daytime ambient noise levels similar to the data collected at LT-2. Average hourly noise levels during construction hours range from 65 to 71 dBA L_{eq} at commercial receptors in the project vicinity. The residential and commercial receptors to the north and the commercial receptor to the east of the project site would have existing daytime ambient noise levels similar to the data collected at LT-3. Average hourly noise levels during construction hours range from 65 to 74 dBA L_{eq} at commercial receptors in the project vicinity.

The nearest noise-sensitive residential land uses would be located approximately 50 feet south and east from the center on the closest buildings on the project site. As shown in Table 5, construction noise levels produced by the project would typically range from 77 to 89 dBA L_{eq} at a distance of 50 feet from the source with all pertinent equipment present at the site. With the minimum required equipment present at the site, construction noise levels produced by the project would typically range from 71 to 83 dBA L_{eq} at a distance of 50 feet from the source. Construction noise would exceed ambient daytime noise levels in the area by more than 5 dBA L_{eq}. Noise levels would be lower as construction moves away from noise sensitive locations or into shielded areas. However, given the construction timeline of 28 months, it is anticipated that ambient noise levels would be exceeded at individual noise sensitive land uses in the vicinity of the site for a period exceeding 12 months. Per Policy EC-1.7 of the City's General Plan, the temporary construction impact would be **potentially 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 **less-than-significant with mitigation**.

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

A significant project impact would result if traffic generated by the project would substantially increase noise levels at sensitive receptors in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater. The existing noise environment in the surrounding area would exceed 60 dBA DNL, based on the ambient noise measurements; therefore, a significant impact would occur if project-generated traffic would permanently increase noise levels by 3 dBA DNL. For reference, a 3 dBA DNL noise increase would be expected if the project would double existing traffic volumes along a roadway.

For the proposed project, peak hour turning movements were provided by *Hexagon Transportation Consultants, Inc* for the 27 study intersections. Background plus project traffic volumes were compared to existing volumes to conservatively estimate the project's contribution to the permanent noise level increase. Upon comparison of these traffic conditions, a traffic noise increase of 0 to 1 dBA DNL was calculated for the primary roadways serving the site. Traffic noise increases are summarized in Table 7, below. The project would neither result in a doubling of traffic nor result in a permanent noise increase of 3 dBA DNL or more. This is a **less-than-significant** impact.

TABLE 7 Project Traffic Noise Increase Summary

Roadway	Segment	Existing PM Peak Hour Volume	Background Plus Project PM Peak Hour Volume ALT 1	Background Plus Project PM Peak Hour Volume ALT 2	Relative Noise Level Increase, (dBA DNL) ALT 1/ALT2
Union Avenue	North of Camden Avenue	1495	1487	1490	0/0
	South of Camden Avenue	1680	1878	1906	1/1
Camden Avenue	West of Union Avenue	3106	3149	3166	0/0
	East of Union Avenue	3381	3686	3692	0/0

Source: Hexagon Transportation Consultants and Illingworth & Rodkin, Inc., September 2020.

A significant cumulative impact would occur if the cumulative traffic noise level increase was 3 dBA DNL or greater for existing levels exceeding 60 dBA DNL or was 5 dBA DNL or greater for existing levels at or below 60 dBA DNL and if the project would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of 1 dBA DNL or more attributable solely to the proposed project.

Cumulative traffic noise level increases were calculated by comparing the cumulative traffic volumes and the cumulative plus project volumes to the existing traffic volumes. Upon comparison of these traffic conditions, a traffic noise increase of 0 to 1 dBA DNL was estimated for the primary roadways serving the site under cumulative conditions. Traffic noise increases are summarized in Table 8, below. The project would not make a "cumulatively considerable" contribution to the

overall traffic noise increase expected under cumulative conditions, which are not considered substantial. This is a **less-than-significant** impact.

TABLE 8 Cumulative Traffic Noise Increase Summary

Roadway	Segment	Existing PM Peak Hour Volume	Cumulative No Project PM Peak Hour Volume	Cumulative Plus Project PM Peak Hour Volume ALT 1/ALT2	Relative Noise Level Increase, (dBA DNL) ALT 1/ALT2
Union Avenue	North of Camden Avenue	1495	1512	1504/1507	0/0
	South of Camden Avenue	1680	1839	1949/1977	1/1
Camden Avenue	West of Union Avenue	3106	3167	3186/3203	0/0
	East of Union Avenue	3381	3510	3703/3709	0/0

Source: Hexagon Transportation Consultants and Illingworth & Rodkin, Inc., September 2020.

