NORTHEAST AREA SPECIFIC PLAN NOISE AND VIBRATION ASSESSMENT

SAN CARLOS, CALIFORNIA

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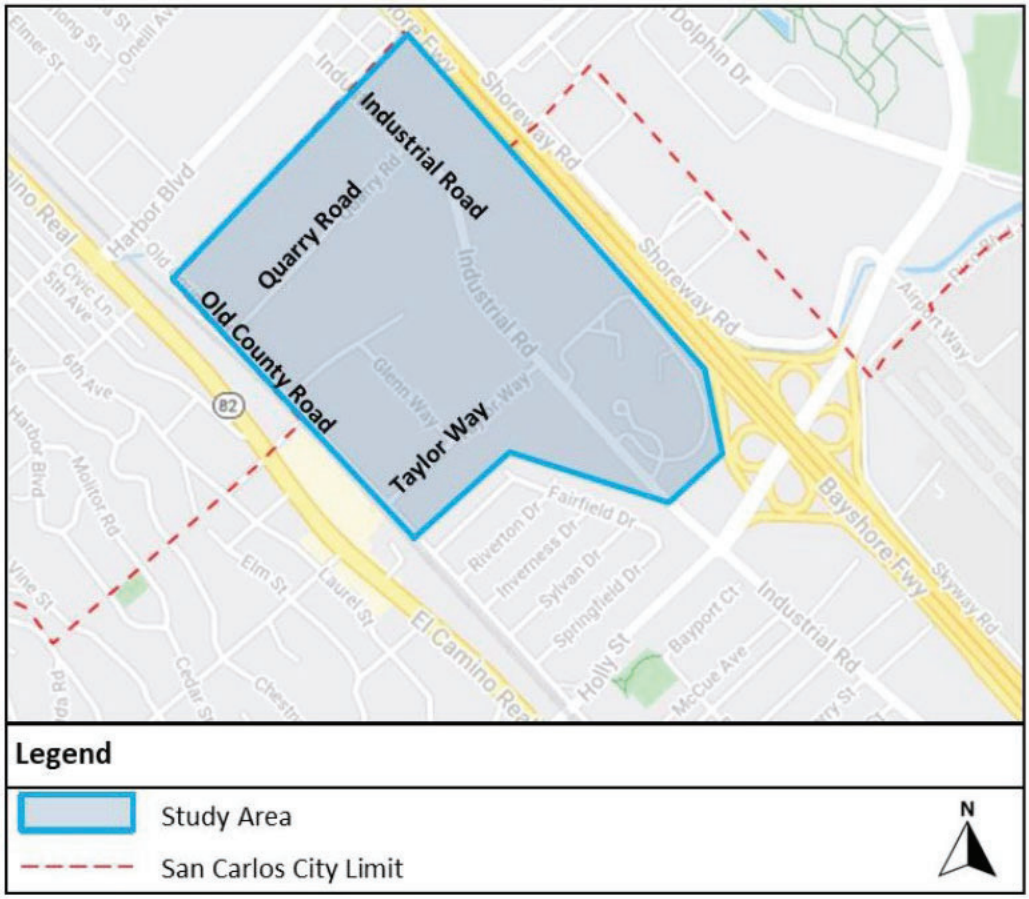
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INTRODUCTION

The Northeast Area Specific Plan (NEASP) is proposed in the geographical region north of Holly Street (excluding the single-family neighborhood and the area already included in the East Side Innovation District Vision Plan) to the San Carlos City Limits at Belmont Creek, and between Highway 101 and Old County Road within the City of San Carlos, California. Figure 1 shows the plan area boundaries. The Palo Alto Medical Foundation site is located at 301 Industrial Road and is included within the proposed study area. However, this 18-acre site already has an approved development agreement and an approved Planned Development Permit to build a hospital within the next 10 years.

FIGURE 1 Project Study Area



This report evaluates the potential to result in significant noise and vibration impacts with respect to California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency Section discusses noise and land use compatibility utilizing policies in the City of San Carlos's General Plan; and 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate impacts that would result from

implementation of the Specific Plan upon sensitive receptors at a programmatic level, provides a discussion of each impact, and presents measures, where necessary, to mitigate the impacts.

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 used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement that 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.

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 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 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 that 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 2018.

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 L_{dn}. 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.[1] Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} 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 L_{dn} 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 L_{dn}. At a L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} 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 L_{dn} of 60 to 70 dBA. Between a L_{dn} 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 L_{dn} 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.[2]

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1 Based on the U.S. Department of Transportation Federal Highway Administration document "Highway Traffic Noise: Analysis and Abatement Guidance" (2010) and data from Illingworth & Rodkin, Inc. noise monitoring projects.

2 Kryter, Karl D. The Effects of Noise on Man. Menlo Park, Academic Press, Inc., 1985.

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 is the Peak Particle Velocity (PPV) and another is the Root Mean Square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. 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 vibration levels produce. The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much 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. In high noise environments, that are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Typical background vibration levels in residential areas are usually 50 VdB or lower, well below the threshold of perception for most humans (60 to 70 VdB). Perceptible vibration levels inside residences are attributed to the operation of heating and air conditioning systems, door slams and foot traffic. Table 3 illustrates some common sources of vibration and the association to human perception or the potential for structural damage. Construction activities, train operations, and heavy truck and bus traffic are some of the most common external sources of vibration that can be perceptible inside residences.

TABLE 3 Typical Levels of Groundborne Vibration

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

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

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 induce structural 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. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. 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 minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. 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.

Table 4 displays continuous vibration impacts on human annoyance and on buildings. As discussed previously, annoyance is a subjective measure and vibrations may be found to be annoying at much 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.

TABLE 4 Reactions 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.

Rail Vibration

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

One of the problems with developing suitable criteria for groundborne vibration is the limited research into human response to vibration and more importantly human annoyance inside buildings. The U.S. Department of Transportation (U.S. DOT) Federal Transit Administration (FTA) has developed rational vibration limits that can be used to evaluate human annoyance to groundborne vibration. These limits are summarized in Table 5. These criteria are primarily based on experience with passenger train operations, such as rapid transit and commuter rail systems. The main difference between passenger and freight operations is the time duration of individual events; a passenger train lasts a few seconds whereas a long freight train may last several minutes, depending on speed and length.

TABLE 5 FTA Groundborne Vibration Impact Criteria

Land Use Category	Impact Levels (VdB re 1 micro-inch /sec)		
	Frequent Events[1]	**Occasional Events[2]**	**Infrequent Events[3]**
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

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

Notes:

1. "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events per day. This category includes most commuter rail systems.
4. This limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.

Vibration from Heavy Trucks and Buses

Groundborne vibration levels from heavy trucks and buses are not normally perceptible, especially if roadway surfaces are smooth. Buses and trucks typically generate groundborne vibration levels to about 63 VdB at a distance of 25 feet when traveling at a speed of 30 mph. Higher vibration levels can occur when buses or trucks travel at higher rates of speed or when the pavement is in poor condition. Vibration levels below 65 VdB are not normally perceptible.

Regulatory Background

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

Federal

U.S. Department of Housing and Urban Development (HUD)

HUD environmental criteria and standards are presented in 24 CFR Part 51. New residential construction qualifying for HUD financing proposed in high noise areas (exceeding 65 dBA L_{dn}) must incorporate noise attenuation features to maintain acceptable interior noise levels. A goal of 45 dBA L_{dn} is set forth for interior noise levels and attenuation requirements are geared toward achieving that goal. It is assumed that with standard construction any building will provide sufficient attenuation to achieve an interior level of 45 dBA L_{dn} or less if the exterior level is 65 dBA L_{dn} or less. Approvals in a "normally unacceptable noise zone" (exceeding 65 dBA but not exceeding 75 dBA) require a minimum of 5 dBA additional noise attenuation for buildings if the day-night average is greater than 65 dBA but does not exceed 70 dBA, or minimum of 10 dBA of additional noise attenuation if the day-night average is greater than 70 dBA but does not exceed 75 dBA.

Federal Highway Administration (FHWA)

Proposed federal or federal-aid highway construction projects at a new location, or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes requires an assessment of noise and consideration of noise abatement per Title 23 of the Code of Federal Regulations, Part 772 (23 CFR Part 772), "Procedures for Abatement of Highway Traffic Noise and Construction Noise." FHWA has adopted noise abatement criteria (NAC) for sensitive receivers such as picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals when "worst-hour" noise levels approach or exceed 67 dBA L_{eq}. The California Department of Transportation (Caltrans) has further defined approaching the NAC to be 1 dBA below the NAC for noise-sensitive receivers identified as Category B activity areas (e.g., 66 dBA L_{eq} is considered approaching the NAC).[3]

Federal Transit Administration (FTA)

The FTA has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[4] 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.

The FTA has identified vibration impact criteria for sensitive buildings, residences, and institutional land uses near rail transit and railroads. The thresholds for residences and buildings where people normally sleep (e.g., nearby residences) are 72 VdB for frequent events (more than 70 events of the same source per day), 75 VdB for occasional events (30 to 70 vibration events of the same source per day), and 80 VdB for infrequent events (less than 30 vibration events of the same source per day).

3 Traffic Noise Analysis Protocol, Caltrans Division of Environmental Analysis, May, 2011.

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

State of California

2022 California Building Code, Title 24, Part 2.

The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn}/CNEL in any habitable room.

Division of Aeronautic Noise Standards

Title 21 of the California Code of Regulations[5] sets forth the State's airport noise standards. In the findings described in Section 5006, the standard states the following: "A level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a CNEL value of 65 dB for purposes of these regulations. This criterion has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep, and community reaction." Based on this finding, the airport noise standard as defined in Section 5012 is set at a CNEL of 65 dBA.

California Department of Transportation (Caltrans) – Construction Vibration

Caltrans recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards. A conservative vibration limit of 0.25 to 0.30 in/sec PPV has been used for older buildings that are found to be structurally sound but cosmetic damage to plaster ceilings or walls is a major concern. For buildings that are documented to be structurally weakened, a conservative limit of 0.08 in/sec PPV is often used to provide the highest level of protection. All of these limits have been used successfully and compliance to these limits has not been known to result in appreciable structural damage. All vibration limits referred to herein apply on the ground level and take into account the response of structural elements (i.e. walls and floors) to groundborne excitation.

CEQA Guidelines

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

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

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

5 California Code of Regulations Airport Noise Standards, Title 21, Public Works Division 2.5, Division of Aeronautics (Department of Transportation), Chapter 6 Noise Standards, Article 1.General.

(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.

2022 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 2022 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 that establishes the acceptable interior noise level is the method typically used when applying these standards.

County of San Mateo

Comprehensive Airport Land Use Compatibility Plan for the Environs of San Carlos Airport

The policies and maps included in this document are related to the state-mandated airport compatibility factors – noise, safety, airspace protection, and overflight. The following noise compatibility policies shall apply to the ALUCP and are applicable to this project:

Noise Policy 1 – Noise Impact Area. The threshold for evaluation is the projected CNEL 60 dB contour depicted on Exhibit 4-2. This contour defines the noise impact area of the Airport. All land uses located outside this contour are consistent with the noise compatibility policies of this ALUCP.

Noise Policy 2 – Airport Noise/Land Use Compatibility Criteria. The noise compatibility policies set forth in this section shall be used in conjunction with the 20-year future noise exposure contours depicted on Exhibit 4-2 and noise/land use compatibility criteria presented in Table 4-3.

a. The compatibility criteria in this section indicate the maximum acceptable airport-related noise levels, which are measured in terms of CNEL, for a range of land uses.

b. Noise compatibility policies only apply to the identified noise contours. Within the four noise exposure ranges, each land use type is shown as "compatible", "conditionally compatible", or "incompatible". The meaning of these terms is provided in Table 4-3.

c. Land uses not specifically listed in Table 4-3 shall be evaluated using the criteria for similar listed uses.

Noise Policy 4 – Interior Noise Levels. Within all identified noise contours, land uses for which interior activities may be easily disrupted by noise shall be required to comply with the following interior noise level criteria (calculations should assume windows are closed):

a. The maximum, aircraft-related, interior noise level which shall be considered acceptable for land uses within the airport influence area is CNEL 45 dB in:

    1. Living and sleeping areas of single- or multi-family residences;

    2. Hotels and motels;

    3. Religious facilities, cemetery chapels, and mortuaries; and

    4. Schools, libraries, and museums.

b. The maximum, aircraft-related, interior noise level which shall be considered acceptable for the following land uses is CNEL 50 dB in:

