ICON-ECHO MIXED-USE TOWERS NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The Icon-Echo Mixed-Use Towers project proposes the construction of two towers connected on floors one through four at a site located along North 4th Street between East Santa Clara Street and East St. John Street in San José, California. The north tower would include up to 415 residential units located on up to 27 floors. The south tower would be 21 stories tall and would include approximately 525,000 gross square-feet of office space and a total of 8,500 square feet of ground-level retail space. One level of below-grade parking and four floors of above-grade parking for the residential and office uses would also be included in the proposed project. The site is currently developed with a gas station, commercial/retail, and a church, which would be demolished as part of the project.

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 ambient noise conditions in the project vicinity; 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 to 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 to 62 dBA DNL with open windows and 65 to 70 dBA DNL if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

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 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60 to 70 dBA. Between a DNL of 70 to 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 to 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	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 Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

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

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. Residential. 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:

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.

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-2.1 Near light and heavy rail lines or other sources of ground-borne vibration, minimize vibration impacts on people, residences, and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration. Require new development within 100 feet of rail lines to demonstrate prior to project approval that vibration experienced by residents and vibration sensitive uses would not exceed these guidelines.

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 along North 4th Street between East Santa Clara Street and East St. John Street in the downtown area of San José, California. Adjoining the site to the west are two existing office buildings, a residential building, and a commercial building. To the east, opposite North 4th Street, are two residential buildings and a commercial building. Commercial uses are located north of the site, opposite East St. John Street, and to the south of the site, opposite East Santa Clara Street. The project site is currently developed with a gas station, commercial/retail, and a church.

The existing noise environment at the site results primarily from local vehicular traffic along East St. John Street, East Santa Clara Street and North 4th Street. Distant SR 87 traffic noise and aircraft associated with Mineta San José International Airport also contribute to the noise environment.

Due to the COVID-19 pandemic, 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.*[1] Measurements and noise contours generated for the Downtown Strategy Plan were reviewed to establish the existing noise environment.

As part of the ambient noise measurements made for the Downtown Strategy Plan in 2017, two long-term noise measurements were made near the project site: LT-9 was made approximately 25 feet from the centerline of North 4th Street between East St. John Street and East St. James Street; and LT-10 was made approximately 25 feet from the center of East St. John Street between North 4th Street and North 5th Street. Both measurements were made between April 25, 2017 and April 27, 2017. The day-night average noise levels at LT-9 and LT-10 were 68 and 63 dBA DNL, respectively, during this timeframe. The hourly average noise levels at LT-9 ranged from 61 to 70 dBA L_{eq} during daytime hours between 7:00 a.m. and 10:00 p.m. and from 50 to 66 dBA L_{eq} during

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

the nighttime hours between 10:00 p.m. and 7:00 a.m. The hourly average noise levels at LT-10 ranged from 56 to 68 dBA L_{eq} during daytime hours and from 48 to 61 dBA L_{eq} during the nighttime hours. Additionally, the existing traffic noise contours, based on traffic peak hour traffic volumes provided in 2015, were generated for the Plan Area. Note that no traffic data was provided for North 4th Street, therefore, the measured noise levels are more reliable in establishing existing conditions along North 4th Street. Noise contours are shown in Figure 1. Figure 2 shows an aerial image of the project site, with LT-9 and LT-10 identified, and Figures 3 and 4 show the daily trends for each long-term measurement, respectively.

FIGURE 1 Existing (2015) Noise Contours for the Downtown Strategy Plan Area

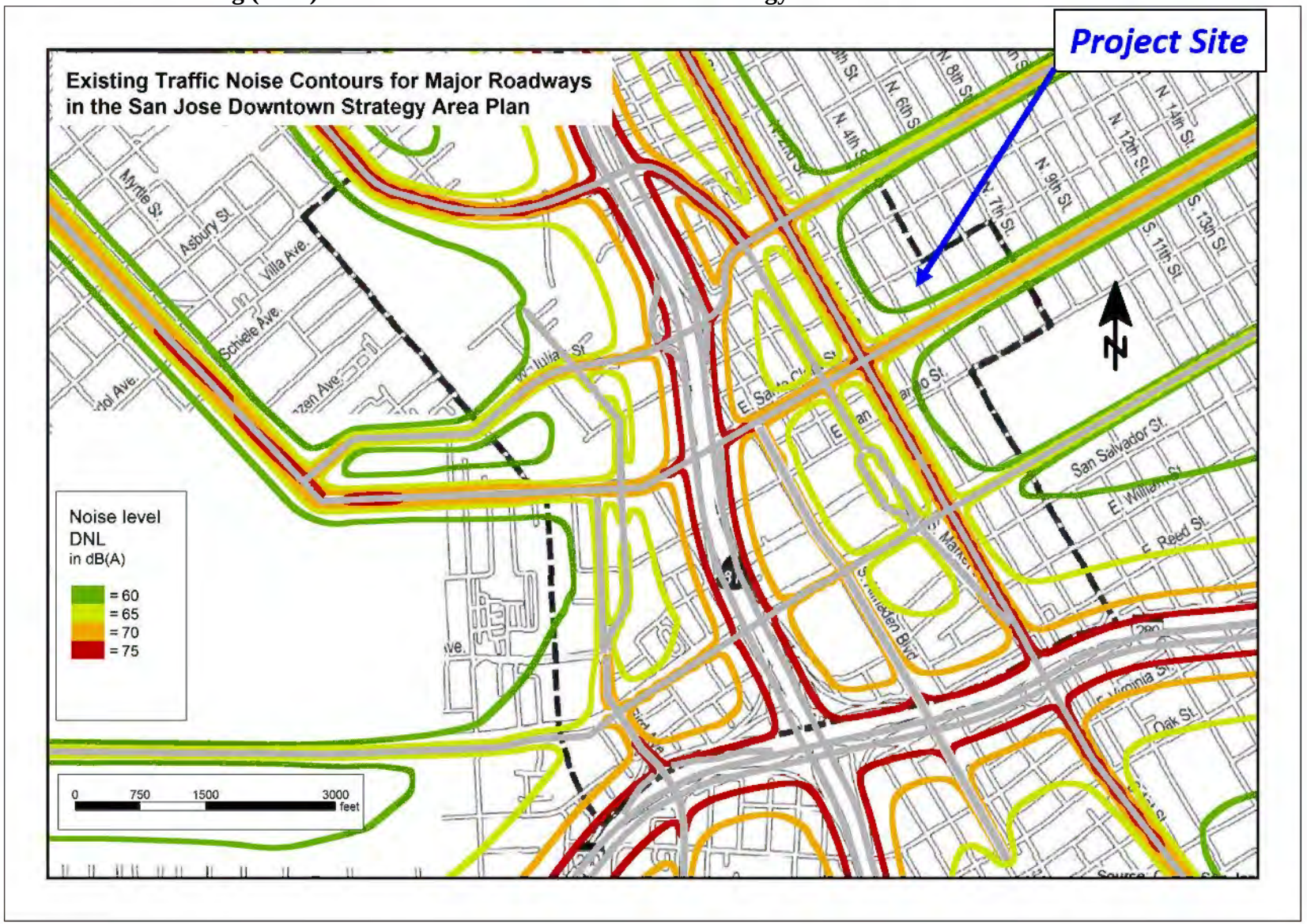
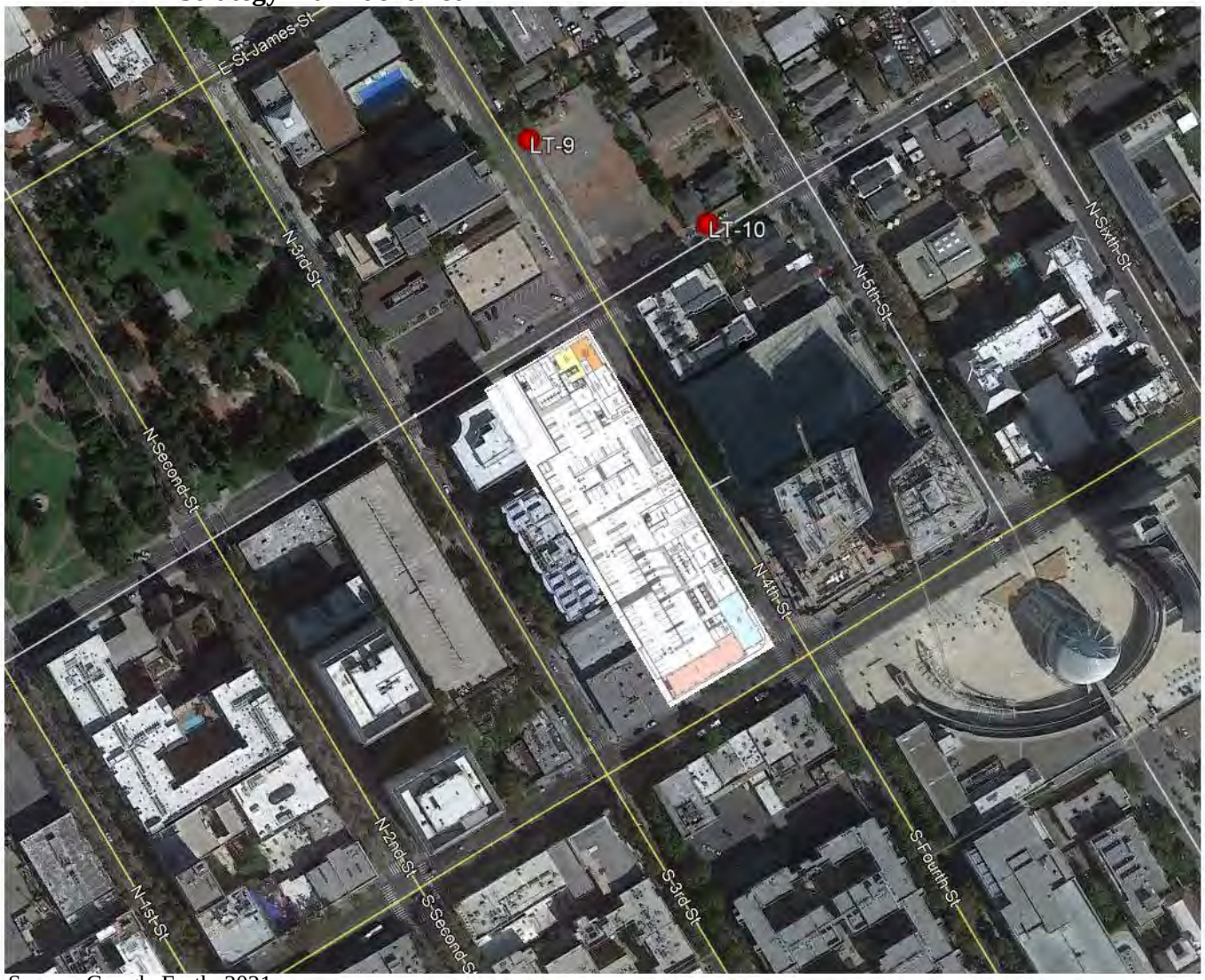


