INTEL CENTRAL UTILITIES BUILDING PROJECT NOISE AND VIBRATION ASSESSMENT

Santa Clara, California

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Prepared for:

Désirée Dei Rossi
Project Manager
David J. Powers & Associates, Inc.
1736 Franklin Street, Suite 400
Oakland, CA 94612

Prepared by:

Carrie J. Janello
Michael S. Thill

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 East Cotati Avenue
Cotati, CA 94931
(707) 794-0400

Project: 22-156

INTRODUCTION

A Central Utility Building (CUB) is proposed at a site currently developed as a paved surface parking lot and landscaped areas in the southwest corner of the 26-acre Intel Bowers Campus located at 3065 Bowers Avenue in Santa Clara, California. The proposed CUB structure would have a ground-level footprint of about 14,200 square feet with an additional 2,800 square feet of mechanical penthouse at the roof level. The proposed CUB would serve the existing and planned equipment at the SC1 cleanroom facility, which is utilized for the manufacture of microchips and other materials in a controlled environment. The CUB would house a chiller area, pumps, brine containment, generator yard, electrical substation/battery storage room, and mechanical equipment. The CUB would also include approximately 175 square feet of office space for engineering and maintenance staff.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory background, and describes the existing ambient noise environment at the project site; and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the 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* (L_{dn} or *DNL*) 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 CNEL. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} 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 CNEL with open windows and 65 to 70 dBA CNEL 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 CNEL 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 CNEL. At a CNEL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the CNEL 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 CNEL of 60 to 70 dBA. Between a CNEL 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 CNEL 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 p.m. and 7:00 a.m.
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 p.m.to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
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

Federal Agencies, the State of California, and the City of Santa Clara have established noise criteria, and the California Department of Transportation (Caltrans) have established vibration criteria, that are applicable in this assessment. The State of California Environmental Quality Act (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.

State of California

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

[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; or

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

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.					

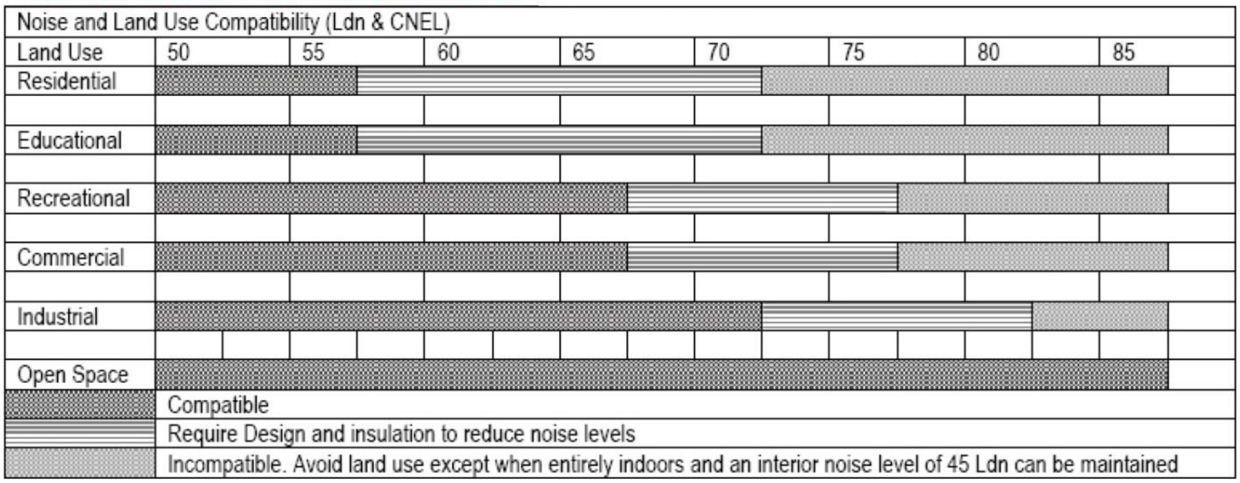
Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1

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

City of Santa Clara

City of Santa Clara General Plan. The City of Santa Clara's General Plan identifies noise and land use compatibility standards for various land uses and establishes policies to control noise within the community. Table 5.10-2 from the General Plan shows acceptable noise levels for various land uses.

TABLE 5.10-2: GENERAL PLAN NOISE STANDARDS



Applicable goals and policies presented in the General Plan are as follows:

5.10.6-G1 Noise sources restricted to minimize impacts in the community.

5.10.6-G2 Sensitive uses protected from noise intrusion.

5.10.6-G3 Land use, development and design approvals that take noise levels into consideration.

5.10.6-P1 Review all land use and development proposals for consistency with the General Plan compatibility standards and acceptable noise exposure levels defined on Table 5.10-1.

5.10.6-P2 Incorporate noise attenuation measures for all projects that have noise exposure levels greater than General Plan "normally acceptable" levels, as defined on Table 5.10-1.

5.10.6-P3 New development should include noise control techniques to reduce noise to acceptable levels, including site layout (setbacks, separation and shielding), building treatments (mechanical ventilation system, sound-rated windows, solid core doors and baffling) and structural measures (earthen berms and sound walls).

5.10.6-P4 Encourage the control of noise at the source through site design, building design, landscaping, hours of operation and other techniques.

5.10.6-P5 Require noise-generating uses near residential neighborhoods to include solid walls and heavy landscaping along common property lines, and to place compressors and mechanical equipment in sound-proof enclosures.

5.10.6-P7 Implement measures to reduce interior noise levels and restrict outdoor activities in areas subject to aircraft noise in order to make Office/Research and Development uses compatible with the Norman Y. Mineta International Airport land use restrictions.

City of Santa Clara Municipal Code. The City's Municipal Code establishes noise level performance standards for fixed sources of noise. Section 9.10.40 of the Municipal Code limits noise levels at receiving multi-family residences to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA at night (10:00 p.m. to 7:00 a.m.); at receiving commercial and office buildings to 65 dBA during daytime hours and 60 dBA at night; at receiving light industrial uses to 70 dBA anytime. The noise limits are not applicable to emergency work, licensed outdoor events, City-owned electric, water, and sewer utility system facilities, construction activities occurring within allowable hours, permitted fireworks displays, or permitted heliports.

Construction activities are not permitted within 300 feet of residentially zoned property except within the hours of 7:00 a.m. and 6:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

The City Code does not define the acoustical time descriptor such as L_{eq} (the average noise level) or L_{max} (the maximum instantaneous noise level) that is associated with the above limits. A reasonable interpretation of the City Code would identify the ambient base noise level criteria as an average or median noise level (L_{eq}/L_{50}).

Regulatory Background – Vibration

State of California

California Department of Transportation. To avoid damage to buildings, Caltrans recommends that construction vibration levels are limited to 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, to 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and to 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened (see Table 3).

Existing Noise Environment

The project site is located in the southwestern corner of the 26-acre Intel Bowers Campus, and is bound by Bowers Avenue and industrial buildings to the west; Central Expressway and industrial buildings to the south; industrial buildings and data centers to the east; and a parking lot to the north. The nearest residences are located northeast of the Scott Boulevard/Coronado Place intersection, which is over 1,700 feet northeast of the project site.

The noise environment at the site and in the surrounding areas results primarily from vehicular traffic along Central Expressway and equipment noise from the surrounding data centers and industrial sites. Aircraft associated with the Mineta San José International Airport are also audible at times at the project site.

A noise monitoring survey was performed at the site beginning on Tuesday January 24, 2023 and concluding on Thursday January 26, 2023. The monitoring survey included two long-term (LT-1 and LT-2) and three short-term (ST-1 through ST-3) noise measurements, which are shown in Figure 1.

