

# ***ARBOR OFFICE PROJECT ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT***

***San José, California***

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## INTRODUCTION

The Arbor Office project proposes the construction of a 688,780 gross square foot, 14-story building at 255 West Julian Street in San José, California. The new building would include 450,000 square feet of office space and 13,000 square feet of ground-level retail space. Parking would be provided within four levels of below-grade parking. As part of the project, the existing surface parking lot would be demolished, and the existing Davidson Office building would be renovated to retain 50,000 square feet of office space. The proposed project would retrofit the ground floor of the existing building with 6,000 square feet of retail space and install a total of approximately 17,262 square feet of new outdoor patios and balconies on floors 2 through 7, including the rooftop.

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 and groundborne vibration, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the Plan Consistency Analysis section discusses noise and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to mitigate project impacts to a less-than-significant level.

## 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**

<b>Term</b>	<b>Definition</b>
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
Jet fly-over at 1,000 feet	110 dBA	Rock band
Gas lawn mower at 3 feet	100 dBA	
Diesel truck at 50 feet at 50 mph	90 dBA	Food blender at 3 feet
Noisy urban area, daytime	80 dBA	Garbage disposal at 3 feet
Gas lawn mower, 100 feet Commercial area	70 dBA	Vacuum cleaner at 10 feet 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 Quiet suburban nighttime	40 dBA	Theater, large conference room
Quiet rural nighttime	30 dBA	Library 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**

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

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

### **Regulatory Background – Noise**

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

#### **State of California**

***State CEQA Guidelines.*** The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

- (a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- (b) Generation of excessive groundborne vibration or groundborne noise levels;
- (c) For a project located within the vicinity of a private airstrip or an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

**2019 California Building 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 ( $L_{eq(1-hr)}$ ) 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**

***Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan.*** The Comprehensive Land Use Plan (CLUP) 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**

- N-1 The Community Noise Equivalent Level (CNEL) method of representing noise levels shall be used to determine if a specific land use is consistent with the CLUP.
- N-2 In addition to the other policies herein, the Noise Compatibility Policies presented in Table 4-1 shall be used to determine if a specific land use is consistent with this CLUP.
- N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (not shown in this report).
- N-6 Noise level compatibility standards for other types of land uses shall be applied in the same manner as the above residential noise level criteria. Table 4-1 presents acceptable noise levels for other land uses in the vicinity of the Airport.

Table 4 - 1

NOISE COMPATIBILITY POLICIES

LAND USE CATEGORY	CNEL					
	55-60	60-65	65-70	70-75	75-80	80-85
Residential – low density Single-family, duplex, mobile homes	*	**	***	****	****	****
Residential – multi-family, condominiums, townhouses	*	**	***	****	****	****
Transient lodging - motels, hotels	*	*	**	****	****	****
Schools, libraries, indoor religious assemblies, hospitals, nursing homes	*	***	****	****	****	****
Auditoriums, concert halls, amphitheaters	*	***	***	****	****	****
Sports arena, outdoor spectator sports, parking	*	*	*	**	***	****
Playgrounds, neighborhood parks	*	*	***	****	****	****
Golf courses, riding stables, water recreation, cemeteries	*	*	*	**	***	****
Office buildings, business commercial and professional, retail	*	*	**	***	****	****
Industrial, manufacturing, utilities, agriculture	*	*	*	***	***	****
* Generally 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. Mobile homes may not be acceptable in these areas. Some outdoor activities might be adversely affected.					
** Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Outdoor activities may be adversely affected. <u>Residential:</u> Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.					
*** Generally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor activities are likely to be adversely affected.					
**** Unacceptable	New construction or development shall not be undertaken.					

Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1

Source: Comprehensive Land Use Plan Santa Clara County, Norman Y Mineta San José International Airport, May 25, 2011, Amended May 23, 2019.

**City of San José**

**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:

**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 <sup>1</sup>						
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						

<sup>1</sup>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.

Source: Envision San José 2040 General Plan, Adopted November 1, 2011, As Amended on May 16, 2019.

**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 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**

***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 255 West Julian Street in the downtown area of San José, California. The site is bound to the west by State Route 87 (SR 87), to the east by Terraine Street, to the south by West Julian Street/West St. James Street, and to the north by a vacant lot. East of Terraine Street are residential buildings, and south of West Julian Street/West St. James Street is a commercial building and a residential building. Government buildings are located west of SR 87.

The existing noise environment at the site results primarily from vehicular traffic along SR 87. The local traffic along West Julian Street/West St. James Street and aircraft associated with Mineta San José International Airport also contribute to the noise environment at the site.

Due to the Shelter-in-Place restrictions in the Bay Area at the time of this study, traffic volumes along the surrounding roadways were reduced from typical conditions. A noise monitoring survey was not completed to document ambient noise levels during this unique time period because resultant noise levels would not be representative of typical ambient conditions. However, the project site and the surrounding area falls within the plan area for the *Downtown San José Strategy Plan 2040 EIR*.<sup>1</sup> Noise measurement data and noise contours generated for the Downtown Strategy Plan were reviewed to establish the existing noise environment.

Existing traffic noise contours, based on traffic peak hour traffic volumes provided in 2015, were generated for the Downtown Strategy Plan. Based on these data, noise levels at the project site would have ranged from 70 to 75 dBA DNL in 2015. These noise contours are shown in Figure 1. In the model, a receptor was positioned 75 feet from the centerline of the northbound SR 87 on-

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<sup>1</sup> City of San José, "Downtown San José Strategy Plan 2040 Environmental Impact Report," December 2018.

ramp at West Julian Street, which is the approximate setback of the proposed building. At this distance, noise levels in 2015 would have been approximately 74 dBA DNL.