FIGURE 2 Aerial Image of the Project Site and Surrounding Area with the Locations of LT-9 and LT-10 of the Downtown Strategy Plan Identified



Source: Google Earth, 2021.

FIGURE 3 Daily Trend in Noise Levels for LT-9 from April 25, 2017 through April 27, 2017

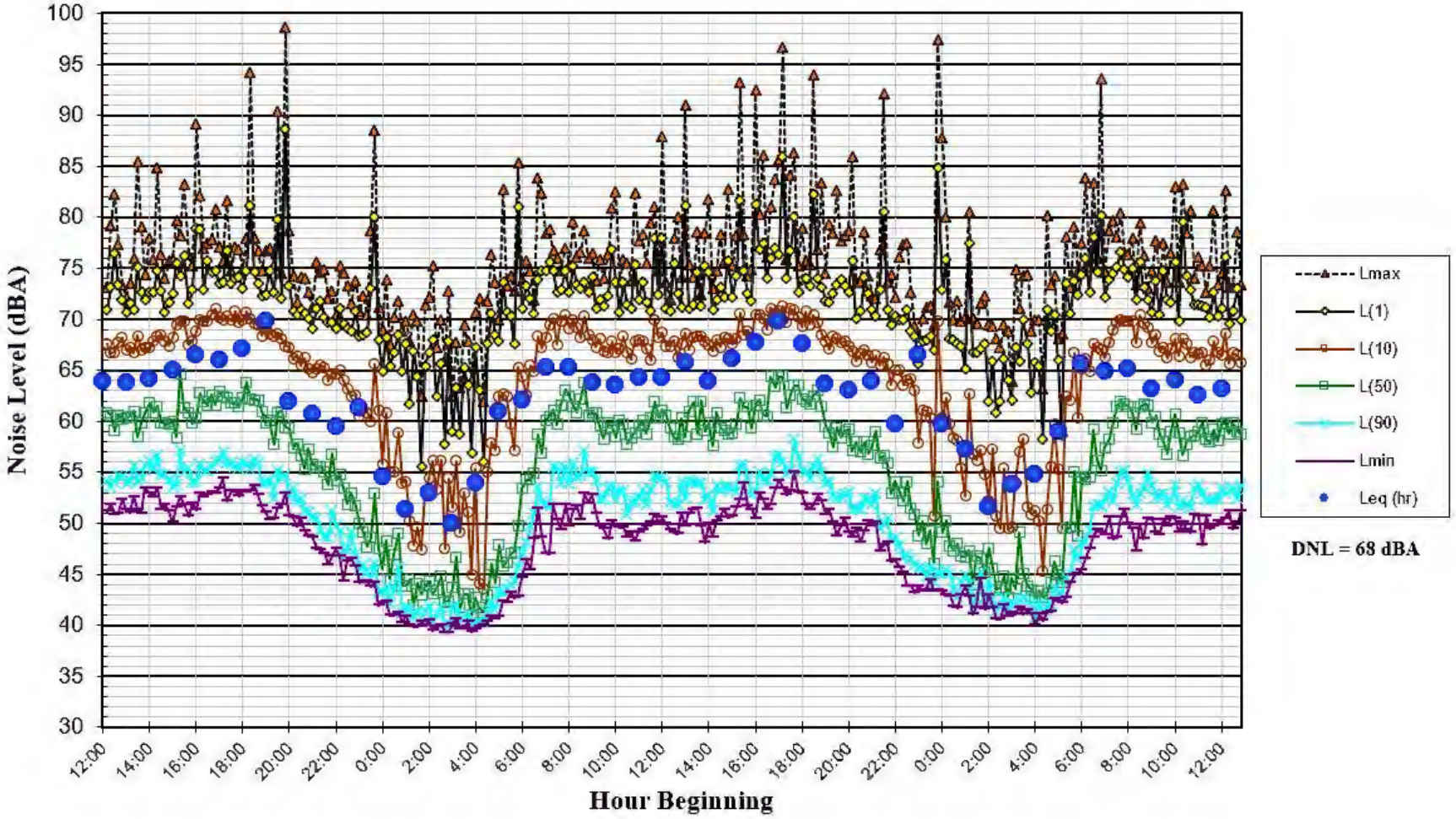
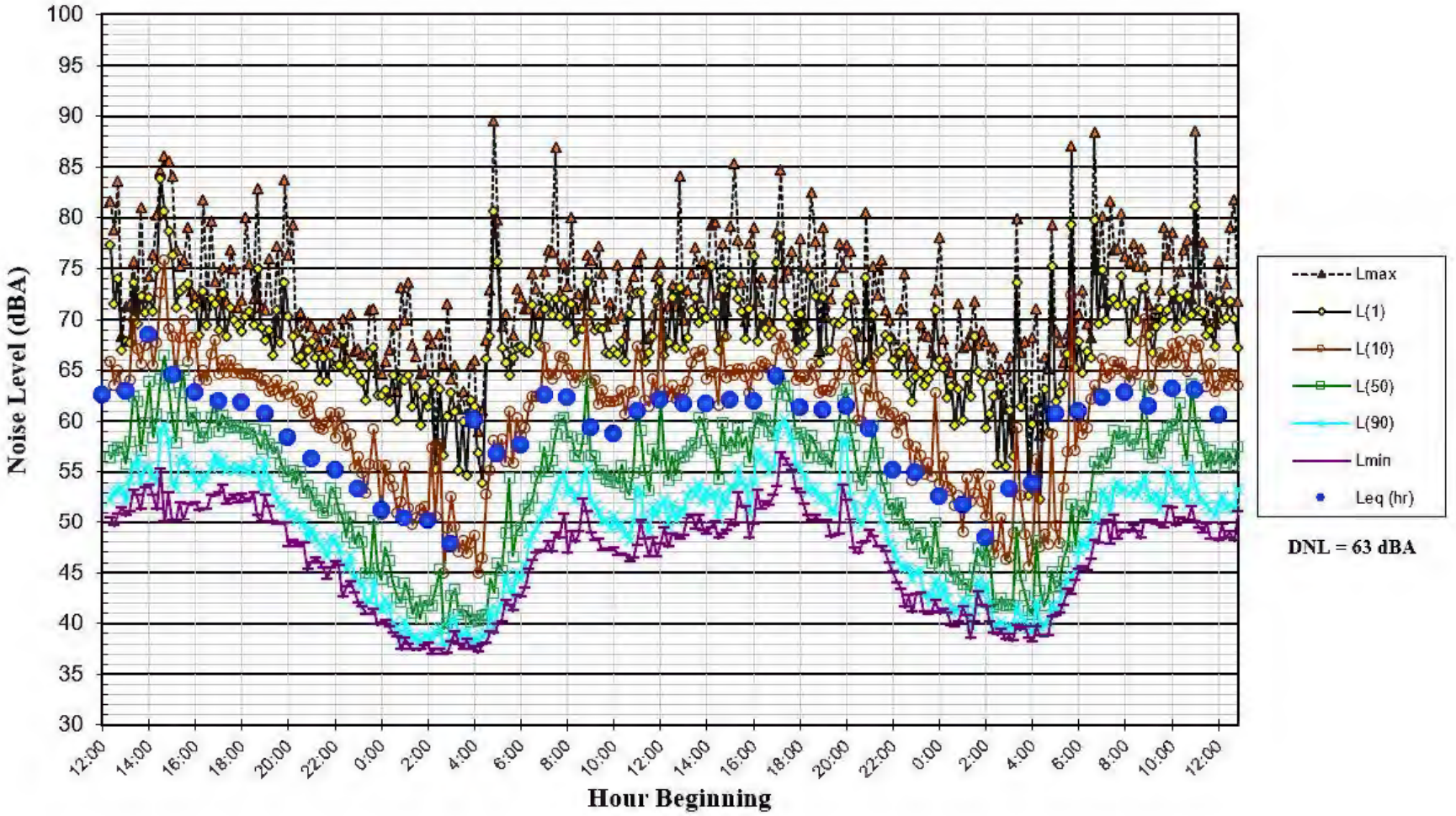