    1. Office environments;

    2. Eating and drinking establishments; and

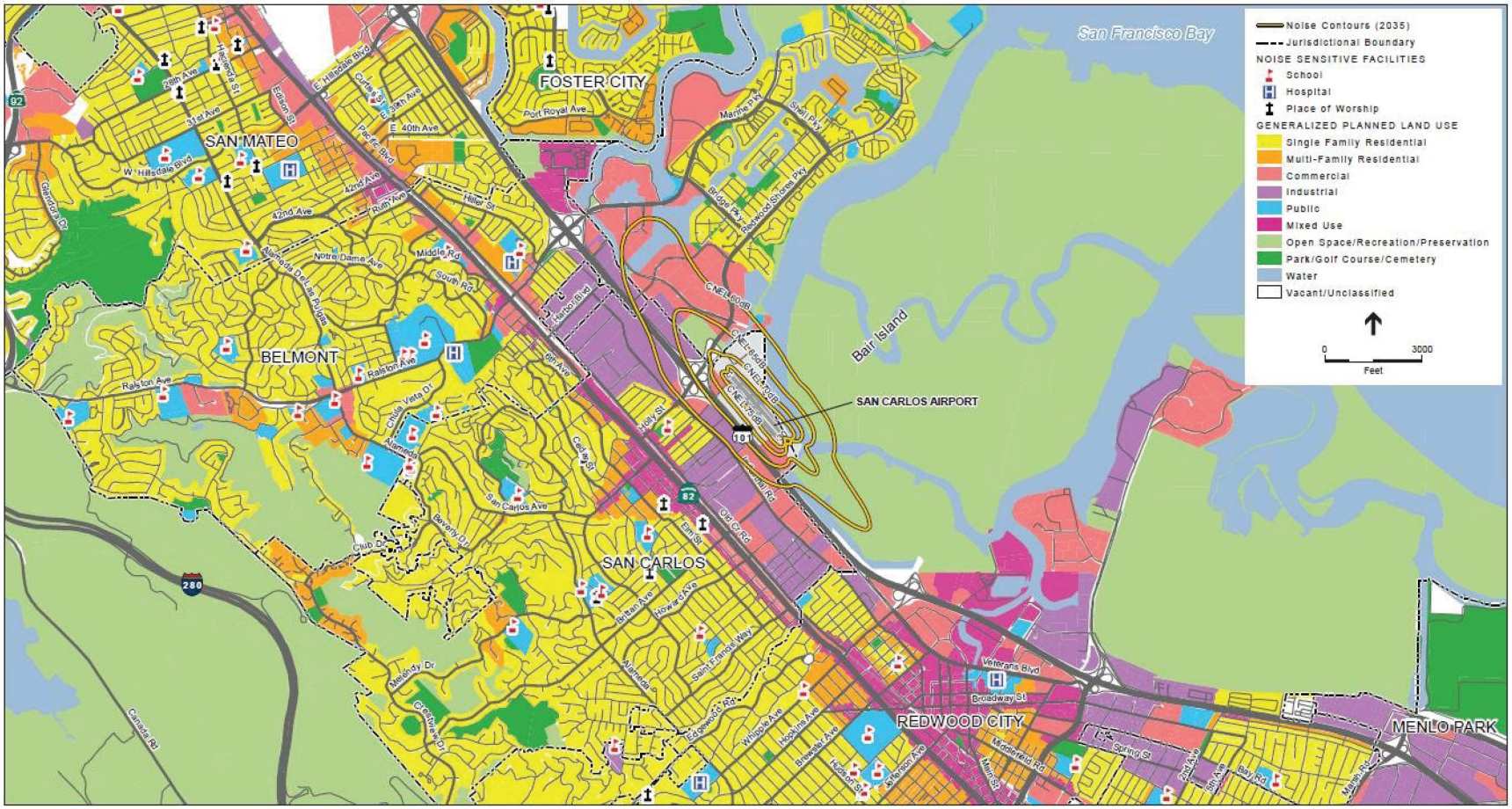
    3. Other commercial facilities.

c. When reviewed as part of a general plan or zoning ordinance amendment or as a major land use action, evidence that proposed structures will be designed to comply with these criteria shall be submitted to the San Mateo County Airport Land Use Commission (the C/CAG Board) under the following circumstances:

    1. Any single- or multi-family residence within the CNEL 60 dB contour, as identified on Exhibit 4-2.

    2. Any hospital or nursing home, religious facility, school, library, or other noise-sensitive nonresidential use within the CNEL 60 dB contour, as identified on Exhibit 4-2.

    3. Any hotel, motel, or transient lodging within the CNEL 65 dB contour, as identified on Exhibit 4-2.



SOURCE: Belmont, 1982; San Mateo County, 1986; Foster City, 1993; Menlo Park, 1994; San Carlos, 2009; City of San Mateo, 2010; Redwood City, 2010; ESRI, 2014; ESA Airports, 2015

San Carlos Airport ALUCP . 130753

Exhibit 4-2
Future Conditions (2035) Aircraft Noise Contours

TABLE 4-3
NOISE COMPATIBILITY CRITERIA

Land Use Category	Community Noise Equivalent Level (dBA)			
	<60	60-64	65-69	70-75
Residential and Lodging				
Residential Single-family (detached, semi-detached, attached row)	Y	C(2)	N	N
Multi-family residential	Y	C(2)	N	N
Mobile home parks or courts	Y	N	N	N
Retirement homes; intermediate care facilities	Y	C(2)	N	N
Hotels; motels; other transient lodging	Y	Y	C(1)	N
Public/Institutional				
Children's schools (K-12) and child care facilities	Y	C(2)	C(2)	N
Adult schools; colleges; universities (excluding laboratories, gymnasiums, and outdoor athletic facilities)	Y	Y	C(1)	N
Outdoor amphitheaters and stadiums	Y	N	N	N
Auditoriums; concert halls; indoor arenas	Y	Y	C(1)	N
Hospitals; nursing homes; other health care services	Y	C(2)	N	N
Religious facilities; cemetery chapels; mortuaries; libraries; museums	Y	C(2)	N	N
Prisons; reformatories	Y	Y	C(3)	N
Public safety facilities (e.g., police, fire stations)	Y	Y	C(3)	C(3)
Cemeteries	Y	Y	Y	N
Recreational				
Children-oriented neighborhood parks; playgrounds	Y	Y	N	N
Community parks; regional parks; golf courses; tennis courts; athletic fields; outdoor spectator sports; fairgrounds; water recreation facilities	Y	Y	N	N
Recreation buildings; gymnasiums; club houses; athletic clubs; dance studios	Y	Y	C(3)	C(3)
Campgrounds; recreational vehicle/motor home parks	Y	C(4)	N	N
Commercial				
Office buildings; office areas of industrial facilities; medical clinics; laboratories; radio, television, and recording studios	Y	Y	C(3)	N
Retail sales; eating/drinking establishments; movie theaters; personal services	Y	Y	C(3)	N
Wholesale sales; warehouses; mini/other indoor storage	Y	Y	Y	C(3)
Auto and marine sales and repair services; car washes; gas stations	Y	Y	Y	C(3)
Animal shelters/kennels	Y	C(4)	C(4)	N
Industrial				
Light industrial/manufacturing; miscellaneous manufacturing; research and development facilities	Y	Y	Y	C(3)
Printing, publishing, and allied industries	Y	Y	Y	Y
Processing of food, wood and paper products; warehouses; wholesale storage	Y	Y	Y	Y

TABLE 4-3
NOISE COMPATIBILITY CRITERIA

Land Use Category	Community Noise Equivalent Level (dBA) <60	60-64	65-69	70-75
Refining, manufacturing and storage of chemicals, petroleum and related products; manufacturing and assembly of electronic components	Y	Y	Y	Y
Salvage yards; natural resource extraction and processing; public works yards; solid waste facilities; outdoor storage; automobile dismantling	Y	Y	Y	Y
Utilities, road, rail rights-of-way; communication and other utilities; automobile parking	Y	Y	Y	Y
Agriculture and Animal-Related				
Nature preserves; wildlife preserves	Y	Y	Y	Y
Agriculture-related activities (except livestock); greenhouses; fishing	Y	C(1)	C(5)	C(5)
Horse stables; livestock breeding or farming	Y	Y	C(5)	C(5)
Zoos	Y	C(4)	N	N
Interactive Nature Exhibits	Y	C(4)	N	N

Notes:
Y – Land use and related structures are compatible without restrictions.
C(1) – Land use and related structures are conditionally compatible. Building structure must be capable of attenuating exterior noise levels to an interior noise level of CNEL 45 dB or lower.
C(2) - Land use and related structures are conditionally compatible. Building structure must be capable of attenuating exterior noise levels to an interior noise level of CNEL 45 dB or lower. Requires that an avigation easement be granted to San Mateo County as the operator of San Carlos Airport.
C(3) - Land use and related structures are conditionally compatible. Building structure must be capable of attenuating exterior noise levels to an interior noise level of CNEL 50 dB or lower.
C(4) – Land Use is conditionally compatible. Caution should be exercised with regard to noise-sensitive outdoor uses as these uses are likely to be disrupted by aircraft noise events.
C(5) – Land Use is conditionally compatible. Caution should be exercised with regard to noise-sensitive outdoor uses as these uses are likely to be disrupted by aircraft noise events. Accessory dwelling units are not compatible.
N – Land use and related structures are not compatible under any circumstances.
Source: ESA Airports, September 2014.

Noise Policy 5 – Application of Noise Contours to Individual Project Sites to Determine Compatibility. Future/projected aircraft noise contours are inherently imprecise because flight paths and other factors that influence noise exposure are variable and activity projections are always uncertain. Given this imprecision, the San Carlos Airport noise contours shall be utilized, as follows, in assessing the compatibility of a proposed use at a specific development site:

a. In general, the highest CNEL range to which a project site is anticipated to be exposed shall be used in evaluating the compatibility of development over the entire site.

b. An exception to this policy is where no part of the building(s) or residential units proposed on the site fall within the higher CNEL range; the criteria for the CNEL range where the buildings are located shall apply.

City of San Carlos

San Carlos 2045 General Plan Reset

The City of San Carlos is currently updating the General Plan, and the 2045 General Plan Reset Draft Environmental Impact Report (EIR),[6] which was completed in January 2025, outlines the proposed changes to the General Plan, which will be implemented by the time the NEASP is approved. Chapter 9 of the 2045 General Plan Reset includes the Noise Element, which provides goals, policies, and actions to maintain a community with a noise environment that supports a high quality of life. The goals, policies, and actions that apply to the proposed project are as follows:

Goal NOI-1: Encourage compatible noise environments for new development and control sources of excessive noise citywide.

Policy NOI-1.1. Use the Noise and Land Compatibility Standards shown in Figure 9-1, the noise level performance standards in Table 9-1 and the projected future noise contours for the General Plan shown in Figure 9-3 and detailed in Table 9-2, as a guide for future planning and development decisions.

Policy NOI-1.2. Minimize noise impacts on noise-sensitive land uses. Noise-sensitive land uses include residential uses, retirement homes, hotel/motels, schools, libraries, community centers, places of public assembly, daycare facilities, churches, and hospitals.

Policy NOI-1.3. Limit noise impacts on noise-sensitive uses to noise level standards as indicated in Table 9-1.

Policy NOI-1.4. Require a detailed acoustic report in all cases where noise-sensitive land uses are proposed in areas exposed to exterior noise levels of 60 CNEL L_{dn} or greater. If recommended in the report, mitigation measures shall be required as conditions of project approval.

Policy NOI-1.5. New development of noise-sensitive land uses proposed in noise-impacted areas shall incorporate effective mitigation measures into the project design to reduce exterior and interior noise levels to the following acceptable levels.

a. For new single-family residential development, maintain a standard of 60 L_{dn} (day/night average noise level) for exterior noise in private use areas.

b. For new multi-family residential development maintain a standard of 65 L_{dn} in community outdoor recreation areas. Noise standards are not applied to private decks and balconies and shall be considered on a case-by-case basis.

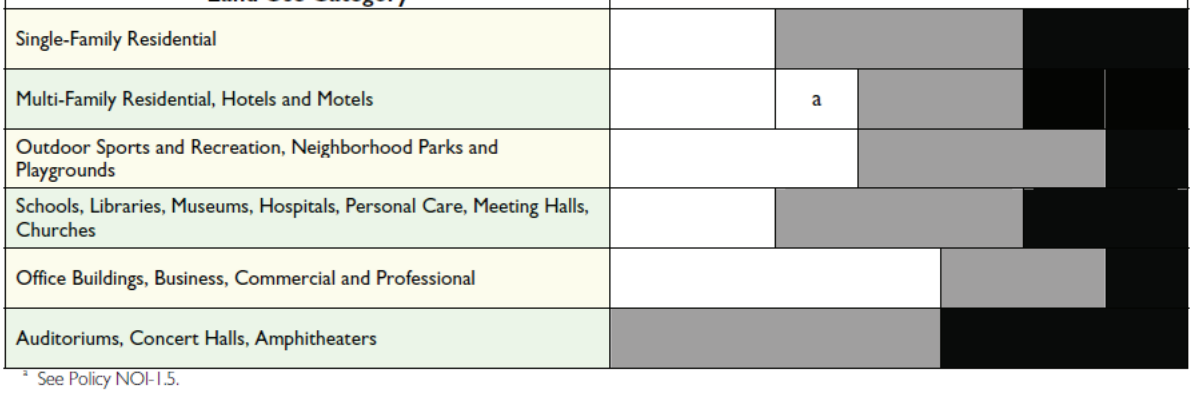
c. Interior noise levels shall not exceed 45 L_{dn} in all new residential units (single- and multi-family). Development sites exposed to noise levels exceeding 60 L_{dn} shall be analyzed following protocols in Appendix Chapter 12, Section 1208, A, Sound

[6] Placeworks, "*2045 General Plan Reset Draft EIR*," January 2025.

Transmission Control, 2001 Building Code Chapter 12, Appendix 1207.11.2 of the 2007 California Building Coe (or the latest version).

d. Where new residential units (single- and multi-family) would be exposed to intermittent noise levels generated during train operations, maximum railroad noise levels inside homes shall not exceed 50 dBA in bedrooms or 55 dBA in other occupied spaces. These single event limits are only applicable where there are normally four or more train operations per day.

FIGURE 9-1 LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENT



[a] See Policy NOI-1.5.

NORMALLY ACCEPTABLE. Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special insulation requirements.

CONDITIONALLY ACCEPTABLE. Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

UNACCEPTABLE. New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Policy NOI-1.6. Where noise mitigation measures are required to achieve the noise level standards, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered after practical design-related noise mitigation measures have been integrated into the project.

Policy NOI-1.7. The City shall seek to reduce impacts from groundborne vibration associated with rail operations by requiring that vibration-sensitive buildings (e.g. residences) are sited at least 100 feet from the centerline of the railroad tracks whenever feasible. The development of vibration-sensitive buildings within 100 feet from the centerline of the railroad tracks would require a study demonstrating that groundborne vibration issues associated with rail operations have been adequately addressed (i.e., through building siting, foundation design and construction techniques).

Policy NOI-1.8. All construction activities shall comply with the City's noise ordinance. Development projects that require an acoustical study shall incorporate reasonable noise and vibration reduction measures and best management practices to minimize excessive noise levels during all phases of construction activity. Reduction measures and best management practices may include, but are not limited to, noise control techniques for construction tools and equipment, construction site management techniques, temporary noise barriers, noise monitoring and reporting, and/or construction traffic management.