Assuming about a 1% increase in traffic volumes along SR 87 each year, which would represent standard growth in a built-out area, noise levels by 2021 would increase by less than 1 dBA DNL.



**FIGURE 2 Project Site Plan Overlaid on a Satellite Image of the Downtown San José Area**



Source: Google Earth, 2021.

## 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 standard is 70 dBA DNL or less for the proposed commercial land uses.
- The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ( $L_{eq(1-hr)}$ ) of 50 dBA in occupied areas of nonresidential uses during any hour of operation.

The future noise environment at the site would continue to result primarily from vehicular traffic along SR 87 and the local roadways. According to the traffic study completed for the *Downtown San José Strategy Plan 2040 EIR*,<sup>1</sup> the traffic noise level increase at the project site would be 1 dBA DNL under each of the 2040 cumulative buildout alternatives.

#### *Future Exterior Noise Environment*

The proposed project includes ground-level plazas south of the existing building (arboretum plaza), between the buildings (grove plaza), and north of the new building (pop up plaza); however, the site plan does not indicate any extended uses, such as outdoor dining, would occur at these plazas. Therefore, the ground-level plazas would not be considered outdoor use areas subject to the City's exterior noise thresholds.

The project plans show balconies and small patios on levels 2 through 14. Additionally, the renovations for the existing building would also include balconies on levels 2 through 6. However, balconies and private patio decks are excluded from exterior noise thresholds, according to the City's General Plan. Therefore, these areas would not be subject to the City's exterior noise thresholds.

The renovations of the existing building would include a roof patio, which would connect to level 7 of the proposed building. This rooftop patio would potentially be used for extended outdoor use and therefore would be subject to the City's 70 dBA DNL threshold for commercial uses. The entire rooftop would be part of the patio area, with the center of the outdoor space located approximately 300 feet from the centerline of the nearest through lane along northbound SR 87. Additionally, the elevation of the rooftop over SR 87 and the staircase and boiler room located along the western edge of the roof would provide partial shielding for the rooftop patio. At the center of the rooftop patio, future exterior noise levels would be up to 68 dBA DNL. This would be compatible with the City's exterior noise thresholds of 70 dBA DNL for commercial uses.

## *Future Interior Noise Environment*

### Commercial Land Uses

Ground-level commercial retail uses and commercial offices on floors 2 through 14 are proposed as part of the project. Additionally, the existing commercial building would be renovated to include ground-level retail uses and maintain offices on floors 2 through 6. Along major expressways, such as SR 87, the peak hour noise level is typically 1 dBA lower than the DNL and typically occur during daytime hours. Therefore, the future hourly average noise levels during daytime hours of operation would be up to 75 dBA  $L_{eq}$  at the western building façade, with day-night average noise levels up to 76 dBA DNL.

Standard construction materials for commercial uses would provide about 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so that windows may be kept closed at the occupant's discretion and would provide an additional 5 dBA reduction. The standard construction materials in combination with forced-air mechanical ventilation would satisfy the daytime threshold of 50 dBA  $L_{eq(1-hr)}$ .

Spaces where lower noise levels would be desired, such as private offices and conference rooms, may benefit from additional noise control in order to meet a lower, more desirable interior noise level. Additional noise control could be accomplished by selecting higher sound-rated windows (STC 34 or greater along exterior façades).

## **NOISE IMPACTS AND MITIGATION MEASURES**

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

### **Significance Criteria**

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

- 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 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.

- A significant permanent noise level increase would occur if the project 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.
- 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 or Municipal Code.
- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.08 in/sec PPV would have the potential to result in cosmetic damage to historic buildings, and groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.
- 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 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 that is 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.

Project construction proposes work hours from 7:00 a.m. to 10:00 p.m. Monday through Friday and from 7:00 a.m. to 7:00 p.m. on Saturdays. The hours lie outside the allowable construction hours and would require a permit from the City.

Based on the existing noise contours provided in the *Downtown San José Strategy Plan 2040 EIR*, ambient noise levels at existing noise-sensitive receptors in the project vicinity would range from 70 to 75 dBA  $L_{eq}$  during daytime hours between 7:00 a.m. and 10:00 p.m.

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 demolition of the existing parking lot located at the site, substantial excavation to create the basement levels and foundations, utilities, and building construction. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. For the proposed project, pile driving is not expected.

Construction activities for individual projects are typically carried out in phases. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA  $L_{max}$  at a distance of 50 feet (see Table 4) from the equipment. Table 5 shows the average noise level ranges, by construction phase. Hourly average noise levels generated by construction are about 75 to 89 dBA  $L_{eq}$  for commercial office buildings measured at a distance of 50 feet from the center of a busy construction site. 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 often result in lower construction noise levels at distant receptors.

A detailed list of equipment expected to be used during each phase of project construction was provided and is summarized in Table 6. Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming every piece of equipment would operate simultaneously, which would represent the worst-case scenario. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power.