FIGURE 4 Daily Trend in Noise Levels for LT-10 from April 25, 2017 through April 27, 2017



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 60 dBA DNL or less for the proposed residential land uses.

- The City's acceptable interior noise level standard is 45 dBA DNL or less for the proposed residential land uses.

- 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 ($L_{eq\ (1\text{-}hr)}$) 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 nearby roadways. According to the traffic study completed for the *Downtown San José Strategy Plan 2040 EIR*,[1] the traffic noise level increase at the project site would be 2 dBA DNL above existing conditions under each of the 2040 cumulative buildout alternatives.

Future Exterior Noise Environment

The proposed project includes two towers connected by a shared parking structure. The south tower, located at the corner of East Santa Clara Street and North 4th Street, shall consist of ground-level commercial retail facing East Santa Clara Street and office space on levels three through 20. The north tower, located at the corner of East St. John Street and North 4th Street, shall consist of a multi-family residential building with units on levels three through 24. The project plans do not identify sensitive outdoor activity areas related to the ground-level retail; however, there are several terraces associated with both residential and office uses. These are discussed below.

Residential Land Uses

Common use outdoor areas associated with the residential component of the project proposes a 5th floor amenity deck located on the interior of the project site, which would include a fitness deck, a seating area with a trellis structure, a turf field, and an infinity pool; a 5th floor seating area in the northeastern corner of the building; and a roof terrace on the 24th floor located along the northern façade of the building.

The amenity deck on the 5th floor would be mostly shielded from the surrounding roadways by the proposed residential and office towers, as well as existing buildings to the west of the project site. The seating area with the trellis structure would stretch to the eastern façade of the building and would have some direct exposure to traffic noise along North 4th Street. The center of the seating area with the trellis structure would be approximately 100 feet from the centerline of North 4th Street. Along the eastern edge of the seating area with the trellis structure, future exterior noise levels would be up to 60 dBA DNL; however, future exterior noise levels would be below 60 dBA DNL towards the center of the seating area, as well as the other outdoor use spaces included in the 5th floor amenity deck.

An additional seating area located in the northeastern corner of the building on the 5th floor was also identified in the site plan dated November 5, 2021. Due to the location of this seating area, the occupants would be exposed to traffic noise from both East St. John Street and North 4th Street; however, the elevation of the outdoor use area would provide partial shielding for occupants located five feet or more from the northern and eastern edges. The center of the seating area, which is where exterior noise level thresholds are typically enforced, would be approximately 40 feet south of the centerline of East St. John Street and approximately 55 feet west of the centerline of North 4th Street. While noise levels at the northeastern edge of the 5th floor seating area would be up to 64 dBA DNL, future exterior noise levels at the center of the outdoor use area would be below 60 dBA DNL, meeting the City's threshold for residential uses.

The roof terrace would be located along the northern façade, with shielding from rooftop residential units along the eastern edge of the terrace. Due to the elevation of this terrace above roadways below, the center of the outdoor space would be adequately shielded and future exterior noise levels at the roof terrace would be below 60 dBA DNL.

The future noise levels at the centers of the outdoor use areas associated with the residential component of the proposed project would meet the City's normally acceptable threshold of 60 dBA DNL.

Commercial Land Uses

Terraces associated with the office building are located on levels 3, 5, 9 through 21 (roof). The 3rd floor terrace would be located in the southwestern corner of the office building. While the terrace would have direct line-of-sight to East Santa Clara Street, the elevation of the outdoor use space, as well as the proposed building and adjacent existing commercial building would provide partial shielding from the traffic noise at the center of the terrace, which would be set back approximately 60 feet from the centerline of the roadway. At the southern edge of the terrace, future exterior noise levels would be up to 72 dBA DNL; however, at the center of the terrace where exterior noise thresholds would be enforced, future exterior noise levels would be below 70 dBA DNL. Traffic noise levels typically reduce 1 dBA every two stories above the ground. Based on the additional elevation of the other terraces and the setbacks of the centers of these spaces, future exterior noise levels at the center of the remaining terraces associated with the office tower would be below 70 dBA DNL. This would satisfy the City's normally acceptable threshold for commercial uses.

Future Interior Noise Environment

Residential Land Uses

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA DNL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Residential units are located on floors 3 through 24 of the proposed residential building on the north portion of the project site. Units located along the eastern façade nearest North 4th Street would be set back from the centerline of the roadway by approximately 45 feet. At this distance, the units facing North 4th Street would be exposed to future exterior noise levels up to 68 dBA DNL. Assuming windows to be partially open, future interior noise levels in these units would be up to 53 dBA DNL.

Units along the northern façade would be set back approximately 25 feet from the centerline of East St. John Street. At this distance, the units facing East St. John Street would be exposed to future exterior noise levels would range from 65 to 68 dBA DNL. Assuming windows to be partially open, future interior noise levels in these units would range from 50 to 53 dBA DNL.

To meet the interior noise requirements set forth by the City of San José of 45 dBA DNL, implementation of noise insulation features would be required.

Commercial Land Uses

Ground-level commercial retail uses and commercial offices on floors 3 through 20 are proposed as part of the project. The setbacks from the centerlines of North 4th Street and East Santa Clara Street are 45 and 50 feet, respectively. Based on the results of *Downtown San José Strategy Plan 2040 EIR,* daytime hourly average noise levels at the ground level of the building exterior would be up to 74 dBA L_{eq} at the southern building façade, with day-night average noise levels up to 72 dBA DNL. Noise levels decrease approximately 1 dBA every two stories; therefore, the daytime hourly average noise levels and day-night average noise level at the upper floors would be lower.

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 $L_{eq(1\text{-}hr)}$.