TABLE 9-1 NON-TRANSPORTATION NOISE STANDARDS

Land Use Receiving the Noise	Hourly Noise-Level Descriptor	Exterior Noise-Level Standard In Any Hour (dBA)		Interior Noise-Level Standard In Any Hour (dBA)	
		Daytime (7am-10pm)	Nighttime (10pm-7am)	Daytime (7am-10pm)	Nighttime (10pm-7am)
Residential	L_{eq}	55	45	40	30
	L_{max}	70	60	55	45
Medical, convalescent	L_{eq}	55	45	45	35
	L_{max}	70	60	55	45
Theater, auditorium	L_{eq}	--	--	35	35
	L_{max}	--	--	50	50
Church, meeting hall	L_{eq}	55	--	40	40
	L_{max}	--	--	55	55
School, library, museum	L_{eq}	55	--	40	--
	L_{max}	--	--	55	--

Notes:
1. The Residential standards apply to all residentially zoned properties.
2. Each of the noise levels specified above shall be lowered by 5 dBA for tonal noises characterized by a whine, screech, or hum, noises consisting primarily of speech or music, or recurring impulsive noises.
3. In situations where the existing noise level exceeds the noise levels indicated in the above table, any new noise source must include mitigation that reduces the noise level of the noise source to the existing level.
4. The exterior noise standards are measured at any point on the receiving property where there is, or could be in the future, frequent human use and quiet would be beneficial.
5. These standards do not apply to temporary sources such as construction activities.

Policy NOI-1.9. Minimize potential transportation-related noise through the use of setbacks, street circulation design, coordination of routing and other traffic control measures and the construction of noise barriers and consider use of "quiet" pavement surfaces when resurfacing roadways.

Policy NOI-1.10. Ensure that mixed-use development projects are designed to minimize noise impacts on residential units.

Policy NOI-1.11. Ensure that proposed noise-sensitive land uses include appropriate mitigation to reduce noise impacts from aircraft operations at San Carlos Airport. Work with the San Carlos Airport Pilots Association and San Mateo County to continue to refine and implement the Airport's noise abatement procedures.

Policy NOI-1.12. Ensure consistency with the noise compatibility policies and criteria contained in the Comprehensive Airport Land Use Compatibility Plan for the Environs of San Carlos Airport.

Policy NOI-1.13. Require a noise analysis for new residential uses located within the 55 CNEL impact area of the San Carlos Airport. If recommended in the report, mitigation measures shall be required as conditions of project approval.

Policy NOI-1.14. The Federal Transit Administration vibration impact criteria and assessment methods shall be used to evaluate the compatibility of train vibration with proposed land uses adjoining the UPRR (Caltrain) corridor. Site specific vibration studies shall be completed for vibration-sensitive uses proposed within 100 feet of active railroad tracks.

Action NOI-1.1. Establish a noise abatement protocol for existing sensitive land uses located in areas anticipated to experience significant noise increases with the implementation of the General Plan. Cumulative traffic noise impacts on existing noise-sensitive uses could be reduced through the inclusion of exterior and/or interior sound-reduction measures, such as setbacks, noise barriers, forced-air mechanical ventilation and sound-rated window construction. The City should research sources of funding for these actions.

Action NOI-1.2. Revise the City's Noise Ordinance to be consistent with this Element.

Action NOI-1.3. Require residents of new mixed-use developments to be informed of potential noise from refuse collection and other activities typically associated with commercial activity.

Action NOI-1.4. Require the evaluation of mitigation measures for projects that would cause the following criteria to be exceeded or would cause a significant adverse community response:

a. Cause the L_{dn} at noise-sensitive uses to increase by 3 dBA or more and exceed the "normally acceptable" level.

b. Cause the L_{dn} at noise-sensitive uses to increase by 5 dBA or more and remain "normally acceptable."

c. Cause noise levels to exceed the limits in Table 9-1.

Action NOI-1.5. Enforce Section 27007 of the California Motor Vehicle Code that prohibits amplified sound that can be heard 50 or more feet from a vehicle.

Action NOI-1.6. Enforce Section 27150 of the California Motor Vehicle Code that addresses excessive exhaust noise.

Action NOI-1.7. Update and review procedures for dealing with noise complaints in the community.

Action NOI-1.8. Evaluate the necessity of requesting Caltrain to establish a Quiet Zone designation for San Carlos.

City of San Carlos Municipal Code

Chapter 9.30, Noise Control, of the City's Municipal Code seeks to protect the peace, health and safety of its citizens from unnecessary and unreasonable noises produced by any machine, person or device.

9.30.030 Basic noise regulation. Except as otherwise permitted under this chapter, no person shall cause and no property owner shall permit, as to property owned by him, a noise produced by any person, amplified sound or device, or any combination thereof in excess of the noise limits established in Table 18.21.050-A to emanate from any property, public or private, as measured at the receiving property line. (Ord. 1439 § 4 (Exh. B (part)), 2011: Ord. 1086 § 1 (part), 1991)

9.30.070 Exempt activities. The following noise-generating activities are exempt from the provisions of this chapter:

A. Transportation facilities, such as freeways, airports, buses, and railroads;

B. Construction activities; such activities, however, shall be limited to the hours of eight a.m. to five p.m. Monday through Friday, and nine a.m. to five p.m. on Saturdays and Sundays. No construction noise-related activities on the following holidays: New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, Juneteenth, 4th of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day. All gasoline-powered construction equipment shall be equipped with an operating muffler or baffling system as originally provided by the manufacturer, and no modification to these systems is permitted (the Building Official shall have the authority to grant exceptions to construction noise-related activities);

C. Home workshops and gas-powered gardening equipment; such activities, however, shall be limited to the hours of eight a.m. to sunset Monday through Friday, and ten a.m. to sunset on Saturday, Sunday and holidays stated in subsection B of this section;

D. Public works and public utilities activities; such activities, however, shall be limited to the hours set forth under subsection B of this section, except for emergency situations (the Public Works Director shall have the authority to grant exceptions to public works and public utilities construction noise-related activities);

E. Emergency vehicles;

F. Solid waste pickup; such activities, however, shall be limited to the hours of collection set forth under the applicable franchise agreement for solid waste pickup, recyclable materials pickup

and/or organic materials pickup as may be restricted for residential, commercial and City facilities. (Ord. 1439 § 4 (Exh. B (part)), 2011: Ord. 1086 § 1 (part), 1991)

Chapter 18.21 provides performance standards for noise and vibration. The following sections apply to this report:

18.21.050 Noise.

A. Noise Limits. No use or activity shall create noise levels that exceed the following standards. The maximum allowable noise levels specified in Table 18.21.050-A, Noise Limits, do not apply to noise generated by automobile traffic or other mobile noise sources in the public right-of-way.

    1. Adjustments to Noise Limits. The maximum allowable noise levels of Table 18.21.050-A, Noise Limits, shall be adjusted according to the following provisions. No more than one increase in the maximum permissible noise level shall be applied to the noise generated on each property.

        a. Ambient Noise. If the ambient noise level at a noise-sensitive use is ten dBA or more below the standard, the allowable noise standard shall be decreased by five decibels.

        b. Duration. The maximum allowable noise level (L_{50}) shall be increased as follows to account for the effects of duration:

            i. Noise that is produced for no more than a cumulative period of fifteen minutes in any hour may exceed the noise limit by five decibels; and

            ii. Noise that is produced for no more than a cumulative period of five minutes in any hour may exceed the noise limits by ten decibels;

            iii. Noise that is produced for no more than a cumulative period of one minute in any hour may exceed the noise limits by fifteen decibels.

        c. Character of Sound. If a noise contains a steady audible tone or is a repetitive noise (such as hammering or riveting) or contains music or speech conveying informational content, the maximum allowable noise levels shall be reduced by five decibels.

        d. Prohibited Noise. Noise for a cumulative period of thirty minutes or more in any hour which exceeds the noise standard for the receiving land use.

B. Noise Exposure – Land Use Requirements and Limitations. Table 18.21.050-B, Noise Exposure—Land Requirements and Limitations, describes the requirements and limitations of various land uses within the listed day/night average sound level (L_{dn}) ranges.

C. Acoustic Study. The Director may require an acoustic study for any proposed project that could cause any of the following:

1. Locate new residential uses within the fifty-five CNEL impact area of the San Carlos Airport;

2. Cause noise levels to exceed the limits in Table 18.21.050-A;

TABLE 18.21.050-A: NOISE LIMITS

Land Use Receiving the Noise	Noise-Level Descriptor	Exterior Noise Level Standard in Any Hour (dBA)		Interior Noise-Level Standard in Any Hour (dBA)	
		Daytime (7 a.m. – 10 p.m.)	Nighttime (10 p.m. – 7 a.m.)	Daytime (7 a.m. – 10 p.m.)	Nighttime (10 p.m. – 7 a.m.)
Residential	L_{50}	55	45	40	30
	L_{max}	70	60	55	45
Medical, convalescent	L_{50}	55	45	45	35
	L_{max}	70	60	55	45
Theater, auditorium	L_{50}	-	-	35	35
	L_{max}	-	-	50	50
Church, meeting hall	L_{50}	55	-	40	40
	L_{max}	-	-	55	55
School, library, museum	L_{50}	55	-	40	-
	L_{max}	-	-	55	-

Notes: 1. New residential development in noise impacted areas area subject to the following noise levels:

a. For new single-unit residential development, maintain a standard of 60 L_{dn} for exterior noise in private use areas.

b. For new multi-unit residential development, maintain a standard of 65 L_{dn} in community outdoor recreation areas. Noise standards are not applied to private decks and balconies and shall be considered on a case-by-case basis in the MU-DC District.

c. Where new residential units (single and multifamily) would be exposed to intermittent noise levels generated during train operations, maximum railroad noise levels inside homes shall not exceed forty-five dBA in bedrooms or fifty-five dBA in other occupied spaces. These single-event limits are only applicable where there are normally four or more train operations per day.

3. Create a noise exposure that would require an acoustic study and noise attenuation measures listed in Table 18.21.050-B, Noise Exposure – Land Use Requirements and Limitations; or

4. Cause the L_{dn} at noise-sensitive uses to increase three dBA or more.

D. Establishing Ambient Noise. When the Director has determined that there could be cause to make adjustments to the standards, an acoustical study shall be performed to establish ambient noise levels. In order to determine if adjustments to the standards should be made either upwards or downwards, a minimum twenty-four-hour-duration noise measurement shall be conducted. The noise measurements shall collect data utilizing noise metrics that are consistent with the noise limits presented in Table 18.21.050-A, e.g., L_{max} (zero minutes), L_{02} (one minute), L_{08} (five minutes), L_{25} (fifteen minutes) and L_{50} (thirty minutes). An arithmetic average of these ambient noise levels during the three quietest hours shall be made to demonstrate that the ambient noise levels are regularly ten or more decibels below the respective noise standards. Similarly, an arithmetic average of ambient noise levels during the three loudest hours should be made to demonstrate that ambient noise levels regularly exceed the noise standards.

E. Noise Attenuation Measures. Any project subject to the acoustic study requirements of subsection C of this section may be required as a condition of approval to incorporate noise attenuation measures deemed necessary to ensure that noise standards are not exceeded.

1. New noise-sensitive uses (e.g., schools, hospitals, churches, and residences) shall incorporate noise attenuation measures to achieve and maintain an interior noise level of forty-five dBA.

2. Noise attenuation measures identified in an acoustic study shall be incorporated into the project to reduce noise impacts to satisfactory levels.

3. Emphasis shall be placed upon site planning and project design measures. The use of noise barriers shall be considered and may be required only after all feasible design-related noise measures have been incorporated into the project. (Ord. 1438 § 4 (Exh. A (part)), 2011)

F. Airport Land Use Compatibility Plan Consistency. Where required, conformance with applicable airport land use compatibility plan standards, as described in Section 18.21.150, San Carlos Airport land use compatibility plan consistency, is require. (Ord. 1606 (Exh. A), 2023; Ord. 1438 § 4 (Exh. A (part)), 2011)

18.21.060 Vibration. No vibration shall be produced that is transmitted through the ground and is discernible without the aid of instruments by a reasonable person at the lot lines of the site. Vibrations from temporary construction, demolition, and vehicles that enter and leave the subject parcel (e.g., construction equipment, trains, trucks, etc.) are exempt from this standard. (Ord. 1438 § 4 (Exh. A (part)), 2011)

TABLE 18.21.050-B: NOISE EXPOSURE
—LAND USE REQUIREMENTS AND LIMITATIONS

Land Use	Day/Night Average Sound Level (Ldn)	Requirements and Limitations
Residential (1) and Other Noise-Sensitive Uses (e.g., Schools, Hospitals, and Churches)	Less than 60	Satisfactory
	60 to 75	Acoustic study and noise attenuation measures required
	Over 75	Acoustic study and noise attenuation measures required
Auditoriums, Concert Halls, Amphitheaters	Less than 70	Acoustic study and noise attenuation measures required
	Over 70	Not allowed
Commercial and Industrial	Less than 70	Satisfactory
	70 to 80	Acoustic study and noise attenuation measures required
	Over 80	Airport-related development only; noise attenuation measures required
Outdoor Sports and Recreation, Parks	Less than 65	Satisfactory
	65 to 80	Acoustic study and noise attenuation measures required; avoid uses involving concentrations of people or animals
	Over 80	Limited to open space; avoid uses involving concentrations of people or animals

Notes: 1. New residential development in noise impacted areas area subject to the following noise levels:

a. For new single-unit residential development, maintain a standard of 60 L_{dn} for exterior noise in private use areas.

b. For new multi-unit residential development, maintain a standard of 65 L_{dn} in community outdoor recreation areas. Noise standards are not applied to private decks and balconies and shall be considered on a case-by-case basis in the MU-DC District.

c. Where new residential units (single and multifamily) would be exposed to intermittent noise levels generated during train operations, maximum railroad noise levels inside homes shall not exceed forty-five dBA in bedrooms or fifty-five dBA in other occupied spaces. These single-event limits are only applicable where there are normally four or more train operations per day.

Existing Noise Environment

The existing noise environment at the site results primarily from traffic noise along US 101, Holly Street, and Industrial Avenue. Traffic noise from other roads such as Harbor Boulevard, Old Country Road, El Camino Real, and other minor roads also contributes to the noise environment. The Peninsula Corridor/ Union Pacific railroad tracks are just southwest of Old Country Road and are utilized primarily by Caltrain services. San Carlos Airport is located as close as 1,100 feet to the east of the study area. Operational noise from surrounding industrial land uses also contributes to the noise environment. The locations of noise measurements were chosen to fully represent existing noise levels at sites within the study area.