For each phase, the worst-case hourly average noise level, as estimated at the property line of each surrounding land use, is also shown in Table 6. For overall construction noise levels, multiple pieces of equipment used simultaneously would add together creating a collective noise source. While every piece of equipment per phase would likely be scattered throughout the site, the noise-sensitive receptors surrounding the site would be subject to the collective noise source generated by all equipment operating at once. Therefore, to assess construction noise impacts at the receiving property lines of noise-sensitive receptors, the collective worst-case hourly average noise level for each phase was positioned at the geometrical center of the site and propagated to the nearest property line of the surrounding land uses. These noise level estimates are also shown in Table 6. Noise levels in the table do not assume reductions due to intervening buildings or existing barriers. Note, for the phases requiring cement and mortar mixers, the table shows the total number expected during the phase; however, these would not all be operating at one time. For modeling worst-case scenario, six cement and mortar mixers were assumed for the trenching/foundation, building – superstructure/exterior, and sitework phases. Additionally, during pour days of the foundation, it is expected that up to six trucks would be operational on site at any given time. These truck trips are included in the noise level estimates of Table 6.

Note, all existing land uses west of SR 87 are not considered noise-sensitive receptors for this project since noise levels from SR 87 would mask all noise generated at the project site.

As shown in Table 6, ambient levels at the surrounding uses would potentially be exceeded by 5 dBA  $L_{eq}$  or more at various times throughout construction. Project construction is expected to last for a period of approximately 31 months. Since project construction would last for a period of more than one year and considering that the project site is within 500 feet of existing residential uses and within 200 feet of existing commercial uses, this temporary construction impact would be considered significant in accordance with Policy EC-1.7 of the City's General Plan.

The proposed project falls within the *Downtown San José Strategy Plan 2040 EIR* plan area, which included mitigation measures to reduce temporary construction noise levels at noise-sensitive receptors. The *Downtown San José Strategy Plan 2040 EIR* would enforce Policy EC-1.7 of the City's General Plan, which states the following:

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.

Additionally, the City requires that reasonable noise reduction measures be incorporated into the construction plan and implemented during all phases of construction activity. Accordingly, the *Downtown San José Strategy Plan 2040 EIR* requires that all projects shall implement the following standard noise control measures:

- 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, where feasible).
- The surrounding neighborhood within 500 feet 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.

Adherence to the Municipal Code requirements would minimize impacts to neighboring properties from temporary increases in ambient noise levels resulting from future construction activities. Larger projects within the *Downtown San José Strategy Plan 2040 EIR* plan area that are expected to last over one year in duration, such as the proposed project, may result in a substantial temporary noise increase at adjacent land uses and would require a “construction noise logistics plan,” in accordance with GP Policy EC-1.7. As stated in the *Downtown San José Strategy Plan 2040 EIR*, 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;
- Locate all stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from adjacent land uses;
- Locate staging areas and construction material areas as far away as possible from adjacent land uses;
- Prohibit all unnecessary idling of internal combustion engines;
- If impact driving is proposed, multiple-pile drivers shall be considered to expedite construction. Although noise levels generated by multiple pile drivers would be higher than the noise generated by a single pile driver, the total duration of pile driving activities would be reduced; (*not applicable*)

- If impact pile driving is proposed, temporary noise control blanket barriers shall shroud pile drivers or be erected in a manner to shield the adjacent land uses. Such noise control blanket barriers can be rented and quickly erected; *(not applicable)*
- If impact pile driving is proposed, foundation pile holes shall be pre-drilled to minimize the number of impacts required to seat the pile. Pre-drilling foundation pile holes is a standard construction noise control technique. Pre-drilling reduces the number of blows required to seat the pile. Notify all adjacent land uses of the construction schedule in writing; *(not applicable)*
- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem be implemented. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

With the implementation of GP Policy EC-1.7, Municipal Code requirements, and the above measures included in the *Downtown San José Strategy Plan 2040 EIR*, the temporary construction noise impact would be reduced to a less-than-significant level.

**Mitigation Measure 1a: No further mitigation required.**

**TABLE 4 Construction Equipment 50-Foot Noise Emission Limits**

Equipment Category	L <sub>max</sub> Level (dBA) <sup>1,2</sup>	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 <sup>3</sup>	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

Equipment Category	L <sub>max</sub> Level (dBA) <sup>1,2</sup>	Impact/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:

<sup>1</sup> Measured at 50 feet from the construction equipment, with a “slow” (1 sec.) time constant.

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

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

**TABLE 5 Typical Ranges of Construction Noise Levels at 50 Feet, L<sub>eq</sub> (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
<b>I</b> - All pertinent equipment present at site. <b>II</b> - Minimum required equipment present at site.								

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

**TABLE 6 Estimated Construction Noise Levels at Nearby Land Uses**

Phase of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, $L_{eq}$ (dBA)							
			Ambient Noise Levels = 70 to 75 dBA $L_{eq}$							
			East Res. (120ft)		NE Res. (280ft)		South Comm. (390ft)		SE Res. (410ft)	
			Level, dBA	Exceeds Ambient by 5 dBA or more?	Level, dBA	Exceeds Ambient by 5 dBA or more?	Level, dBA	Exceeds Ambient by 5 dBA or more?	Level, dBA	Exceeds Ambient by 5 dBA or more?
Demolition	6 days	Concrete/Industrial Saw (1) Excavator (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	78 dBA	No	71 dBA	No	68 dBA	No	68 dBA	No
Site Preparation	65 days	Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)	78-81 dBA <sup>b</sup>	Yes	71-74 dBA <sup>b</sup>	No	68-71 dBA <sup>b</sup>	No	68-71 dBA <sup>b</sup>	No
Grading/ Excavation	140 days	Excavator (2) Grader (1) Rubber-Tired Dozer (1) Concrete/Industrial Saw (2) Tractor/Loader/Backhoe (1)	81 dBA	Yes	74 dBA	No	71 dBA	No	70 dBA	No
Trenching/ Foundation	30 days	Tractor/Loader/Backhoe (1) Excavator (1) Crane (2) Cement & Mortar Mixer (700 <sup>a</sup> )	80 dBA	Yes	72 dBA	No	69 dBA	No	69 dBA	No
Building – Superstructure/ Exterior	380 days	Crane (2) Forklift (2) Aerial Lift (5) Cement & Mortar Mixer (1,755 <sup>a</sup> )	79 dBA	No	71 dBA	No	68 dBA	No	68 dBA	No
Building – Cores/ Elevators	304 days	Industrial Saw (2) Aerial Lift (5)	78-81 dBA <sup>c</sup>	Yes	71-73 dBA <sup>c</sup>	No	68-70 dBA <sup>c</sup>	No	68-70 dBA <sup>c</sup>	No
Sitework	50 days	Cement & Mortar Mixer (200 <sup>a</sup> ) Paving Equipment (8) Roller (1) Tractor/Loader/Backhoe (1)	85 dBA	Yes	78 dBA	No	75 dBA	No	75 dBA	No

