865 EMBEDDED WAY INDUSTRIAL PROJECT NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The project proposes the construction of a one-story 121,850-square-foot industrial/manufacturing warehouse building at 865 Embedded Way in the City of San José, California. The project site is approximately 10.17 acres, and the majority of the site is currently vacant and consists of undeveloped grassland. A paved parking area and access roadways associated with the adjacent property extend onto a portion of the site, along its eastern boundary. The Coyote Creek Trail borders the project site to the west, while industrial uses border the site to the north, to the east, and to the south. While a designated end use has not been determined for the proposed building, the project is designed for a research and development (R&D) use. The land use and zoning designation allow for a variety of industrial uses, such as R&D, manufacturing, assembly, testing, and offices. For purposes of this study, the project is analyzed as an R&D facility.

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 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 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.

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:

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

(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.

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

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

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

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

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

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

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

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

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

Regulatory Background – Vibration

City of San José

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

EC-2.3 Require new development to minimize continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

Existing Noise Environment

The project site is located at 865 Embedded Way in San José, California. The site is bound by existing industrial buildings to the north, to the east, and to the south. Coyote Creek Trail borders the site to the west, and the nearest residential land uses are located approximately 340 feet west of the project site boundary.

The existing noise environment at the site results primarily from vehicular traffic along nearby U.S. Highway 101 (US 101) and Hellyer Avenue. Aircraft associated with Mineta San José International Airport also contribute to the noise environment.

A noise monitoring survey consisting of two long-term (LT-1 and LT-2) and three short-term (ST-1, ST-2, and ST-3) noise measurements was made at the site and the surrounding area between

Wednesday, July 6, 2022, and Friday, July 8, 2022. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made from a utility pole in front of 521 Delridge Drive, approximately 50 feet from the centerline of the southbound through traffic lanes along Coyote Road. LT-1 represents the existing ambient noise levels at the nearest residential land uses. Hourly average noise levels at LT-1 typically ranged from 58 to 64 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 48 to 58 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Thursday, July 7, 2022, was 63 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures A1 through A3 of Appendix A.

LT-2 was made from a utility pole at the western end of Embedded Way, along the southernmost portion of the project site. LT-2 represents the existing ambient noise levels at the project site and the existing industrial buildings surrounding the site. Hourly average noise levels at LT-2 typically ranged from 52 to 62 dBA L_{eq} during daytime hours and from 46 to 58 dBA L_{eq} during nighttime hours. The day-night average noise levels on Thursday, July 7, 2022, was 61 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figures A4 through A6 of Appendix A.

Short-term noise measurements ST-1 and ST-2 were made on Wednesday, July 6, 2022, between 12:20 p.m. and 12:50 p.m. in 10-minute intervals. ST-3 was made on Friday, July 8, 2022, in a 10-minute interval starting at 12:10 p.m. Results of the measurements are summarized in Table 4.

ST-1 was made at the northeastern corner of the project site, along the boundaries shared with existing industrial buildings. Distant traffic noise levels from US 101 were below 53 dBA. Distant rooftop mechanical equipment resulted in noise levels of about 50 to 52 dBA and were constant throughout the ST-1 measurement. An air-brake release from a truck in the north parking lot produced noise levels up to 66 dBA at ST-1, and jets produced noise levels ranging from 54 to 57 dBA. The 10-minute L_{eq} measured at ST-1 was 52 dBA.

ST-2 was made at the east end of Fontanelle Court, approximately 35 feet from the southbound traffic lanes along Coyote Road. The primary noise source at the ST-2 measurement location was local traffic noise along Coyote Road. Vehicular noise levels along Coyote Road were produced by one heavy truck, yielding noise levels of 74 dBA, and 21 automobiles, yielding noise levels ranging from 51 to 72 dBA. A distant leaf blower, generating noise levels of 54 dBA, and distant hammering, generating noise levels of 53 to 59 dBA, were also measured at ST-2. One airplane flyover generated noise levels of 50 dBA at ST-2. The 10-minute L_{eq} measured at ST-2 was 59 dBA.

ST-3 was made near the intersection of Embedded Way and Hellyer Avenue. The primary noise source at ST-3 was vehicular traffic along Hellyer Avenue. Heavy trucks generated noise levels ranging from 62 to 63 dBA at ST-3, while automobiles generated noise levels ranging from 51 to 64 dBA. Jet flyovers at ST-3 produced noise levels that ranged from 51 to 61 dBA. The 10-minute L_{eq} measured at ST-3 was 54 dBA.

TABLE 4 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location	Date, Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: NE corner of the project site	7/6/2022, 12:20-12:30	66	57	53	52	51	52
ST-2: ~35 feet west of the centerline of the southbound through lanes of Coyote Road	7/6/2022, 12:40-12:50	74	71	63	52	45	59
ST-3: Near the intersection of Embedded Way and Hellyer Avenue	7/8/2022, 12:10-12:20	64	62	58	51	47	54

FIGURE 1 Aerial Image of the Project Site and Surrounding Area with Long- and Short-Term Measurement Locations Identified

Source: Google Earth, 2022.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

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 US 101 and local roadways. The traffic study completed for the proposed project did not include future traffic volumes. However, the traffic study did show that the project would result in a noise level increase of 1 dBA DNL over existing volumes. According to the noise assessment completed for the *Envision San Jose 2040 General Plan Comprehensive Update Draft Environmental Impact Report*,[2] the traffic noise levels due to US 101 would increase at the project site by 1 dBA DNL above existing conditions in the year 2035. Since US 101 is more than 1,500 feet from the project site, a conservative cumulative increase of 1 dBA DNL is assumed at the project site under future build conditions.

Future Interior Noise Environment

The nearest building façades are approximately 365 feet east of the centerline of the northbound travel lanes of Coyote Road and approximately 500 feet north of the centerline of Embedded Way. At these distances, daytime hourly average noise levels at the building exterior would be below 60 dBA L_{eq}, with day-night average noise levels of 61 dBA DNL.

Standard construction materials for nonresidential 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 $L_{eq(1\text{-}hr)}$.

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-

[2] Illingworth & Rodkin, Inc., *Envision San José 2040 General Plan Comprehensive Update Environmental Noise Assessment*, December 2010.