Mitigation Measure 1b: None required.

Impact 1c: Noise Levels in Excess of Standards. The proposed project could generate noise in excess of standards established in the City's General Plan at the nearby sensitive receptors. This is a **potentially significant** noise impact.

Residential, hotel, commercial, and office buildings typically require various mechanical equipment, such as air conditioners, exhaust fans, and air handling equipment for ventilation of the buildings. Specific development plans were not available at the time of this analysis, but mechanical equipment for similar buildings are generally located in equipment rooms in the basement or ground floor, in mechanical units on the side of the building, or on the roof of the building.

The nearest noise-sensitive uses to the project site include the adjacent single-and multi-family residences to the south and east. An 8-foot wall is proposed between the project site and the residences to the south and east to provide acoustical shielding of ground floor mechanical equipment. There are also single-family residences to the west opposite Union Avenue and to the north opposite Camden Avenue. Commercial uses surrounding the project site include the adjacent commercial building to the east (which would be shielded from ground floor mechanical equipment by the proposed 8-foot wall), commercial buildings to the north opposite Camden Avenue, and commercial buildings to the west opposite Union Avenue. Under the City's Noise Element and Municipal Codes, noise levels produced by the operation of the mechanical equipment would be limited to 55 dBA L_{eq} at receiving residential land uses and 60 dBA L_{eq} at receiving commercial land uses. Given the close proximity of noise-sensitive uses to the project site and lack of sufficient details about the mechanical equipment, mechanical rooms, and equipment locations, there is the potential for noise from mechanical equipment to exceed 55 dBA L_{eq} at noise-sensitive land uses and 60 dBA L_{eq} at commercial land uses in the immediate project vicinity. Design planning should take into account the noise criteria associated with such equipment and utilize site planning to locate equipment in less noise-sensitive areas where feasible. Other controls could include, but shall not be limited to, fan silencers, enclosures, and screen walls. The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts. This is a **potentially significant** impact.

Truck Loading and Unloading

Truck deliveries for the commercial and office uses and trash pickups for all the buildings on the project site would have the potential to generate noise. While delivery and trash areas were not identified on the conceptual site plan, and delivery times and the frequency of these events were not provided at the time of this study, this analysis assumes that these events would occur during daytime hours, approximately 2 to 3 times a week. Typical noise levels generated by loading and unloading of truck deliveries would be similar to noise levels generated by truck movements on Union Avenue and Camden Avenue and by similar activities at the existing land use and surrounding commercial uses. Peak noise levels from truck activities would therefore not be anticipated to increase the ambient day-night average noise levels in the project vicinity resulting in a **less-than-significant** impact.

Parking and Circulation Noise

Intermittent noise from proposed parking lots and garages would be required to meet the noise thresholds established in the City's Municipal Code. According to the project data, there would be a combination of surface and garage parking for the multi-family residential, commercial, hotel, and assisted living/office land uses. There would be ground floor garage parking for the townhomes and single-family homes.

The surrounding land uses are currently exposed to parking lot noise from the existing land use and will continue to be exposed to similar noise as a result of the proposed project. The below-grade parking levels would be completely shielded from nearby receptors and would not result in audible noise levels at off-site receptor locations. The parking and circulation noise from the hotel building, the multi-family residential and commercial uses, the assisted living facility/office, the single-family homes, and the townhomes would not be greater than the ambient noise environment due to traffic along Camden Avenue and Union Avenue, and nearby off-site receptors would not be able to distinguish parking noise from traffic noise.

Bercaw Lane residences are exposed to lower ambient noise levels and would be exposed to parking and circulation noise from the 49 single-family homes proposed along the eastern border of the site. The calculated hourly average noise at the adjacent residential properties behind the 8-foot noise barrier would be 34 dBA L_{eq} assuming one vehicle trips per unit during the peak hour (49 trips). This noise level would be below ambient traffic noise levels and the City's threshold for exterior noise levels resulting in a **less-than-significant** impact.

Mitigation Measure 1c:

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

- 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 55 dBA L_{eq} or 60 dBA L_{eq} noise limit at the shared property line. 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.