<sup>a</sup>This represents total number of equipment; however, for modeling purposes, it is assumed that up to six would be operational at any given time.

<sup>b</sup>Range of hourly average noise levels reflects the site preparation phase only and in combination with the demolition phase.

<sup>c</sup>Range of hourly average noise levels reflects the building cores/elevators phase only and in combination with the building – superstructure/exterior phase.

**Impact 1b: Permanent Noise Level Increase.** The proposed project is not expected to cause a substantial permanent traffic 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 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. 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. The City’s General Plan defines the “normally acceptable” outdoor noise level standard for the nearby residential land uses to be 60 dBA DNL. Existing ambient levels, based on the measurements made in the project vicinity, exceed 60 dBA DNL. Therefore, a significant impact would occur if traffic due to the proposed project would permanently increase ambient 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.

The peak hour turning movements were provided for six intersections in the project vicinity. When the project volumes were added to each segment of the roadways in the existing traffic scenario, the existing plus project scenario was calculated. When the existing plus project scenario was compared to the existing traffic scenario, all roadway segments resulted in a noise level increase of 1 dBA DNL or less. Low existing volumes along Terraine Street, north of West Julian Street/West St. James Street, and along Old West Julian Street, east of Terraine Street, would double under existing plus project conditions; however, due to the close proximity of existing residential receptors along these roadways to SR 87, the increase in local traffic volumes would be insignificant compared to traffic noise generated along the expressway. Therefore, the calculated noise level increase along these roadway segments would be 1 dBA DNL over existing ambient conditions. The project would not result in a permanent noise increase of 3 dBA DNL or more at noise-sensitive receptors in the project vicinity. This is a less-than-significant impact.

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

**Impact 1c: Noise Levels in Excess of Standards.** The proposed project is not expected to generate noise in excess of standards established in the City’s General Plan at the nearby residential receptors. This is a **less-than-significant impact.**

### *Mechanical Equipment*

Under the City’s Noise Element, noise levels from nonresidential building equipment shall not exceed a noise level of 55 dBA DNL at receiving noise-sensitive land uses. Noise-sensitive receptors surrounding the site would include existing residences to the east, to the northeast, and to the southeast of the site, opposite Terraine Street and West Julian Street. Policies EC-1.3 and EC-1.6 shall be enforced for the proposed project.

High-rise structures typically include various mechanical equipment for heating, ventilation, and air-conditioning (HVAC) needs, as well as an emergency generator, cooling tower, etc. The site plan shows emergency generator rooms, electrical rooms, pump rooms, and mechanical rooms located

within the below-grade parking structure. Additionally, fluid coolers and exhaust vents are shown on the roof, surrounded by parapet walls and mechanical screens. At the time of this analysis, the specific mechanical equipment had not been selected, nor were specific details, such as manufacturer’s noise data for such equipment, available.

The equipment rooms located below-grade would be well-shielded from the surrounding noise-sensitive receptors. The ground-level site plan does show generator exhaust vents located within the loading zone area at the western portion of the building. The noise exposure on the exterior of the building would be below 55 dBA DNL. The surrounding residential and commercial land uses would not be exposed to generator noise levels exceeding the City’s thresholds.

The parapet walls and mechanical screens on the rooftop surrounding the fluid coolers and the elevation of the roof being about 200 feet above the ground would provide at least 20 dBA reduction. The fluid coolers would be more than 35 feet from the edge of the eastern building façade and 90 feet more from the nearest surrounding noise-sensitive property line.

Assuming up to five fluid coolers to be operating simultaneously at any given time, the combined noise level would be 56 dBA at 210 feet. These units typically operate continuously over a 24-hour period, resulting in day-night average noise levels of 62 dBA DNL at 210 feet. Table 7 summarizes the estimated noise levels due to the fluid coolers at the nearest receiving property planes surrounding the project site.

**TABLE 7 Estimated Operational Noise Levels for the Fluid Coolers, Assuming a Conservative 20 dBA Reduction from Screening**

<b>Receptor</b>	<b>Distance from Center of the Noise Source</b>	<b>Hourly Average Noise Level</b>	<b>Day-Night Average Noise Level</b>
Eastern Residential Property Plane	125 feet	41 dBA $L_{eq}$	47 dBA DNL
Northeastern Residential Property Plane	200 feet	36 dBA $L_{eq}$	43 dBA DNL
Southeastern Residential Property Plane	415 feet	30 dBA $L_{eq}$	37 dBA DNL
Southern Commercial Property Plane	400 feet	30 dBA $L_{eq}$	37 dBA DNL

Mechanical equipment noise levels are not anticipated to exceed the General Plan threshold of 55 dBA DNL at noise-sensitive land uses near the project site. This is a less-than-significant impact.