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 temporary construction-related activities would substantially 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.

  - 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 not be exposed to a temporary increase in ambient noise levels for a period of more than one year due to project construction, and construction noise levels would not exceed the FTA's recommended limits at existing noise-sensitive land uses surrounding the site. With the implementation of the City's Standard Permit Condition, this temporary noise increase would be reduced to a **less-than-significant** level.

Construction of the project is anticipated to begin in February 2023 and end in December 2023, for a total construction period of 10 months. The site is vacant but would require some demolition work. Construction activities would include minimal demolition, site preparation, grading, building construction, architectural coating, and paving. 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.

While the City of San José does not establish noise level thresholds for construction activities, this analysis uses the noise limits established by the Federal Transit Administration (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*.[1] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be applied at residential land uses and 90 dBA L_{eq} shall be applied at commercial and industrial land uses.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. 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. 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 5) from the equipment. Table 6 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 warehouse 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.

TABLE 5 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 6 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.

Equipment expected to be used in each construction stage are summarized in Table 7, along with the quantity of each type of equipment and the reference noise level at 50 feet, assuming the operation of the two loudest pieces of construction equipment for each construction phase.

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 recommended 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 also summarizes the construction noise levels for the two loudest pieces of equipment propagated to the surrounding receiving land uses.

To assess construction noise impacts at the receiving property lines of existing noise-sensitive receptors, the worst-case hourly average noise level, which would result in the noise levels summarized in Table 7, was propagated from the geometrical center of the project site to the nearest property lines or building façades of the surrounding land uses. These noise level estimates are shown in Table 8. Noise levels in Table 8 do not assume reductions due to intervening buildings or existing barriers.

TABLE 7 Estimated Construction Noise Levels for the Proposed Warehouse Building at a Distance of 50 feet

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet
Demolition	11 days	Excavator (2)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)[a]	82 dBA L_{eq}
Site Preparation	15 days	Grader (5)[a] Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)[a]	84 dBA L_{eq}
Grading/ Excavation	37 days	Excavator (3) Grader (4)[a] Rubber-Tired Dozer (3) Concrete/Industrial Saw (3)[a] Tractor/Loader/Backhoe (3)	85 dBA L_{eq}
Trenching/Foundation/ Structure	72 days	Tractor/Loader/Backhoe (2)[a] Excavator (2)[a]	82 dBA L_{eq}
Building –Exterior	64 days	Crane (1) Forklift (2) Tractor/Loader/Backhoe (3)[a] Welder (4)[a] Boom Lift (4)	81 dBA L_{eq}
Building – Interior/ Architectural Coating	13 days	Aerial Lift (2)[a]	68 dBA L_{eq}
Paving	26 days	Paver (1) Paving Equipment (1)[a] Roller (1) Tractor/Loader/Backhoe (1)[a]	84 dBA L_{eq}

[a] Denotes two loudest pieces of construction equipment per phase.

TABLE 8 Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	North Industrial (310ft)	East Industrial (340ft)	South Industrial (240ft)	West Residences (700ft)
Demolition	66 dBA L_{eq}	65 dBA L_{eq}	68 dBA L_{eq}	59 dBA L_{eq}
Site Preparation	68 dBA L_{eq}	67 dBA L_{eq}	70 dBA L_{eq}	61 dBA L_{eq}
Grading/Excavation	69 dBA L_{eq}	68 dBA L_{eq}	71 dBA L_{eq}	62 dBA L_{eq}
Trenching/Foundation	66 dBA L_{eq}	65 dBA L_{eq}	68 dBA L_{eq}	59 dBA L_{eq}
Building –Exterior	65 dBA L_{eq}	64 dBA L_{eq}	67 dBA L_{eq}	58 dBA L_{eq}
Building – Interior/ Architectural Coating	52 dBA L_{eq}	51 dBA L_{eq}	54 dBA L_{eq}	45 dBA L_{eq}
Paving	69 dBA L_{eq}	68 dBA L_{eq}	71 dBA L_{eq}	62 dBA L_{eq}

As shown in Table 8, construction noise levels would intermittently range from 45 to 62 dBA L_{eq} at existing residential uses and from 51 to 71 dBA L_{eq} at existing industrial uses in the project vicinity when construction activities focused near the center of the project site. These construction noise levels would not exceed the exterior threshold of 80 dBA L_{eq} at residential land uses. The 90 dBA L_{eq} threshold would not be exceeded at industrial land uses in the project vicinity during project construction. While specific construction activities would at times exceed these thresholds when work is conducted near shared property lines, construction would move throughout the project site during the planned 10-month period and thus would not constitute a significant temporary increase. Since project construction would not last for a period of more than one year, this temporary construction impact would not be considered significant according to Policy EC-1.7 of the City's General Plan.

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.

- 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.

- 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.

With the implementation of GP Policy EC-1.7, Municipal Code requirements, and the City's Standard Permit Conditions, the temporary construction noise impact would be less-than-significant.

Mitigation Measure 1a: No mitigation required.

Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards. The proposed project would not result in a substantial permanent noise level increase. The proposed project would not exceed applicable standards at the existing noise-sensitive uses. **This is a less-than-significant impact.**

According to Policy EC-1.2 of the City's General Plan, a significant permanent noise increase would occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA DNL or more where ambient noise levels exceed the "normally acceptable" noise level standard. Where ambient noise levels are at or below the "normally acceptable" noise level standard, noise level increases of 5 dBA DNL or more would be considered significant. The City's General Plan defines the "normally acceptable" outdoor noise level standard for the nearby residential land uses to be 60 dBA DNL. Existing ambient levels, based on the measurements made in the project vicinity, exceed 60 dBA DNL. Therefore, a significant impact would occur if noise due to the proposed project would permanently increase ambient levels by 3 dBA DNL. Policy EC-1.2 applies only to land use categories 1, 2, 3, and 6, which do not include industrial uses. Therefore, Policy EC-1.2 would not apply to the existing industrial uses surrounding the site.

Under the City's Noise Element, noise levels from new nonresidential building equipment shall not exceed a noise level of 55 dBA DNL at receiving noise-sensitive land uses. Noise-sensitive receptors surrounding the site would include existing residences west of the site.