Impact 2: **Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels are expected to potentially exceed applicable vibration thresholds at a nearby sensitive land use. **This is a potentially significant impact.**

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 0.2 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls. The vibration limits contained in this policy are conservative and designed to provide the ultimate level of protection for existing buildings in San José.

Construction activities associated with the project would include demolition, site preparation, 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. Vibration levels are highest close to the source, and then attenuate with increasing distance at the rate $(D_{ref}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Heavy vibration generating construction equipment, such as vibratory rollers or the dropping of heavy equipment (e.g., clam shovel drops), would have the potential to produce vibration levels of 0.08 in/sec PPV or more at historic buildings within 60 feet of the project site. This same equipment would have the potential to produce vibration levels of 0.2 in/sec PPV or more at buildings of normal conventional construction located within 30 feet of the project site.

Table 9 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. Pile driving is not anticipated as a method of construction.

TABLE 9 Construction Vibration Levels at Nearby Buildings

Equipment		PPV (in/sec)			
		Source Level (25 ft)	East / South Residential / Commercial (5 ft)	West Residential / Commercial (100 ft)	North Residential (140 ft)
Clam shovel drop		0.202	**1.186**	0.044	0.030
Hydromill (slurry wall)	in soil	0.008	0.047	0.002	0.001
	in rock	0.017	0.100	0.004	0.003
Vibratory Roller		0.210	**1.233**	0.046	0.032
Hoe Ram		0.089	**0.523**	0.019	0.013
Large bulldozer		0.089	**0.523**	0.019	0.013
Caisson drilling		0.089	**0.523**	0.019	0.013
Loaded trucks		0.076	**0.446**	0.017	0.011
Jackhammer		0.035	**0.206**	0.008	0.005
Small bulldozer		0.003	0.018	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., September 2020.

Based on a review of the Historical Resources Inventory for the City of San José,[4] the nearest historic building in the project vicinity is the Hamilton Residence located at 2295 S. Bascom Avenue, which is approximately 1.4 miles 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.

The nearest sensitive receptors would be the adjacent residences located approximately 5 feet to the east and south of the project site. At this distance, vibration levels due to construction activities would be up to 1.2 in/sec PPV, which would be above the 0.2 in/sec PPV threshold. Other sensitive receptors near the project site include the residences located approximately 100 feet west opposite Union Avenue and approximately 140 feet north opposite Camden Avenue. At these distance, vibration levels due to construction activities would be up to 0.05 in/sec PPV, which would be below the 0.2 in/sec PPV threshold. The nearest commercial land uses would be the adjacent commercial building located approximately 5 feet to the east of the project site. At this distance, vibration levels due to construction activities would be up to 1.2 in/sec PPV, which would exceed the 0.2 in/sec PPV threshold. Other commercial land uses near the project site include the commercial buildings located approximately 100 feet west opposite Union Avenue and approximately 140 feet north opposite Camden Avenue. At these distances, vibration levels due to construction activities would be up to 0.05 in/sec PPV, which would be below the 0.2 in/sec PPV threshold.