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 Insulation Features to Reduce Future Interior Noise Levels

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

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

- Preliminary calculations indicate that residential units along the eastern building façade would require windows and doors with a minimum rating of 28 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

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

Conditions of Approval

Interior Noise Standard for Residential Development. The project applicant shall prepare final design plans that incorporate building design and acoustical treatments to ensure compliance with State Building Codes and City noise standards. A project-specific acoustical analysis shall be prepared to ensure that the design incorporates controls to reduce interior noise levels to 45 dBA DNL or lower within the residential unit and to 50 dBA $L_{eq(1\text{-}hr)}$ or lower within nonresidential interiors. The project applicant shall conform with any special building construction techniques requested by the City's Building Department, which may include sound-rated windows and doors, sound-rated wall constructions, and acoustical caulking.

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 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.

- 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.

Based on the 2017 ambient measurements 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 56 to 70 dBA L_{eq} during daytime hours.

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 gas station, commercial/retail, and church located at the site, excavation to create the basement level 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, which generates excessive noise levels, 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 hourly average noise level ranges, by construction phase, typical for various types of projects. Hourly average noise levels generated by construction are about 75 to 89 dBA L_{eq} for mixed-use 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 by the applicant for this analysis 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 was estimated at the property line of each surrounding land use. 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 Table 6 do not assume reductions due to intervening buildings or existing barriers.

TABLE 4 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.

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 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 = 56 to 70 dBA L_{eq}							
			West Res. & Comm. (75ft)		East Res. & Comm. (165ft)		North Comm. (355ft)		South Comm. (345ft)	
			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	1/3/2023-3/4/2023	Concrete/Industrial Saw (5) Excavator (2) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	87	Yes	80	Yes	74	No	74	No
Site Preparation	3/4/2023-4/3/2023	Grader (1) Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)	83	Yes	76	Yes	69	No	70	No
Grading/ Excavation	4/3/2023-7/2/2023	Excavator (2) Grader (1) Rubber-Tired Dozer (1) Concrete/Industrial Saw (4) Tractor/Loader/Backhoe (1)	87	Yes	80	Yes	73	No	74	No
Trenching/ Foundation	7/2/2023-9/30/2023	Tractor/Loader/Backhoe (1) Excavator (1)	78	Yes	71	No	65	No	65	No
Structure	9/30/2023-9/24/2024	Crane (1)	69	No	62	No	56	No	56	No
Building – Exterior	9/24/2023-4/22/2025	Crane (1) Forklift (10) Generator Set (4) Tractor/Loader/Backhoe (3) Welder (8)	85	Yes	78	Yes	71	No	72	No
Building – Interior/ Architectural Coating	4/22/2025-11/3/2025	Air Compressor (10) Aerial Lift (12)	81	Yes	75	Yes	68	No	68	No
Paving	11/3/2025-1/2/2026	Cement & Mortar Mixer (2) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (1)	82	Yes	76	Yes	69	No	69	No

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 36 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 as part of their Standard Permit Condition. The following measures shall be included as part of the proposed project construction:

- Limit construction hours to between 7:00 a.m. and 7:00 p.m., Monday through Friday, unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence.

- Construct solid plywood fences around ground level construction sites adjacent to operational businesses, residences, or other noise-sensitive land uses.

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

- Prohibit unnecessary idling of internal combustion engines.

- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses.

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

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

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

- If complaints are received or excessive noise levels cannot be reduced using the measures above, erect a temporary noise control blanket barrier along surrounding building facades that face the construction sites.

- Designate a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

- Limit construction 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.

Further, the proposed project falls within the *Downtown San José Strategy Plan 2040 EIR*, which requires that all projects shall implement the following additional standard noise control measures:

- 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.

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:

- Locate staging areas and construction material areas as far away as possible from adjacent land uses;

- 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)*

With the implementation of GP Policy EC-1.7, Municipal Code requirements, City's Standard Permit Conditions, 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.

Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards. The proposed project would not result in a substantial permanent noise level increase or exceed applicable standards at the noise-sensitive receptors 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 substantially increase noise levels at existing sensitive receptors in the project 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 at residences; or b) the noise

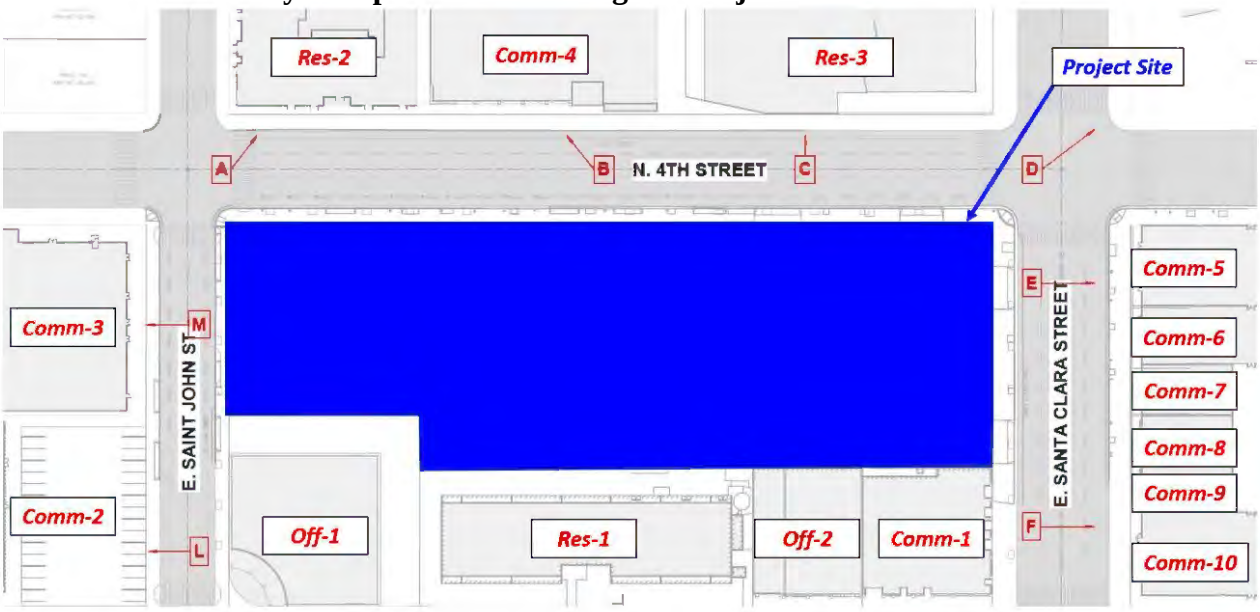
level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater at residences. Noise levels at sensitive land uses exceed 60 dBA DNL; therefore, a significant impact would occur if traffic or operational noise due to the proposed project would permanently increase ambient levels by 3 dBA DNL.

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 an existing residential building to the west and existing and future residential buildings to the east, opposite North 4th Street. While the proposed project does include a residential component, the mixed-use building equipment would be used by both the residential and commercial uses; conservatively, Policies EC-1.3 and EC-1.6 shall be enforced for the proposed project.

While the Municipal Code does not include noise performance standards for Downtown Primary Commercial Zoning District developments, within which this site falls, performance standards included in Section 20.40.600 of the Municipal Code are conservatively used in this study to provide a noise limit of 60 dBA at receiving commercial uses and 55 dBA DNL at receiving residential uses.

The surrounding land uses, which would be considered receptors for this analysis, are identified in Figure 5.

FIGURE 5 Nearby Receptors Surrounding the Project Site



Project Traffic Increase

The traffic study included peak hour turning movements for the existing traffic volumes and project trips at four intersections in the vicinity of the project site. The peak hour project trips were added to the existing traffic volumes to establish the existing plus project traffic scenario. By comparing the existing plus project traffic scenario to the existing scenario, the project's contribution to the overall noise level increase was determined to be 2 dBA DNL or less along each roadway segment in the project vicinity, as summarized in Table 7. Therefore, the project would not result in a permanent noise increase of 3 dBA DNL or more at noise-sensitive receptors in the project vicinity.