Additionally, the City's Municipal Code limits noise levels from industrial uses to 55 dBA DNL at existing residential uses and to 70 dBA DNL at existing industrial uses, which are located to the north, to the east, and to the south. While exceeding the Municipal Code thresholds would not constitute a significant CEQA impact, these thresholds should be used during the final design phase of the project to control noise at existing receptors in the project vicinity.

Project Traffic Increase

The traffic study included peak hour turning movements for existing traffic volumes and for project trips. The peak hour project trips were added to the existing volumes to generate an 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 1 dBA DNL or less along each roadway segment in the project vicinity. The calculated increases are summarized in Table 9. 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 9 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
Embedded Way	East of Hellyer Avenue	0 dBA DNL
	West of Hellyer Avenue	1 dBA DNL
Fontanoso Way	East of Hellyer Avenue	0 dBA DNL
	Hellyer Avenue to Silver Creek Valley Road	1 dBA DNL
	South of Silver Creek Valley Road	0 dBA DNL
Silver Creek Valley Road/ Blossom Hill Road	East of Hellyer Avenue	0 dBA DNL
	Hellyer Avenue to Fontanoso Way	0 dBA DNL
	Fontanoso Way to US 101 NB ramps/Coyote Road	0 dBA DNL
	US 101 NB ramps/Coyote Road to US SB ramps	0 dBA DNL
	West of US 101 SB ramps	0 dBA DNL
Hellyer Avenue	North of US 101 SB ramps	0 dBA DNL
	US 101 SB ramps to US 101 NB ramps/Dove Road	0 dBA DNL
	US 101 NB ramps/Dove Road to Embedded Way	0 dBA DNL
	Embedded Way to Fontanoso Way	0 dBA DNL
	Fontanoso Way to Silver Creek Valley Road	0 dBA DNL
	South of Silver Creek Valley Road	0 dBA DNL
Coyote Road	North of Silver Creek Valley Road/Blossom Hill Road	0 dBA DNL
Dove Road	North of Hellyer Avenue	0 dBA DNL
US 101 NB ramps	On/off ramp at Hellyer Avenue	0 dBA DNL
	Off ramp at Silver Creek Valley Road/Blossom Hill Road	0 dBA DNL
US 101 SB ramps	On/off ramp at Hellyer Road	0 dBA DNL
	Off ramp at Blossom Hill Road	0 dBA DNL
	On ramp at Blossom Hill Road	0 dBA DNL

Mechanical Equipment

The roof plan for the proposed project shows four ventilation units along the southern edge of the building, towards the center. Only a portion of the proposed building will be ventilated; so, additional equipment is not expected. Trane WHC060 or Trane WHC048 heat pump units are planned for the proposed warehouse building, and noise level information from the manufacturer was provided for this study. At a distance of 5 feet, an individual heat pump unit would generate noise levels ranging from 80 to 81 dBA. Assuming all four units to be operating simultaneously at any given time, the total noise level generated by the rooftop equipment would range from 86 to 87 dBA at a distance of 5 feet. Worst-case conditions assumes that all four units would cycle on and off continuously throughout a 24-hour period, which would result in day-night average noise levels up to 93 dBA DNL at a distance of 5 feet.

Assuming no reductions due to shielding effects or building elevations, the estimated rooftop equipment noise levels were estimated at the property lines of the nearest surrounding land uses. The estimated noise levels at the receptors are summarized in Table 10.

TABLE 10 Estimated Rooftop Equipment Noise Levels at Receiving Land Uses

Receptor	Distance from Nearest Center of the Equipment Area	Hourly L_{eq}	DNL	Noise Level Increase, DNL
West Residences	700 feet	43 to 44 dBA	50 dBA	0 dBA
North Industrial	385 feet	48 to 49 dBA	55 dBA	N/A[a]
East Industrial	315 feet	50 to 51 dBA	57 dBA	N/A[a]
South Industrial	200 feet	54 to 55 dBA	61 dBA	N/A[a]

[a] Noise level increases were not calculated at the existing industrial uses surrounding the site since Policy EC-1.2 would not apply to these land uses.

Hourly average noise levels would not exceed 55 dBA at the property lines of the nearest residences west of the site, and the day-night average noise level would not exceed 55 dBA DNL at the nearest residences. The Municipal Code thresholds for industrial uses would also not be exceeded at the property lines of the nearest land uses. Mechanical equipment noise would not result in a measurable or detectable increase over existing ambient noise levels (0 dBA DNL increase) at the residential land uses in the project vicinity.

Parking Lot Noise

Surface parking lots would be located to the east, to the south, and to the west of the proposed building. Noise sources associated with the use of the parking lots would include vehicular circulation, loud engines, door slams, and human voices. The maximum noise level of a passing car at 15 mph typically ranges from 45 to 55 dBA L_{max} at a distance of 100 feet. The noise generated during an engine start is similar. Door slams cause slightly lower noise levels. The hourly average noise levels resulting from all of these noise-generating activities in a busy parking lot typically ranges from 40 to 50 dBA L_{eq} at a distance of 100 feet from the parking area. Noise levels decrease at a rate of 6 dB per doubling of distance. Table 11 summarizes the estimated parking lot noise at the property lines of the surrounding receptors when the noise source is positioned at the center of the nearest parking area on the project site.

Due to the nature of the proposed warehouse, parking lot activity would be busy in the morning when people arrive to work and, in the evening, when people would depart. For estimating worst-case conditions, hourly average noise levels in a busy parking lot were assumed for two AM hours and for three PM hours when calculating the day-night average noise level. These levels are also summarized in Table 11.

TABLE 11 Estimated Parking Lot Noise Levels at Receiving Land Uses

Receptor	Distance from Center of Nearest Parking Area	Hourly L_{eq}	DNL	Noise Level Increase, DNL
West Residences	435 feet	27 to 37 dBA	30 dBA	0 dBA
North Industrial	300 feet	31 to 41 dBA	34 dBA	N/A[a]
East Industrial	45 feet	47 to 57 dBA	50 dBA	N/A[a]
South Industrial	150 feet	37 to 47 dBA	40 dBA	N/A[a]

[a] Noise level increases were not calculated at the existing industrial uses surrounding the site since Policy EC-1.2 would not apply to these land uses.

