Appendix G: Noise and Vibration Assessment

1207 N. CAPITOL AVENUE DAYCARE NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The approximately 1.50-acre project site is located at 1207 N. Capitol Avenue (Assessor's Parcel Number 245-05-015) in the City of San José. The project site has a General Plan land use designation of Neighborhood/Community Commercial and is zoned R-1-8 (Single Family Residential). The project site is currently developed with an approximately 5,627 square foot single-family residence. The project proposes to demolish the existing single-family residence and redevelop the site with new, approximately 14,379 square foot daycare center. The project would also include an approximately 9,424 square feet of outdoor play area divided into three separate spaces. The proposed daycare center would include a preschool program serving ages six weeks to five years old, operating between the hours of 6:30 a.m. and 6:30 p.m. and requiring 33 to 34 full-time employees. Access to the proposed daycare center would be provided via a driveway along N. Capitol Avenue. A parking area would be located west of the daycare center and would include approximately 40 vehicle parking spaces and three motorcycle parking spaces. Of the 40 parking spaces, four would include electric vehicle (EV) charging stations and 16 would be EV capable. The project would also provide three long-term bicycle storage spaces and 26 short-term bicycle storage spaces.

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/vibration and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to mitigate project impacts to a less-than-significant level.

SETTING

Fundamentals of Environmental Noise

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

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more

intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

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

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA DNL with open windows and 65-70 dBA DNL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a

typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60-70 dBA. Between a DNL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

TABLE 1 Definition of Acoustical Terms Used in this Report

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.

Railroad and light rail operations are potential sources of substantial ground vibration depending on distance, the type and the speed of trains, and the type of railroad track. People's response to ground vibration from rail vehicles has been correlated best with the average, root mean square (RMS) velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1 x 10-6 in/sec RMS, which equals 0 VdB, and 1 in/sec equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

Typical background vibration levels in residential areas are usually 50 VdB or lower, well below the threshold of perception for most humans. Perceptible vibration levels inside residences are attributed to the operation of heating and air conditioning systems, door slams and foot traffic. Construction activities, train operations, and street traffic are some of the most common external sources of vibration that can be perceptible inside residences. Table 4 illustrates some common sources of vibration and the association to human perception or the potential for structural damage.

TABLE 4 Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level, VdB	Typical Events (50-foot setback)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment
		Heavy tracked vehicles (Bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	
		Commuter rail, upper range
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, occasional events		Commuter rail, typical Bus or truck over bump or on rough roads
Residential annoyance, frequent events	70	Rapid transit, typical
Approximate human threshold of perception to vibration		Buses, trucks and heavy street traffic
	60	
		Background vibration in residential settings in the absence of activity
Lower limit for equipment ultra-sensitive to vibration	50	

Source: Transit Noise and Vibration Impact Assessment, US Department of Transportation Federal Transit Administration, September 2018.

Regulatory Background – Noise

This section describes the relevant guidelines, policies, and standards established by Federal and 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.

Federal Government

Federal Transit Administration. The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[1] which limit daytime construction noise to 80 dBA L_{eq} at residential land uses and to 90 dBA L_{eq} at commercial and industrial land uses.

1 Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

State of California

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

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels;

(c) For a project located within the vicinity of a private airstrip or an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

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

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

California Collaborative for High Performance School (CHPS). CHPS provides criteria for interior noise levels in learning spaces of schools due to exterior noise sources, summarized in Table 5. The CHPS criteria shown in the table refer to hourly average noise levels ($L_{eq(h)}$) during the loudest hour of the school day.

TABLE 5 Exterior-to-interior noise intrusion criteria for schools

School Room Use	CHPS Prerequisite	CHPS Enhanced Acoustics
Core learning spaces	45 dB(A) or less indoors	35 dB(A) or less indoors
Ancillary learning & assembly spaces	N/A	40 dB(A) or less indoors

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.

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.

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

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.

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.

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.

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.

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 at 1207 N. Capitol Avenue in San José, California. Existing improvements to the site including a residence would be demolished to accommodate the project. The site is located in a primarily residential area with single-family residences located to the northwest, southwest, and across N. Capitol Avenue to the northeast. Southeast of the site is the former Berryessa Elementary School building which now serves as a commercial and office building. The Valley Transportation Authority (VTA) Orange Line train operates within the N. Capitol Avenue median near the project site with the Berryessa station located approximately 255 feet southeast of the site's eastern corner.

A noise monitoring survey was conducted between Wednesday, September 7, 2022 and Friday, September 9, 2022 to document ambient noise levels at the site and in the surrounding area. The survey included one long-term measurement and three short-term measurements at the locations shown in Figure 1. The existing noise environment at the site results primarily from vehicular traffic along N. Capitol Avenue, with VTA train passbys, vehicular traffic along Interstate 680 (I-680), and aircraft flyovers associated with the Norman Y. Mineta San José International Airport as secondary sources of noise.

Long-term measurement LT-1 was made starting on Wednesday, September 7, 2022 and concluding on Friday, September 9, 2022. Measurement LT-1 was made to quantify ambient noise levels at the site. Hourly average noise levels at this location typically varied from 60 to 64 dBA L_{eq} during the day and from 52 to 61 dBA L_{eq} at night. The day-night average noise level on Thursday, September 8, 2022 was 65 dBA DNL. The daily trend in noise levels at long-term measurement LT-1 is shown in Figures 2 through 4.

On Wednesday, September 7, 2022, three attended, short-term (10-minute) measurements were made to quantify existing ambient noise levels at different points within the project site. Measurement ST-1 was conducted at the approximate location of the northeastern façade of the proposed building fronting N. Capitol Avenue. Measurement ST-2 was conducted at the approximate location of a proposed playground area which would be located behind the building, and near the center of the site. Measurement ST-3 was conducted along the southwest property line, near a single-family residence. The primary noise source at all three locations was vehicular traffic along N. Capitol Avenue. At locations ST-2 and ST-3, noise originating from vehicular traffic along I-680 became a secondary noise source. Occasional VTA train passbys and aircraft flyovers were measured and observed as secondary noise sources. A summary of the short-term measurement data is presented below in Table 6.