TABLE 7 Estimated Noise Level Increases of Existing Plus Project Traffic Volumes Over Existing Volumes at Receptors in the Project Vicinity

Roadway	Segment	Estimated Noise Level Increase
4th Street	North of St. John Street	0 dBA DNL
	St. John Street to Santa Clara Street	1 dBA DNL
	South of Santa Clara Street	0 dBA DNL
Santa Clara Street	East of 4th Street	0 dBA DNL
	4th Street to 3rd Street	1 dBA DNL
	West of 3rd Street	0 dBA DNL
St John Street	East of 4th Street	0 dBA DNL
	4th Street to 3rd Street	0 dBA DNL
	West of 3rd Street	2 dBA DNL
3rd Street	North of St. John Street	0 dBA DNL
	St. John Street to Santa Clara Street	1 dBA DNL
	South of Santa Clara Street	0 dBA DNL

Mechanical Equipment

The ground-level parking garage shared by both towers would include transformer rooms, electrical equipment rooms, and emergency generator rooms for both the residential and commercial office towers. Additionally, the roof plan of the residential tower shows a heat pumps, a cooling tower, air cooled chillers, and solar panels. The roof plan for the office tower shows air handling units, heat pumps, air cooled chillers, and solar panels.

The equipment rooms located on the basement level of both buildings would be underground and well-shielded from the surrounding noise-sensitive receptors. Noise from these mechanical equipment units would not be expected to generate noise levels of 55 dBA DNL at the surrounding residences or exceed 60 dBA DNL at the surrounding commercial properties.

<u>Ground-Level Mechanical Equipment</u>

The ground-level transformer room in the residential building and the substation room in the office building would both be located along the eastern building façade. Assuming no windows in these rooms, the building façade would provide at least 20 dBA reduction due to the room enclosures. Typically, transformers up to 1,000 kVA generate noise levels up to 64 dB, as measured at 1 meter (3.28 feet). Assuming the transformer runs continuously during daytime and nighttime hours, the day-night average noise level would be 50 dBA DNL at a distance of 1 meter (3.28 feet), which includes the 20 dBA reduction due to the wall assembly. The nearest receiving land uses with direct line-of-sight to these rooms would be the residential and commercial buildings to the east of the project site, opposite North 4th Street. These uses would be 80 feet or more from the transformer room and substation. At 80 feet, hourly average noise levels due to transformers would be below 20 dBA L_{eq}, and day-night average noise levels would be below 25 dBA DNL. All other ground-level electrical rooms would generate noise levels lower than transformers.

Both emergency generators proposed for the project would have a capacity of 1,000 kW. Generators of this size would typically generate noise levels up to 89 dBA at a distance of 50 feet with a standard weather enclosure. With the inclusion of Level 1 or Level 2 sound enclosures, noise levels could be reduced to 65 dBA at 50 feet from the generator room. Emergency generators are typically tested monthly for a period of one hour between 7:00 a.m. and 10:00 p.m. Further, it is assumed that the City's thresholds would not apply during emergency conditions when the generators may run continuously during daytime and nighttime hours. During the testing periods, the threshold would apply. The generator room for the residential building would be located along the northern building façade, while the generator room for the office building would be located along the eastern building façade. Assuming worst-case scenario conditions, testing for both generators would occur in the same 24-hour period. Table 8 summarizes the hourly average noise levels and day-night average noise levels expected at the property lines of the surrounding receptors, assuming sound enclosures are included for the generators. This is incorporated into the results of Table 8.

Res-1, Off-2, and Comm-1 of Figure 5 are not included in the results of Table 8. These receptors would not have direct line-of-sight to the generator rooms and would be well-shielded. Noise levels due to generator testing would be less than those shown in the table.

TABLE 8 Estimated Operational Noise Levels for Monthly Tests of the Emergency Generator, with the Inclusion of Sound Enclosures

Receptor	Distance from Center of the Res. Generator Room	L_{eq} from Res. Generator, dBA	Distance from Center of the Office Generator Room	L_{eq} from Office Generator, dBA	Combined DNL, dBA	Noise Level Increase, dBA DNL
Off-1	55 feet	64	230 feet	52	51	0
Comm-2 & Comm-3	70 feet	62	365 feet	48	48	0
Res-2	155 feet	55	185 feet	54	44	0
Comm-4	205 feet	53	95 feet	59	47	0
Res-3	365 feet	48	110 feet	58	45	N/A[a]
Comm-5 to Comm-10	635 feet	43	350 feet	48	36	0

[a] Res-3 is not an existing receptor. These residential towers would be occupied by the time the proposed project is completed; however, the residents would not be exposed to a noise level increase due to the proposed project.

While the hourly average noise levels during testing of the emergency generators would potentially exceed 55 dBA, this exceedance would only occur for one hour every month, and the 55 dBA DNL threshold would not be exceeded. For all existing receptors, the noise level increase due to emergency generator noise would not be measurable or detectable (0 dBA DNL increase).

Rooftop Mechanical Equipment

The mechanical equipment located on the rooftops would be approximately 265 feet above the ground for both towers. The buildings adjoining the project site to the west would be a maximum of 110 feet above the ground. Therefore, the elevation of the rooftop equipment would provide at least 20 dBA reduction, assuming a minimum setback of 10 feet from the western edge of the buildings, as indicated in the site plan. Additionally, the commercial buildings to the north and to the south of the project site, as well as Res-2 and Comm-4 (see Figure 5) to the east, would be 70 feet or less and would also receive a minimum noise level reduction of 20 dBA from the elevation of the rooftop equipment. However, Res-3 in Figure 5 is a residential tower currently under construction. This tower shall be 28 stories when complete. Therefore, occupants of this building may have direct line-of-sight to the rooftop equipment at the proposed project site.

Both the residential and office buildings would include heat pumps, air cooled chillers, and solar panels. Typical heating pumps would generate noise ranging from 56 to 66 dBA at a distance of 3 feet. Assuming up to 10 heating pumps would run simultaneously at any given time, hourly average noise levels would range from 66 to 76 dBA L_{eq} at a distance of 3 feet. While the number and type of air cooled chillers were not available at the time of this study, the worst-case scenario would include up to five chillers generating a collective noise level of 56 dBA at 210 feet.

Cooling towers, like the one on the rooftop of the residential building, would include fan operations with noise levels up to 74 dBA at a distance of 50 feet. Typically, cooling towers are surrounded by

parapet walls or mechanical screens, which would provide a minimum noise level reduction of 10 dBA. When combined with the heating pumps and the chillers, the total mechanical equipment noise generated on the rooftop of the residential building would be 94 dBA at a distance of 3 feet.

The site plan shows air handling units on the rooftop of the office building. For office buildings of this size, air handling units typically generate noise levels up to 62 dBA at a distance of 20 feet. When combined with the heating pumps and the chillers, the total mechanical equipment noise generated on the rooftop of the office building would be 93 dBA at a distance of 3 feet.

Table 9 shows the estimated mechanical equipment noise propagated to the surrounding land uses.

TABLE 9 Estimated Operational Noise Levels for the Rooftop Equipment, Propagated from the Center of the Rooftop Equipment

Receptor	Distance from Center of the Res. Rooftop Equip.	L_{eq} from Res. Equip., dBA	Distance from Center of the Office Rooftop Equip.	L_{eq} from Office Equip., dBA	Combined DNL, dBA	Noise Level Increase, dBA DNL
Off-1	105 feet	43[a]	250 feet	35[a]	50[a]	0
Res-1	135 feet	41[a]	80 feet	45[a]	53[a]	0
Off-2	275 feet	35[a]	80 feet	45[a]	51[a]	0
Comm-1	350 feet	33[a]	125 feet	41[a]	48[a]	0
Comm-2 & Comm-3	200 feet	38[a]	430 feet	30[a]	45[a]	0
Res-2	110 feet	43[a]	285 feet	34[a]	50[a]	0
Comm-4	110 feet	43[a]	165 feet	38[a]	51[a]	0
Res-3	240 feet	56[b]	165 feet	58[b]	67[b]	N/A[c]
Comm-5 to Comm-10	500 feet	30[a]	270 feet	34[a]	42[a]	0

[a] A conservative 20 dBA reduction was applied to the noise levels due to the elevation of the rooftop equipment.
[b] No reduction was applied to the noise levels since residential units would have direct line-of-sight to the rooftop equipment.
[c] Res-3 is not an existing receptor. These residential towers would be occupied by the time the proposed project is completed; however, the residents would not be exposed to a noise level increase due to the proposed project.