Noise levels resulting from parking activities would be well below ambient noise levels and the City thresholds. Proposed parking lot/parking activities would not measurably contribute to an increase in the ambient noise levels at noise-sensitive receptors in the project vicinity (0 dBA DNL increase).

Truck Deliveries

The site plan shows 12 truck loading docks along the northern façade of the proposed warehouse building. Assuming worst-case conditions, each of the dock doors would have a minimum turnover of two trucks per day, which equates to a total of 48 daily truck trips. For an assumed 12-hour daily operations schedule from 7:00 a.m. to 7:00 p.m., this would equate to four trucks per hour for the entire 12 hour period.

Truck delivery noise would include both maneuvering activities occurring at the loading docks and truck pass-by activities occurring at the access driveways.

Trucks maneuvering would generate 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 used for incoming deliveries typically generate maximum instantaneous noise levels of 70 to 75 dBA L_{max} at a distance of 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 L_{max} at a distance of 50 feet. Hourly average noise levels due to truck maneuvering would range from 65 to 70 dBA L_{eq} at 50 feet.

Due to the orientation of the proposed warehouse building, the only surrounding receptors with direct line-of-sight to the loading docks where the truck maneuvering would occur would be the industrial building to the north. All other receptors, including the nearest residences to the west, would be shielded from the truck loading area and would not be exposed to truck maneuvering noise. The property line of the industrial building to the north would be approximately 170 feet from the center of the truck loading area. At this distance, hourly average noise levels would be

54 to 59 dBA L_{eq}, and the day-night average noise level is estimated to be 53 dBA DNL. Noise levels resulting from truck maneuvering activities in the loading area would not exceed the City's Municipal Code thresholds for receiving industrial land uses.

To estimate the pass-by noise levels for heavy trucks traveling at speeds of 15 to 25 mph, which is assumed for on-site driveway access, the Federal Highway Administration's Traffic Noise Model (FHWA TNM), version 2.5, was used to model various hourly scenarios for truck traffic, based on the assumed daily trip distribution discussed above. Table 12 summarizes the estimated truck pass-by noise levels at the property lines of the surrounding receptors when propagated from the center of the nearest on-site access driveway.

TABLE 12 Estimated Truck Pass-by Noise Levels at Receiving Land Uses

Receptor	Distance from Center of Nearest Driveway	Hourly L_{eq}	DNL	Noise Level Increase, DNL
West Residences	380 feet	36 dBA	33 dBA	0 dBA
North Industrial	100 feet	47 dBA	44 dBA	N/A[a]
East Industrial	45 feet	54 dBA	51 dBA	N/A[a]
South Industrial	110 feet	47 dBA	44 dBA	N/A[a]

[a] Noise level increases were not calculated at the existing industrial uses surrounding the site since Policy EC-1.2 would not apply to these land uses.

Hourly average noise levels and the day-night average noise level due to truck deliveries at the project site would not exceed the City's General Plan or Municipal Code thresholds at the property lines of the nearest surrounding land uses. Additionally, project noise due to truck deliveries would not result in a measurable or detectable increase over existing ambient noise levels at the nearest residences (0 dBA DNL increase).

Total Combined Project-Generated Noise

The operational noise levels produced by the proposed project combined (i.e., traffic, mechanical equipment, parking lot, truck loading/unloading activities, and truck pass-bys) would not substantially increase ambient noise levels in the project vicinity. The total noise level increase due to the proposed project would be immeasurable or undetectable (0 dBA DNL) at the residences to the west and would be 1 dBA DNL or less in the project vicinity. Further, operational noise levels would not exceed 55 dBA DNL at the nearest residential land uses. This is a less-than-significant impact.

Mitigation Measure 1b: None required.

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

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

According to Policy EC-2.3 of the City of San José General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction. The vibration limits contained in this policy are conservative and designed to provide the ultimate level of protection for existing buildings in San José. As discussed in detail below, vibration levels exceeding these thresholds would be capable of cosmetically damaging adjacent buildings. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls.

Table 13 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 13 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 13 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., July 2022.

According to the City's Historic Resource Inventory,[3] the nearest historical building is nearly 1.4 miles southwest of the project site. At this distance, vibration levels due to construction activities

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

at the project site would be 0.0004 in/sec PPV or below. All buildings in the immediate vicinity of the project site would consist of normal conventional construction materials and would, therefore, be subject to the City's 0.2 in/sec PPV threshold. Historical buildings are not discussed further in this section.

Table 14 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 14), which are different than the distances used to propagate construction noise levels (as shown in Table 8), were estimated under the assumption that each piece of equipment from Table 13 was operating along the nearest boundary of the project site, which would represent the worst-case scenario.

TABLE 14 Vibration Levels at Nearest Buildings Surrounding the Project Site

Equipment		PPV (in/sec)			
		West Residences (350ft)	North Industrial (120ft)	East Industrial (60ft)	South Industrial (95ft)
Clam shovel drop		0.011	0.036	0.077	0.047
Hydromill (slurry wall)	in soil	<0.001	0.001	0.003	0.002
	in rock	0.001	0.003	0.006	0.004
Vibratory Roller		0.012	0.037	0.080	0.048
Hoe Ram		0.005	0.016	0.034	0.020
Large bulldozer		0.005	0.016	0.034	0.020
Caisson drilling		0.005	0.016	0.034	0.020
Loaded trucks		0.004	0.014	0.029	0.018
Jackhammer		0.002	0.006	0.013	0.008
Small bulldozer		<0.001	0.001	0.001	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., July 2022.

As shown in Table 14, the nearest structure adjoining the project site would be the industrial building to the east, which is 60 feet from the boundary of the project site. At this distance, the conventional industrial building would be exposed to vibration levels at or below 0.08 in/sec PPV, which is well below the City's 0.2 in/sec PPV threshold. All other buildings in the project vicinity would be exposed to lower vibration levels due to project construction.

Neither cosmetic, minor, or major damage would occur at conventional buildings surrounding the project site. At these locations, and in other surrounding areas where vibration would not be expected to cause cosmetic damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

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

Mitigation Measure 2: None required.

Impact 3: **Excessive Aircraft Noise.** The project site is located about 8.7 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. This is a **less-than-significant** impact.