A noise monitoring survey consisting of four long-term (LT-1 through LT-4) and six short-term (ST-1 through ST-6) noise measurements was conducted within the study area and vicinity between Wednesday, January 25, 2023, and Friday, January 27, 2023. All noise measurement locations are shown in Figure 2.

Long-term noise measurement LT-1 was made in the southeast corner of the study area, approximately 90 feet northwest of the centerline of Holly Street, 85 feet northeast of the centerline of Industrial Road, and 780 feet southwest of the centerline of US 101. This location is also approximately 1,450 southwest of the San Carlos Airport. The location was chosen to represent existing noise levels at the southeast limits of the study area. Traffic noise from Holly Street, Industrial Road, and US 101, as well as aircraft noise from the San Carlos Airport were the main sources of noise at this location. Hourly average noise levels typically ranged from 67 to 75 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 58 to 71 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Thursday, January 26, 2023, was 73 dBA L_{dn}. The daily trend in noise levels at LT-1 is shown in Figures A1 through A3 of the Appendix.

Long-term noise measurement LT-2 was made in the center of the study area, approximately 40 feet west of the centerline of Industrial Road. The location was chosen to represent existing noise levels along Industrial Road. Traffic noise from Industrial Road was the main source of noise at this location. Aircraft noise, as well as industrial and commercial noise also contributed to the noise environment at this location. Hourly average noise levels typically ranged from 64 to 72 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 57 to 68 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Thursday, January 26, 2023, was 71 dBA L_{dn}. The daily trend in noise levels at LT-2 is shown in Figures A4 through A6 of the Appendix.

Long-term noise measurement LT-3 was made near the northwest corner of the study area, approximately 25 feet northeast of the centerline of Old Country Road. The location was chosen to represent existing noise levels along Old Country Road. Traffic noise from Old Country Road was the main source of noise at this location. Train noise, as well as industrial and commercial noise also contributed to the noise environment at this location. Hourly average noise levels typically ranged from 63 to 69 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 54 to 67 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise

level on Thursday, January 26, 2023, was 70 dBA L_{dn}. The daily trend in noise levels at LT-3 is shown in Figures A7 through A9 of the Appendix.

Long-term noise measurement LT-4 was made near the northeast boundary of the study area, approximately 215 feet northeast of the centerline of US 101. The location was chosen to represent existing noise levels along US 101. Traffic noise from US 101 was the main source of noise at this location. Aircraft noise also contributed to the noise environment at this location. Hourly average noise levels typically ranged from 66 to 76 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 59 to 75 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Thursday, January 26, 2023, was 76 dBA L_{dn}. The daily trend in noise levels at LT-4 is shown in Figures A10 through A12 of the Appendix.

Short-term noise measurements were made on Wednesday, January 25, 2023, between 11:20 a.m. and 1:20 p.m. in 10-minute intervals. Results of the measurements are summarized in Table 6.

Short-term noise measurement ST-1 was made near the northeast boundary of the study area, approximately 400 feet southwest of the centerline of US 101. This location was chosen to further represent traffic noise levels from US 101. Traffic noise from US 101 was the main source of noise at this location, and typically ranged from 54 to 63 dBA. Aircraft noise from four airplanes ranged from 59 to 69 dBA during the noise measurement. The 10-minute L_{eq} measured at ST-1 was 58 dBA.

ST-2 was made along the north boundary of the residential neighborhood just south of the study area. This location was chosen to represent typical noise levels at the residential neighborhood, which is farther from traffic noise than most other locations within the study area. Distant background traffic noise was the main source of noise at this location, typically ranging from 44 to 50 dBA. Aircraft noise from two airplanes ranged from 50 to 59 dBA during the noise measurement. Distant construction noise was audible at times. The 10-minute L_{eq} measured at ST-2 was 48 dBA.

ST-3 was made approximately 65 feet southwest of the centerline of Industrial Road. This location was chosen to further represent traffic noise levels from Industrial Road. Traffic noise from Industrial Road was the main source of noise at this location, typically ranging from 58 to 73 dBA. 79 vehicles passed by during the measurement, with noise levels ranging from 58 to 77 dBA. Six trucks produced noise levels ranging from 66 to 73 dBA. One bus produced noise levels up to 64 dBA. Aircraft noise from four airplanes ranged from 62 to 68 dBA during the noise measurement. The 10-minute L_{eq} measured at ST-3 was 64 dBA.

ST-4 was made approximately 30 feet northwest of the centerline of Quarry Road, and 410 feet northeast of the centerline of the Caltrain tracks. This location was chosen to represent traffic noise levels along Quarry Road. Traffic noise from Quarry Road was the main source of noise at this location. 13 vehicles passed by during the measurement, with noise levels ranging from 58 to 70 dBA. Two trucks produced noise levels ranging from 65 to 70 dBA. One Caltrain produced noise levels up to 57 dBA. Aircraft noise from three airplanes ranged from 58 to 68 dBA during the noise measurement. Industrial noise, including loading of trucks and liftgates, occasionally ranged from 55 to 71 dBA. The 10-minute L_{eq} measured at ST-4 was 59 dBA.

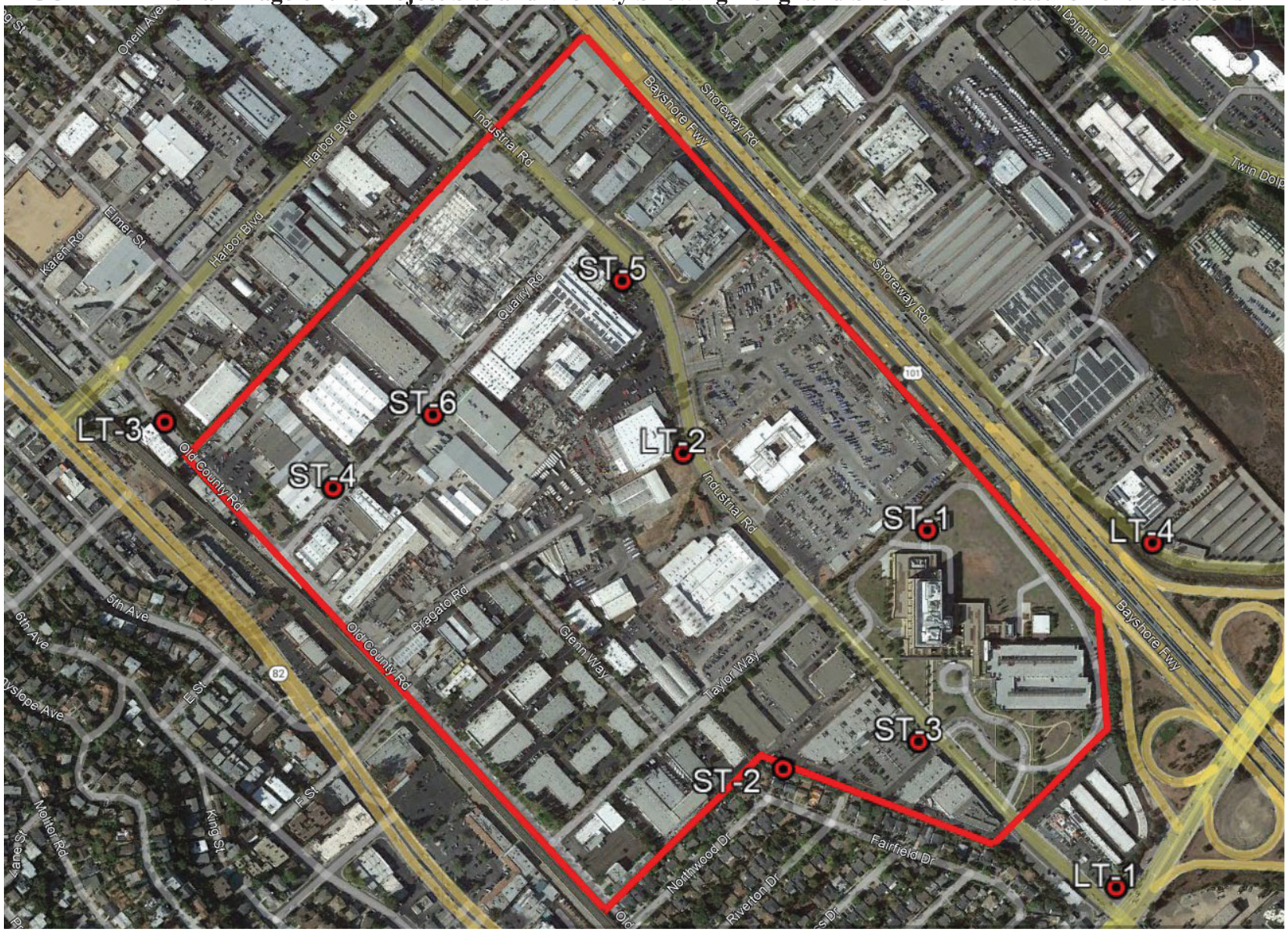
ST-5 was made approximately 75 feet southwest of the centerline of Industrial Road. This location was chosen to further represent traffic noise levels along Industrial Road. Traffic noise from Industrial Road was the main source of noise at this location. 83 vehicles passed by during the measurement, with noise levels ranging from 57 to 71 dBA. One truck produced noise levels up to 68 dBA. Aircraft noise from two airplanes ranged from 69 to 70 dBA during the noise measurement. The 10-minute L_{eq} measured at ST-5 was 63 dBA.

ST-6 was made approximately 60 feet southeast of the centerline of Quarry Road. This location was chosen to further represent traffic noise levels along Quarry Road. Traffic noise from Quarry Road was the main source of noise at this location. Nine vehicles passed by during the measurement, with noise levels ranging from 58 to 63 dBA. Three trucks produced noise levels ranging from 68 to 72 dBA. One airplane produced noise levels up to 66 dBA during the noise measurement. Loading of a truck briefly produced noise levels up to 65 dBA. The 10-minute L_{eq} measured at ST-6 was 58 dBA.

TABLE 6 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location	Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: ~400 feet from the centerline of US 101	11:20-11:30	69	65	60	57	55	58
ST-2: ~520 feet from the centerline of Industrial Road	11:40-11:50	59	57	50	46	45	48
ST-3: ~65 feet from the centerline of Industrial Road	12:00-12:10	77	73	67	60	54	64
ST-4: ~30 feet from the centerline of Quarry Road	12:20-12:30	75	70	64	53	47	59
ST-5: ~75 feet from the centerline of Industrial Road	12:50-13:00	71	70	67	61	53	63
ST-6: ~60 feet from the centerline of Quarry Road	13:10-13:20	72	70	61	51	46	58

FIGURE 2 Aerial Image of the Project Site and Vicinity Showing Long- and Short-Term Measurement Locations



Source: Google Earth, 2024.

Existing and Future Noise Scenarios

SoundPLAN Version 8.2, a three-dimensional ray-tracing computer program, was used to develop the traffic noise contours calculated for the Existing 2023, the Existing (2023) with Plan (Build), Cumulative (2045) without Plan (No Build), and Cumulative (2045) with Plan (Build) scenarios along major roadways in the plan area. Calculations accounted for the source of noise (traffic), the frequency spectra of the noise source, traffic speeds, vehicle mix information and the topography of the area. In order to provide a credible worst-case assessment of existing and future traffic noise conditions throughout the plan area, the modeling did not incorporate existing buildings or barriers, including centerline K-rails on the expressway medians, into the calculations. The modeling also assumed a hard ground surface for the plan area since it consists of mostly paved roads and buildings and other features commonly found in built environments. The geometric data used to create the model assumed a relatively flat topography, as is the case in the Plan Area. Peak hour traffic data for each scenario was provided by the traffic consultants, and observed travel speeds were input into the model for local roadways. A truck mix of 1% to 2% was used along the local roadways.

Additionally, traffic along US 101 would also impact the Plan Area. According to the California Department of Transportation (Caltrans) website,[7] the most recent traffic volumes available are from 2022. A standard traffic volume increase of 1% to 2% each year and the peak hour project trips of 3,546 were used to estimate the Existing 2023, the Existing (2023) with Plan (Build), Cumulative (2045) without Plan (No Build), and Cumulative (2045) with Plan (Build) traffic volumes for the proposed project. The Caltrans website also includes truck mix data, which showed medium trucks to be 3% of the total traffic mix and heavy trucks to be 2% of the total traffic mix, was used in this analysis.

The Caltrain rail lines run parallel to Old County Road, and according to the current Caltrain schedule,[8] about 75 trains pass through San Carlos in a 24-hour period. This is expected to continue under future conditions, with and without the build. Additionally, the California High Speed Rail (HSR) system is expected to run from San Francisco to the Los Angeles basin by 2029. For the segment from San Francisco to San José, it is anticipated that Caltrain and HSP would share the existing Caltrain tracks, operating as a blended system. According to the EIR completed for the HSR project,[9] the corridor would add 122 to 176 revenue trains and 12 nonrevenue trains per day at the Area Plan. During the peak hour, up to 4 trains per direction would occur. Measured noise levels at LT-3 include noise from existing Caltrain rail activities, as well as the vehicular traffic noise along Old County Road. The Caltrain tracks were included in the SoundPLAN model using typical local conditions for the Existing 2023 and Existing (2023) with Plan (Build) scenarios. Additional HSR activity was added to the Cumulative (2045) without Plan (No Build) and Cumulative (2045) with Plan (Build) models.

All predicted noise levels were compared to measured noise levels for calibration purposes and adjustments were made, as necessary, to the model. Table 7 summarizes the existing and future

[7] https://dot.ca.gov/programs/traffic-operations/census

[8] https://www.caltrain.com/station/sancarlos?active_tab=route_explorer_tab&origin=7013

[9] California High Speed Rail Authority, "San Francisco to San Jose Project Section Draft Environmental Impact Report," September 2020.

L_{dn} noise levels at 75 feet from the centerline of the roadway. US 101 was modeled directionally, and the noise level was measured 75 feet from the centerline of the nearest through lane.

Figures 3 through 6 show the noise contours for the Existing 2023, Existing (2023) with Plan (Build), Cumulative (2045) without Plan (No Build), and Cumulative (2045) with Plan (Build) scenarios.