Long-term noise measurement LT-1 was made in front of an existing office building along Central Expressway, approximately 110 feet from the centerline of the roadway, which was the dominant noise source at LT-1. The location of LT-1 was selected to isolate the traffic noise along Central Expressway in the absence of industrial noise sources and noise generated by data centers. Hourly average noise levels at LT-1 typically ranged from 66 to 76 dBA L_{eq} during the daytime hours between 7:00 a.m. and 10:00 p.m. and from 57 to 68 dBA L_{eq} at night between 10:00 p.m. and 7:00 a.m. The average community noise equivalent level (CNEL) for 24-hour periods calculated on Wednesday January 25, 2023 was 73 dBA CNEL. The daily trends in noise levels at LT-1 are shown in Figures A1 through A3 in the Appendix of this report.

LT-2 was made over 400 feet north of the proposed CUB building along Bowers Avenue. LT-2 was positioned approximately 140 feet east of the centerline Bowers Avenue, which would be the dominant noise source at this location. Hourly average noise levels at LT-2 typically ranged from 61 to 66 dBA L_{eq} during the day and from 53 to 64 dBA L_{eq} at night. The average CNEL calculated on Wednesday January 25, 2023 was 67 dBA. The daily trends in noise levels at LT-2 are shown in Figures A4 through A6 of the Appendix.

Each short-term noise measurement was made in 10-minute intervals between 11:20 a.m. and 11:30 a.m. on Tuesday January 24, 2023 (ST-1) and between 10:40 a.m. and 11:10 a.m. on Thursday January 26, 2023 (ST-2 and ST-3). Table 4 summarizes the results of these 10-minute noise measurements.

ST-1 was made along the northern boundary of the Intel Bowers Campus, approximately 65 feet from the centerline of Coronado Drive. Ambient background noise levels at ST-1, produced by continually operating mechanical equipment, ranged from 54 to 55 dBA. Parking lot noise at the nearby lot to the south of ST-1 contributed to the noise measurement, generating noise levels of 58 to 63 dBA for passenger cars and noise levels of 61 to 62 dBA for heavy trucks. Additional contributing noise sources included a dog bark (72 dBA) and aircraft (61 to 63 dBA). The 10-minute average noise level at ST-1 was 57 dBA L_{eq}. Additionally, the only existing noise-generating mechanical equipment observed at the Intel Bowers Campus was located east of the SC2 building. Noise levels produced by this equipment were measured to be a constant 70 dBA at a distance of 40 feet. This was the only mechanical noise source identified at the existing Intel Bowers Campus.

ST-2 was made at 2975 Bowers Avenue, approximately 80 feet east of the centerline of the Bowers Avenue and approximately 135 feet south of the centerline of Central Expressway. Noise generated at the Intel Bowers Campus was not audible over traffic noise at ST-2. Traffic noise levels ranged from 58 to 75 dBA at ST-2 during this 10-minute measurement. The 10-minute average noise level at ST-2 was 68 dBA L_{eq}.

ST-3 was made at 2727 Walsh Avenue, approximately 70 feet south of the centerline of Central Expressway. Mechanical equipment at the Intel Bowers Campus produced noise levels that ranged from 60 to 61 dBA at ST-3. Traffic noise levels ranged from 60 to 83 dBA at ST-3 during this 10-minute measurement. The 10-minute average noise level at ST-3 was 71 dBA L_{eq}.

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

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10)}$
ST-1: Northern boundary of Intel Bowers Campus (1/24/2023, 11:20-11:30 a.m.)	73	63	59	56	65	57
ST-2: 2975 Bowers Avenue (1/26/2023, 10:40-10:50 a.m.)	75	73	71	67	62	68
ST-3: 2727 Walsh Avenue (1/26/2023, 11:00-11:10 a.m.)	83	77	75	69	64	71

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

Source: Google Earth, 2023.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

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

(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.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would not be exposed to a temporary increase in ambient noise levels due to project construction activities for a period of more than one year. The incorporation of construction best management practices as project conditions of approval would result in a **less-than-significant** temporary noise impact.

The construction schedule assumed that the earliest possible start date would be early September 2023, and the development would be built over a period of less than 12 months, with construction expected to conclude by mid-April 2024. Construction phases would include demolition, site preparation, grading, trenching, building construction, architectural coating, and paving. In addition to the main CUB building, trenching would be required to install piping that connects to the existing Intel building to the east, and construction of a trellis to support the piping along the exterior of the CUB building would be completed. This work would be done concurrently with construction of the CUB building. 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.

The City's Municipal Code limits construction activities (including the loading and unloading of materials and truck movements) within 300 feet of residentially zoned property to the hours of 7:00 a.m. to 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays. Residentially zoned property would not be located within 300 feet of the project site.

While the City of Santa Clara 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*. 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 for individual projects are typically carried out in phases. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 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 utilities 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.

Equipment expected to be used in each construction phase for the proposed CUB 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. Table 8 summarizes equipment quantities and noise levels at 50 feet for the two loudest pieces of equipment for trenching and construction of the trellis.

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.

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 from all equipment per phase in Table 7 operating simultaneously, was propagated from the geometrical center of the proposed utilities building to the property lines of the receptors. These noise level estimates are shown in Table 9. Since trenching and trellis construction work would occur concurrently with the CUB building, noise level ranges are shown in Table 9 that reflects activity during CUB construction only and simultaneously with the trenching and trellis construction. For all noise levels in Table 9, attenuation due to intervening buildings or existing barriers are not assumed for all receptors except the nearest residences northeast of the site. For the nearest residences, several intervening buildings would provide more than 20 dBA attenuation, which is applied to the noise levels in Table 9.

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.

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

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet
Demolition	20 days	Concrete/Industrial Saw (1)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (3)[a]	85 dBA L_{eq}
Site Preparation	2 days	Grader (1)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)[a]	84 dBA L_{eq}
Grading/Excavation	4 days	Grader (1)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)[a]	84 dBA L_{eq}
Trenching/Foundation	4 days	Tractor/Loader/Backhoe (1)[a] Excavator (1)[a]	82 dBA L_{eq}
Building – Exterior	200 days	Crane (1) Forklift (1) Generator Set (1)[a] Tractor/Loader/Backhoe (1)[a] Welder (3)	82 dBA L_{eq}
Building – Interior/ Architectural Coating	10 days	Air Compressor (1)[a]	74 dBA L_{eq}
Paving	10 days	Cement & Mortar Mixer (1) 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 for the Proposed Pipe Trenching and Trellis at a Distance of 50 feet

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet
Demolition	20 days	Concrete/Industrial Saw (1)[a] Excavator (1)[a] Dump Truck (1)	84 dBA L_{eq}
Trenching/Foundation	30 days	Excavator (1)[a] Dump Truck (4)[a]	78 dBA L_{eq}
Building – Exterior	60 days	Forklift (2) Generator Set (1)[a] Welder (1)[a]	78 dBA L_{eq}
Building – Interior/ Architectural Coating	80 days	Aerial Lift (2)[a]	68 dBA L_{eq}
Paving	5 days	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 9 Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
	North Silicon Valley Christian Assembly (620ft[a])	West Industrial & Office Buildings (450ft[a])	South Medical Office & Office Buildings (400ft[a])	Northeast Office Building (660ft[a])	Nearest Residences (1,655ft[a])
Demolition	66 to 67[b]	68 to 70[b]	69 to 71[b]	65 to 67[b]	37 to 39[b,c]
Site Preparation	63	66	67	62	34[c]
Grading/ Excavation	64	67	68	63	36[c]
Trenching/Foundation	60 to 62[b]	63 to 65[b]	64 to 66[b]	59 to 62[b]	31 to 34[b,c]
Building – Exterior	61 to 63[b]	64 to 66[b]	65 to 67[b]	61 to 62[b]	33 to 34[b,c]
Building – Interior/ Architectural Coating	52 to 53[b]	55 to 56[b]	56 to 57[b]	51 to 52[b]	23 to 24[b,c]
Paving	64 to 66[b]	66 to 69[b]	67 to 70[b]	63 to 66[b]	35 to 38[b,c]

[a] The distances shown in the table were measured from the center of the nearest project building to the receiving property lines.
[b] Range of noise levels reflects construction activities for the CUB building only and in combination with pipe trenching and construction of the trellis.
[c] Conservative 20 dBA attenuation assumed for intervening structures.