Norman Y. Mineta San José International Airport is a public-use airport located approximately 8.7 miles northwest of the project site. According to the City's new Airport Master Plan Environmental Impact Report,[4] the project site lies well outside the 60 dBA CNEL/DNL contour line (see Figure 2). The proposed project would be compatible with the City's exterior noise standards for aircraft noise. This would be a less-than-significant impact.

Mitigation Measure 3: None required.

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

FIGURE 2 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5

Scenario 2: With Project 2037 Noise Contour Map

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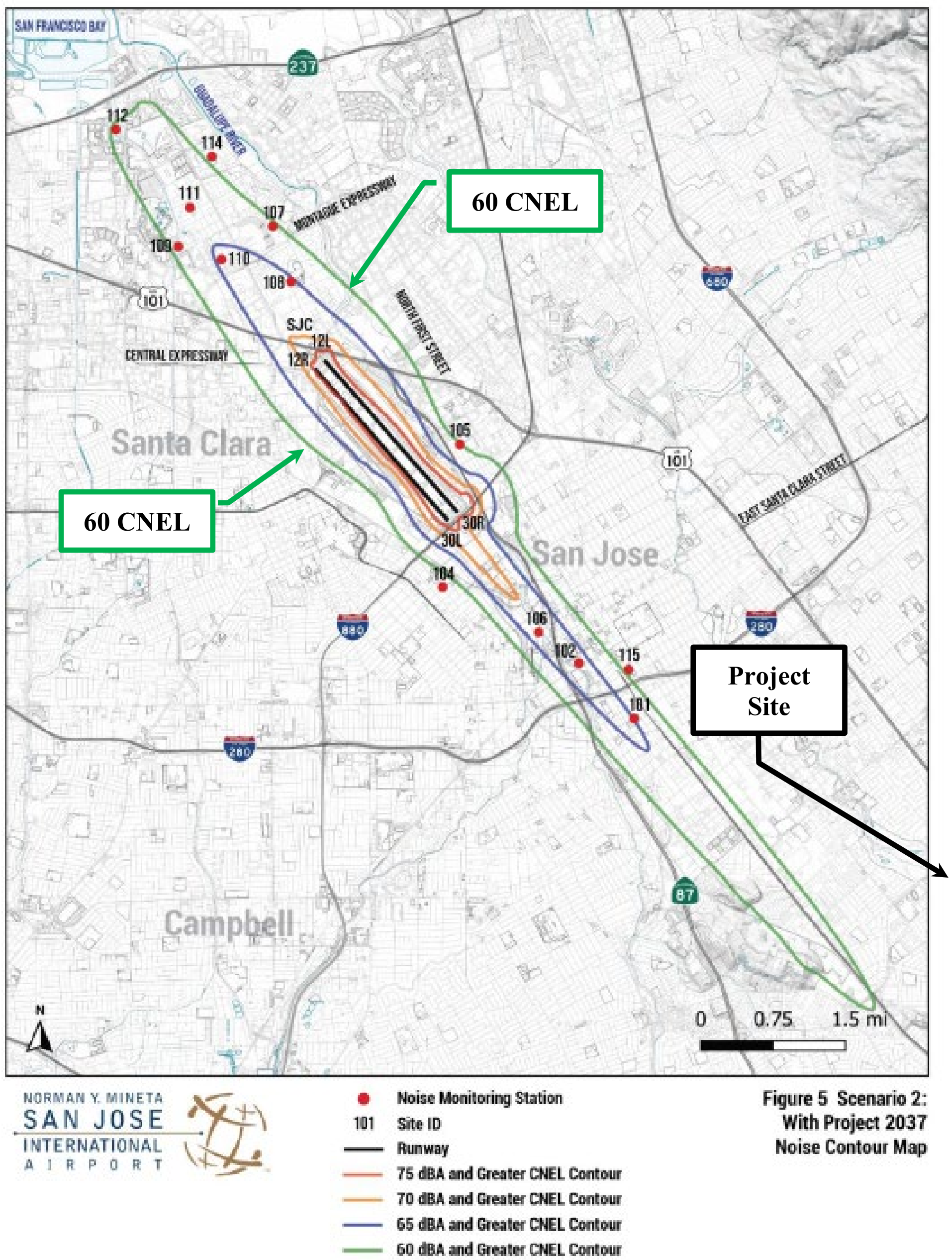

Source: BridgeNet International 2019

Cumulative Impacts

Cumulative noise impacts would include temporary construction noise from cumulative construction projects. From the City's website,[5] the nearest planned or approved project would be about 1.5 miles south of the project site (Western Digital Campus Buildings at 5601 Great Oaks Parkway), which would not share receptors with the proposed project. Therefore, there would not be a cumulative construction impact.

Cumulative traffic volumes were not provided for the proposed project. A significant cumulative traffic noise impact is not assumed for this project.