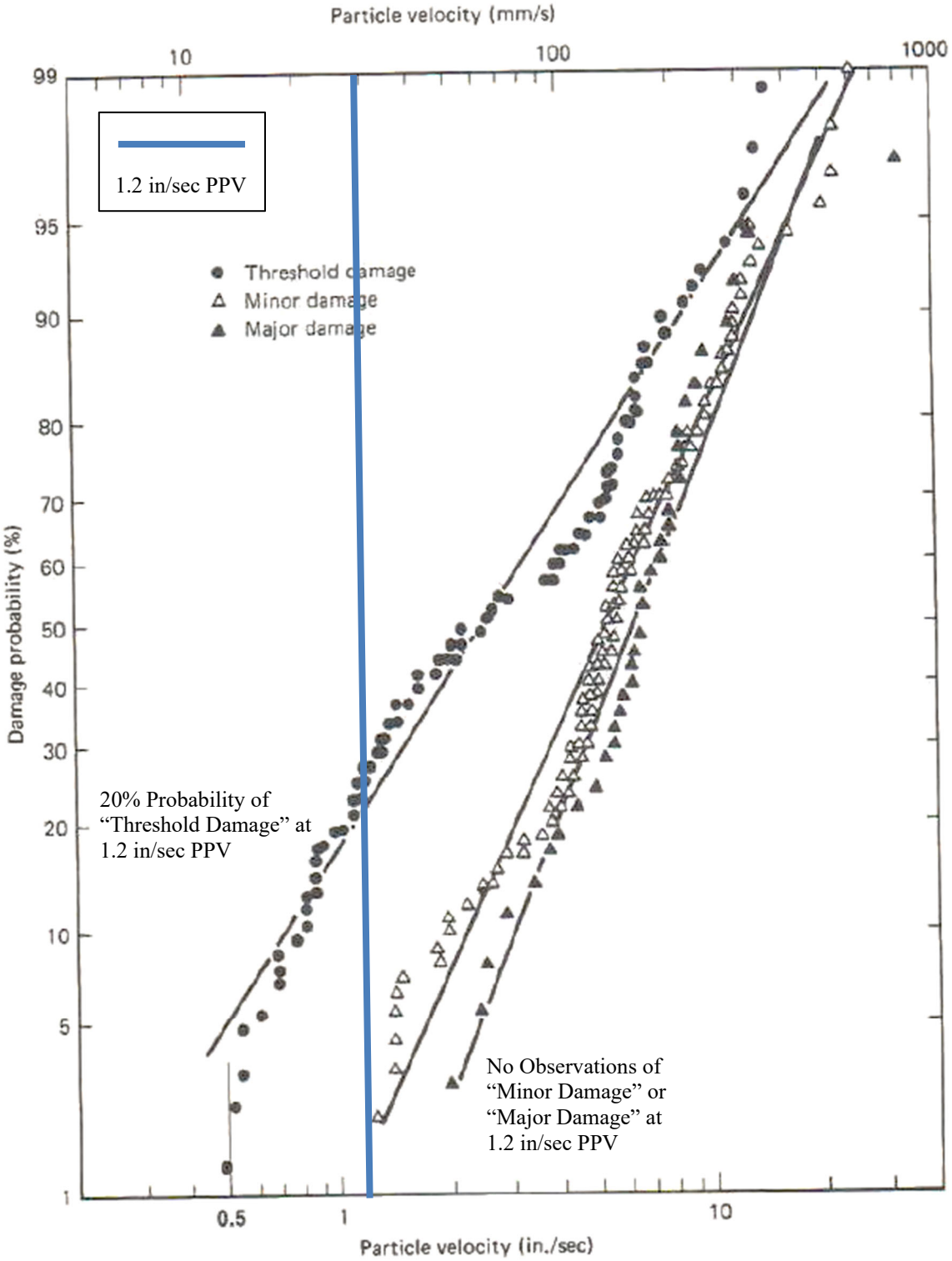
[4] https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/historic-preservation/historic-resources-inventory

The US Bureau of Mines has analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[5] The findings of this study have been applied to buildings effected by construction-generated vibrations.[6] As reported in USBM RI 8507[5] and reproduced by Dowding,[6] Figure 6 presents the damage probability, in terms of "threshold damage," "minor damage," and "major damage," at varying vibration levels. Threshold damage, which is described as cosmetic damage in this report, would entail hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage would include hairline cracking in masonry or the loosening of plaster, and major structural damage would include wide cracking or shifting of foundation or bearing walls. As shown in Figure 6, maximum vibration levels of 1.2 in/sec PPV would result in approximately 20% of threshold damage or cosmetic damage, while no minor or major damage was observed with maximum vibration levels of 1.2 in/sec PPV.

Project-generated vibration levels would be capable of cosmetically damaging the adjacent residential and commercial buildings to the east and south, but would fall below the General Plan threshold of 0.2 in/sec PPV at other surrounding conventional buildings located 30 feet or more from the project site. Neither cosmetic, minor, or major damage would occur beyond a distance of 30 feet. At these locations, and in other surrounding areas where vibration would not be expected to cause structural damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration. By use of 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.

[5] Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration form Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.
[6] Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

FIGURE 3 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996 as modified by Illingworth & Rodkin, Inc., September 2020.

Mitigation Measure 2:

The following measures shall be implemented where vibration levels due to construction activities would exceed 0.2 in/sec PPV at nearby buildings to reduce the impact to a less-than-significant level:

- Prohibit the use of heavy vibration-generating construction equipment within 30 feet of adjacent commercial or residential buildings.