As shown in Table 9, construction noise levels would be below 60 dBA L_{eq} at nearest residential uses and from 51 to 71 dBA L_{eq} at existing industrial, office, medical office buildings, and church uses surrounding the site when activities are focused near the center of the proposed building. These construction noise levels would not exceed the exterior threshold of 80 dBA L_{eq} at existing residential land uses surrounding the site (i.e., more than 1,600 feet northeast of the site) or the 90 dBA L_{eq} threshold at the nonresidential uses in the project vicinity when activities occur near the center of the buildings.

Existing land uses surrounding the site would not be located within 200 feet of the nearest construction activities. Since construction noise levels are expected to be about 20 dBA or more below the FTA thresholds at all receptors in the project vicinity and total construction is expected to last for less than 12 months, this would be considered a less-than-significant impact.

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

Impact 1b: **Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project would not result in a substantial permanent noise level increase, and operational noise generated by the proposed project would not exceed the ambient noise level conditions at the surrounding receptors. This is a **less-than-significant impact**.

A significant impact would occur if the permanent noise level increase due to project-generated traffic was 3 dBA CNEL or greater for future ambient noise levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future ambient noise levels at or below 60 dBA CNEL. Existing ambient measurements made in the project site vicinity indicate that existing and future ambient noise levels at the noise-sensitive receptors in the project site vicinity would result in noise levels over 60 dBA CNEL. Therefore, a significant impact would occur if project-generated traffic increased levels by 3 dBA CNEL or more.

Under the City of Santa Clara Municipal Code, noise generated by fixed sources of noise would be restricted to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and to 50 dBA during nighttime hours (10:00 p.m. to 7:00 a.m.) at residentially zoned land uses. At existing commercial and office land uses, noise would be restricted to 65 dBA during daytime hours and to 60 dBA during nighttime hours. For light industrial uses, noise would be restricted to 70 dBA during daytime and nighttime hours. Exceedance of these noise levels would also be considered a significant impact.

Project-Generated Traffic

The proposed CUB structure would only have a few employees/maintenance staff. This building would not be a trip-generating use; therefore, a traffic study is not required for the proposed project and would not result in a measurable increase over existing traffic conditions. For all existing receptors in the project vicinity, the noise level increase due to project traffic noise would not be measurable or detectable (0 dBA CNEL increase). This impact is a less-than-significant impact.

Mechanical Equipment

Various mechanical equipment at the CUB structure would include emergency generators, chillers, transformers, pumps, a cooling tower, and heating, ventilation, and air conditioning (HVAC) units. According to the site plan, the transformers would be housed within the building on the ground floor, which would adequately shield the equipment noise from the surrounding land uses. The generators would be located within an enclosed space at the southern end of the building. The cooling towers and air handling units would be located on the rooftop of the proposed building. A proposed screen would be located around the building, providing partial shielding.

Manufacturer specifications were provided by the applicant[2] for the dominant noise-generating sources located on the rooftop and the generator enclosure. The noise source spectra provided by the applicant and used as inputs into the modeling program are summarized in Table 10.

Based on the source levels in Table 10, SoundPLAN (version 8.2), a three-dimensional ray-tracing computer program, was used to create models representing daily operations with and without the emergency generators. The mechanical equipment noise sources were modeled as either point-sources (e.g., air handling units) or area sources (e.g., cooling towers) noise inputs to demonstrate the noise propagation to the adjacent sites based on the cumulative noise from the combined sources operating during the different scenarios. Other inputs to the models include the existing on-site and off-site buildings.

Figures 2 and 3 show the hourly average L_{eq} during typical daily operations without and with the emergency generators, respectively. Additionally, Table 11 summarizes the noise levels calculated in SoundPLAN at the nearest boundaries for the surrounding off-site receptors during daily operations without the emergency generators. Table 12 summarizes the noise levels with the operation of the emergency generators. The tables show the hourly average noise levels; the calculated CNEL, assuming daily operations run each hour for a 24-hour period; and the permanent noise level increase calculated for the surrounding receptors.

[2] Colin Gordon Associates, "Environmental Noise Analysis of Proposed Intel Santa Clara CUB (SOW 642/643) – Revision 1 Memorandum," March 2023.

TABLE 10 Sound Power Levels for the CUB Outdoor Noise Sources

Noise Sources (Number of Units)		Sound Power Level, dB ref 1 µW							
		63 Hz	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**
3,000 cfm Air Handling Unit AHU-04-BG-01[a] (1)		76	67	68	47	35	23	18	21
9,500 cfm Air Handling Unit AHU-04-BG-02[a] (1)		73	68	72	63	47	40	36	32
32,000 cfm Air Handling Unit AHU-04-BG-03/04[a] (1)		85	78	75	68	59	51	46	37
3,900 gpm Cooling Tower CT-11-GB-01/06[b] (6)	Intake	103	97	97	94	93	90	82	75
	Discharge	105	103	102	97	96	95	90	84
Emergency Backup Generator[c] (2)		88	101	101	98	95	89	83	77

[a] Sound power spectra provided by GLUMAC/BASX Solutions; casing-radiated noise only.

[b] Sound power calculated from reported sound pressure levels from Marley/GLUMAC; sound power levels are *per tower*, with six operating towers assumed.

[c] Sound power spectrum estimated by CGA, based on stated noise level of 75 dBA measured at 23 feet; sound power levels are *per generator*, with two operating generators assumed. Absent vendor-supplied noise data, a representative spectrum shape for the genset was assumed, normalized to the target level of 75 dBA at 23 feet for this project.