The San Francisco International Airport is a public-use airport located approximately 8 miles northwest of the Plan Area. According to the *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*,[10] the project site lies well outside the 65 dBA CNEL/L_{dn} noise contour. The San Carlos Airport is located east of the Plan Area, opposite the US 101/Holly Street interchange. As shown in Figure 7, the eastern corner of the Plan Area lies within the 60 dBA CNEL/L_{dn} noise contour, but the entire Plan Area lies outside the 65 dBA CNEL/L_{dn} noise contour.

PLAN CONSISTENCY ANALYSIS

The goal of the NEASP is to create a vision, policies, and standards to guide new development within the Plan area in a way that supports existing and new businesses, residents, and the overall community. The NEASP will manage and direct changes in development patterns within the Plan area and guide present and future land uses, zoning changes, economic development, urban design, infrastructure, transportation circulation management and mobility, service provision, and community benefits. The Plan anticipates new development and change over an approximate 20-year period, through 2045, and would allow for an increase of 1,890 residential units (no residential units exist within the Plan area currently), as well as an increase in net new square footage of existing non-residential land uses within the Plan area.

This section summarizes the analysis of the land use compatibility of the proposed development within the Plan Area with respect to the future noise environment. Recommendations are made to ensure that future developments within the Plan Area are not exposed to excessive noise levels.

[10] Ricondo & Associates, Inc. with Jacobs Consultancy and Clarion Associates, *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*, November 2012.

TABLE 7 Existing and Future Modeled Noise Levels Along Surrounding Roadways

Roadway	Segment	L_{dn} at 75 feet from the Roadway Centerline, dBA				Increase Over Existing, dBA L_{dn}			Increase of Cumulative Build Scenario Over Cumulative No Build Scenarios, dBA
		Existing (2023)	Existing (2023) with Plan (Build)	Cumulative (2045) without Plan (No Build)	Cumulative (2045) with Plan (Build)	Existing (2023) with Plan (Build)	Cumulative (2045) without Plan (No Build)	Cumulative (2045) with Plan (Build)	
Old County Road/ Caltrain tracks	West of Harbor Blvd.	66	67	68	69.1	1	2	**3**	**1**
	Harbor Blvd. to Quarry Rd.	67	68	69	70	1	2	**3**	**1**
	Quarry Rd. to Taylor Way	68	69	71	71	1	**3**	**3**	0
	Taylor Way to Holly St.	68	69	71	71	1	**3**	**3**	0
	East of Holly St.	67	68	70	70	1	**3**	**3**	0
Industrial Road	Harbor Blvd. to Quarry Rd.	69	70	70	71	1	1	2	1
	Quarry Rd. to Taylor Way	68	69	70	70	1	2	2	0
	Taylor Way to driveway	68	70	70	71	2	2	**3**	**1**
	Driveway to Holly St.	68	69	69	70	1	1	2	1
	East of Holly St.	69	69	71	71	0	2	2	0
Holly Street	North of US 101	67	68	68	68	1	1	1	0
	Industrial Rd. to Old County Rd.	65	66	67	67	1	1	2	1
	South of Old County Rd.	66	67	68	69	1	2	**3**	**1**
Taylor Way	Industrial Rd. to Old County Rd.	60	62	62	63	2	2	**3**	**1**

Roadway	Segment	L_{dn} at 75 feet from the Roadway Centerline, dBA				Increase Over Existing, dBA L_{dn}			Increase of Cumulative Build Scenario Over Cumulative No Build Scenarios, dBA
		Existing (2023)	Existing (2023) with Plan (Build)	Cumulative (2045) without Plan (No Build)	Cumulative (2045) with Plan (Build)	Existing (2023) with Plan (Build)	Cumulative (2045) without Plan (No Build)	Cumulative (2045) with Plan (Build)	
Quarry Road	Industrial Rd. to Old County Rd.	61	63	62	64	2	1	**3**	**2**
Harbor Boulevard	North of Industrial Rd.	71	72	73	74	1	2	**3**	**1**
	Industrial Rd. to Old County Rd.	66	68	67	68	2	1	2	1
US 101	North of Holly Street	82	82	84	84	1	2	2	0

FIGURE 3 **Noise Contours for the Existing 2023 Traffic Scenario**

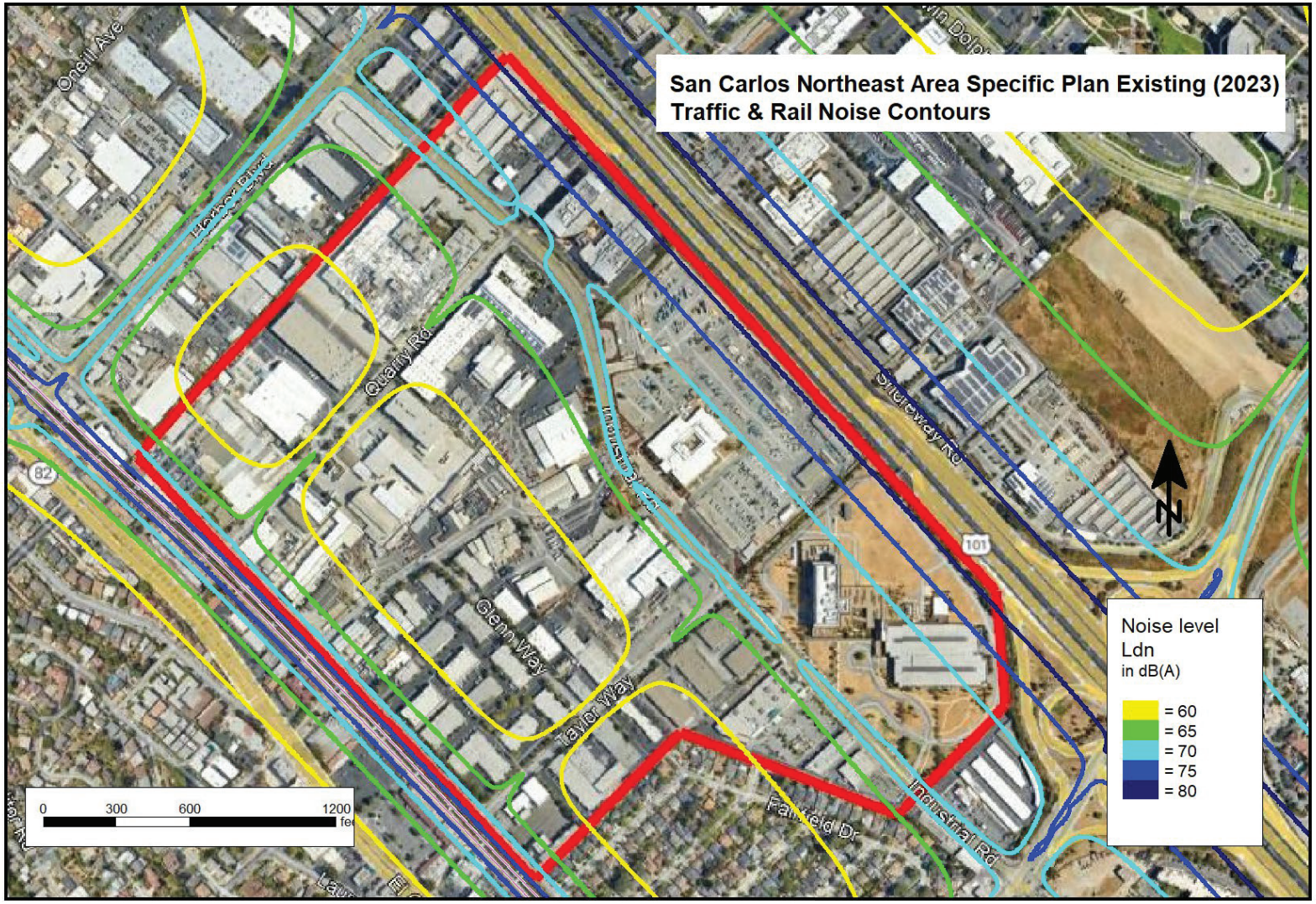


FIGURE 4 Noise Contours for the Existing (2023) With Plan (Build) Traffic Scenario

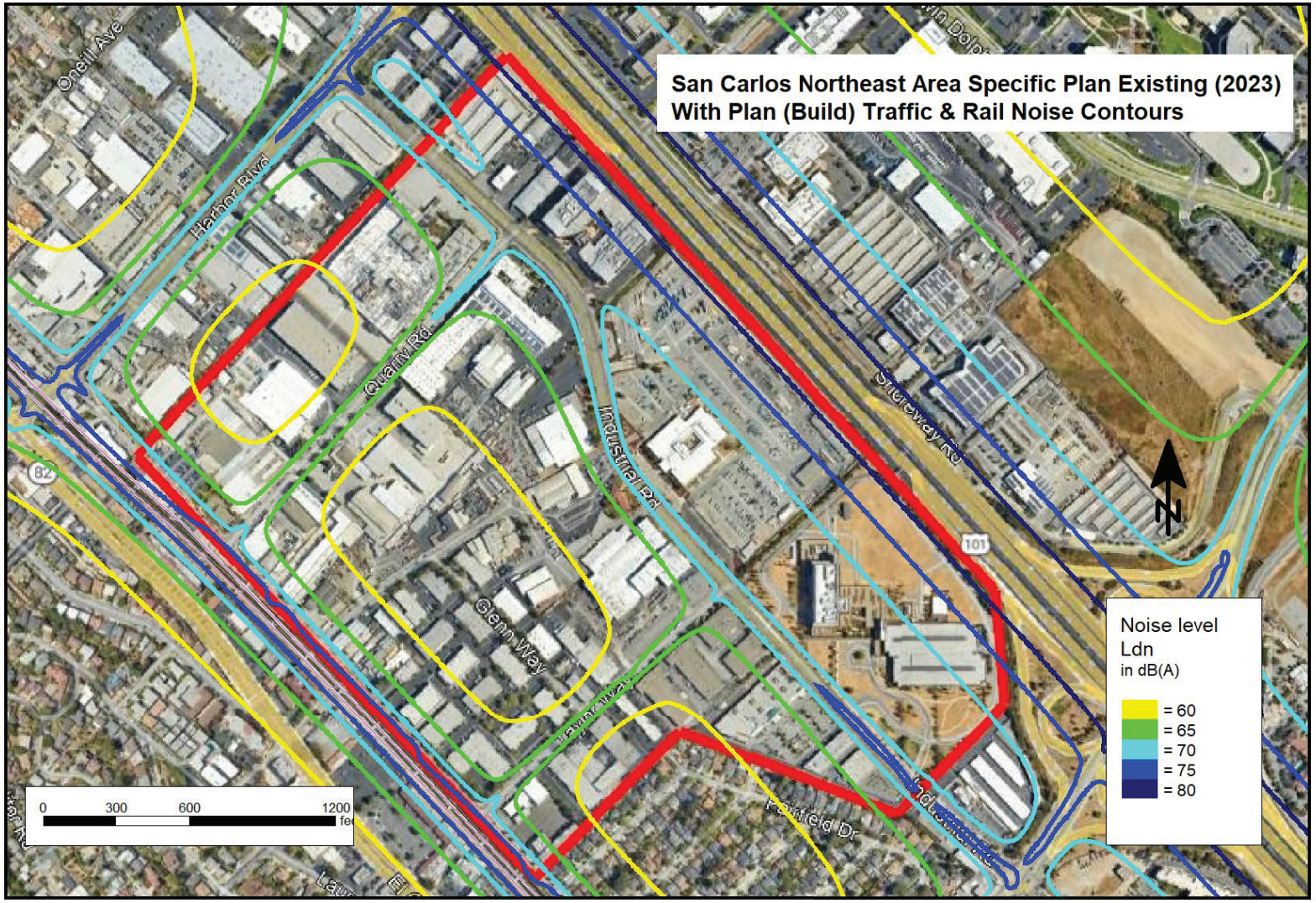


FIGURE 5 Noise Contours for the Cumulative (2045) Without Plan (No Build) Traffic Scenario

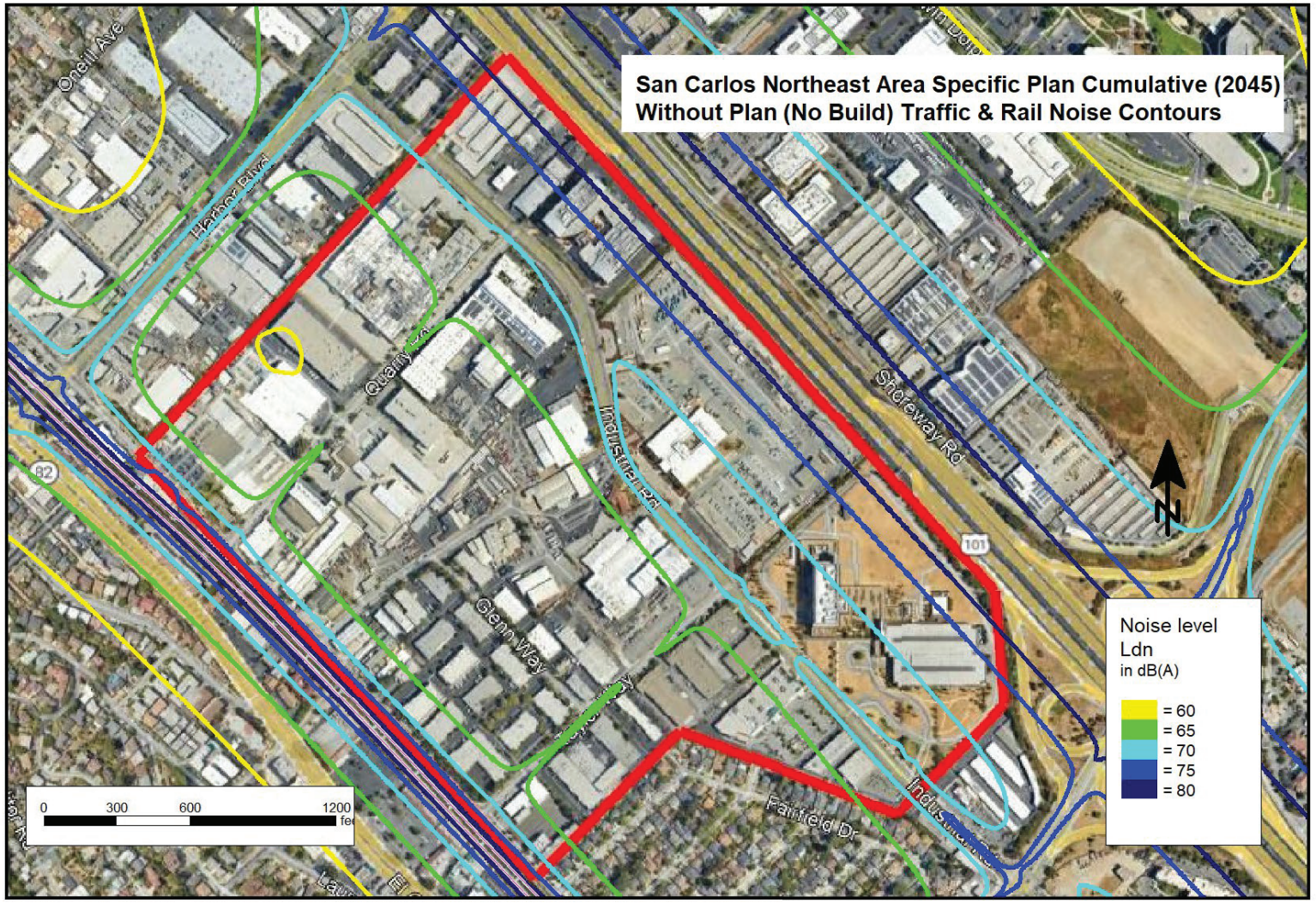


FIGURE 6 Noise Contours for the Cumulative (2045) With Plan (Build) Traffic Scenario