- Use a smaller vibratory roller, such as the Caterpillar model CP433E vibratory compactor, when compacting materials within 30 feet of adjacent commercial buildings. Only use the static compaction mode when compacting materials within 15 feet of residential buildings.

- Avoid dropping heavy equipment and use alternative methods for breaking up existing pavement, such as a pavement grinder, instead of dropping heavy objects, within 30 feet of adjacent residential buildings.

- Designate a person responsible for registering and investigating claims of excessive vibration. The contact information of such person shall be clearly posted on the construction site.

Impact 3: **Excessive Aircraft Noise.** The project site is located approximately 6 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 6 miles north-northeast of the project site. Figure 4 shows the 2037 60 dBA CNEL noise contour of the airport according to the City's new Airport Master Plan Environmental Impact Report.[7] The project site is located outside of the map area, and 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 8 miles northeast of 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.**

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

FIGURE 4 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

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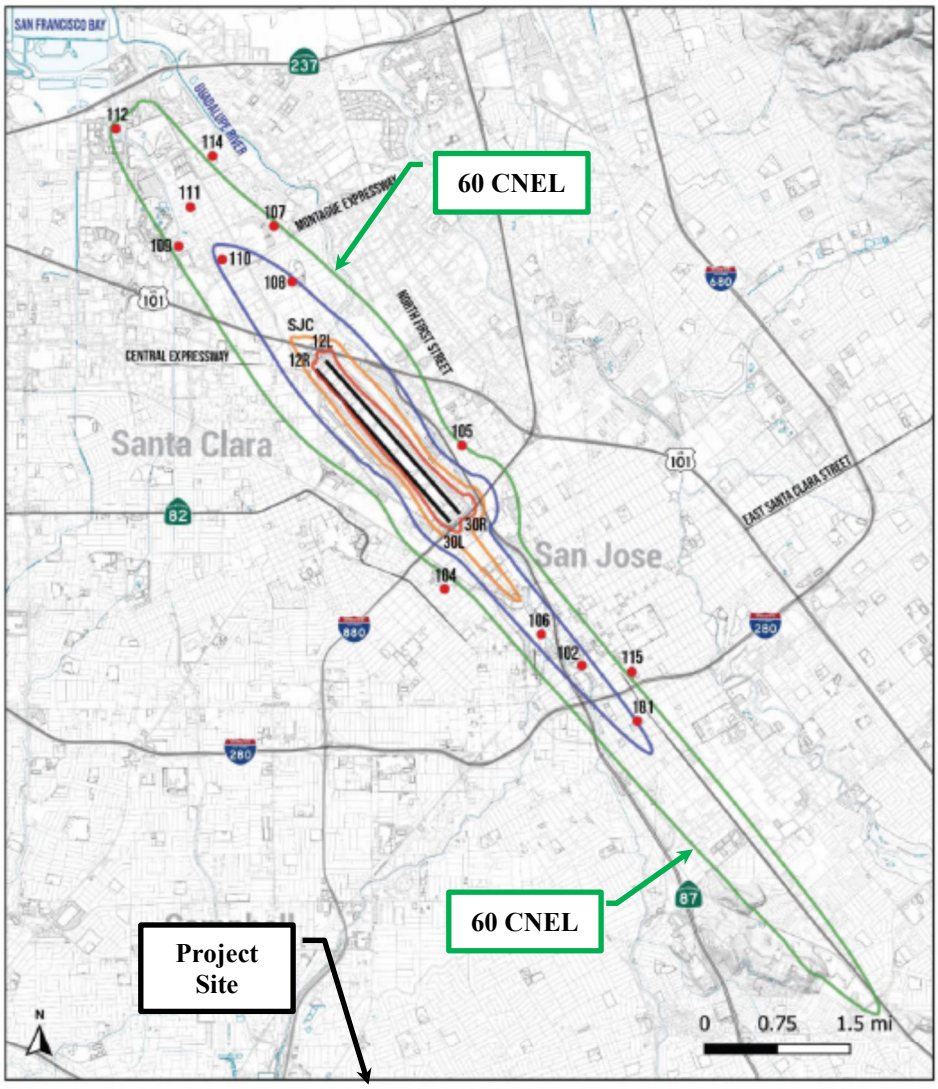

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

Figure 5 Scenario 2: With Project 2037 Noise Contour Map

Source: BridgeNet International 2019