FIGURE 1 Noise Measurement Locations

Source: Google Earth 2022

FIGURE 2 Noise Levels at LT-1 on Wednesday, September 7, 2021

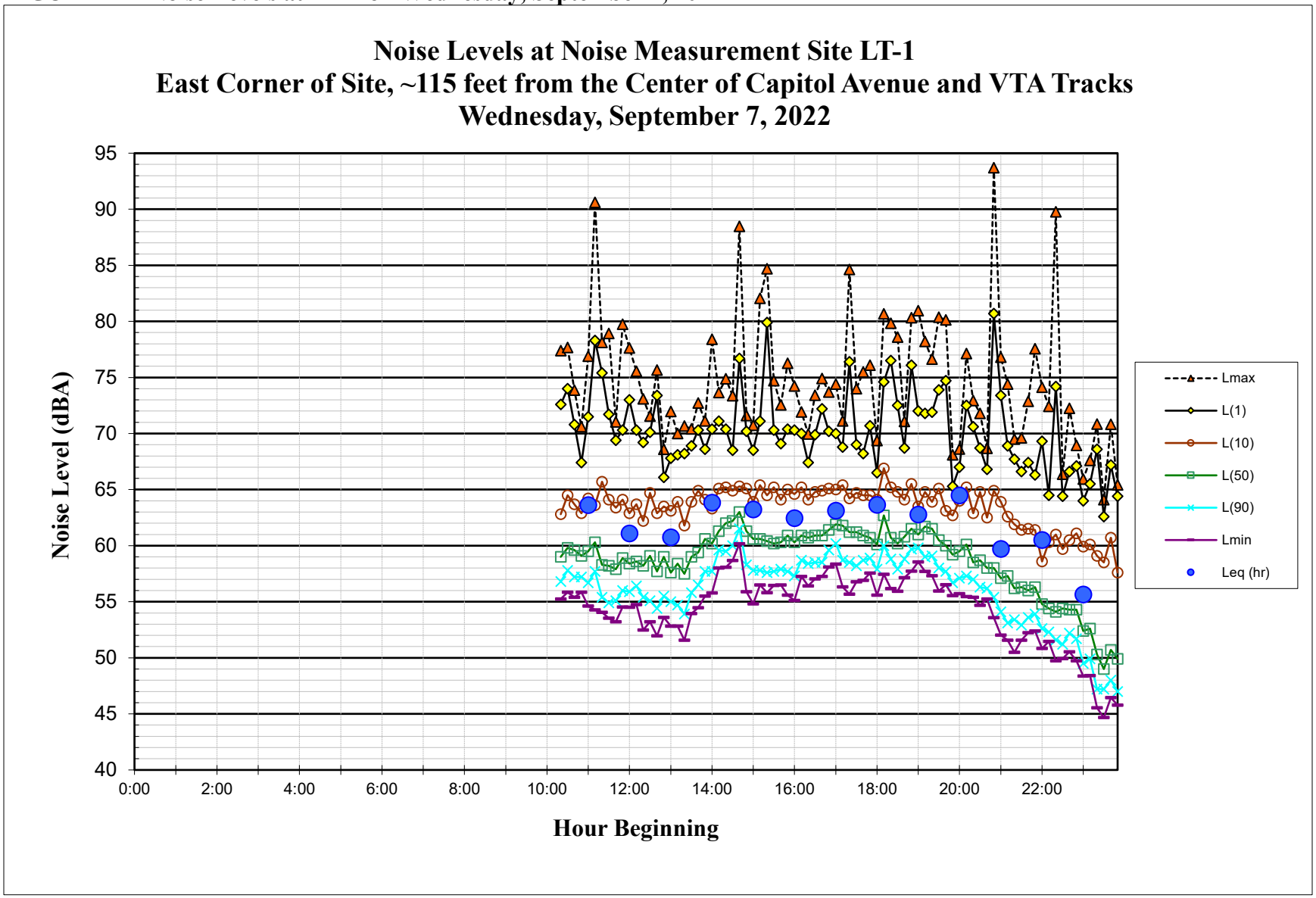


FIGURE 3 Noise Levels at LT-1 on Thursday, September 8, 2021

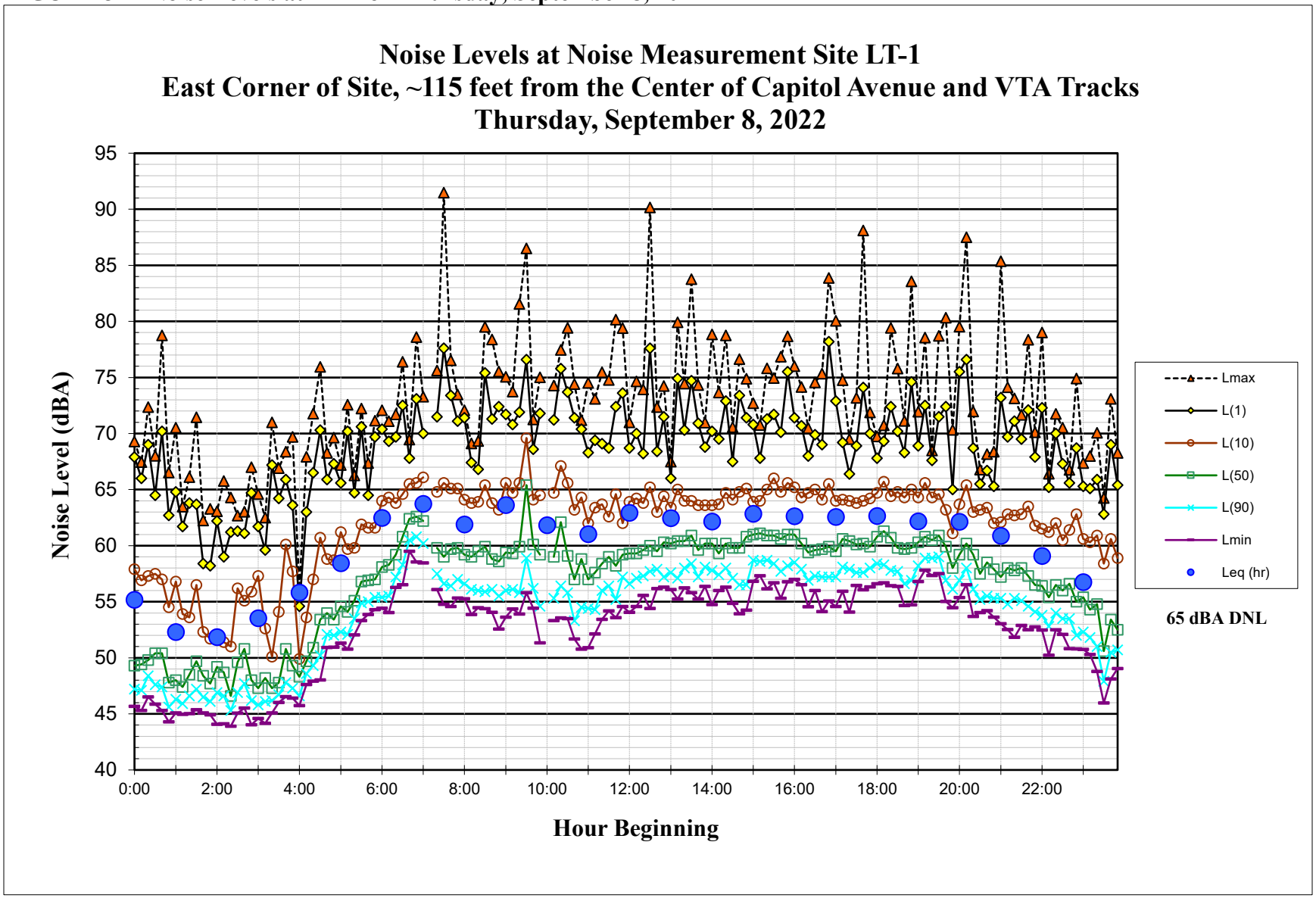


FIGURE 4 Noise Levels at LT-1 on Friday, September 9, 2021

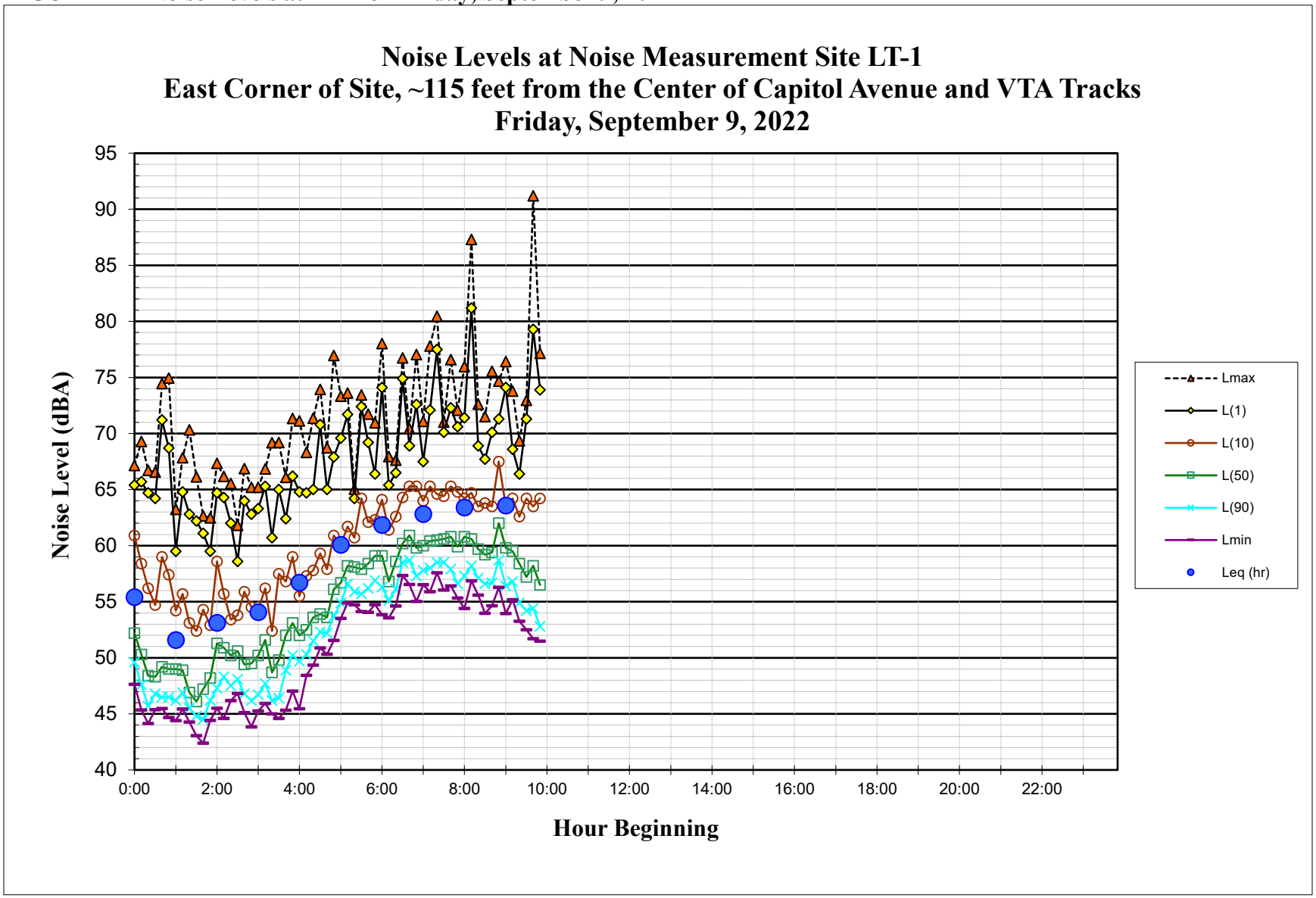


TABLE 6 Summary of Short-Term Noise Measurement Data, September 7, 2022

ID	Location (Time and Date)	Measured Noise Levels, dBA				Calculated Peak Hour, dBA L_{eq}*	Calculated DNL, dBA*	Primary Noise Sources
		L_{10}	L_{50}	L_{90}	L_{eq}			
ST-1	Approximate location of northeastern façade of proposed building, ~85 feet southwest of N. Capitol Avenue centerline (10:20-10:30 a.m., Wednesday, September 7, 2022)	64	57	53	63	65	66	Vehicular traffic along N. Capitol Avenue, VTA trains, aircraft flyovers.
ST-2	Approximate location of playground area, ~155 feet southwest of N. Capitol Avenue centerline. (10:30-10:40 a.m., Wednesday, September 7, 2022)	59	55	53	57	58	59	Vehicular traffic along N. Capitol Avenue, VTA trains, aircraft flyovers, vehicular traffic along I-680.
ST-3	Southwestern property line near residence, ~275 feet southwest of N. Capitol Avenue centerline. (10:40-10:50 a.m., Wednesday, September 7, 2022)	54	51	49	52	54	55	Vehicular traffic along N. Capitol Avenue, VTA trains, aircraft flyovers, vehicular traffic along I-680.

*Peak Hour and DNL levels calculated through comparison between short-term and long-term noise levels.