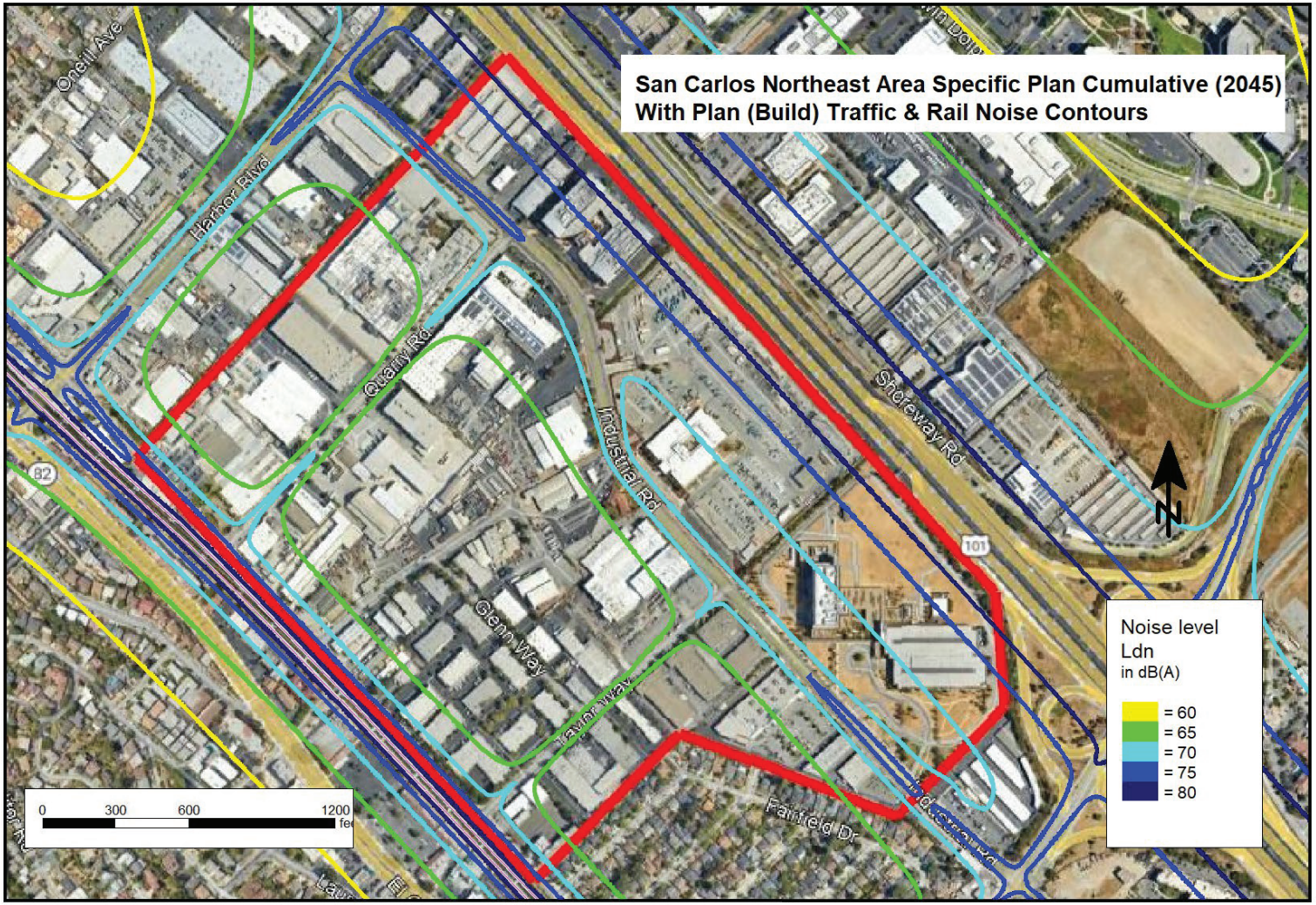
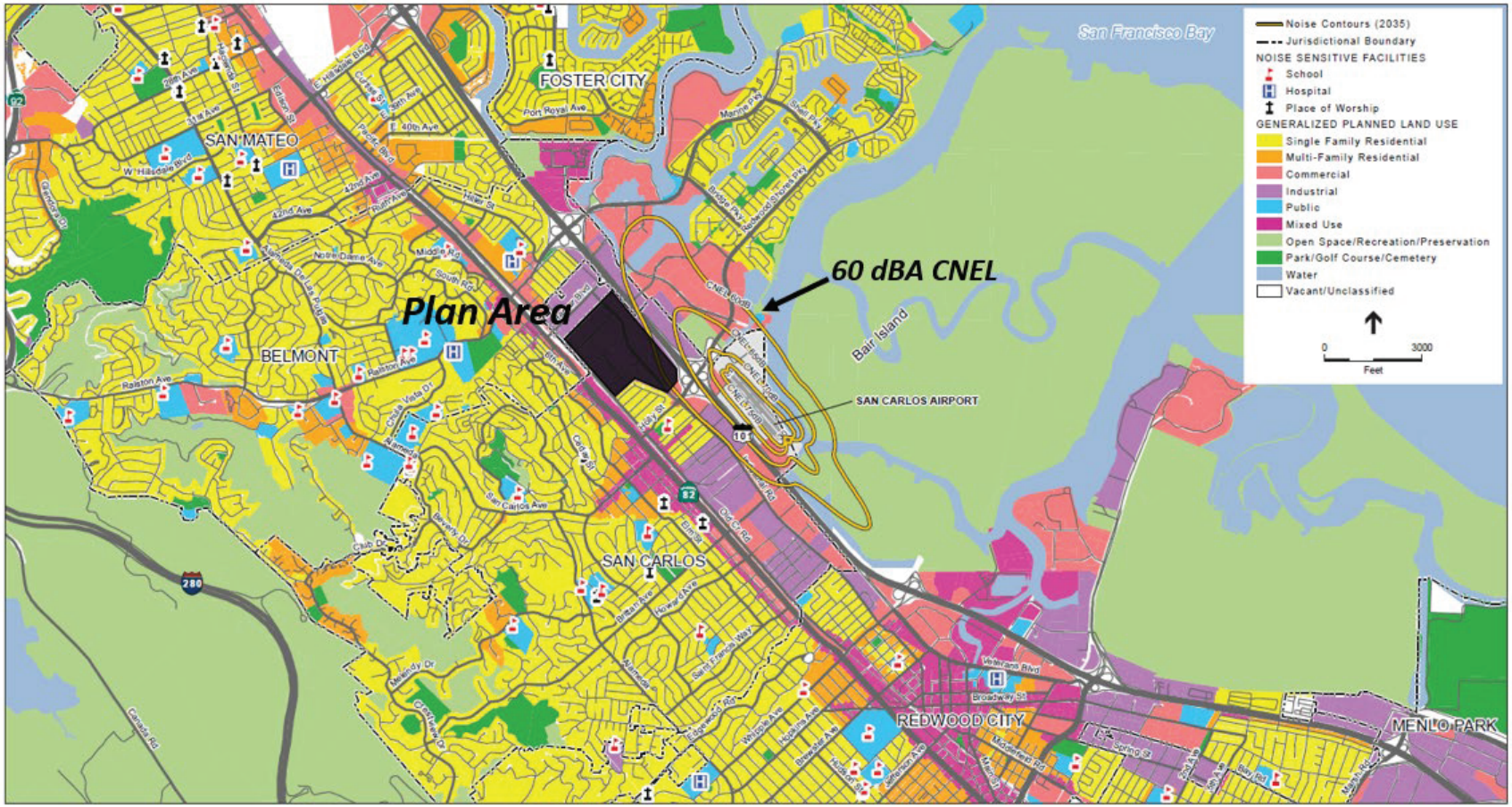


FIGURE 7 2035 Noise Contours for San Carlos Airport



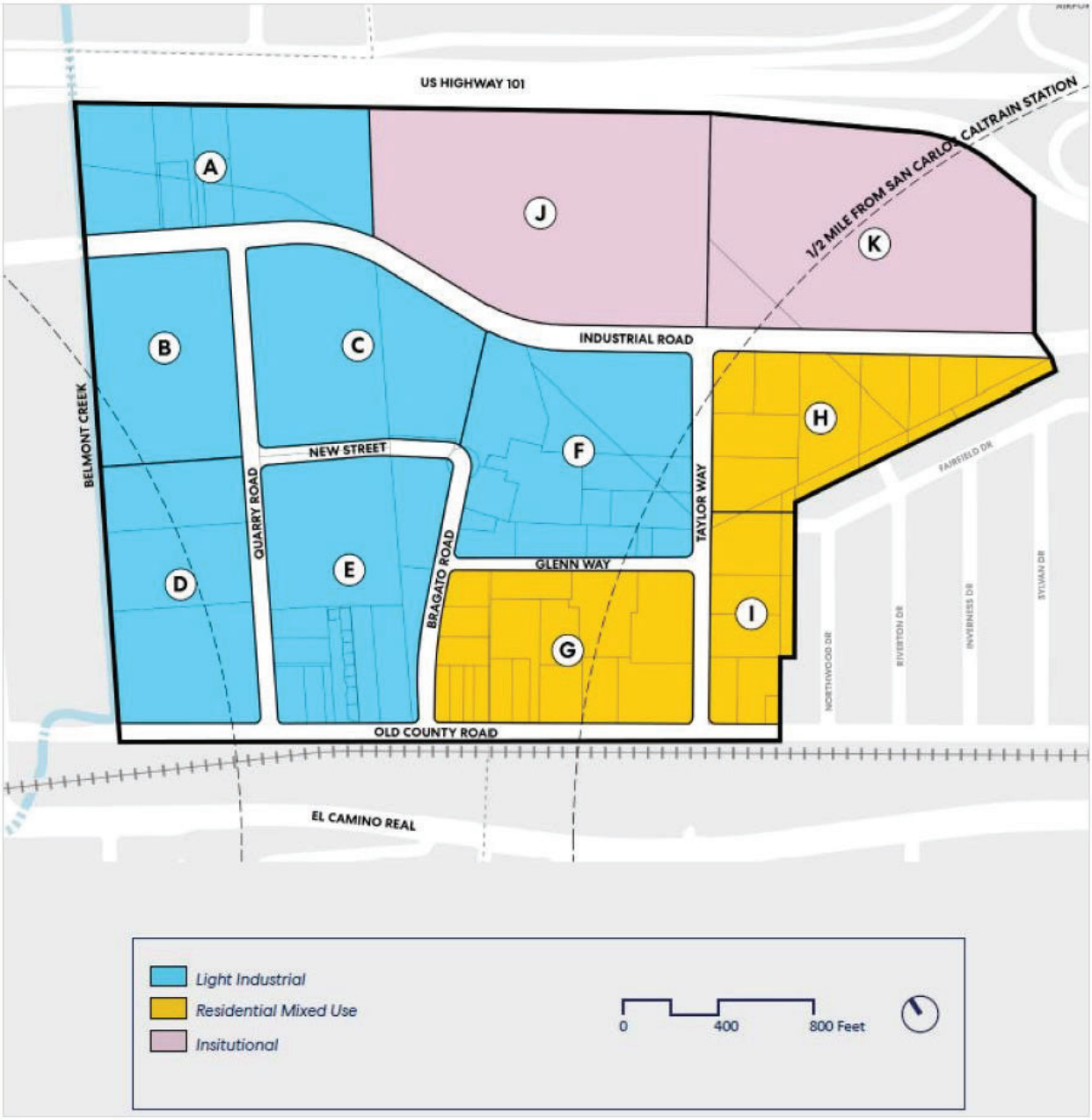
SOURCE: Belmont, 1982; San Mateo County, 1986; Foster City, 1993; Menlo Park, 1994; San Carlos, 2009; City of San Mateo, 2010; Redwood City, 2010; ESRI, 2014; ESA Airports, 2015

San Carlos Airport ALUCP . 130753

Exhibit 4-2

Future Conditions (2035) Aircraft Noise Contours

FIGURE 8 Map of Proposed Developments in the Plan Area



Noise and Land Use Compatibility

The City of San Carlos's 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 Carlos. Policy NOI-1.1 defines the noise level standards required for noise and land compatibility studies. The policy states the following:

> **Policy NOI-1.1.** Use the Noise and Land Compatibility Standards shown in Figure 9-1, the noise level performance standards in Table 9-1 and the projected future noise contours for

the General Plan shown in Figure 9-3 and detailed in Table 9-2, as a guide for future planning and development decisions.

Noise level thresholds included in Figure 9-1 and Policy NOI-1.5 requires future projects proposed within the Plan Area to meet the following noise levels:

- The City's acceptable exterior noise level standard is 60 dBA L_{dn} or less for proposed single-family residential uses.

- The City's acceptable exterior noise level standard is 65 dBA L_{dn} or less for proposed multi-family residential uses and hotels/motels.