The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts with the General Plan or Municipal Code. For noise-generating land uses, the *Downtown San José Strategy Plan 2040 EIR* states the following:

The implementation of General Plan Policies EC-1.2, EC-1.3, and EC-1.9 would reduce potential impacts associated with new noise-producing land uses facilitated by the plan to a less-than-significant level. Policy EC-1.2 limits noise generation by requiring use of noise

attenuation measures, such as acoustical enclosures and sound barriers, where feasible, to avoid substantial increases to ambient noise. General Plan Policy EC-1.3 would be implemented and would require new projects to mitigate noise generation to 55 dBA DNL at the property line. Lastly, General Plan Policy EC-1.9 would be implemented and would require that studies be conducted to mitigate loud intermittent noise sources associated with new projects.

The implementation of this mitigation measure would reduce noise levels originating from the project site.

### *Truck Loading and Unloading*

The site plan shows truck loading and unloading activities occurring within the building on the ground level at the entrance of the garage ramp. All loading activities would occur on the western side of the building and would be shielded from all surrounding noise-sensitive uses by the building. Additionally, the site plan shows a garage roll-up door, which could provide additional shielding if solid, with no cracks or gaps.

Assuming all deliveries and on-site maintenance activities would occur during daytime hours between 7:00 a.m. and 10:00 p.m., a noise increase above existing conditions is not expected. Further, existing truck traffic occurs along the surrounding local roadways, and the existing noise environment ranges from 70 to 75 dBA DNL. Truck deliveries occurring at the proposed project site are not expected to generate levels exceeding 55 dBA DNL or existing ambient conditions at the nearby noise-sensitive land uses. This would be a less-than-significant impact.

**Mitigation Measure 1c: No further mitigation required.**

**Impact 2: Exposure to Excessive Groundborne Vibration.** Construction-related vibration levels are not expected to exceed applicable vibration thresholds at nearby sensitive land uses. **This is a less-than-significant impact.**

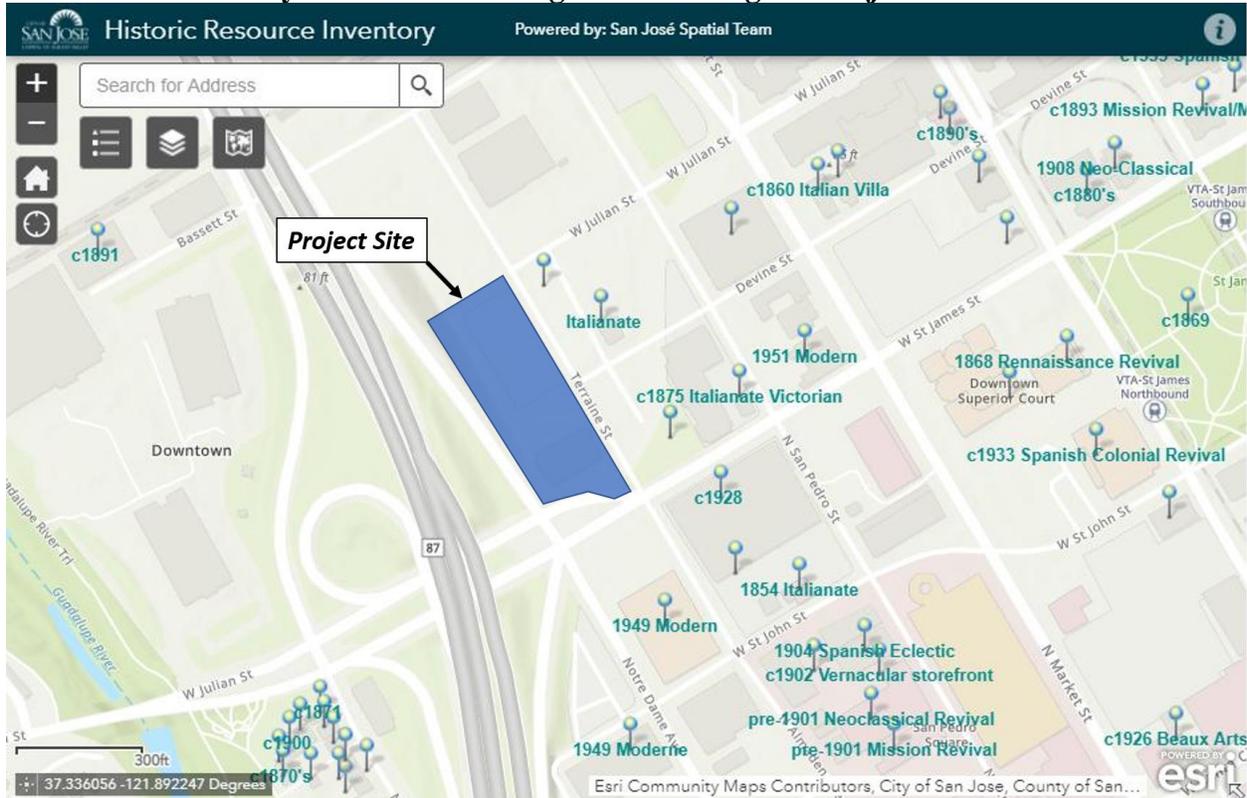
The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include demolition, site preparation work, foundation work, and new building framing and finishing. Pile driving equipment, which can cause excessive vibration, is not expected to be required for the proposed project.