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 school land use.

- 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 CHPS Prerequisite criterion for exterior-to-interior noise intrusion for schools is 45 dBA L_{eq} or less indoors for core learning spaces. The criteria for Enhanced Acoustics are 35 dBA L_{eq} or less for core learning spaces and 40 dBA L_{eq} or less for ancillary learning and assembly spaces.

The future noise environment at the site would continue to result primarily from vehicular traffic along nearby roadways with N. Capitol Avenue acting as the dominant noise source. Orange Line VTA train passbys, aircraft flyovers associated with the Norman Y. Mineta San José International Airport, and vehicular traffic along I-680 would continue to act as secondary noise sources.

Future Exterior Noise Environment

Existing noise levels at the site range from about 66 dBA DNL along the northeastern property line fronting N. Capitol Avenue to about 55 dBA DNL along the opposite, southwestern property line furthest from N. Capitol Avenue. A one percent increase in traffic volume every year for the next twenty years would result in an approximate noise increase of 1 dBA DNL at the project site. Future noise levels at the site are expected to range between 56 and 67 dBA DNL.

Planned outdoor use areas for the project include three play areas totaling 9,424 square feet. Two of the play areas would be located along the southwestern side of the proposed day care building and would be shielded from direct exposure to traffic noise originating from N. Capitol Avenue. Without considering shielding provided by the building, noise levels at these two play areas are anticipated to reach 60 dBA DNL. Shielding from the building could reduce noise at the centers of the two play areas by about 10 dBA DNL, resulting in a day-night average noise level of 50 dBA DNL. Noise levels would be expected to be higher near the northwestern and southeastern ends of the building where there would the shielding provided would not be as great. However, a noise reduction of about 4 dBA DNL would be expected from the partial shielding provided by the building, resulting in noise levels up to 56 dBA DNL at the segments of these two playgrounds with the greatest amount of noise exposure.

A third play area would be located along the southeastern side of the proposed daycare building and would extend northeast towards N. Capitol Avenue. The northeastern end of this play area would be subjected to direct exposure to traffic noise originating from vehicular traffic along N. Capitol Avenue. Assuming no mitigation, noise levels at the northeastern end of the play area would reach up to 60 dBA DNL. This would not exceed the City's exterior noise level compatibility standards for school land uses. To ensure this compatibility standard is met, it is recommended that the property line walls, which according to the City of San José Municipal Code Section 20.40.560 and acknowledged by project staff would reach a height of up to five feet and would be constructed of masonry or solid wood, be constructed along the southeastern property line of the project site as far as possible in the northeastern direction approaching N. Capitol Avenue to shield this play area to the greatest extent possible from direct noise exposure. Doing so could provide another 3 to 4 dBA DNL of noise reduction to a large portion of the play area.

Future Interior Noise Environment

Project drawings indicate modern construction with façade materials including stucco, metal panels, and artificial wood panels. Typical modern school building construction can be expected to provide between 20 and 25 dBA of exterior-to-interior noise reduction assuming windows in a closed position. Applying this reduction to the northeastern façade of the proposed building where noise exposure would be greatest, interior noise levels attributable to exterior sources would reach 42 to 47 dBA DNL. Peak hour noise levels measured during the noise survey were found to be 1 dBA lower than the measured day-night average noise level, and therefore would be expected to reach 41 to 46 dBA L_{eq} within rooms located along the northeastern building façade. These noise levels would be compatible with the Cal Green Code standard of 50 dBA $L_{eq\ (1\text{-}hr)}$ for occupied areas of non-residential uses. However, if meeting CHPS Prerequisite or Enhanced Acoustics criteria is desired, sound-rated construction materials would be necessary. To achieve the CHPS Prerequisite noise level standard of 45 dBA L_{eq} for core learning spaces, an exterior-to-interior noise reduction of 21 dBA would be required. To meet the CHPS Enhanced Acoustics standard of 35 dBA L_{eq} for core learning spaces, an exterior-to-interior noise reduction of 31 dBA would be required. These noise reductions are readily achievable using sound-rated construction materials and methods. Exterior wall construction meeting a Sound Transmission Class (STC) rating of 46, such as that which would be expected of an insulated, single-stud wall with stucco exterior finish, in addition to windows and doors meeting an STC rating of 26 or greater would be expected to provide a noise reduction of 32 dBA assuming. This is assuming a 16% window-and-door to wall ratio as seen on project elevations dated June 30, 2022.

While no additional mitigation would be necessary to meet basic state and City requirements for exterior and interior noise levels, the following measures are recommended to ensure noise levels are reasonably reduced to the greatest extent feasible:

- To ensure the greatest noise reduction feasible at the play area located along the southeastern side of the building, a property line barrier wall constructed of masonry or solid wood without gaps or cracks should be constructed along the southeastern property line extending to the maximum distance in the northeastern direction towards N. Capitol Avenue.

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

- Rooms along the northeastern building façade would be exposed to interior noise levels originating from exterior sources of up to 46 dBA L_{eq}. If CHPS Prerequisite or Enhanced Acoustics is desired, sound-rated construction materials and methods are recommended for the northeastern building façade. Preliminary calculations indicate that a wall construction meeting an STC rating of 46 or greater with windows and doors meeting an STC rating of 26 or greater would achieve the noise reduction necessary for CHPS Enhanced Acoustics.

Future Vibration Environment

Policy EC-2.1 of the City's General Plan requires new development within 100 feet of rail lines to demonstrate prior to project approval that vibration experienced by vibration-sensitive uses would not exceed FTA guidelines. In the FTA's *Transit Noise and Vibration Impact Assessment Manual*, the vibration impact criterion for frequent vibration events, such as those caused by VTA trains, at institutional uses like schools is set at 75 VdB. As daycares may have naptimes for children throughout the day, a more conservative criterion of 72 VdB intended for residences and buildings where people normally sleep would be appropriate.

VTA Orange Line trains run along tracks located at the centerline of N. Capitol Avenue. According to the VTA,[2] the maximum speed of a VTA train operating through a freeway median is 55 mph. As the Berryessa station is located near to the project site, it can be reasonably assumed that this speed would not regularly be reached along the track nearest the site with trains slowing down a stop at the station. The nearest track is at a distance of about 70 feet from the façade of the proposed daycare building. At this distance, using an operating speed of 50 mph, and assuming normal track conditions and vibration propagation for at-grade light rail vehicles, a vibration level of 71 VdB would be expected along the nearest façade of the daycare building. This would not exceed the 72 VdB criterion for buildings where people normally sleep.