FIGURE 2 Noise Contours for Daily Operations at the CUB Building without the Emergency Generators

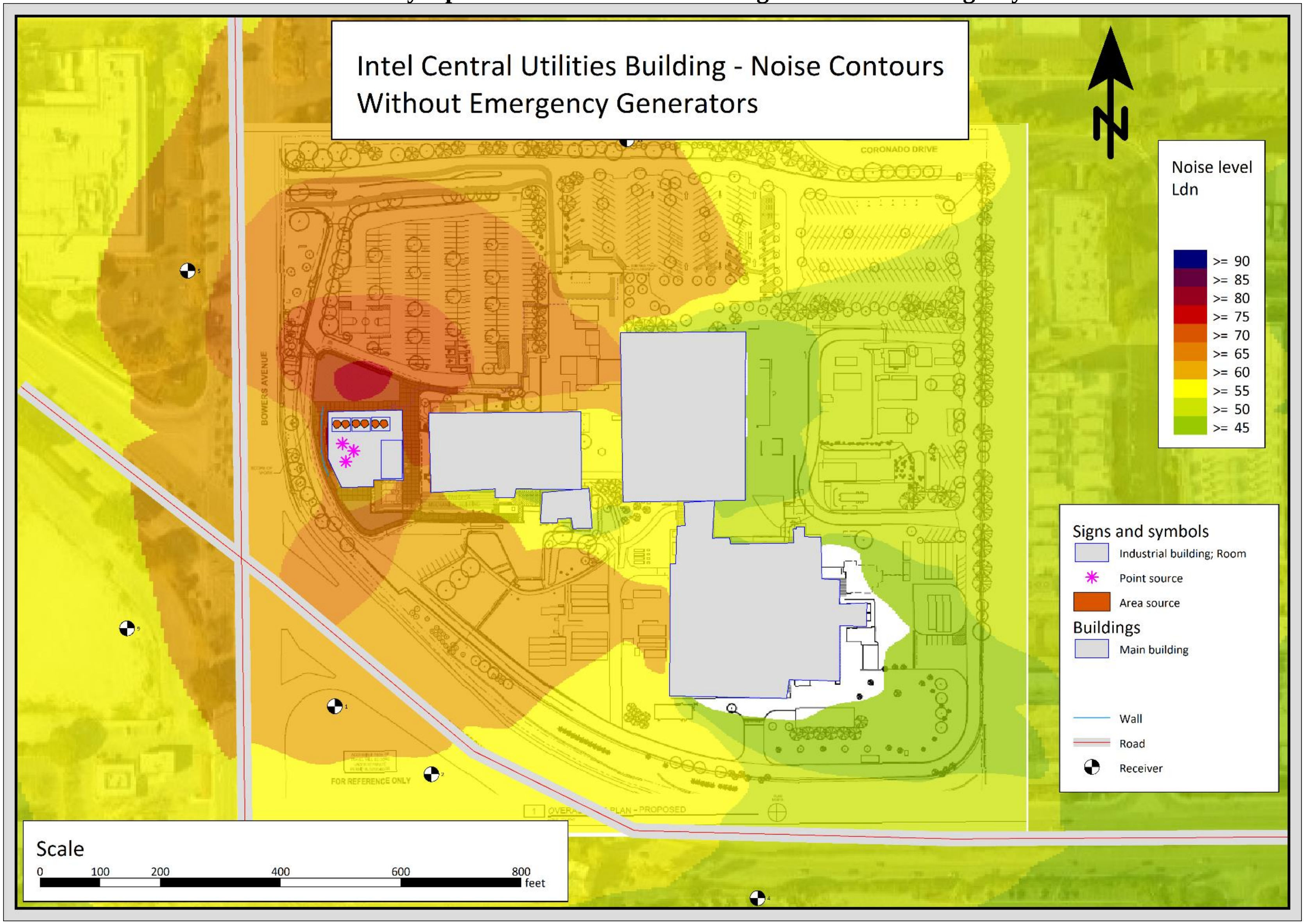


FIGURE 3 Noise Contours for Daily Operations at the CUB Building with the Emergency Generators

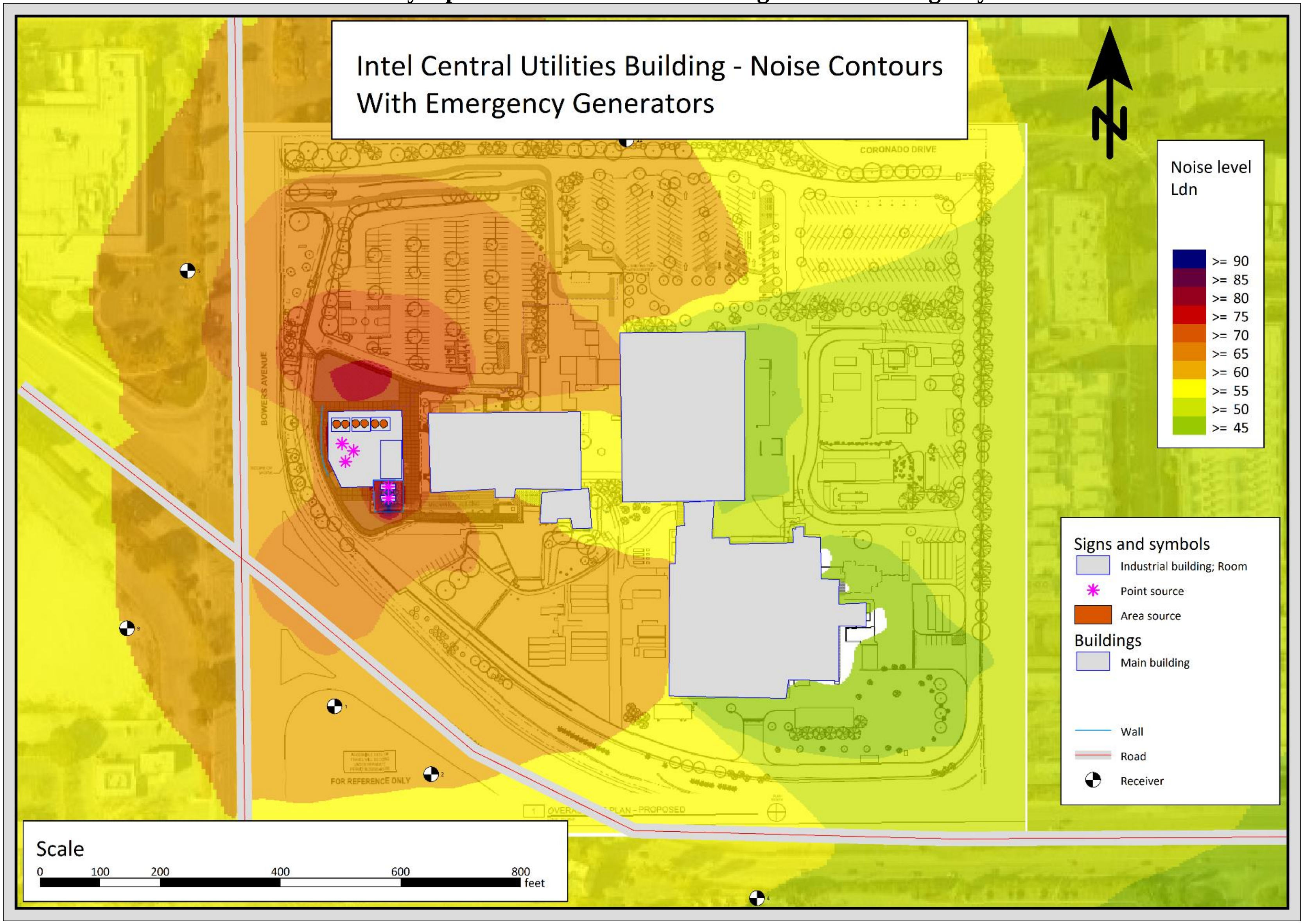


TABLE 11 Daily Operational Noise Levels Calculated in SoundPLAN without the Emergency Generators

Receptor	Distance from Center of Proposed CUB, feet	L_{eq} from Daily Operational Noise (No Generators), dBA	Calculated CNEL, dBA	Noise Level Increase, dBA CNEL
North Silicon Valley Christian Assembly	620	54	61	1
Northeast Office	575	55	61	1
West Office & Industrial Buildings	450	57	64	2
South Medical Office & Office Buildings	400	47 to 55	54 to 62	0
Nearest Residences	1,655	25	32	0

TABLE 12 Daily Operational Noise Levels Calculated in SoundPLAN with the Emergency Generators

Receptor	Distance from Center of Proposed CUB, feet	L_{eq} from Daily Operational Noise (Generators), dBA	Calculated CNEL, dBA	Noise Level Increase, dBA CNEL
North Silicon Valley Christian Assembly	620	54	61	1
Northeast Office	575	55	61	1
West Office & Industrial Buildings	450	57	64	2
South Medical Office & Office Buildings	400	49 to 56	55 to 63	0
Nearest Residences	1,655	26	32	0

Hourly average noise levels due to daily activities at the proposed CUB facility would not exceed the daytime or nighttime hourly average thresholds for commercial and office uses surrounding the project site or exceed the daytime and nighttime thresholds at the nearest residential uses. For all existing receptors, the noise level increase due to daily operational noise would result in up to 2 dBA CNEL increase. This is a less-than-significant impact.