Based on the estimated noise levels in Table 9, mechanical equipment noise levels would potentially exceed the City's General Plan threshold of 55 dBA DNL at the future residential building to the east of the project site, which is currently under construction. For all existing receptors, the noise level increase due to mechanical equipment noise would not be measurable or detectable (0 dBA DNL increase).

The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts with the General Plan or Municipal Code. The City's standard permit condition shall be implemented as condition of approval for the proposed project. The standard permit condition states the following:

> A detailed acoustical study shall be prepared during final building design to evaluate the potential noise generated by building mechanical equipment and demonstrate the necessary noise control to meet the City's 55 dBA DNL goal. Noise control features such as sound attenuators, baffles, and barriers shall be identified and evaluated to demonstrate that mechanical equipment noise would not exceed 55 dBA DNL at noise-sensitive locations around the project site. The noise control features identified by the study shall be incorporated into the project prior to issuance of a building permit.

Additionally 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.

Truck Loading and Unloading

The site plan shows truck loading and unloading activities occurring on the ground-level facing North 4th Street. The loading zone for the residential building would be located just north of the transformer rooms, and the loading zone for the office building would be located between the generator and transformer rooms. Both loading areas would be located within the proposed building.

All receptors to the north, to the south, and to the west would be adequately shielded from all loading activities. Res-2 and Comm-4 shown in Figure 5 would have direct line-of-sight to the loading zone at the residential building, with setbacks of 80 and 100 feet, respectively, from the center of the loading zone, while Res-3 would be adequately shielded from the residential loading zone. Comm-4 and Res-3 would have direct line-of-sight to the loading zone at office building, with setbacks of 85 and 100 feet, respectively, from the center of the loading zone, while Res-2 would be adequately shielded.

The loading zone of the residential building is expected to have no more than two deliveries in a week by medium-sized trucks. The loading zone of the office building would have medium- and heavy-sized trucks, with up to four deliveries in a week.

Truck delivery noise would include a combination of engine, exhaust, and tire noise, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air brakes. Heavy trucks typically generate maximum instantaneous noise levels of 70 to 75 dBA at a distance of 50 feet. Smaller medium-sized delivery trucks typically generate maximum noise levels of 60 to 65 dBA at 50 feet. The noise level of backup alarms can vary depending on the type

and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA at a distance of 50 feet.

It is assumed that all deliveries and on-site maintenance activities would occur during daytime hours between 7:00 a.m. and 10:00 p.m. For this analysis, the noise level reduction due to the building at each loading area is assumed to be a conservative 15 dBA. Hourly average noise levels and day-night average noise levels are summarized in Table 10.

TABLE 10 Estimated Operational Noise Levels Due to Truck Deliveries

Receptor	Distance from Center of the Nearest Loading Zone	L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
Res-2	80 feet from residential loading zone	41-46	26[a]	0
Comm-4	100 feet from residential loading zone & 85 feet from office loading zone	39-55	39[a,b]	0
Res-3	100 feet	49-54	37[b]	N/A[c]

[a] Assumes one medium truck delivery in a given day.
[b] Assumes two heavy truck deliveries in a given day.
[c] Res-3 is not an existing receptor. These residential towers would be occupied by the time the proposed project is completed; however, the residents would not be exposed to a noise level increase due to the proposed project.

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. For all existing receptors, the noise level increase due to truck delivery noise would not be measurable or detectable (0 dBA DNL increase).

Total Combined Project-Generated Noise

The operational noise levels produced by the proposed project combined (i.e., traffic, mechanical equipment, and truck loading/unloading activities) would result in an increase of 1 dBA DNL or less at all existing noise-sensitive receptors surrounding the project site. Therefore, the proposed project would not result in a substantial increase over ambient noise levels in the project vicinity. Further, operational noise levels would not exceed 55 dBA DNL at the nearest noise-sensitive receptors with the incorporation of the City's standard permit code as a condition of approval and the mitigation measures included in the *Downtown San José Strategy Plan 2040 EIR*. This is a less-than-significant impact.

Mitigation Measure 1b: No further mitigation required.

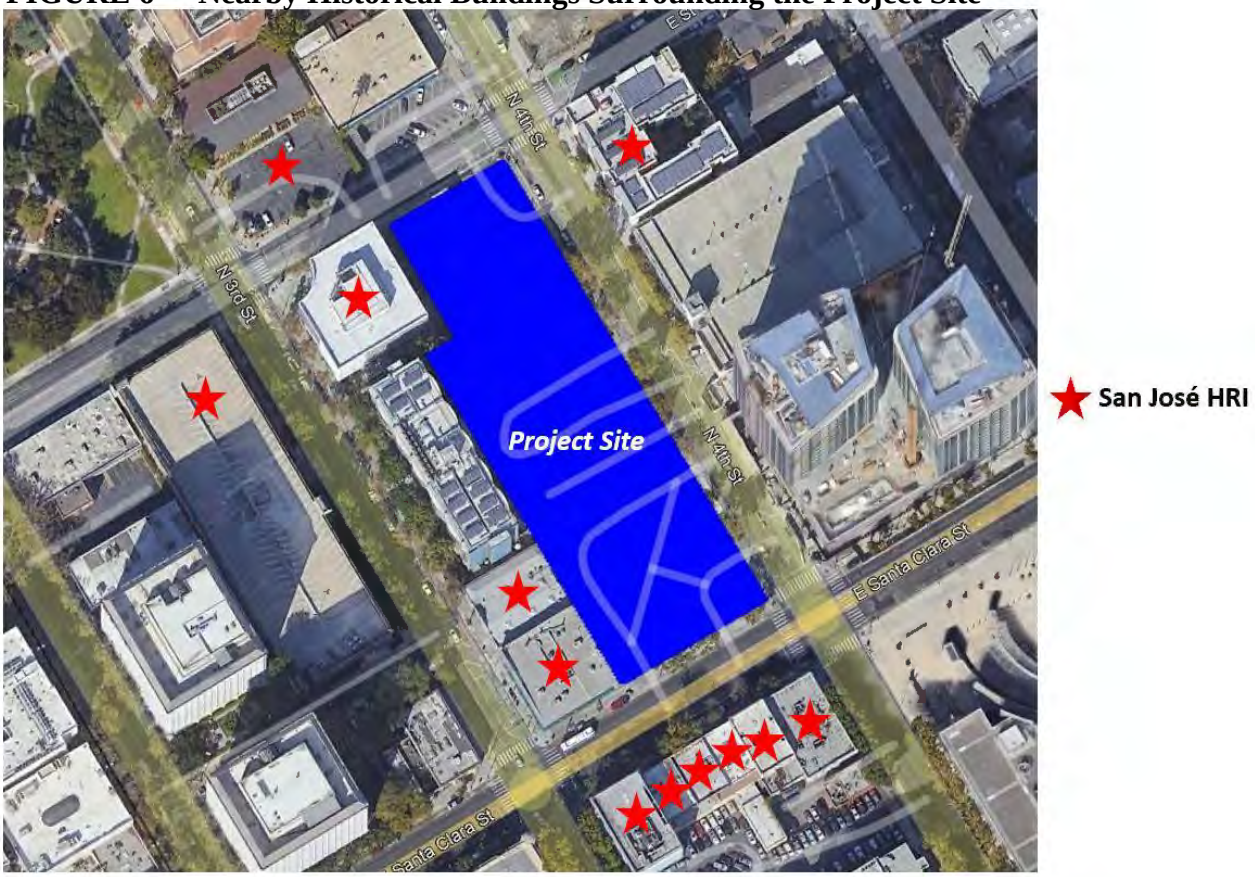
Impact 2: Exposure to Excessive Groundborne Vibration. Construction-related vibration levels could potentially exceed applicable vibration thresholds at nearby sensitive land uses. **This is a significant impact.**

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 project site partially included in the St. James Square City Landmark District and is adjacent to the Downtown Commercial National Historic District. According to the City's Historic Resource Inventory,[2] a number of historical structures surround the project site. These are identified in Figure 6. In addition to historical structures adjoining the site, a historical building is identified in the northernmost portion of the site; however, this on-site building would be demolished as part of the project and would not be considered a receptor for this impact analysis.