- The City's acceptable exterior noise level standard is 70 dBA L_{dn} or less for proposed office buildings, business, commercial and professional uses.

- The City's acceptable interior noise level standard is 45 dBA L_{dn} or less for the proposed residential land uses and hotels/motels. Where new residential units (single- and multi-family) would be exposed to intermittent noise levels generated during train operations, maximum railroad noise levels inside homes shall not exceed 50 dBA in bedrooms or 55 dBA in other occupied spaces. These single event limits are only applicable where there are normally four or more train operations per day.

- 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.

Noise levels in the Plan Area were measured and calculated using SoundPLAN Version V8.2. The estimated noise level increases along each roadway segment are summarized in Table 7, and the cumulative plus project noise contours are shown in Figure 6.

Future Exterior Noise Environment

Specific locations for future development projects are unknown at this time. However, distances to the 60, 65, and 70 dBA L_{dn} thresholds for proposed uses, as summarized in Table 8, were estimated along each roadway segment based on the future exterior noise levels calculated using SoundPLAN Version V8.2.

Noise produced by vehicular traffic along roadways and trains in the vicinity of Plan Area could potentially expose the proposed land uses to levels exceeding the exterior compatibility thresholds. Future exterior noise levels at a distance of 75 feet from the centerline of the primary roadways within the Plan Area would typically range from 63 dBA L_{dn} along Taylor Way between Industrial Road and Old County Road to 76 dBA L_{dn} along Harbor Boulevard, south of Old County Road. Future exterior noise levels within 75 feet of the nearest through lane of U.S. Highway 101 would be 84 dBA L_{dn}. Table 8 summarizes the distances to the 60, 65, and 70 dBA L_{dn} noise contours along the roadways within the Plan Area.

Caltrain activity is not expected to change under future conditions. However, the California HSR system is expected to run up to 176 revenue trains and 12 nonrevenue trains per day at the Area Plan, with a peak hour of up to 4 trains per direction. The Cumulative (2045) Without Plan (No Build) and Cumulative (2045) With Plan (Build) scenarios both include noise levels due the future HSR. Since the train corridor runs parallel to Old County Road, the setbacks from the centerline of the roadway in Table 8 reflect the noise from the future rail, as well.

TABLE 8 Cumulative (2045) with Plan (Build) Noise Contour Distances within the Plan Area

Roadway	Segment	Distance from Centerline to Traffic Noise Contour, feet		
		70 dBA L_{dn}	65 dBA L_{dn}	60 dBA L_{dn}
Old County Road	West of Harbor Blvd.	65	185	555
	Harbor Blvd. to Quarry Rd.	85	245	735
	Quarry Rd. to Taylor Way	95	290	855
	Taylor Way to Holly St.	95	290	855
	East of Holly St.	80	235	705
Industrial Road	Harbor Blvd. to Quarry Rd.	95	280	840
	Quarry Rd. to Taylor Way	80	240	720
	Taylor Way to driveway	90	260	770
	Driveway to Holly St.	85	245	735
	East of Holly St.	90	270	805
Holly Street	North of US 101	55	160	475
	Industrial Rd. to Old County Rd.	< 50	130	380
	South of Old County Rd.	60	175	520
Taylor Way	Industrial Rd. to Old County Rd.	< 50	55	155
Quarry Road	Industrial Rd. to Old County Rd.	< 50	65	190
Harbor Boulevard	North of Industrial Rd.	165	485	1,450
	Industrial Rd. to Old County Rd.	55	155	465
US 101	North of Holly St.	1,655	4,945	2,350

Future Interior Noise Environment

Residential Uses

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Where exterior noise levels range from 60 to 65 dBA L_{dn}, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA L_{dn}, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade

facing the noise source, sound-rated windows and doors, sound-rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

The setback distances in Table 8 to meet the exterior noise limit of 60 dBA L_{dn} would also meet the interior noise limit of 45 dBA L_{dn}, assuming standard residential construction materials. Buildings within the setback distances to the 65 dBA L_{dn} contour would require adequate forced-air mechanical ventilation with standard construction materials to meet 45 dBA L_{dn} within residential units. At or within the 70 dBA L_{dn} contour distance, sound-rated construction materials would be required to meet the 45 dBA L_{dn} limit.

Commercial, Office, and Industrial Uses

Standard construction materials for commercial, office, and industrial 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 $L_{eq(1\text{-}hr)}$ at most commercial, office, and industrial uses.

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

Recommendations to Reduce Future Exterior and Interior Noise Levels

Incorporation of Policies NOI-1.4 and NOI-1.13 require noise studies for all projects where noise-sensitive land uses are proposed in areas exposed to exterior noise levels of 60 dBA L_{dn} or greater or are located within the 55 dBA CNEL/L_{dn} impact area of the San Carlos Airport. The policies state the following:

> **Policy NOI-1.4.** Require a detailed acoustic report in all cases where noise-sensitive land uses are proposed in areas exposed to exterior noise levels of 60 L_{dn} or greater. If recommended in the report, mitigation measures shall be required as conditions of project approval.
>
> **Policy NOI-1.13.** Require a noise analysis for new residential uses located within the 55 CNEL/L_{dn} impact area of the San Carlos Airport. If recommended in the report, mitigation measures shall be required as conditions of project approval.

When project-level development information, such as site plans, building elevations, floor plans, and the position of buildings and outdoor use areas within the Plan Area are known, site-specific project-level noise studies should be conducted to confirm the recommendations for exterior and interior noise reduction methods for both residential and nonresidential uses. An acoustical study shall be conducted when an application is received for a development project that could be exposed to noise greater than that deemed acceptable by the maximum noise levels specified by the City.

The study shall determine compliance with the noise and land use compatibility standards, identify potential noise impacts, and propose site-specific measures to reduce exposure to exterior and interior noise levels that exceed maximum permissible levels.

A project-specific acoustical analysis shall be prepared, in compliance with State Building Codes and City noise standards, to ensure that the design incorporates controls to reduce interior noise levels specified in Policy NOI-1.5. The policy states the following:

> **Policy NOI-1.5.** New development of noise-sensitive land uses proposed in noise-impacted areas shall incorporate effective mitigation measures into the project design to reduce exterior and interior noise levels to the following acceptable levels.
>
> a. For new single-family residential development, maintain a standard of 60 L_{dn} (day/night average noise level) for exterior noise in private use areas.
>
> b. For new multi-family residential development maintain a standard of 65 L_{dn} in community outdoor recreation areas. Noise standards are not applied to private decks and balconies and shall be considered on a case-by-case basis in the downtown core.
>
> c. Interior noise levels shall not exceed 45 L_{dn} in all new residential units (single- and multi-family). Development sites exposed to noise levels exceeding 60 L_{dn} shall be analyzed following protocols in Appendix Chapter 12, Section 1208, A, Sound Transmission Control, 2001 Building Code Chapter 12, Appendix 1207.11.2 of the 2007 California Building Coe (or the latest version).
>
> d. Where new residential units (single- and multi-family) would be exposed to intermittent noise levels generated during train operations, maximum railroad noise levels inside homes shall not exceed 50 dBA in bedrooms or 55 dBA in other occupied spaces. These single event limits are only applicable where there are normally four or more train operations per day.

The project applicant shall conform with any special building construction techniques requested by the City's Building Department, which may include sound-rated windows and doors, sound-rated wall constructions, and acoustical caulking.

The following general recommendations shall be considered to reduce exterior noise levels to meet the normally acceptable thresholds of 60 dBA L_{dn} at single-family residences and 65 dBA L_{dn} at multi-family residences and hotels/motels:

- When developing project site plans, locate noise-sensitive outdoor use areas away from major roadways or other significant sources of noise. Shield noise-sensitive spaces with buildings or noise barriers to reduce exterior noise levels. The final detailed design of the heights and limits of proposed noise barriers shall be completed at the time that the final site and grading plans are submitted.

If the 45 dBA L_{dn} or 50 dBA $L_{eq(1\text{-}hr)}$ thresholds would not be met or if maximum instantaneous noise levels generated by train activity near residential dwellings exceed 50 dBA L_{max} within bedrooms or exceed 55 dBA L_{max} within all other residential rooms, other site-specific measures, such as increasing setbacks of the buildings from the adjacent roadways, using shielding by other buildings or noise barriers to reduce noise levels, implementing additional sound treatments to the building design, etc. shall be considered to reduce interior noise levels to meet the State and City thresholds.

Train Vibration and Land Use Compatibility

The U.S. Department of Transportation, Federal Transit Administration's (FTA) vibration impact assessment criteria[11] are used by the City of San Carlos to evaluate the compatibility of proposed projects with vibration levels produced by heavy-rail and light-rail trains proposed within 100 feet of the centerline of the tracks, according to Policies NOI-1.7 and NOI-1.14 of the City's General Plan. The policies state the following:

> **Policy NOI-1.7.** The City shall seek to reduce impacts from groundborne vibration associated with rail operations by requiring that vibration-sensitive buildings (e.g. residences) are sited at least 100 feet from the centerline of the railroad tracks whenever feasible. The development of vibration-sensitive buildings within 100 feet from the centerline of the railroad tracks would require a study demonstrating that groundborne vibration issues associated with rail operations have been adequately addressed (i.e., through building siting, foundation design and construction techniques).
>
> **Policy NOI-1.14.** The Federal Transit Administration vibration impact criteria and assessment methods shall be used to evaluate the compatibility of train vibration with proposed land uses adjoining the UPRR (Caltrain) corridor. Site specific vibration studies shall be completed for vibration-sensitive uses proposed within 100 feet of active railroad tracks.

The FTA vibration impact criteria are based on maximum overall levels for a single event. The impact criteria for groundborne vibration are shown in Table 6. Note that there are criteria for frequent events (more than 70 events of the same source per day), occasional events (30 to 70 vibration events of the same source per day), and infrequent events (less than 30 vibration events of the same source per day).

Future Vibration Environment

Old County Road borders the Plan Area to the west, and the Caltrain tracks run parallel to Old County Road just outside the Plan Area boundary. The centerline of the nearest tracks would be approximately 60 to 135 feet from the Plan Area's western boundary.

[11]U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

Assuming existing rail activity plus additional HSR activity under future buildout conditions, more than 70 trains would pass through San Carlos in a 24-hour period. Therefore, the vibration level thresholds for train pass-bys would be 65 VdB for buildings where vibration would interfere with sensitive interior operations (e.g., research labs), 72 VdB for residential buildings, and 75 VdB for commercial, office, and institutional buildings.

While vibration measurements were not made within the Plan Area, vibration levels due to train pass-bys were measured for a nearby project.[12] At 90 to 100 feet, vibration levels were measured to be 65 to 71 VdB in this previous study. Using these source levels, minimum setback distances for residential and nonresidential buildings along the western boundary of the Plan Area are summarized in Table 9.

TABLE 9 Minimum Distances to the Vibration Thresholds for Proposed Buildings within the Plan Area

Roadway Segment	Distance from Edge of Nearest Tracks, feet		
	Buildings with Sensitive Interiors (65 VdB)	Residences (72 VdB)	Nonresidential (75 VdB)
Old County Road	335	75	40

Based on the setback distances presented in Table 9, project-specific vibration analyses shall be prepared for residential buildings proposed along Old County Road within 75 feet of the nearest Caltrain track and for buildings with interiors sensitive to vibration that are within 335 feet of the nearest Caltrain track. These studies should include vibration measurements at the project sites and comparisons of the measurements to the established FTA standards in order to verify vibration and land use compatibility.

All proposed offices, commercial buildings, and institutional buildings would be compatible with the future train vibration environment and would not require project-specific vibration analyses.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise 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;

[12] Illingworth & Rodkin, Inc., "789 Old County Road Noise Assessment," June 21, 2024.

(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 residential land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. With the incorporation of reasonable noise reduction measures, in accordance with Policy NOI-1.8 of the City's General Plan, temporary construction noise shall be reduced to a **less-than-significant** level.

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.

Chapter 9.30.070 of the City's Municipal Code limits construction activities to between 8:00 a.m. and 6:00 p.m. on weekdays and to between 9:00 a.m. and 5:00 p.m. on weekends. Construction activities are prohibited on the following holidays: New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, 4th of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day. Additionally, the Municipal Code requires all gasoline-powered construction equipment to be equipped with an operating muffler or baffling system as originally provided by the manufacturer, and no modification to these systems is permitted.

While the City of San Carlos 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*.[13] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be enforced at residential land uses, 85 dBA L_{eq} shall be enforced at commercial and office uses, and 90 dBA L_{eq} shall be enforced at industrial land uses.

Major noise-generating construction activities associated with Specific Plan would typically include removal of existing structures, site grading and excavation, installation of utilities, the construction of building foundations, cores, and shells, paving, and landscaping. Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. While specific project information is unknown at this time, the construction of building foundations for high-rise building may require impact or vibratory pile driving activities to support the structure, which would generate high noise levels. Site grading, excavation activities, the operation of heavy construction equipment, and the arrival/departure of heavy-duty trucks would also generate high noise levels, as these phases often require the

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

simultaneous use of multiple pieces of heavy equipment such as dozers, excavators, scrapers, and loaders.

Typical hourly average construction generated noise levels are about 81 to 88 dBA L_{eq}, measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by buildings or terrain often results in lower construction noise levels at distant receptors. Lower noise levels result from building construction activities when these activities move indoors, and less heavy equipment is required to complete the tasks. Typical construction noise levels at a distance of 50 feet are shown in Tables 10 and 11. Table 10 shows the average noise level ranges, by construction phase, and Table 11 shows the maximum noise level ranges for different construction equipment.

TABLE 10 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 11 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

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/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.

Temporary construction noises are disturbances that are necessary for the construction or repair of buildings and structures in urban and rural areas. Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction materials, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Limiting the hours when construction can occur to daytime hours is often a simple method to reduce the potential for noise impacts. In areas immediately adjacent to construction, controls such as constructing temporary noise barriers and utilizing "quiet" construction equipment can also reduce the potential for noise impacts.