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

APPENDIX A

FIGURE A1 Daily Trend in Noise Levels for LT-1, Wednesday, July 6, 2022

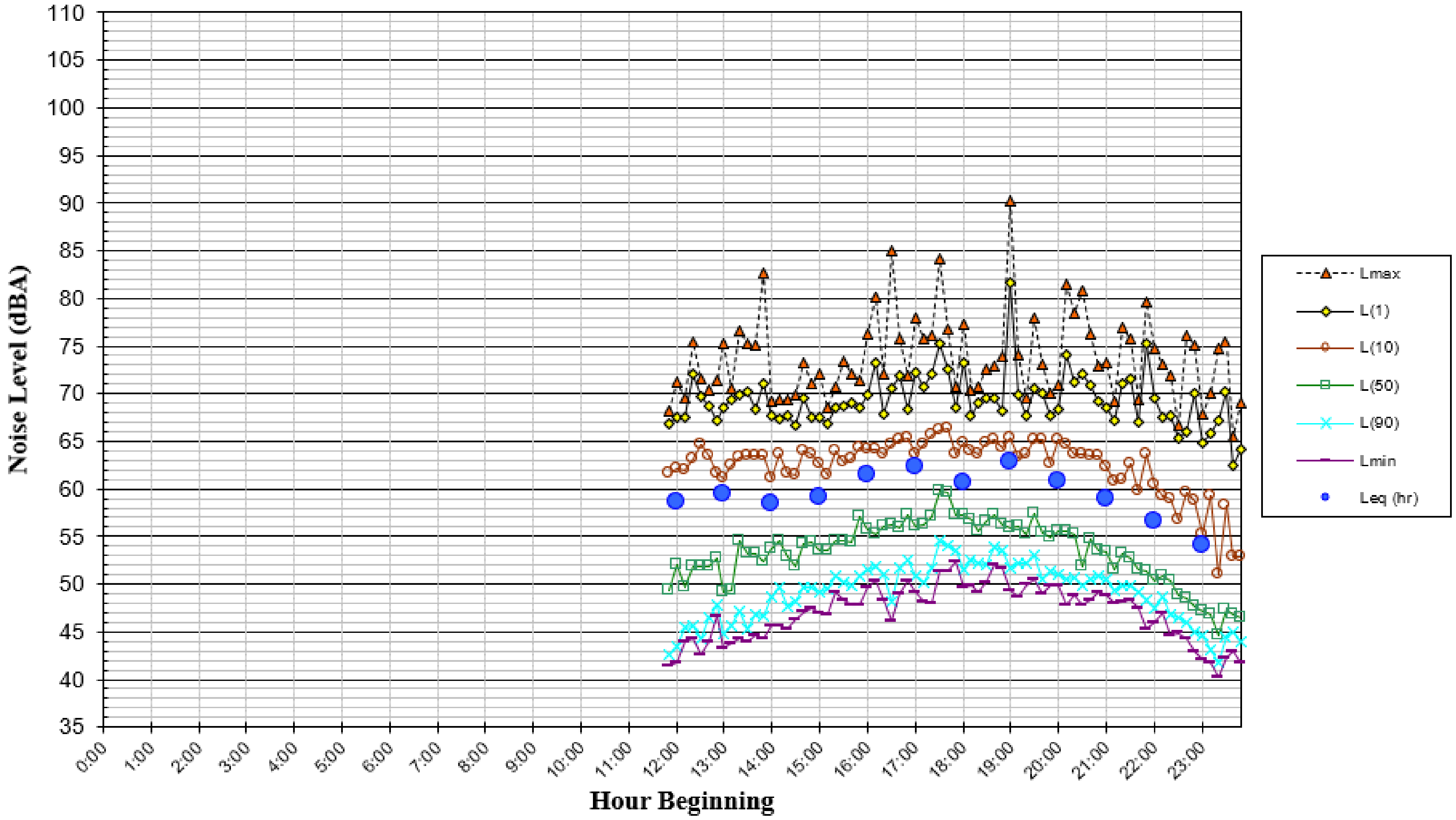

FIGURE A2 Daily Trend in Noise Levels for LT-1, Thursday, July 7, 2022