The City's Historic Resource Inventory<sup>2</sup> was reviewed to identify historical structures in the project vicinity. Figure 3 shows the project site, with respect to the historical inventory map. Several of the buildings identified as historical in the City's inventory are recently constructed buildings. The residential buildings east and southeast of the project site appear to have been built within the last 20 years and therefore would not be considered historical structures. For purposes of this analysis, the buildings considered historical would include the commercial building south of the project site and law office building located at the corner of Devine Street and Element Road.

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<sup>2</sup> [www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/historic-preservation/historic-resources-inventory](http://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/historic-preservation/historic-resources-inventory)

**FIGURE 3** Nearby Historical Buildings Surrounding the Project Site



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. The vibration limits contained in this policy are conservative and designed to provide the ultimate level of protection for existing buildings in San José. As discussed in detail below, vibration levels exceeding these thresholds would be capable of cosmetically damaging adjacent buildings. 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.

Table 8 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. 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. Table 8 also summarizes the distances to the 0.08 in/sec PPV threshold for historical buildings and to the 0.2 in/sec PPV threshold for all other buildings.

**TABLE 8 Vibration Source Levels for Construction Equipment**

Equipment	PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.08 in/sec PPV (feet)	Minimum Distance to Meet 0.2 in/sec PPV (feet)
Clam shovel drop	0.202	58	26
Hydromill (slurry wall)	in soil	0.008	3
	in rock	0.017	6
Vibratory Roller	0.210	60	27
Hoe Ram	0.089	28	12
Large bulldozer	0.089	28	12
Caisson drilling	0.089	28	12
Loaded trucks	0.076	24	10
Jackhammer	0.035	12	5
Small bulldozer	0.003	1	<1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., February 2021.

The nearest building of normal conventional construction would be the residential building east of the project site (approximately 40 feet from the eastern boundary of the project boundary). This building would not be exposed to vibration levels exceeding 0.2 in/sec PPV.

The existing on-site commercial building, which shall be renovated as part of project construction would be exposed to vibration levels exceeding 0.2 in/sec PPV; however, it is expected that any damage to this building caused by project construction would be repaired as part of the project. Being an on-site receptor, exposure to excessive vibration levels would not be considered a significant impact. Therefore, the buildings designated as historical are the focus of this study.

Table 9 summarizes the vibration levels at the historical buildings surrounding the project site. Vibration levels are highest close to the source and then attenuate with increasing distance at the rate  $\left(D_{ref}/D\right)^{1.1}$ , where  $D$  is the distance from the source in feet and  $D_{ref}$  is the reference distance of 25 feet. While construction noise levels increase based on the cumulative equipment in use simultaneously, construction vibration levels would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor sharing that property line. Further, construction vibration impacts are assessed based on damage to buildings on receiving land uses, not receptors at the nearest property lines. Therefore, the distances used to propagate construction vibration levels (as shown in Table 9), which are different than the distances used to propagate construction noise levels (as shown in Table 6), were estimated under the assumption that each piece of equipment from Table 8 was operating along the nearest boundary of the project site, which would represent the worst-case scenario.

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 at the surrounding buildings; however, the nearest historical building would be located more than 100 feet east of the project site and would not be subject to vibration

levels exceeding 0.04 in/sec PPV. As shown in Table 9, the 0.08 in/sec PPV threshold would not be exceeded at the law office to the east or at the commercial building to the south.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.<sup>3</sup> The findings of this study have been applied to buildings affected by construction-generated vibrations.<sup>4</sup> As reported in USBM RI 8507<sup>3</sup> and reproduced by Dowding,<sup>4</sup> Figure 4 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 4, maximum vibration levels of 0.2 in/sec PPV or lower would result in virtually no measurable damage. With maximum vibration levels of 0.13 in/sec PPV, there would be little to no chance of threshold or cosmetic damage, and no minor or major damage would be expected at any buildings surrounding the project site.

At these locations, and in other surrounding areas where vibration would not be expected to cause cosmetic 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 (use of jackhammers and other high-power tools). 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 businesses, perceptible vibration can be kept to a minimum.

In summary, the construction of the project would not generate vibration levels exceeding the General Plan threshold of 0.08 in/sec PPV at historic properties or 0.2 in/sec PPV at conventional buildings. This would be a less-than-significant impact.

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<sup>3</sup> Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.