FIGURE 6 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

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

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 11 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 11 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 11 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	59	26
Hydromill (slurry wall)	in soil	0.008	4	2
	in rock	0.017	7	3
Vibratory Roller		0.210	61	27
Hoe Ram		0.089	28	13
Large bulldozer		0.089	28	13
Caisson drilling		0.089	28	13
Loaded trucks		0.076	24	11
Jackhammer		0.035	12	6
Small bulldozer		0.003	2	<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., April 2021.

As shown in Figure 6, each of the commercial buildings adjoining the site to the west are considered historical and would be subject to the conservative 0.08 in/sec PPV, while the residential building to the west would be considered a normal conventional construction building subject to the 0.2 in/sec PPV threshold. Additional historical buildings would be located to the south of the project, opposite East Santa Clara Street; to the east, opposite North 4th Street; and to the north, opposite East St. John Street.

Table 12 summarizes the vibration levels at each of the surrounding buildings in the project vicinity. 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 12), 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 11 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 in the immediate vicinity of the historical buildings adjoining the project site to the west. As shown in Table 11, the 0.08 in/sec PPV threshold would potentially be exceeded within about 61 feet of the surrounding buildings, and due to the close proximity of the buildings to the west of the project site (about 5 feet), the use of most construction equipment along the shared property line would potentially exceed the City's threshold, as shown in Table 12. Additionally, the non-historical residential building adjoining the project site to the west, which is located about 15 feet from the shared property line, would potentially be exposed to vibration levels exceeding the 0.2 in/sec PPV threshold when heavy objects are dropped near the property line or when vibratory rollers are used near the property line.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[3] The findings of this study have been applied to buildings affected by construction-generated vibrations.[4] As reported in USBM RI 8507[3] and reproduced by Dowding,[4] Figure 7 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 7, maximum vibration levels of 0.2 in/sec PPV or lower would result in virtually no measurable damage, while levels of 0.4 in/sec PPV would result in less than a 5% chance of threshold or cosmetic damage and no minor or major damage. With maximum vibration levels of 1.2 in/sec PPV, there would be about 20% chance of cosmetic damage. No minor or major damage would be expected at the historical buildings immediately adjoining the project site.

Heavy vibration-generating construction equipment would have the potential to produce vibration levels of 0.08 in/sec PPV or more at historic buildings within 61 feet of the project site and of 0.2 in/sec PPV or more at nonhistorical buildings within 25 feet of the project site.

Neither cosmetic, minor, or major damage would occur at historical or conventional buildings located 61 feet or more from 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

[3] 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.

[4] Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

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.

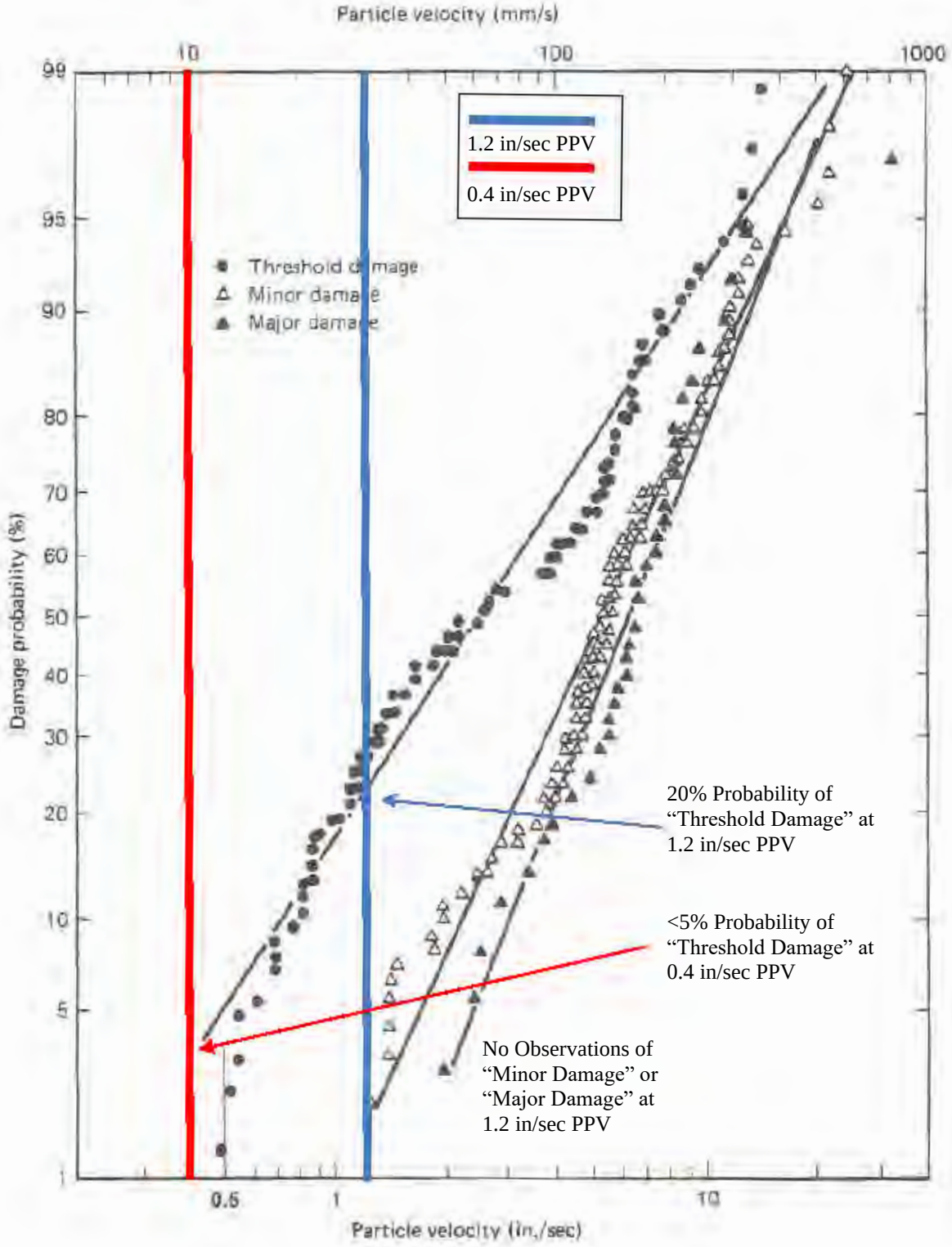
In summary, the construction of the project would generate vibration levels exceeding the General Plan threshold of 0.08 in/sec PPV at historic properties within 61 feet of the site, and the City's 0.2 in/sec PPV threshold would be exceeded at the nonhistorical building within 25 feet of the project site. This would be considered a significant impact.

TABLE 12 Vibration Source Levels for Construction Equipment

Equipment		PPV (in/sec)						
		West Historical Buildings (5ft)	West Residential Building (15ft)	South Historical Buildings (95ft)	East Historical Building (85ft)	East Residential Building (65ft)	North Historical Building (165ft)	North Commercial Building (115ft)
Clam shovel drop		**1.186**	**0.354**	0.047	0.053	0.071	0.025	0.038
Hydromill (slurry wall)	in soil	0.047	0.014	0.002	0.002	0.003	0.001	0.001
	in rock	**0.100**	0.030	0.014	0.004	0.006	0.002	0.003
Vibratory Roller		**1.233**	**0.368**	0.048	0.055	0.073	0.026	0.039
Hoe Ram		**0.523**	0.156	0.020	0.023	0.031	0.011	0.017
Large bulldozer		**0.523**	0.156	0.020	0.023	0.031	0.011	0.017
Caisson drilling		**0.523**	0.156	0.020	0.023	0.031	0.011	0.017
Loaded trucks		**0.446**	0.133	0.018	0.020	0.027	0.010	0.014
Jackhammer		**0.206**	0.061	0.008	0.009	0.012	0.004	0.007
Small bulldozer		0.018	0.005	0.001	0.001	0.001	0.0004	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., November 2021.

FIGURE 7 Probability of Cracking and Fatigue from Repetitive Loading



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

Mitigation Measure 2:

The project shall implement the following measures, in addition to the best practices specified in Mitigation Measure 1a of this report, to minimize the impacts of groundborne vibration.

Construction Vibration Monitoring, Treatment, and Reporting Plan: The project proponent shall implement a construction vibration monitoring plan to document conditions prior to, during, and after vibration generating construction activities. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry-accepted standard methods. The construction vibration monitoring plan shall include, but not be limited to, the following measures:

- The report shall include a description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations.