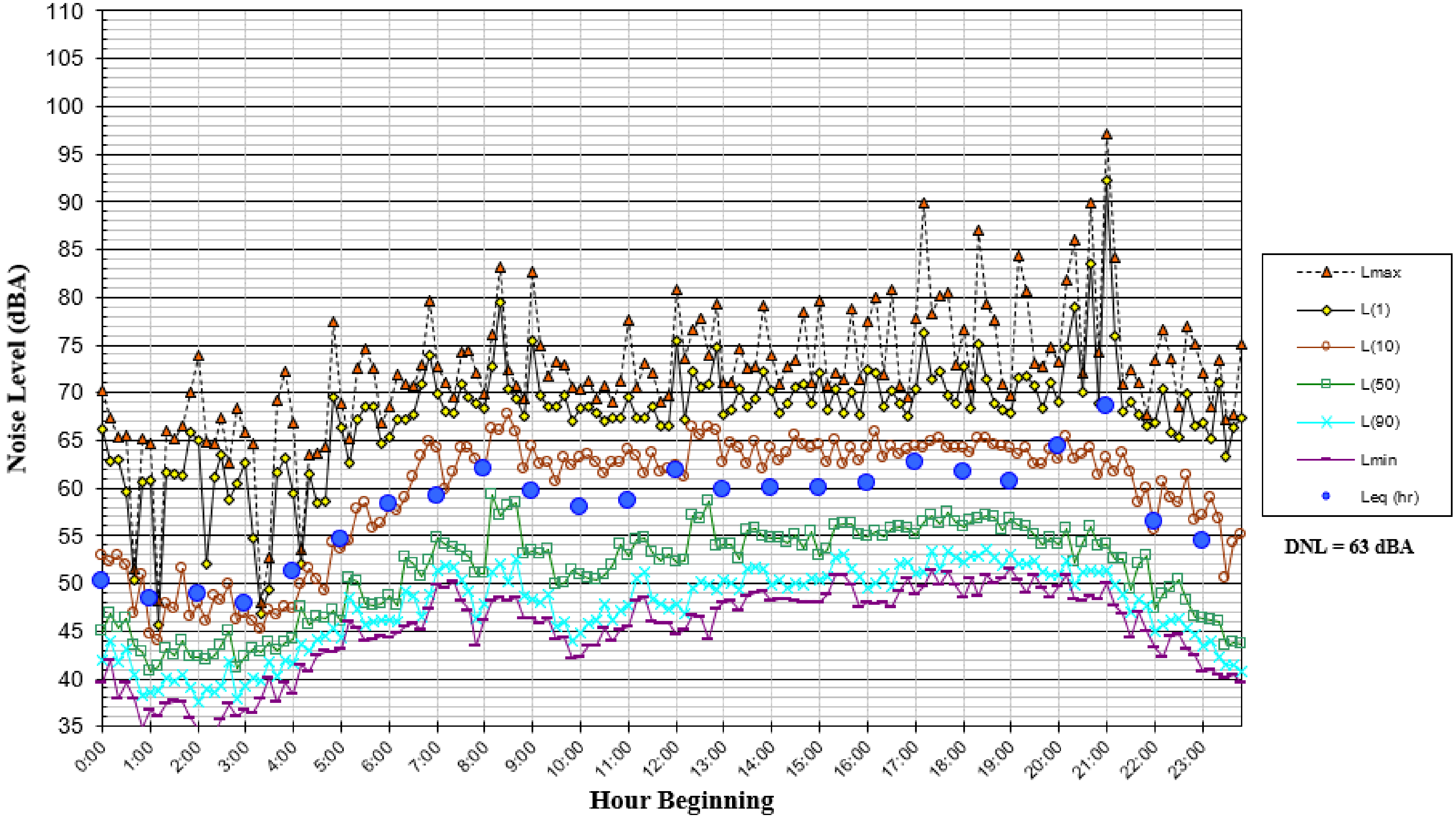

FIGURE A3 Daily Trend in Noise Levels for LT-1, Friday, July 8, 2022

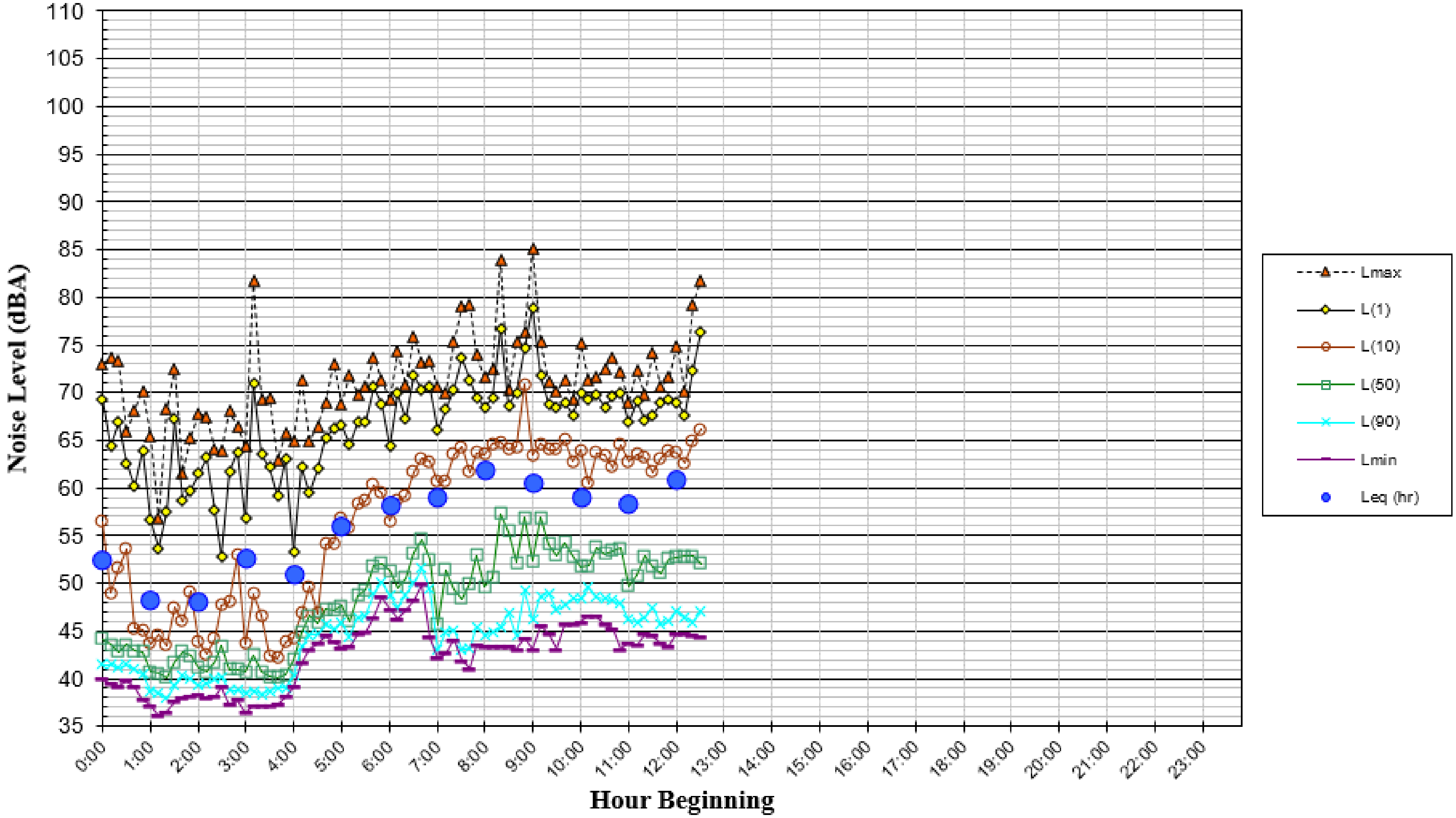

FIGURE A4 Daily Trend in Noise Levels for LT-2, Wednesday, July 6, 2022