2 Valley Transportation Authority, *VTA Facts Light Rail System Overview*, accessed via web at https://web.archive.org/web/20130820152521/http://vta.org/news/factsheets/bus_lightrail_trolly_information/lightrail_overview.pdf

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:

1. 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. 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. After a period of 12 months, a significant temporary noise impact would occur if construction noise levels would exceed 80 dBA L_{eq} at residential land uses near the site or 90 dBA L_{eq} at commercial land uses near the site.

    b. 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.

    c. A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

2. A significant impact would be identified if the construction of the project would generate excessive vibration levels at 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.

3. 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 less-than-significant impact.**

The construction of the project would take about 12 months to complete, beginning January 2024 and finishing in December 2024. During project construction, typical construction equipment that would be used on the project site would include backhoes, dozers, pavers, mixers, trucks, and air compressors. No pile driving is proposed during construction. Construction phases would include demolition, site preparation, grading, trenching, building construction, paving, and architectural coating. 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.

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.

However, the City of San José does not establish noise level thresholds for construction activities. As an alternative, this analysis uses the noise limits established by the FTA to identify the potential for impacts due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*.[3] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be enforced at residential land uses and 90 dBA L_{eq} shall be enforced at commercial and industrial land uses.

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 7) from the equipment. Table 8 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 school 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.

3 Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

Equipment expected to be used during construction are summarized in Table 9. This table also summarizes the quantity of each type of equipment, the reference noise level at 50 feet assuming the operation of the two loudest pieces of construction equipment in a given phase, and the estimated noise levels by phase at distances representative of the nearest property lines projected from the approximate center of construction. 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 the two loudest pieces of equipment would operate simultaneously, as recommend by the FTA for construction noise evaluations. 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.

TABLE 7 Construction Equipment 50-Foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/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 8 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 9 Construction Noise Levels at 50 feet and Various Acoustic Center of the Site

Phase (Work Days)	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq} (dBA) From Operation of Two Loudest Pieces of Construction Equipment				
		Noise Level at 50 feet	Residential Northwest (110 feet)	Residential Southwest (150 feet)	Commercial Southeast (150 feet)	Commercial and Residential Across N. Capitol Ave. Northeast (250 feet)
Demolition (14 days)	Concrete/Industrial Saw (1)* Excavator (2) Rubber-Tired Dozer (1)* Tractor/Loader/Backhoe (2)	84	77	74	74	70
Site Preparation (30 days)	Grader (1)* Rubber-Tired Dozer (1)* Tractor/Loader/Backhoe (1)	83	76	73	73	69
Grading/ Excavation (34 days)	Excavator (2) Grader (1)* Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)*	84	77	74	74	70
Trenching/ Foundation (30 days)	Tractor/Loader/Backhoe (2)* Excavator (2)*	84	77	74	74	70
Building – Exterior (77 days)	Crane (1) Forklift (1) Generator Set (1)* Tractor/Loader/Backhoe (1)* Welder (1)	82	75	72	72	68
Building – Interior (152 days)	Air Compressor (6)* Aerial Lift (5)	77	70	67	67	63
Paving (10 days)	Cement and Mortar Mixer (1) Paver (1) Paving Equipment (1)* Roller (1) Tractor/Loader/Backhoe (1)*	84	77	74	74	70

*Denotes two loudest pieces of construction equipment per phase.

As shown in Table 9, construction noise levels would intermittently range from 77 to 84 dBA Leq when activities occur approximately 50 feet from nearby receptors. Typical construction noise levels originating from the center of the site would range from 70 to 77 dBA L_{eq} at the residential property line to the northwest, from 67 to 74 dBA L_{eq} at the residential property line to the southwest and commercial property line to the southeast, and from 63 to 70 dBA L_{eq} at the residential and commercial uses across N. Capitol Avenue to the northeast. Construction noise levels would exceed the exterior threshold of 80 dBA L_{eq} at residential land uses on occasion when construction activity is centered closer to shared property lines, but overall construction duration would be less than one year. Because of this, the temporary construction impact would not be considered significant in accordance with Policy EC-1.7 of the City's General Plan. However, to ensure that noise from project construction is attenuated to the greatest reasonable extent, the following construction noise best practices should be implemented:

- Limit construction hours to between 7:00 AM and 7:00 PM, 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. 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 PBCE that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential 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 adjacent land uses and nearby residences.
- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to current 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.

With the implementation of the above best practices and with project construction occurring over a period of time less than one year, the temporary noise increase from project construction would result in a **less-than-significant impact**.

Mitigation Measure 1a: None required.

Impact 1c: Permanent Noise Increases in Excess of Established Standards. Project-generated traffic would not result in a permanent noise levels at any noise-sensitive uses in the project vicinity. **This is a less-than-significant impact.**

Existing and future cumulative traffic volumes estimated by Hexagon Transportation Consultants, Inc. were analyzed to determine the permanent traffic noise increase resulting from project-generated traffic. Five study intersections were examined including N. Capitol Avenue and Sierra Road, N. Capitol Avenue and Ohlone Drive, N. Capitol Avenue and Berryessa Road, the I-680 Northbound Off-Ramp and Berryessa Road, and N. Capitol Avenue and Penitencia Creek Road. Project-generated traffic was found to result in a traffic noise increase of up to 1 dBA during the a.m. peak hour, which would correspond to a traffic noise level increase of up to 1 dBA DNL. Project-generated traffic would result in a **less-than-significant impact**.

Impact 1c: Operational Noise in Excess of Established Standards. Project operations including playground activities, parking lot activities, and new mechanical equipment, could not result in noise levels or increases in excess of standards established in the City's Municipal Code or General Plan. **This is a less-than-significant impact with mitigation.**

The City of San José Municipal Code Section 20.40.600 limits the sound pressure level generated by any use or combination of uses on a commercial property to 55 dBA DNL for adjacent residential uses and 60 dBA DNL for adjacent commercial or other non-residential uses when measured at the shared property line. Operational noise sources associated with the project would include three play areas, a parking lot, mechanical equipment, and project-generated traffic. These types of noise sources would have the potential to generate excessive noise at surrounding noise-sensitive uses.