Mitigation Measure 1c: None required.

Impact 2: Exposure to Excessive Groundborne Vibration due to Construction. Construction-related vibration levels resulting from activities at the project site would not exceed 0.3 in/sec PPV at the existing structures surrounding the project site. **This is a less-than-significant impact.**

The construction of the project may generate vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include grading, foundation work, paving, and new building framing and finishing. According to the equipment list provided at the time of this study, impact or vibratory pile driving activities, which can cause excessive vibration, are not expected for the proposed project.

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened. The historical inventory for the City of Santa Clara was reviewed, and no ancient buildings or buildings that are documented to be structurally weakened are located in the project vicinity. However, historical events occurring within the on-site Intel SC1 and SC2 buildings, as discussed in the Historic Resource Technical Report prepared by Architectural Resources Group in June 2023, would be eligible for listing in the California Register of Historical Resources. These buildings, which were constructed in 1971 and 1974, respectively, are not considered historical structures; only the events that occurred within the structures would be considered historical. Since these buildings would still be considered modern buildings, groundborne vibration levels exceeding the conservative 0.3 in/sec PPV would have the potential to result in a significant vibration impact.

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 0.3 in/sec PPV threshold for all conventional buildings.

TABLE 13 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.3 in/sec PPV (feet)
Clam shovel drop		0.202	18
Hydromill (slurry wall)	in soil	0.008	1
	in rock	0.017	2
Vibratory Roller		0.210	19
Hoe Ram		0.089	9
Large bulldozer		0.089	9
Caisson drilling		0.089	9
Loaded trucks		0.076	8
Jackhammer		0.035	4
Small bulldozer		0.003	<1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., February 2023.

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 9), were estimated under the assumption that each piece of equipment from Table 13 was operating along the nearest boundary of the busy construction site, which would represent the worst-case scenario.

The nearest off-site building would be more than 335 feet from project construction activities, which would result in vibration levels up to 0.012 in/sec PPV. The nearest on-site building would be the Intel SC1 building to the east, which is approximately 30 feet from the nearest construction activities and would potentially be exposed to vibration levels up to 0.172 in/sec PPV.

Neither cosmetic, minor, or major damage would occur at historical or conventional buildings located 20 feet or more from the project site. At these locations, and in other surrounding areas where vibration would not be expected to cause cosmetic damage, vibration levels may still be 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 0.3 in/sec PPV threshold at conventional off-site or on-site buildings surrounding the project site. This would be a less-than-significant impact.

Mitigation Measure 2: None required.

TABLE 14 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Estimated Vibration Levels at Structures Surrounding the Project Site, in/sec PPV				
			North Silicon Valley Christian Assembly (690 feet)	West Office & Industrial Buildings (360 feet)	South Medical Office & Office Buildings (335 feet)	Nearest Residences (1,570 feet)	On-site Intel SC1 Building (30 feet)
Clam shovel drop		0.202	0.005	0.011	0.012	0.002	0.165
Hydromill (slurry wall)	in soil	0.008	0.000	0.000	0.001	0.000	0.007
	in rock	0.017	0.000	0.001	0.001	0.000	0.014
Vibratory Roller		0.210	0.005	0.011	0.012	0.002	0.172
Hoe Ram		0.089	0.002	0.005	0.005	0.001	0.073
Large bulldozer		0.089	0.002	0.005	0. 005	0.001	0.073
Caisson drilling		0.089	0.002	0.005	0.005	0.001	0.073
Loaded trucks		0.076	0.002	0.004	0.004	0.001	0.062
Jackhammer		0.035	0.001	0.002	0.002	0.000	0.029
Small bulldozer		0.003	0.000	0.000	0.000	0.000	0.002

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., February 2023.

Impact 3: **Excessive Aircraft Noise.** The project site is located about 1.8 miles from a public airport or public use airport, and the proposed project would not expose people residing or working in the area to excessive aircraft noise levels. **This is a less-than-significant impact.**

Norman Y. Mineta San José International Airport is a public-use airport located approximately 1.8 miles southeast of the project site. According to the new Airport Master Plan Environmental Impact Report,[3] the project site lies outside the 60 dBA CNEL contour line (see Figure 4). Aircraft noise would result in exterior noise levels below the City's requirements for industrial land uses. Therefore, the proposed project would be compatible with the City's exterior noise standards for aircraft noise.

Mitigation Measure 3: **None required.**

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

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

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

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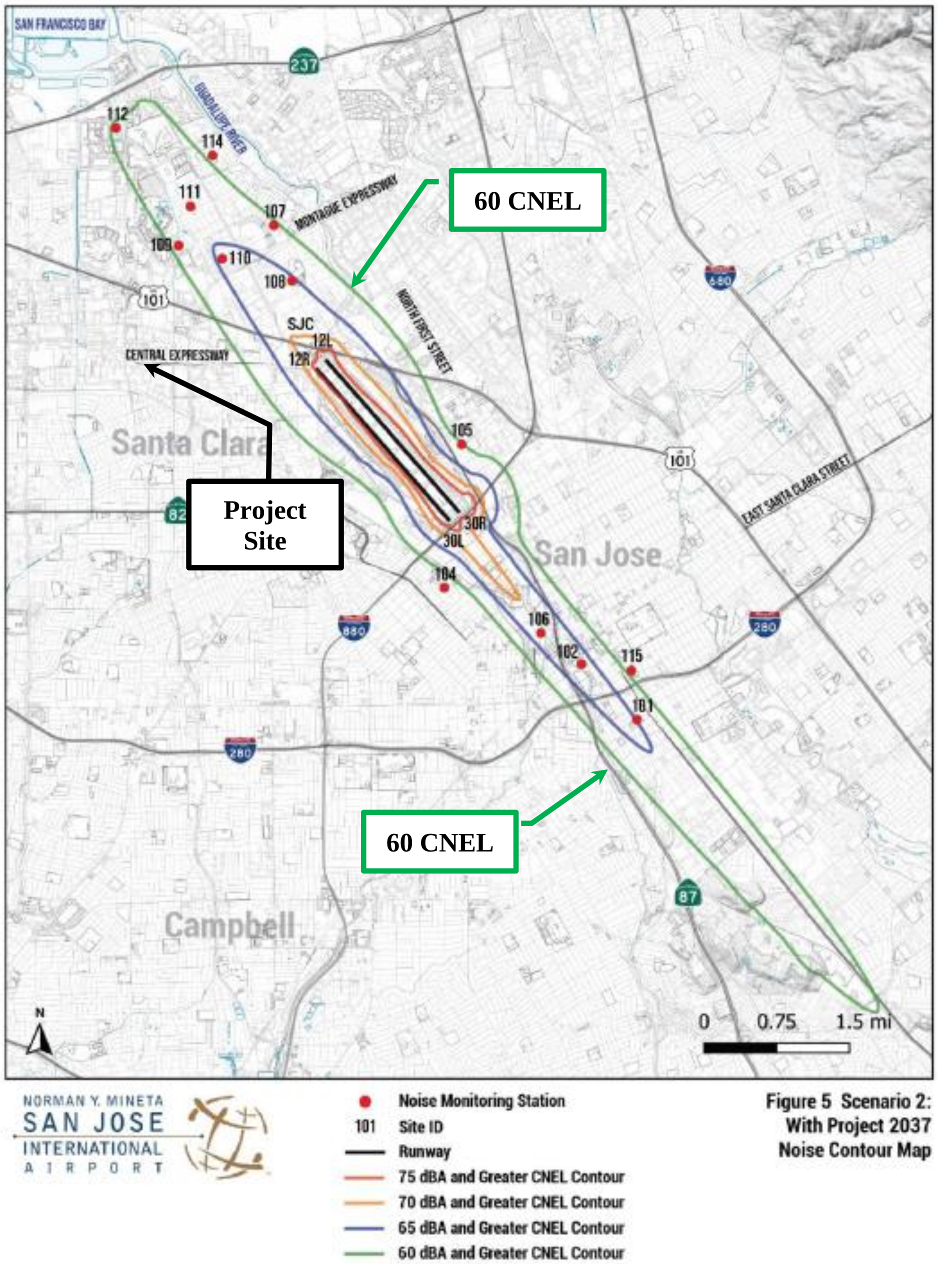