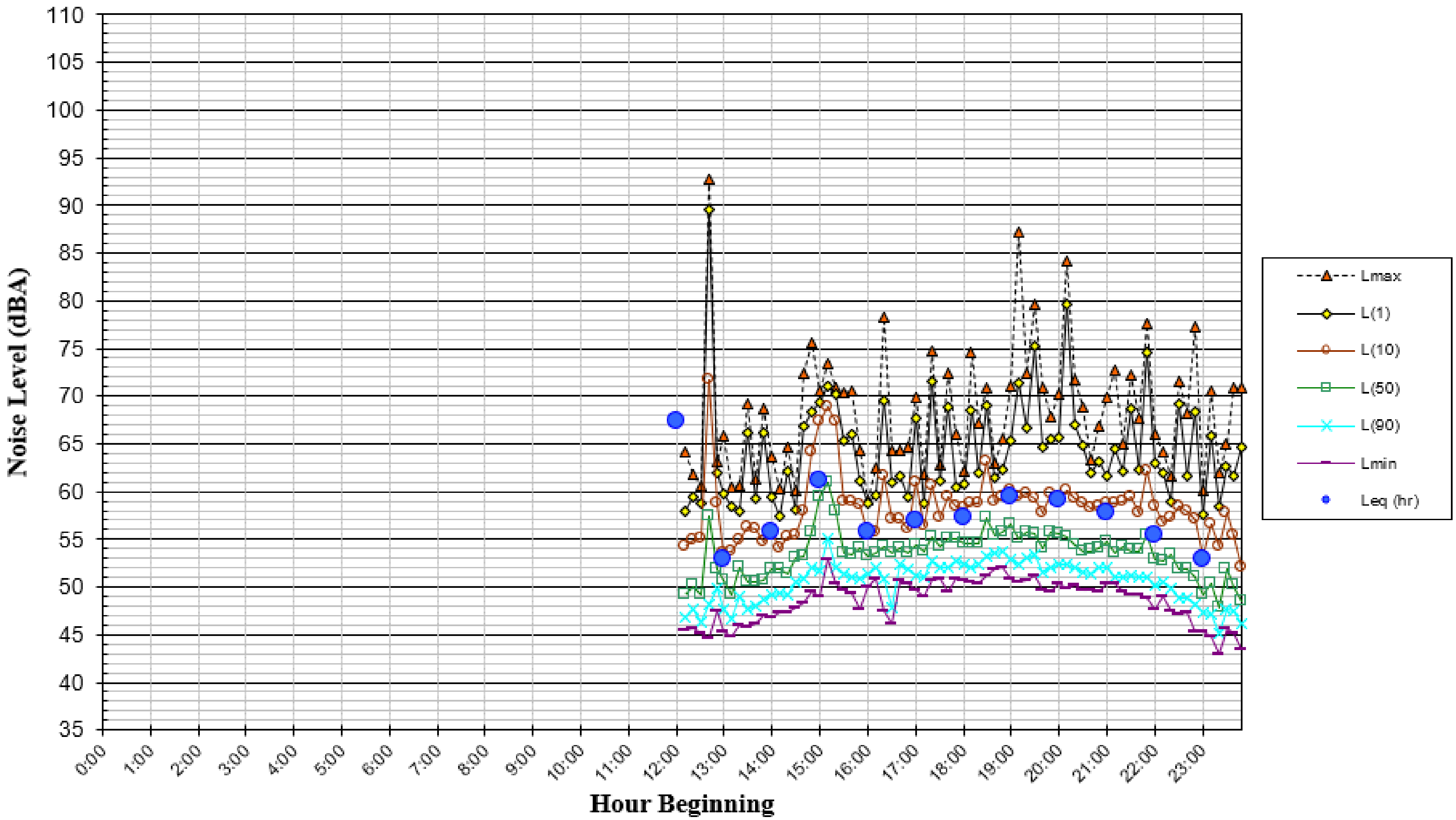

FIGURE A5 Daily Trend in Noise Levels for LT-2, Thursday, July 7, 2022

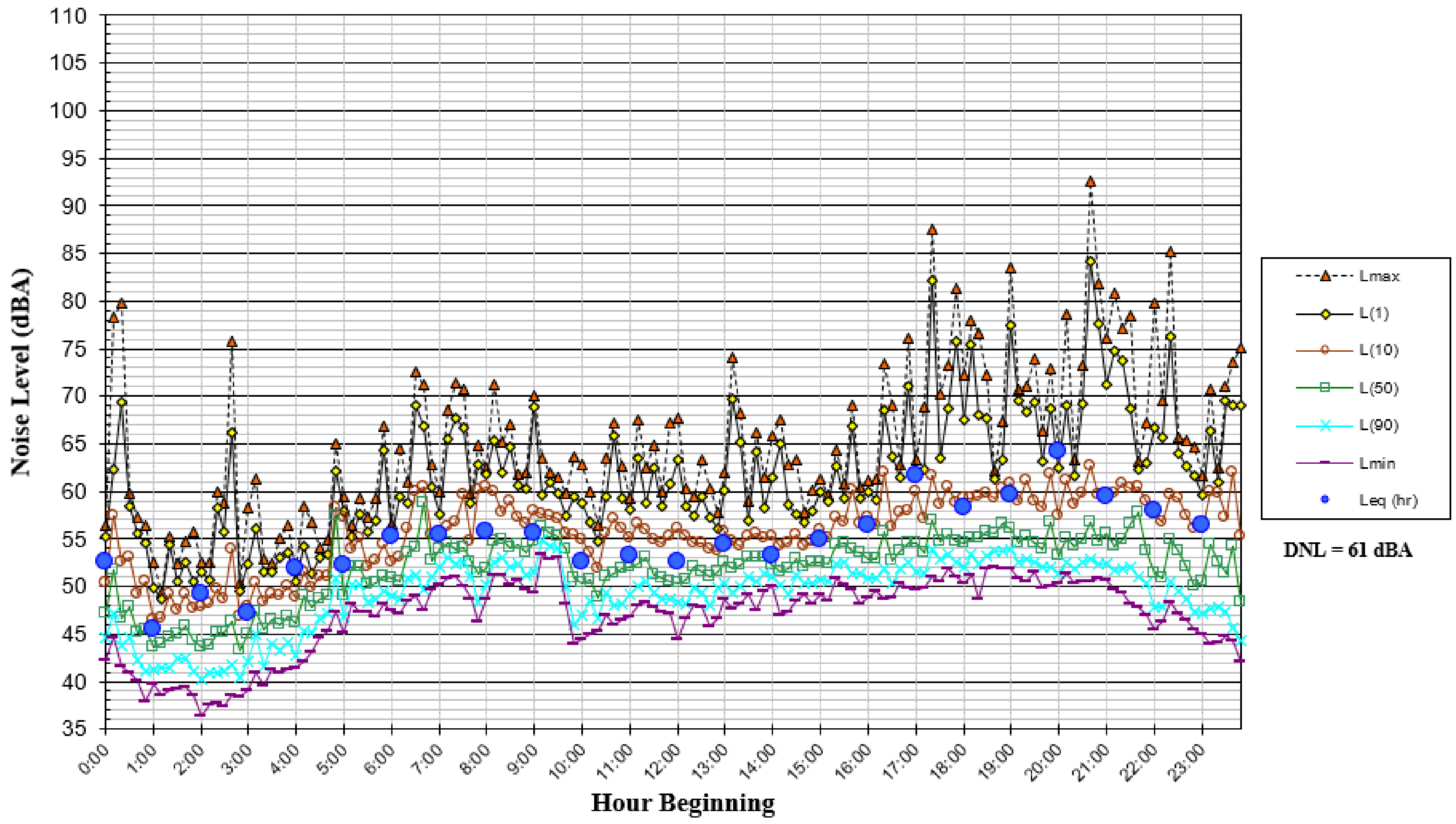

FIGURE A6 Daily Trend in Noise Levels for LT-2, Friday, July 8, 2022