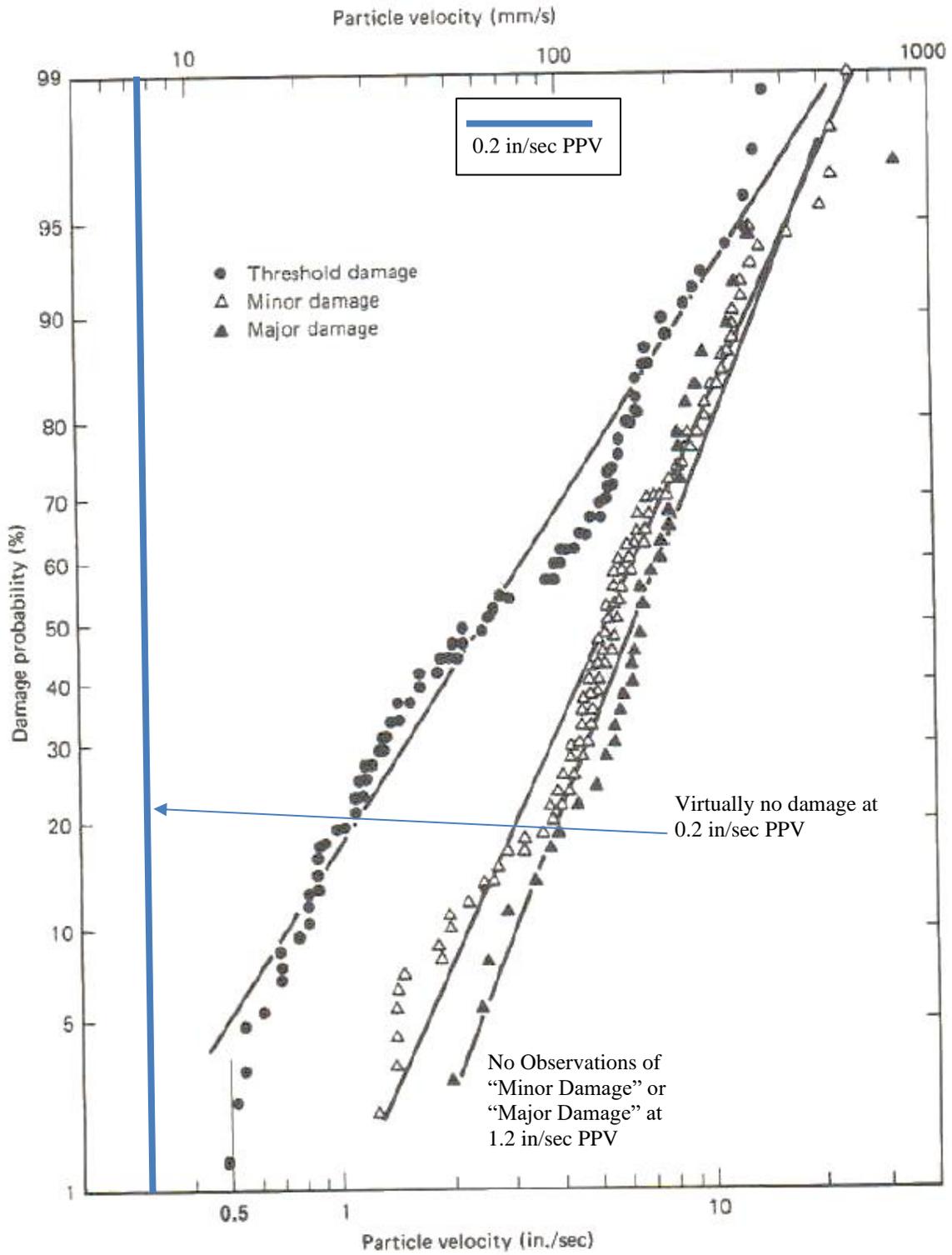
<sup>4</sup> Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

**TABLE 9      Vibration Source Levels for Construction Equipment**

Equipment	PPV (in/sec)					
	East Res. (40ft)	SE Res. (130ft)	East Historical Law Office (125ft)	South Historical Comm. (240ft)	NE Res. (60ft)	
Clam shovel drop	0.120	0.033	0.034	0.017	0.077	
Hydromill (slurry wall)	in soil	0.005	0.001	0.001	0.001	0.003
	in rock	0.01	0.003	0.003	0.001	0.006
Vibratory Roller	0.125	0.034	0.036	0.017	0.080	
Hoe Ram	0.053	0.015	0.015	0.007	0.034	
Large bulldozer	0.053	0.015	0.015	0.007	0.034	
Caisson drilling	0.053	0.015	0.015	0.007	0.034	
Loaded trucks	0.045	0.012	0.013	0.006	0.029	
Jackhammer	0.021	0.006	0.006	0.003	0.013	
Small bulldozer	0.002	0.0005	0.0005	0.0002	0.001	

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., April 2021.

**FIGURE 4** Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

**Impact 3: Excessive Aircraft Noise.** The project site is located less than 2 miles from Norman Y. Mineta International Airport but the noise environment attributable to aircraft is considered normally acceptable under the Santa Clara County ALUC noise compatibility policies for office land uses. This is a **less-than-significant** impact.

Norman Y. Mineta San José International Airport is a public-use airport located approximately 1.3 miles northwest of the project site. According to the City's new Airport Master Plan Environmental Impact Report,<sup>5</sup> the project site lies between the 60 and 65 dBA CNEL/DNL contour lines (see Figure 5). 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 aircrafts. Therefore, the proposed project would be compatible with the City's exterior noise standards for aircraft noise.

Assuming standard construction materials, aircraft noise ranging from 60 to 65 dBA DNL would result in future interior noise levels from aircraft below 50 dBA  $L_{eq(1-hr)}$ . Therefore, future interior noise at the proposed building would be compatible with aircraft noise. This would be a less-than-significant impact.