Source: BridgeNet International 2019

Cumulative Impacts

Cumulative noise impacts would include either cumulative traffic noise increases under future conditions or temporary construction noise from cumulative construction projects.

A significant cumulative traffic noise increase would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA CNEL or greater for future levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future levels at or below 60 dBA CNEL; and 2) if the project would make a “cumulatively considerable” contribution to the overall traffic noise increase. A “cumulatively considerable” contribution would be defined as an increase of 1 dBA CNEL or more attributable solely to the proposed project.

As stated above, a traffic study was not required for the proposed project due to the limited number of employees and project trips the project would generate. Therefore, the cumulative (no project) and cumulative plus project traffic scenarios would result in the same noise level increase over existing conditions, and the project would not result in a “cumulatively considerable” contribution to the overall traffic noise increase. This impact is a less-than-significant impact.

There are no known planned or approved projects within 1,000 feet of the proposed project site that would be constructed during the same timeframe as the proposed project. Therefore, the noise-sensitive receptors surrounding the project site would not be subject to cumulative construction impacts.

APPENDIX

FIGURE A1 Daily Trend in Noise Levels at LT-1, Tuesday, January 24, 2023

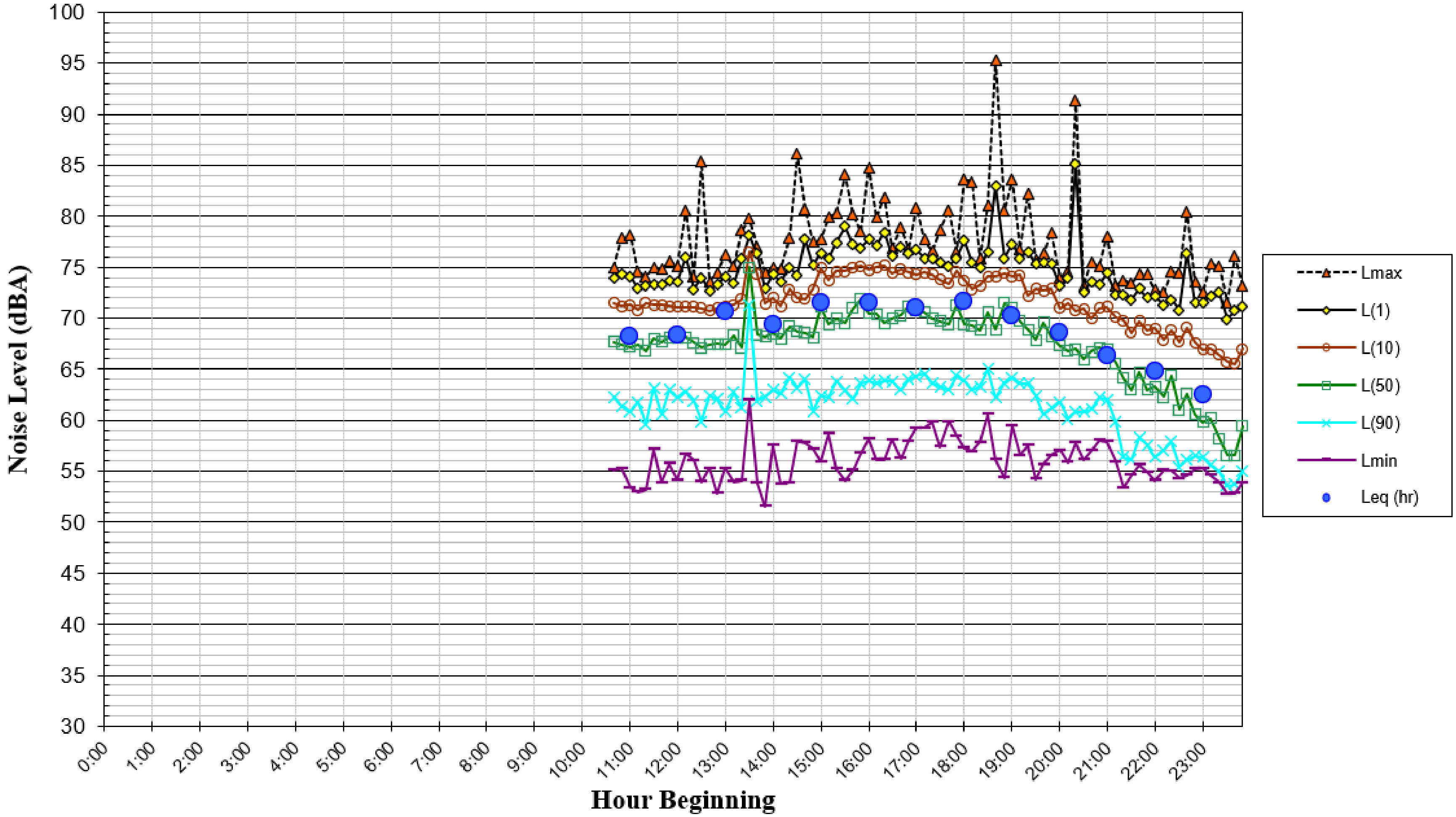

FIGURE A2 Daily Trend in Noise Levels at LT-1, Wednesday, January 25, 2023

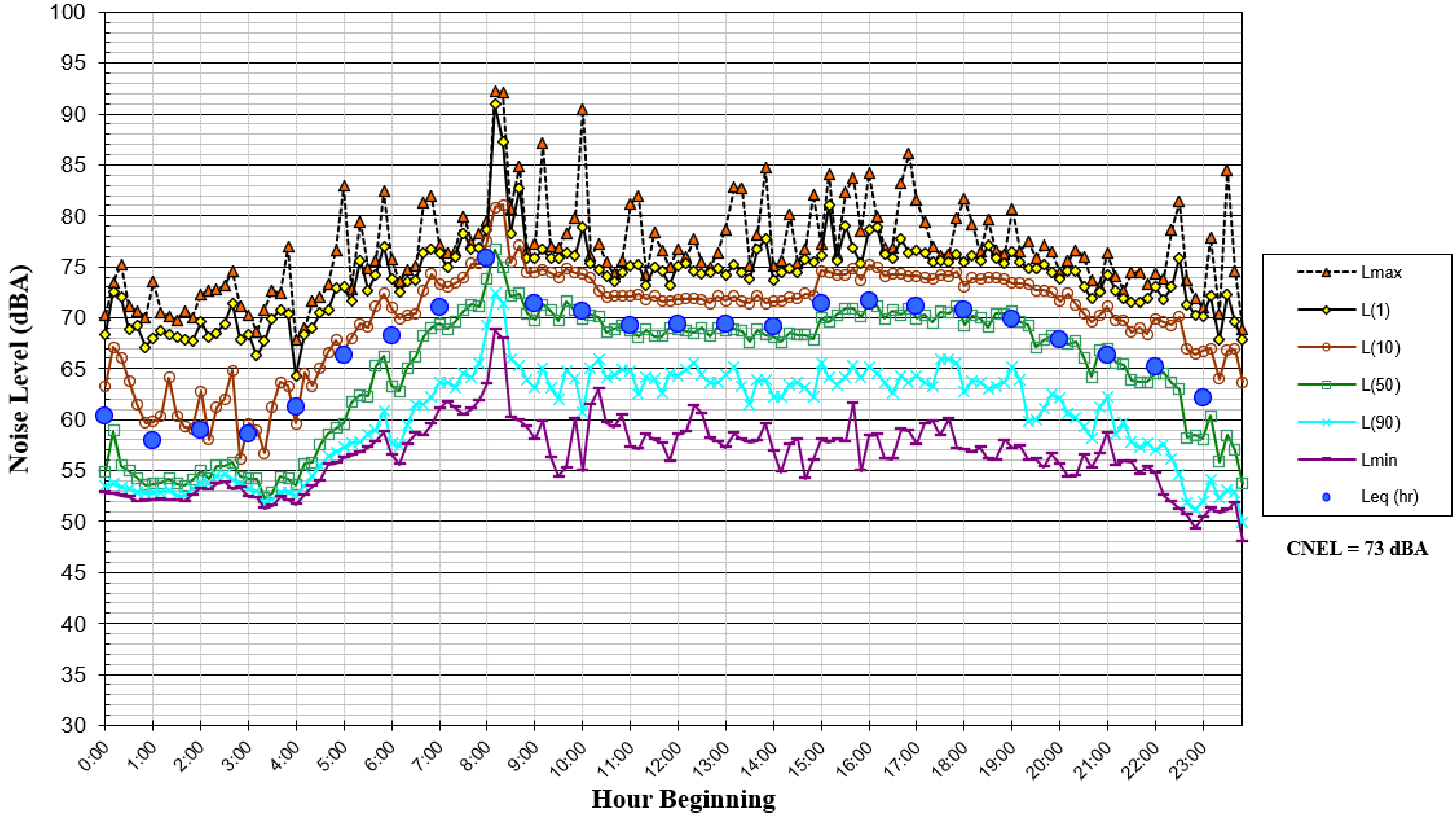

FIGURE A3 Daily Trend in Noise Levels at LT-1, Thursday, January 26, 2023

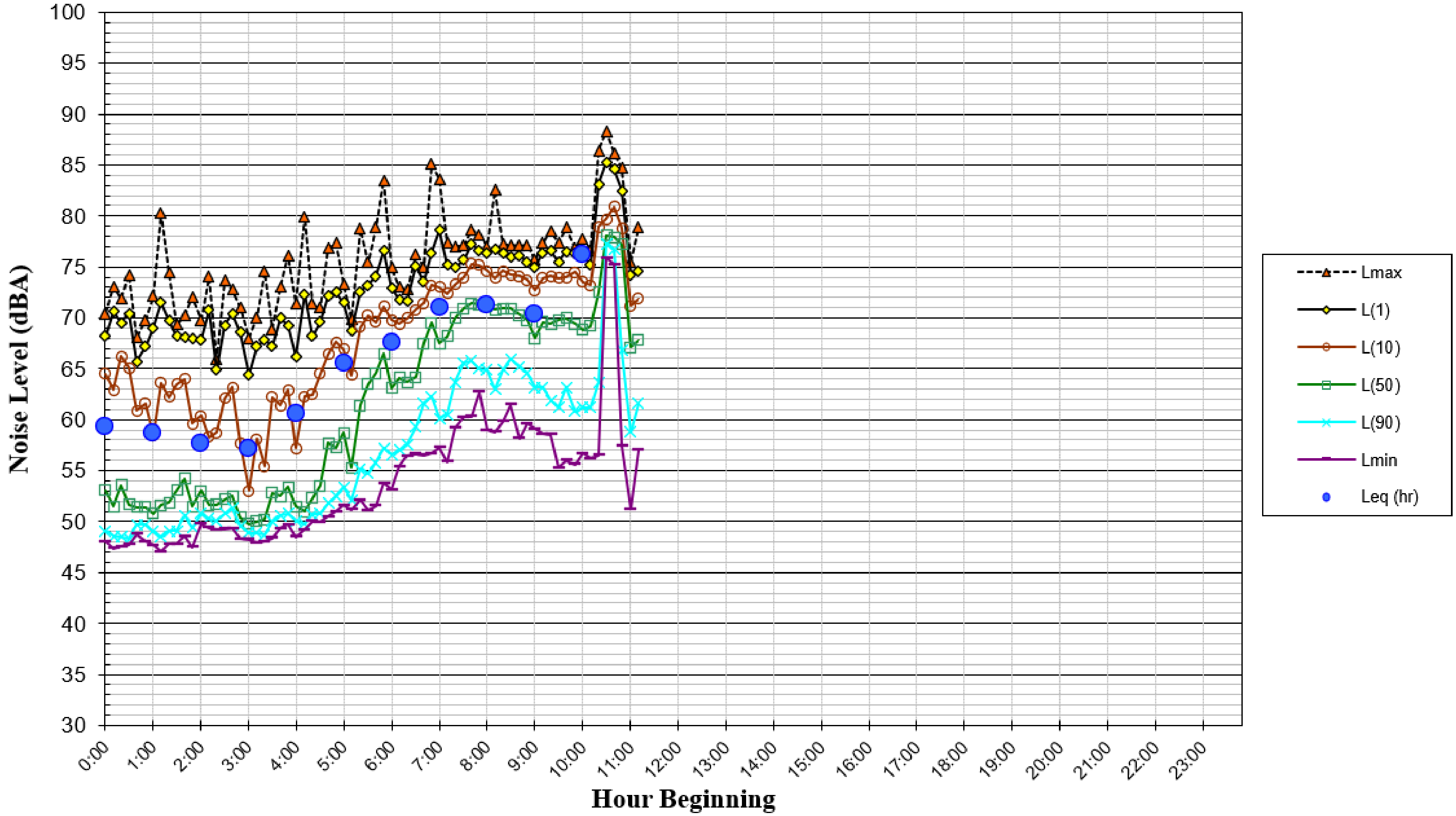

FIGURE A4 Daily Trend in Noise Levels at LT-2, Tuesday, January 24, 2023

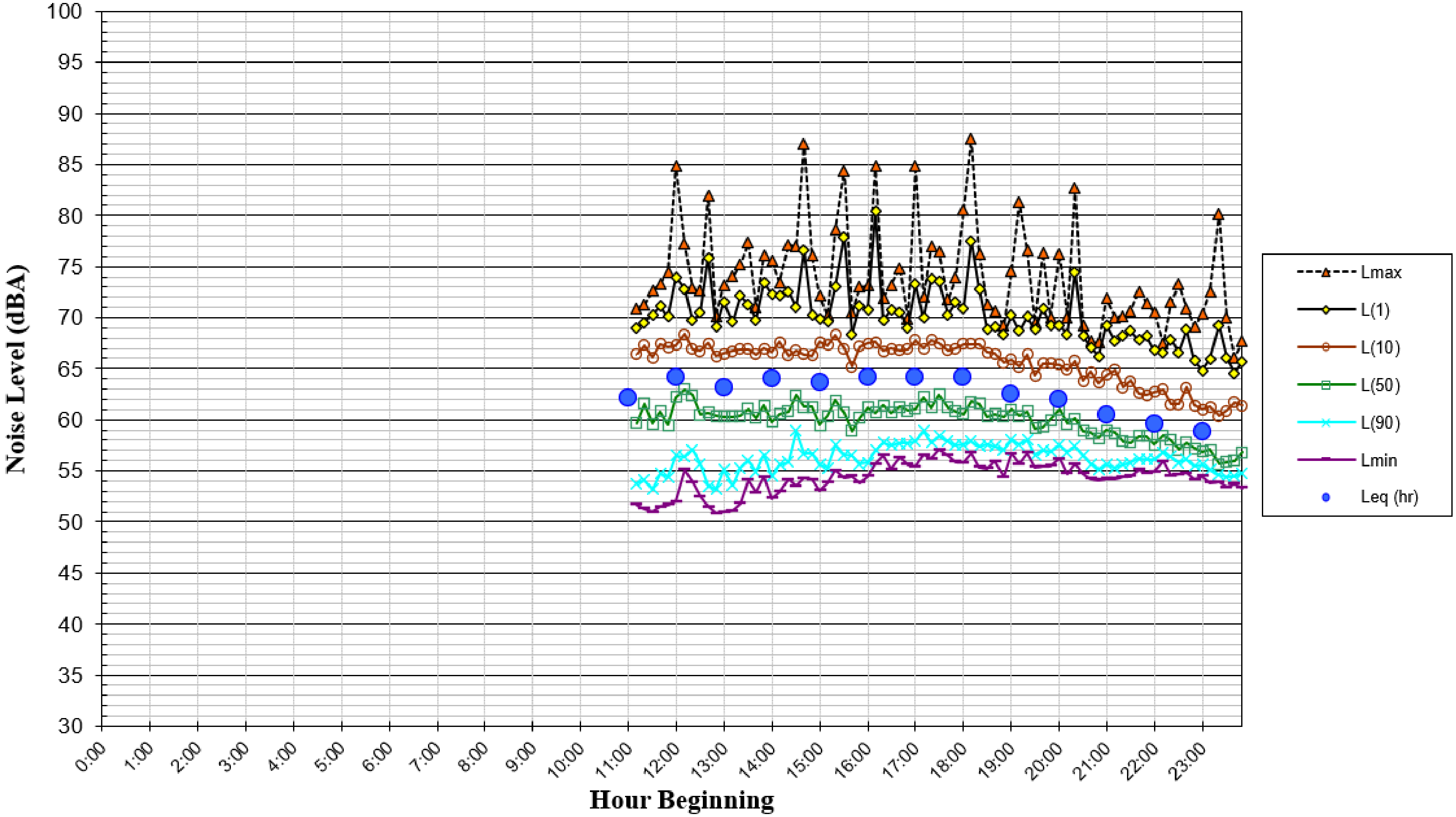

FIGURE A5 Daily Trend in Noise Levels at LT-2, Wednesday, January 25, 2023

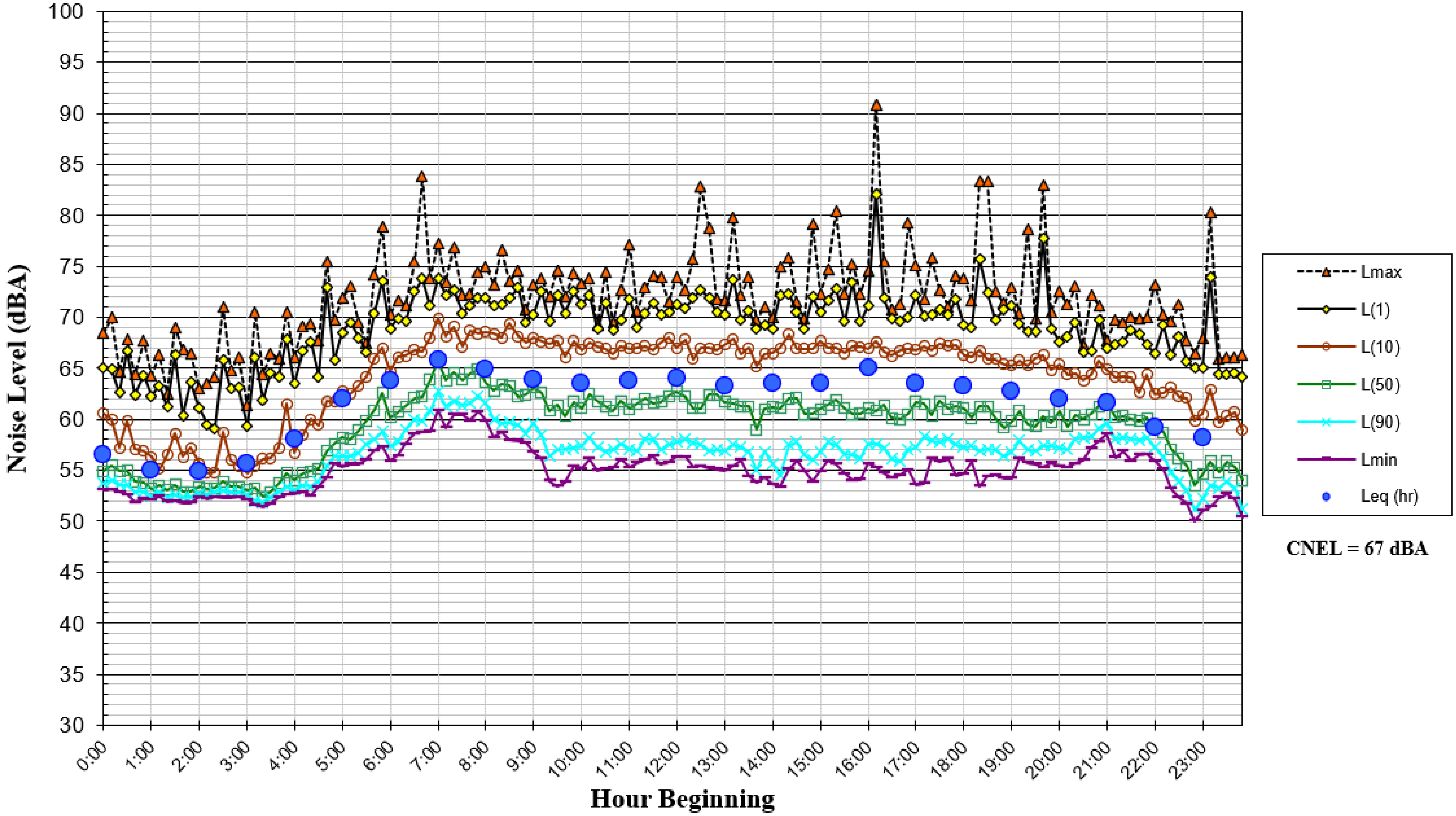

FIGURE A6 Daily Trend in Noise Levels at LT-2, Thursday, January 26, 2023