<u>Play Areas</u>

Programs for children are offered Monday through Friday generally between the hours of 7:00 a.m. and 6:00 p.m. Use of the play areas would not be expected to occur outside of these daytime hours. Three play areas totaling 9,424 square feet are planned for the project. Two of the play areas would be located along the southwest side of the daycare building while the third would be located along the southeast side. One play area would be intended for use of infants and toddlers while the remaining two would be intended for use of two-year-olds through preschool students. The infant and toddler playground would be used for up to 1.5 hours per day per classroom, with only one classroom out in the playground at a time. With three (3) infant and toddler classes total, this results in up to 4.5 hours per day of infant and toddler playground use. The playgrounds intended for two-year-olds through preschool students would be used up to 1 hour per day per classroom. Combining classes and use of the two playgrounds simultaneously for the nine (9) total two-year-old through

preschool classrooms would result in a combined daily maximum use of three (3) hours per day. Not all children would be staying for the full day program which would result in some potential playground activity periods going unused. This analysis assumes a worst-case scenario of full attendance and use of all playgrounds.

There would be a total capacity of 60 children within the 6 weeks to 23 months age group and 192 children within the 2 to 5 year age group, totaling a potential 252 children attending during a given day. Playground activities within individual playgrounds of the size proposed typically generate noise levels ranging from 59 to 67 dBA L_{eq} at a distance of 50 feet. The approximate center of the northernmost playground is located about 100 feet from the nearest property line shared with a residential use to the north. The approximate center of the playground adjacent to it to the south is located about 110 feet from the nearest property line shared with a residential use to the west. The approximate center of the third playground, located along the southeastern side of the daycare building, is located about 175 feet from the nearest property line shared with a residential use and would be partially shielded by the daycare building.

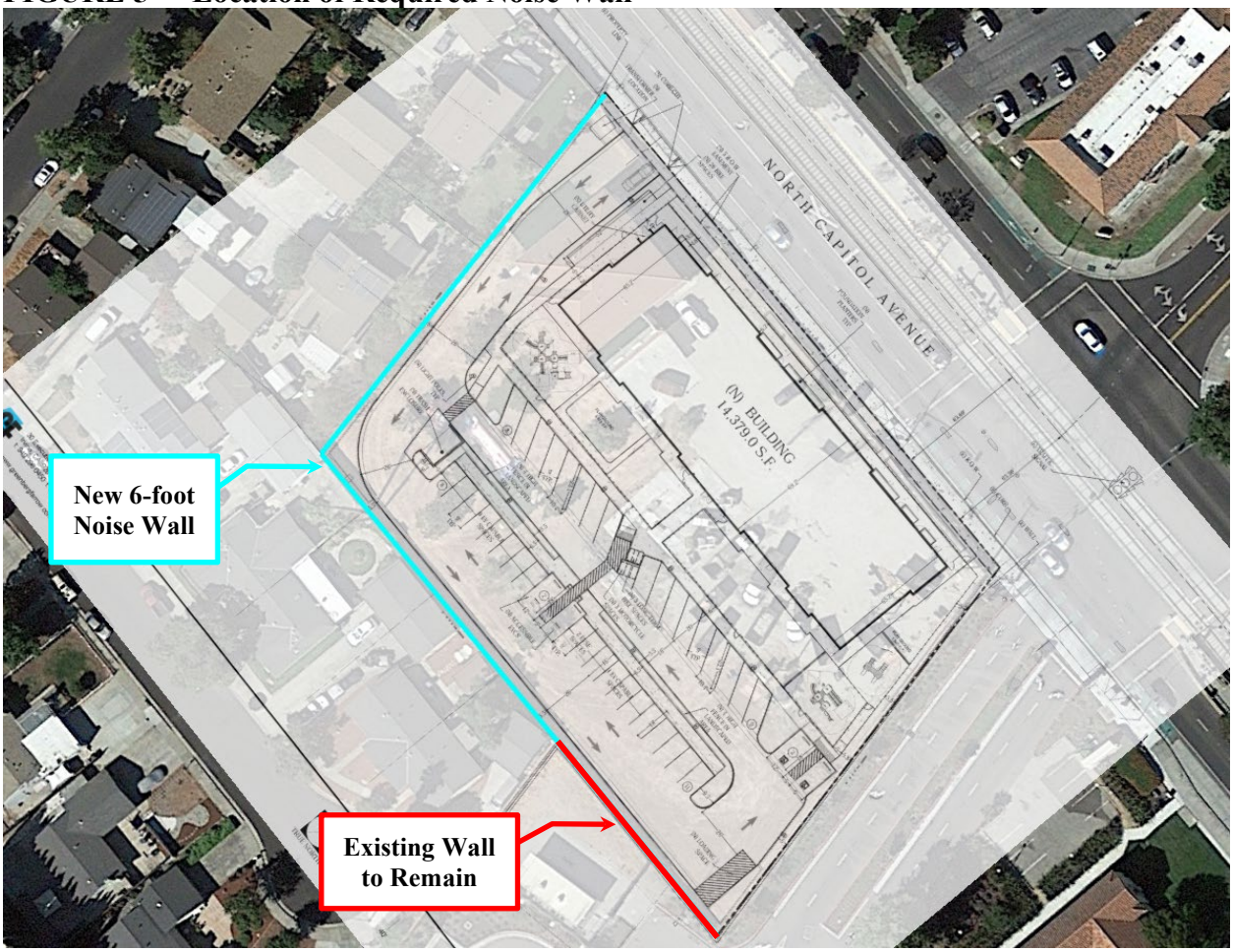
The potentially most-affected residence is that which is located along the southwest property line near noise survey measurement location ST-3. This residence and area along the shared property line could be exposed to noise from all three playgrounds throughout a full day of operation. At a distance of about 110 feet from the center of two playgrounds and about 180 feet (while partially shielded) from the third, the total noise exposure from a full attendance day and full use of all three playgrounds without any mitigation would reach up to 55 dBA DNL.

As children occupying a play area are typically generating noise through their voices originating at a height below five feet, a minimum height of five feet of the property line wall would provide some noise attenuation at the residential properties to the southwest. To ensure that the line of sight between the playgrounds and the residences southwest of the property line is broken and for a greater amount of noise reduction to be achieved, the height of this wall should be increased to a minimum height of six feet. At six feet, the property line wall would be anticipated to provide about 5 dBA of noise reduction at the most affected residences to the southwest, reducing the overall noise exposure from playground activities to about 50 dBA DNL. An existing segment of wall located along the southwestern property line beginning at the southern corner of the project site and bordering a non-residential property appears to reach a height of six feet or greater and would be expected to provide adequate noise reduction.