- A list of all heavy construction equipment to be used for this project and the anticipated time duration of using the equipment that is known to produce high vibration levels (clam shovel drops, vibratory rollers, hoe rams, large bulldozers, caisson drillings, loaded trucks, jackhammers, etc.) shall be submitted to the Director of Planning or Director's designee of the Department of Planning, Building and Code Enforcement by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort required for continuous vibration monitoring. Phase demolition, earth-moving, and ground impacting operations so as not to occur during the same time period.

- Where possible, use of the heavy vibration-generating construction equipment shall be prohibited within 61 feet of any adjacent building.

- Document conditions at all historic structures located within 61 feet of construction and at all other buildings located within 25 feet of construction prior to, during, and after vibration generating construction activities. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry-accepted standard methods. Specifically:

    - Vibration limits shall be applied to vibration-sensitive structures located within 61 feet of any construction activities identified as sources of high vibration levels.

    - Performance of a photo survey, elevation survey, and crack monitoring survey for each historic structure within 61 feet of construction activities and all other buildings within 25 feet of construction activities. Surveys shall be performed prior to any construction activity, in regular intervals during construction, and after project completion, and shall include internal and external crack monitoring in structures, settlement, and distress, and shall document the condition of foundations, walls and other structural elements in the interior and exterior of said structures.

- Develop a vibration monitoring and construction contingency plan to identify structures where monitoring would be conducted, set up a vibration monitoring schedule, define structure-specific vibration limits, and address the need to conduct photo, elevation, and crack surveys to document before and after construction conditions. Construction contingencies shall be identified for when vibration levels approached the limits.

- At a minimum, vibration monitoring shall be conducted during demolition and excavation activities.

- If vibration levels approach limits, suspend construction and implement contingency measures to either lower vibration levels or secure the affected structures.

- 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.

- Conduct a post-construction survey on structures where either monitoring has indicated high vibration levels or complaints of damage has been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities. The survey will be submitted to the City of San José Department of Parks, Recreation, and Neighborhood Services.

Implementation of this mitigation measure would reduce the impact to a less-than-significant level.

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 1.7 miles northwest of the project site. According to the City's new Airport Master Plan Environmental Impact Report,[5] the project site lies outside the 60 dBA CNEL/DNL contour line (see Figure 8). 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 for aircraft noise below 60 dBA DNL, the future interior noise levels resulting from aircraft would below 45 dBA DNL. 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.**

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

FIGURE 8 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

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

Source: BridgeNet International 2019

Cumulative Impacts

Cumulative noise impacts would include 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.

From the City's website,[6] the following planned or approved projects are located within 1,000 feet of the proposed project:

- **Miro (SJSC Towers)** – this project is located at 39 North 5th Street, which is located just east of the project site, in the northeastern corner of the North 4th Street/East Santa Clara Street intersection. This project is currently under construction and near completion. Construction of this project should be completed prior to construction of the Icon-Echo Mixed-Use Towers. This would not result in a cumulative construction impact.

- **Fourth Street Housing** – this project is in the northeast corner of the North 4th Street/East St. John Street intersection, within 100 feet of the Icon-Echo project site. This project has been approved and would consist of a 23-story mixed-use building with approximately 10,733 square feet of commercial uses and up to 316 residential units. Construction dates for this project have not been confirmed but due to the size of this building and the towers included in the Icon-Echo project, it is likely that the existing residential building located in the southeast corner of the North 4th Street/East St. John Street intersection would potentially be exposed to construction activities at both sites simultaneously or consecutively.

- **BDG Mixed-Use** – this project site is located at 148 to 150 East Santa Clara Street, 17 South 4th Street, and 130 to 134 East Santa Clara Street. This project is located south of East Santa Clara Street, which is about 100 feet from the Icon-Echo project site. This project is in the planning review phase and would consist of a six-story mixed-use building with ground-level retail/restaurant uses and office space on the upper floors. Noise-sensitive receptors directly impacted by both construction sites would include the commercial site in the northeastern corner of the East Santa Clara Street/South 3rd Street intersection and the residential uses in the northeastern corner of the East Santa Clara Street/South 4th Street intersection. The construction schedule for the BDG project site is unavailable at this time; however, these shared receptors would potentially be exposed to construction activities at both sites simultaneously or consecutively.

- **Hotel Clariana** – this project is located at 27 South 4th Street, which is about 190 feet south of the project site. This project under review and would consist of a five-story hotel and seven-story condominium building. Construction dates for this project have not been confirmed but would be expected to last for more than one year. The commercial uses south of the project site, opposite East Santa Clara Street, would potentially be exposed to construction activities at both sites. The construction schedule for the Hotel Clariana

[6] https://gis.sanjoseca.gov/maps/devprojects/

project site is unconfirmed at this time; however, these shared receptors would potentially be exposed to construction activities at both sites simultaneously or consecutively.

- **Fountain Alley** – this project is located at 35 South 2nd Street and would include a 21-story mixed-use building with 194 residential units and 405,000 square feet of office space and 31,959 square feet of ground-level retail. This project is currently in the planning review phase and not expected to start before March 2023. However, due to the location of this project site, with respect to the Icon-Echo site, shared receptors are not expected. While some disruption may occur due to traffic lane closures or possibly redirected traffic, no existing receptors would be directly affected by construction at both project sites. This would not result in a cumulative construction impact.

- **Fountain Alley Office** – this project is located at 26 South 1st Street and would include construction of a 6-story commercial building with approximately 91,992 square feet of office and retail space. The Fountain Alley Office is approximately 725 feet from the Icon-Echo project site. This project has been approved, but construction has not started. Noise-sensitive receptors directly impacted by construction at this site would not be shared receptors at the Icon-Echo site. Cumulative construction is therefore not assumed.

- **19 North 2nd Street** – this project is located west of the Icon-Echo project site by approximately 535 feet. This mixed-use project would include 210 residential units and 37,240 square feet of commercial space. This project is currently in the planning review phase. Noise-sensitive receptors directly impacted by construction at this site would not be shared receptors at the Icon-Echo site. Cumulative construction is therefore not assumed.

- **Parkview Towers** – this project is located in the northeast corner of the intersection at North 1st Street and East St. James Street, approximately 875 feet northwest of the Icon-Echo project site. This mixed-use project would include construction of two towers with 220 residential units and up to 18,000 square feet of commercial space. This project has been approved but not constructed. Noise-sensitive receptors directly impacted by construction at this site would not be shared receptors at the Icon-Echo site. Cumulative construction is therefore not assumed.

- **6th Street Project** – this project is located at 73 North 6th Street, approximately 630 feet east of the Icon-Echo project site. This 10-story mixed-use building would include up to 197 residential units and approximately 8,000 square feet of ground floor retail. This project has been approved but not constructed. Noise-sensitive receptors directly impacted by construction at this site would not be shared receptors at the Icon-Echo site. Cumulative construction is therefore not assumed.

- **27 West** – this project is located at 27 South 1st Street, which is about 925 feet southwest of the project site. This project has been approved and consists of a 22-story mixed-use building with 374 residential units and 35,712 square feet of retail space. Noise-sensitive receptors directly impacted by construction at this site would not be shared receptors at the Icon-Echo site. Cumulative construction is therefore not assumed.

- **Eterna Tower** – this project is located at 17 East Santa Clara Street, which is about 630 feet west of the project site. This project is currently under review and consists of a mixed-use building with approximately 2,500 square feet of commercial space and 200 residential units (25% restricted affordable units for low-income residents). Noise-sensitive receptors directly impacted by construction at this site would not be shared receptors at the Icon-Echo site. Cumulative construction is therefore not assumed.

The existing residential building located in the southeast corner of the North 4th Street/East St. John Street intersection would be considered a sensitive receptor during construction activities at both Icon-Echo and Fourth Street Housing project sites. Additionally, the commercial and residential uses to the west and east of the project site, respectively, would be shared receptors for the Icon-Echo project and the BDG Mixed-Use project. The commercial buildings opposite East Santa Clara Street to the south would be shared receptors with the Hotel Clariana project site, as well. However, cumulative construction activities are not assumed at this time. Additionally, each 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 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, potential cumulative construction impacts would be less-than-significant.