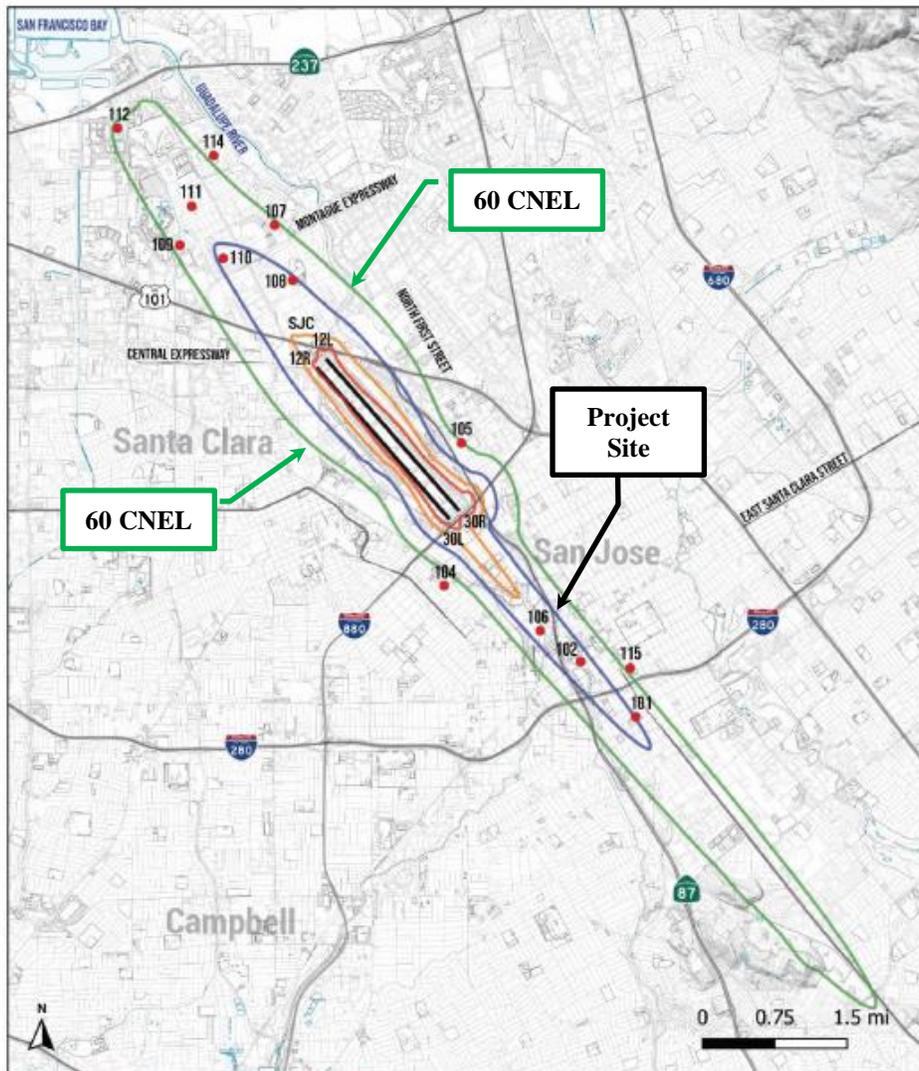
**Mitigation Measure 3: None required.**

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

**FIGURE 5 2037 CNEL Noise Contours for SJIA Relative to Project Site**

Figure 5  
Scenario 2: With Project 2037 Noise Contour Map



- 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

## Cumulative Impacts

Cumulative noise impacts would include cumulative traffic noise increases and temporary construction noise from cumulative construction projects. Cumulative traffic noise increases due to the proposed project was studied in the *Downtown San José Strategy Plan 2040 EIR*. Therefore, no further cumulative traffic noise increases would occur due to the proposed project.

Due to the close proximity of SR 87, noise-sensitive receptors located within 1,000 feet of the project site would be exposed to a noisy existing ambient environment. From the City's website,<sup>6</sup> four planned or approved projects are located within 1,000 feet of the proposed project. These projects are identified in Figure 6. The planned or approved construction projects shown in blue in Figure 6 include:

- **Silvery Towers** – this project is located at 188 West St. James Street, which is about 130 feet southeast of the project site. This project is currently under construction and is expected to be completed by the time Arbor Office begins construction. Additionally, future occupants of this project site were treated as receptors in this report.
- **North San Pedro Tower 3** – this project adjoins the Arbor Office site to the north. This 18-story residential building shall contain 313 residential condos and 1,400 square feet of ground-level retail. This multi-family residential building has been approved by the City of San José; however, the construction schedule for this project is unknown at this time. Cumulative construction is therefore not assumed.
- **Aviato** – located at 199 Bassett Street, this approved project would include an 18-story tower with 803 residential units and 3,800 square feet of ground-level retail. This site is 460 feet northeast of the project site, at the corner of Terraine Street and Bassett Street. The construction schedule for this project is also unknown at this time, and cumulative construction is therefore not assumed.
- **The Carlisle** – this project site is approximately 740 feet south of the Arbor Office site and is located at the corner of Notre Dame Avenue and Carlisle Street. This project consists of a mixed-use 21-story building with 220 residential units, 4,000 square feet of commercial space, and 70,000 square feet of office space. This project would not share noise-sensitive receptors with the Arbor Office Project.

The existing residential building located east of Terraine Street, between Old West Julian Street and Bassett Street, would be considered a sensitive receptor during construction activities at the Arbor Office site, the North San Pedro Tower 3 site, and the Aviato site. However, cumulative construction activities are not assumed at this time. Additionally, all of the identified project sites are located within the boundary of the *Downtown San José Strategy Plan 2040 EIR*. According to the Strategy Plan, implementation of the construction noise and vibration mitigation measures in combination with Policies EC-1.7 and EC-2.3 of the City's General Plan and the construction allowable hours identified in the City's Municipal Code would reduce construction occurring within the Plan Area to a less-than-significant impact. Each individual project includes measures

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<sup>6</sup> <https://gis.sanjoseca.gov/maps/devprojects/>

to further reduce noise and vibration levels emanating from the individual sites. With the implementation of construction noise and vibration mitigation measures included in the *Downtown San José Strategy Plan 2040 EIR* and the construction noise and vibration mitigation measures from the individual projects, construction noise and vibration levels would be reduced as much as possible at all surrounding sensitive receptors during construction of each individual project. Therefore, cumulative construction impacts would be less-than-significant.

**FIGURE 6** Planned or Approved Construction Projects within 1,000 feet of the Proposed Project Site