The southeastern property line is bordered with an access road leading to a commercial building with no noise-sensitive outdoor use areas which would be directly exposed to playground noise. The playground located along this property line would potentially generate greater levels of noise at the nearest property line due to its proximity, being about 15 feet away from the center of the playground. Continuing the solid property line wall up along the southeastern property line would provide substantial shielding to the uses to the southeast, which would continue to experience day-night average noise levels between 60 and 67 dBA DNL resulting primarily from vehicular traffic along N. Capitol Avenue. The continuation of the property line wall could provide about 10 dBA of noise reduction from the nearby playground, with a resulting noise exposure of about 59 dBA DNL at the property to the southeast. However, no noise-sensitive areas beyond the southeast property line would be affected by playground noise.

With construction of a solid property line barrier wall meeting a minimum height of six feet, playground noise levels are not anticipated to exceed the 55 or 60 dBA DNL limits for noise exposure at the property line of residential and non-residential uses, respectively. The location of the required wall is shown below in Figure 5. The new segment to be built is shown in blue while the existing segment to remain is shown in red.

FIGURE 5 Location of Required Noise Wall



Parking Lot

The project would construct a parking lot in the area located west of the daycare center building. The parking lot would include approximately 40 vehicle parking spaces and three motorcycle parking spaces. The project would also provide three long-term bicycle storage spaces and 26 short-term bicycle storage spaces. Parking lots generate noise via low-speed vehicle circulation, car engines, car alarms, squealing tires, door slams, and human voices. The greatest noise levels originating from the parking lot would occur during periods when children are being picked up or dropped off to the full day programs. The children's arrival time would be spread out over a two-and-a-half hour period beginning at 7 a.m. and concluding at 9:30 a.m. The typical departure time would vary depending on the age of the children and the length of program, but would conclude by 6:30 p.m. A potential full attendance of 252 children could be dropped off each day.

Additionally, when at full capacity, a total of about 34 employees would be employed at the daycare. Most would begin the workday at 9:00 a.m. but 50% of the staff would arrive earlier in the day for shifts beginning as early as 7:00 a.m. This sums to an approximate total of 286 parents and employees using the parking lot between the hours of 7:00 a.m. and 9:30 a.m. during a day of full capacity attendance and assuming no carpooling or other means of transportation.

Typical noise levels associated with parking lots of this size would reach 40 to 45 dBA L_{eq} at a distance of 50 feet from the parking area. The center of the nearest parking space to a shared property line is located about 40 feet from the southwest property line shared with residences. At this distance, and assuming 4 active hours of parking lot use per day resulting from 2.5 hours of drop-offs and 1.5 hours of pickups, parking lot activities would be expected to generate a noise level of 38 dBA DNL at the most-affected property line to the southwest.

Mechanical Equipment

Information on the types and locations of mechanical equipment proposed for the project were not available as of this writing. Noise-generating mechanical equipment used for commercial buildings similar to the one proposed typically amounts to heating, ventilation, and air conditioning equipment. Typical commercial HVAC units generate noise levels of 50 to 60 dBA at a distance of 30 feet and would be expected to be operating throughout the entirety of the day. A worst-case placement of HVAC equipment could locate it on the rooftop of the daycare building at the northwest corner, approximately 50 feet from the northwestern property line shared with residences. At this distance, assuming 24-hour operation, noise from HVAC equipment could reach 62 dBA DNL at the nearest property line.

Placement of mechanical equipment at a location further away from shared property lines or behind a parapet wall would substantially reduce noise exposure at nearby sensitive uses. Locating the equipment 150 feet from shared property lines could reduce the noise exposure to 52 dBA DNL. Alternatively, fully shielding the equipment through placement of parapet walls tall enough to fully obscure the line of sight between the property lines and the equipment could also reduce mechanical equipment noise by about 10 dBA.

Total Operational Noise

The northwest and southwest property lines shared with residential uses would experience noise from multiple sources associated with the project throughout a given day. This combined noise exposure from multiple sources can be calculated to determine the total noise exposure at the most-affected areas along each property line.

Northwest Property Line

- Playground noise at the nearest segment of the northwest property line would be expected to reach about 52 dBA DNL without mitigation, resulting from 3 hours of use of each of the playgrounds located along the southwestern side of the daycare building. The third playground located along the southeastern side of the building would be adequately shielded from the northwest property line and would not be expected to generate substantial noise. With mitigation in the form of a 6-foot property line wall, a noise reduction of 5 dBA would be expected, reducing the noise exposure from the playground to 47 dBA DNL.

- The center of the nearest parking lot space is located approximately 60 feet away from the northwest property line. At this distance and with no mitigation, 4 hours of active parking lot use would result in a noise level of about 36 dBA DNL. A 6-foot property line wall reducing the noise exposure by 5 dBA DNL would result in a noise level of about 31 dBA DNL.

- Rooftop HVAC equipment placed at a minimum distance of 150 feet from the northwest property line or fully shielded by a structure such as a parapet wall would generate a noise level of about 52 dBA DNL at the property line.

Combining these three operational sources, the anticipated unmitigated operational noise exposure would just exceed 55 dBA DNL. With mitigation at the northwestern property line, operational noise levels would be reduced to 53 dBA DNL. This would not exceed the Municipal Code standard of 55 dBA DNL for property lines shared with residential uses.

Southwest Property Line

- As described above, playground noise at the nearest segment of the southwest property line would be expected to reach about 55 dBA DNL without mitigation, resulting from 3 hours of use of each of the playgrounds located along the southwestern side of the daycare building and from 4.5 hours of use of the playground located along the southeastern side of the building. With mitigation in the form of a six foot property line wall, a noise reduction of 5 dBA would be expected, reducing the noise exposure from the playground to 50 dBA DNL.

- The center of the nearest parking lot space is located approximately 40 feet away from the northwest property line. At this distance and with no mitigation, 4 hours of active parking lot use would result in a noise level of about 38 dBA DNL. A 6-foot property line wall reducing the noise exposure by 5 dBA DNL would result in a noise level of about 33 dBA DNL.

- Rooftop HVAC equipment placed at a minimum distance of 150 feet from the northwest property line or fully shielded by a structure such as a parapet wall would generate a noise level of about 52 dBA DNL at the property line.

Combining these three operational sources, the anticipated unmitigated operational noise exposure is 57 dBA DNL. With mitigation at the southwestern property line, operational noise levels would be reduced to 54 dBA DNL. This would not exceed the Municipal Code standard of 55 dBA DNL for property lines shared with residential uses.

Northeast and Southeast Property Lines

The northeast property line faces N. Capitol Avenue. No noise-sensitive uses are directly adjacent to this property line. Operational noise originating from the project would not affect uses to the northeast. A commercial building is located about 120 feet from the southeast property line. Separating this building and the project site are a roadway and parking lot. No outdoor use areas beyond the southeast property line would be directly exposed to substantial project-generated noise.

Mitigation Measure 1b: To ensure operational noise is reduced to levels not exceeding City of San José Municipal Code standards, the following measures are to be incorporated into the project design:

- A screening wall reaching a minimum height of six feet and extending along the northwestern and southwestern property lines shall be constructed. The wall must be constructed without gaps or cracks, eliminating the line of sight between the residential uses to the northwest and southwest and noise-generating components of the project including the playgrounds and parking lot. Appropriate wall construction materials should have a minimum surface weight of 3 pounds per square foot such as 1-inch-thick wood, masonry block, or concrete. Alternate materials such as metal (20 gage), glass (1/8-inch), or plexiglass (1/4-inch) could also be considered suitable for the proposed barrier.

- Noise-generating HVAC equipment shall be placed at a minimum distance of 150 feet from the northwestern and southwestern property lines. Alternatively, the equipment may be fully shielded from direct exposure to the northwestern and southwestern property lines via a structure such as a parapet wall such that the line of sight between the equipment and the property lines is fully obscured.

With the above measures incorporated into project design, operational noise levels would be compatible with all applicable regulations, including those of the San José Municipal Code, and this would become a **less-than-significant impact**.

Impact 2: **Exposure to Excessive Groundborne Vibration.** Construction-generated vibration levels at nearby sensitive structures may exceed values recommended by the City. **This is a less-than-significant impact with mitigation.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools are used. Construction phases utilizing such equipment or tools would include demolition, site preparation, grading, trenching, building construction, and paving. Foundation construction techniques involving impact or vibratory pile driving equipment, which can cause excessive vibration, are not expected with the proposed project.

According to Policy EC-2.3 of the City of San José General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.2 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls. The vibration limits contained in this policy are conservative and designed to provide the ultimate level of protection for existing buildings in San José.

A review of the City of San José Historic Resource Inventory[4] identified the former Berryessa Elementary School building located at 1171 N. Capitol Avenue as a historic building. The limit for construction-generated vibration at this building is assessed at 0.08 in/sec PPV. No other historic structures are in the project vicinity. All other affected structures are assessed with a construction-generated vibration limit of 0.2 in/sec PPV.

Table 10 presents typical vibration levels from construction equipment at 25 feet. Jackhammers typically generate vibration levels of 0.035 in/sec PPV and drilling typically generates vibration levels of 0.089 in/sec PPV at 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 10 also presents construction vibration levels calculated at distances representative of the nearest structures along the project property line. These include residential structures located as close as about 5 feet from the southwest property line, residential structures about 20 feet from the northwest property line, the Berryessa Elementary School building located about 110 feet from the southeast property line, and the nearest commercial and residential buildings located about 145 feet from the northeastern property line. Vibration levels are highest close to the source, and then attenuate with increasing distance at the rate $(D_{ref}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet.

4 City of San José Historic Resources Inventory
https://www.arcgis.com/apps/webappviewer/index.html?id=b2d7cc355a86493c8da904b8c2fc3e3e&extent=-13591970.1207%2C4462771.7617%2C-13533877.9792%2C4499308.6613%2C102100

TABLE 10 Vibration Levels for Construction Equipment (in/sec PPV)

Equipment		Reference Distance 25 feet	Residential Structures to SW ~5 feet	Residential Structures to NW ~20 feet	Historic Structure to SE ~110 feet	Res. And Comm. Structures to NE ~145 feet
Vibratory Roller		0.210	**2.348**	**0.293**	0.023	0.015
Clam shovel drop		0.202	**2.258**	**0.282**	0.022	0.014
Hoe Ram		0.089	**0.995**	0.124	0.010	0.006
Large bulldozer		0.089	**0.995**	0.124	0.010	0.006
Caisson drilling		0.089	**0.995**	0.124	0.010	0.006
Loaded trucks		0.076	**0.850**	0.106	0.008	0.005
Jackhammer		0.035	**0.391**	0.049	0.004	0.003
Hydromill (slurry wall)	in soil	0.008	0.190	0.024	0.002	0.001
	in rock	0.017	0.089	0.011	0.001	0.001
Small bulldozer		0.003	0.034	0.004	0.000	0.000

Source: Transit Noise and Vibration Impact Assessment Manual, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, September 2018, as modified by Illingworth & Rodkin, Inc., September 2022.

As indicated above in bold in Table 10, vibration levels resulting from several types of equipment would have the potential to exceed the San José General Plan Policy EC-2.3 limit of 0.2 in/sec PPV for buildings of normal, conventional construction at residential structures located near the southwest and northwest property lines. Vibration levels at the historic former Berryessa Elementary School building would not exceed the 0.08 in/sec PPV limit.

Heavy construction within 25 feet of the southwest and northwest property lines would have the potential to generate excessive vibration. As construction activities move in towards the center of the site and away from shared property lines, construction vibration levels would decrease. This is a potentially significant impact.

Mitigation Measure 2: To reduce construction vibration at nearby sensitive structures, the following construction vibration mitigation measures shall be implemented:

- Avoid using heavy construction equipment such as vibratory rollers, hoe rams, large bulldozers, and tampers within 30 feet of nearby structures.
- Avoid dropping heavy objects or materials within 30 feet of nearby structures.
- Place operating equipment on the construction site as far as possible from vibration-sensitive receptors.
- Use smaller equipment to minimize vibration levels below the limits.
- Select demolition methods not involving impact tools.

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

Impact 3: **Excessive Aircraft Noise.** The project site is located about 3.6 miles from Norman Y. Mineta International Airport. The noise environment attributable to aircraft is considered normally acceptable under the Santa Clara County ALUC noise compatibility policies for school land uses. This is a **less-than-significant** impact.

Norman Y. Mineta San José International Airport is a public-use airport located approximately 3.6 miles southwest of the project site. According to the City's Airport Master Plan Environmental Impact Report,[5] the project site lies outside the 60 dBA CNEL/DNL contour line (see Figure 6). According to Table 4-1 of the Santa Clara County Comprehensive Land Use Plan, school land uses are considered generally acceptable in areas exposed to aircraft noise not exceeding 60 dBA CNEL/DNL. Therefore, the proposed project would be compatible with the County'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 6 2037 CNEL Noise Contours for SJIA Relative to Project Site