Policy NOI-1.8 requires all phases of construction activity to utilize reasonable noise reduction measures to minimize the exposure of neighboring properties to excessive noise levels and comply with the City's noise ordinance. The policy states the following:

> **Policy NOI-1.8.** All construction activities shall comply with the City's noise ordinance. Development projects that require an acoustical study shall incorporate reasonable noise and vibration reduction measures and best management practices to minimize excessive noise levels during all phases of construction activity. Reduction measures and best management practices may include, but are not limited to, noise control techniques for construction tools and equipment, construction site management techniques, temporary noise barriers, noise monitoring and reporting, and/or construction traffic management.

The Municipal Code limits temporary construction work to between 8:00 a.m. and 5:00 p.m. on weekdays and between 9:00 a.m. and 5:00 p.m. on weekends. Construction activity is not permitted on following holidays: New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, Juneteenth, 4th of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day. Further, all gasoline-powered construction equipment shall be equipped with an operating muffler or baffling system as originally provided by the manufacturer, and no modification to these systems is permitted. In accordance with Policy NOI-1.8, reasonable noise reduction measures shall be incorporated into all projects within the Plan Area. Such measures shall include, but not be limited to, the following to reduce construction noise levels as low as practical:

- Limit construction activity to weekdays between 8:00 a.m. and 5:00 p.m. and weekends between 9:00 a.m. and 5:00 p.m., with no construction on the following holidays: New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, Juneteenth, 4th of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day;

- Utilize "quiet" models of air compressors and other stationary noise sources where such technology exists;

- Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment;

- Locate all stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from adjacent land uses;

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

- Prohibit all unnecessary idling of internal combustion engines;

- If impact pile driving is proposed, multiple-pile drivers shall be considered to expedite construction. Although noise levels generated by multiple pile drivers would be higher than the noise generated by a single pile driver, the total duration of pile driving activities would be reduced;

- If impact pile driving is proposed, temporary noise control blanket barriers shall shroud pile drivers or be erected in a manner to shield the adjacent land uses. Such noise control blanket barriers can be rented and quickly erected;

- If impact pile driving is proposed, foundation pile holes shall be pre-drilled to minimize the number of impacts required to seat the pile. Pre-drilling foundation pile holes is a standard construction noise control technique. Pre-drilling reduces the number of blows required to seat the pile. Notify all adjacent land uses of the construction schedule in writing;

- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem are implemented.

- Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction.

With the implementation of these measures to control noise during construction activities, in accordance with Policy NOI-1.8 of the General Plan and Municipal Code allowable construction hours, the temporary construction noise impact would be reduced to a less-than-significant level.

Mitigation Measure 1a: No further mitigation required.

Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards. The proposed project would potentially result in a substantial permanent noise level increase at existing noise-sensitive receptors in the project vicinity. Operational noise levels generated by the proposed project would potentially exceed Municipal Code thresholds. With the incorporation of measures to reduce operational noise levels and cumulative project noise level increases within the Plan Area, in accordance with the City's General Plan, the impact shall be reduced to a **less-than-significant** level.

For a substantial permanent cumulative noise increase to occur, two qualifications must be met: 1) if the Cumulative (2045) With Plan (Build) traffic volumes result in a noise level increase defined in Action NOI-1.4 of the City's General Plan; and 2) if the Cumulative (2045) With Plan (Build) traffic volumes result in a 1 dBA L_{dn} or more noise level increase compared to Cumulative (2045) Without Plan (No Build) conditions, which would be considered a cumulatively considerable contribution to the overall traffic noise increase. The action states the following:

> **Action NOI-1.4.** Require the evaluation of mitigation measures for projects that would cause the following criteria to be exceeded or would cause a significant adverse community response:

a. Cause the L_{dn} at noise-sensitive uses to increase by 3 dBA or more and exceed the "normally acceptable" level.

b. Cause the L_{dn} at noise-sensitive uses to increase by 5 dBA or more and remain "normally acceptable."

c. Cause noise levels to exceed the limits in Table 9-1.

According to Figure 9-1 of the City's General Plan, the "normally acceptable" threshold for single-family receptors is 60 dBA L_{dn} and for multi-family receptors is 65 dBA L_{dn}. Policy NOI-1.3 of the General Plan states the noise level standards that shall be used for defining noise impacts at noise-sensitive receptors. The policy states the following:

> **Policy NOI-1.3.** Limit noise impacts on noise-sensitive uses to noise level standards as indicated in Table 9-1.

Table 9-1 of General Plan and the Municipal Code provides exterior and interior daytime and nighttime L_{eq}/L_{50} and L_{max} thresholds for non-transportation sources. For residential, medical, and convalescent receptors, noise levels are limited to 55 and 45 dBA L_{eq}/L_{50} during daytime and nighttime hours, respectively, and to 70 and 60 dBA L_{max} during daytime and nighttime hours, respectively, at exterior property lines. Within residential interiors, noise levels are limited to 40 and 30 dBA L_{eq}/L_{50} during daytime and nighttime hours, respectively, and to 55 and 45 dBA L_{max} during daytime and nighttime hours, respectively. Within medical and convalescent interiors, noise levels are limited to 45 and 35 dBA L_{eq}/L_{50} during daytime and nighttime hours, respectively, and to 55 and 45 dBA L_{max} during daytime and nighttime hours, respectively.

For churches, meeting halls, schools, libraries, and museums, noise levels are limited to 55 dBA L_{eq}/L_{50} during daytime hours only at exterior property lines. Within church and meeting hall interiors, noise levels are limited to 40 dBA L_{eq}/L_{50} during daytime and nighttime hours and to 55 dBA L_{max} during daytime and nighttime hours. Within school, library, and museum interiors, noise levels are limited to 40 dBA L_{eq}/L_{50} and to 55 dBA L_{max} during daytime hours only. Additionally, theater and auditorium interiors limit interior noise levels to 35 dBA L_{eq}/L_{50} during daytime and nighttime hours and to 55 dBA L_{max} during daytime and nighttime hours.

The Municipal Code includes adjustments to these thresholds. If ambient noise levels are 10 dBA or more below the standards, the allowable noise standards shall be decreased by 5 dBA. If the noise source contains a steady audible tone or is a repetitive noise (e.g., hammering or riveting) or contains music or speech, the noise levels shall also be reduced by 5 dBA. The noise level thresholds would also be adjusted as follows:

- For noise produced for no more than a cumulative period of 15 minutes in any hour, the L_{eq}/L_{50} threshold shall be increased by 5 dBA;

- For noise produced for no more than a cumulative period of 5 minutes in any hour, the L_{eq}/L_{50} threshold shall be increased by 10 dBA;

- For noise produced for no more than a cumulative period of 1 minute in any hour, the L_{eq}/L_{50} threshold shall be increased by 15 dBA.

Policy NOI-1.2 defines the noise-sensitive receptors at which noise impacts shall be minimized. The policy states the following:

> **Policy NOI-1.2.** Minimize noise impacts on noise-sensitive land uses. Noise-sensitive land uses include residential uses, retirement homes, hotel/motels, schools, libraries, community centers, places of public assembly, daycare facilities, churches, and hospitals.

Project Traffic Increase

SoundPLAN Version 8.2 was used to calculate the traffic noise increase expected for the Cumulative (2045) Without Plan (No Build) scenario and for the Cumulative (2045) With Plan (Build) scenario using the traffic data supplied by *Nelson/Nygaard Consulting Associates*. All of the predicted noise levels and increases are summarized in Table 7. As indicated in Table 7, noise levels on several roadway segments in the Plan Area would increase by more than 3 dBA L_{dn} with the Cumulative (2045) With Plan (Build) scenario, when compared to the existing traffic conditions:

- Old County Road west of Harbor Boulevard;
- Old County Road between Harbor Boulevard and Quarry Road;
- Old County Road between Quarry Road and Taylor Way;
- Old County Road between Taylor Way and Holly Street;
- Old County Road east of Holly Street;
- Industrial Road between Taylor Way and driveway;
- Holly Street south of Old County Road;
- Taylor Way between Industrial Road and Old County Road;
- Quarry Road between Industrial Road and Old County Road; and

These increases are bolded in the second column from the right of Table 7 to denote their significance with respect to the City's General Plan requirements. Increased traffic on each of these segments result in a future noise level of 60 dBA L_{dn} or greater under the Cumulative (2045) With Plan (Build) conditions. Along Old County Road between Quarry Road and Taylor Way, between Taylor Way and Holly Street, and east of Holly Street, a 3 dBA L_{dn} increase was also calculated under the Cumulative (2045) Without Plan (No Build) scenario. As shown in the last column in Table 7, the increase attributable solely to the Specific Plan would be 0 dBA L_{dn}. Therefore, the

permanent noise level increase along these three segments would not result in a cumulatively considerable contribution to the overall traffic noise at receptors along these segments.

Along all other segments listed above, the permanent noise level increases would be 1 to 2 dBA L_{dn} higher than the increases calculated for the Cumulative (2045) Without Plan (No Build) scenario. While each of these segments would result in a cumulatively considerable contribution to the overall traffic noise at the existing receptors along these roadways, no existing noise-sensitive receptors (i.e., single- or multi-family residences, schools, hospitals, etc.) are located along Taylor Way, Quarry Road, or Harbor Boulevard. Therefore, these significant noise level increases result in a less-than-significant impact. The Palo Alto Medical Facilities (PAMF) is located along Industrial Road segment between Taylor Way and the driveway, and this would be considered a noise-sensitive receptor. However, this medical facility is located between Industrial Road and U.S. Highway 101, and the existing and future noise environment at the medical facility would be dominated by U.S. Highway 101, which is significantly louder than Industrial Road. Therefore, the traffic noise increase along Industrial Road would not be noticeable at the Palo Alto Medical Facilities (PAMF) compared to the noise level experienced by the adjoining U.S. Highway 101.

Additionally, a newly constructed residential building (Artisan Crossing completed in 2023) is located along Old County Road, west of Harbor Boulevard, and would be considered a sensitive receptor exposed to a potentially significant permanent noise level increase; however, new residential buildings are designed to meet the normally acceptable environmental noise conditions under future conditions, typically 20 years or more in the future. The Artisan Crossing building would include adequate noise attenuating features to reduce future exterior noise levels at common outdoor use areas to meet the City thresholds, as well as adequate STC-rated wall assemblies to ensure residential interiors are at or below 45 dBA L_{dn} under future conditions. These design features included in the Artisan Crossing apartment building are typically recommended mitigation measures to reduce a significant permanent noise level increase to a less-than-significant level. Incorporation of Policy NOI-1.9 would also minimize potential transportation-related noise. The policy states the following:

> **Policy NOI-1.9.** Minimize potential transportation-related noise through the use of setbacks, street circulation design, coordination of routing and other traffic control measures and the construction of noise barriers and consider use of "quiet" pavement surfaces when resurfacing roadways.

Incorporating mitigation measures provided in Action NOI-1.1 of the City's General Plan could be used to reduce significant cumulative traffic noise increases at existing sensitive land uses. This action states the following:

> **Action NOI-1.1.** Establish a noise abatement protocol for existing sensitive land uses located in areas anticipated to experience significant noise increases with the implementation of the General Plan. Cumulative traffic noise impacts on existing noise-sensitive uses could be reduced through the inclusion of exterior and/or interior sound-reduction measures, such as setbacks, noise barriers, forced-air mechanical ventilation and

sound-rated window construction. The City should research sources of funding for these actions.

Such measures include setbacks, noise barriers, forced-air mechanical ventilation and sound-rated window construction. Since the Artisan Crossing building already includes these measures as part of the building design, the permanent noise level increase would be considered a less-than-significant impact at this new sensitive receptor.

Table 8 above summarizes the noise contour distances to the 60, 65, and 70 dBA L_{dn} contours along each major roadway segment and the UPRR tracks within the Plan Area. This table can be used as a guide when refining the alignment of new roadways in order to avoid impacting existing sensitive receptors.

Operational Noise

Various mechanical equipment for heating, ventilation, and cooling purposes, exhaust fans, emergency generators, and other similar equipment could produce noise levels exceeding the maximum noise limits when located near existing or proposed residential land uses. Additionally, potential noise-generating sources, such as truck deliveries or other project-specific operational noise sources, may also be proposed at the project-level. The number of variables inherent in the mechanical equipment needs of an individual project (number and types of units, locations, size, housing, specs, etc.), as well as details pertaining to project-specific noise sources, are unavailable at this time. The impacts of operational noise sources on nearby noise-sensitive uses should be assessed during the final design stage of individual projects. Conservatively, this is considered a potentially significant impact.

For mixed-use development projects within the Plan Area, the incorporation of Policy NOI-1.10 would minimize potential operational noise. The policy states the following:

> **Policy NOI-1.10.** Ensure that mixed-use development projects are designed to minimize noise impacts on residential units.

Additionally, the incorporation of Policy NOI-1.6 would ensure noise level standards are met with the inclusion of mitigation measures. The policy states the following:

> **Policy NOI-1.6.** Where noise mitigation measures are required to achieve the noise level standards, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered after practical design-related noise mitigation measures have been integrated into the project.

Summary of Project-Generated Noise

The City of San Carlos General Plan and Municipal Code provides policies and thresholds to reduce operational and transportation noise at sensitive receptors. Chapter 18.21.050 of the Municipal Code regulates all operational noise and noise attenuation measures, including site planning and project design measures, to be incorporated into the project to reduce noise levels to

meet the above thresholds and interior levels of 45 dBA. Noise barriers shall be considered and may be required only after all feasible design-related noise measures have been incorporated into the project. Therefore, the following shall be incorporated into projects within the Plan Area, in accordance with Policies NOI-1.6 and NOI-1.10:

> New developments within the Plan Area would be required to comply with City noise standards set forth in the General Plan and Municipal Code. To ensure compliance with the operational noise level thresholds required in the General Plan Municipal Code, a qualified acoustical consultant will be retained to review mechanical equipment systems during final design of the proposed project consistent with standards City practice. The consultant shall review selected equipment and determine specific noise reduction measures necessary to reduce noise to comply with the City's noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and/or installation of noise barriers, such as enclosures and parapet walls, to block the line-of-sight between the noise source and the nearest receptors. Additionally, enclosures and interior wall treatments shall be considered to reduce noise exposure within the on-site units. Alternate measures may include locating equipment in less noise-sensitive areas, where feasible. The incorporation of the measures recommended by the acoustical consultant to ensure compliance with the City's requirements would reduce the impact to a less-than-significant level.

Action NOI-1.4 in the General Plan establishes thresholds for permanent noise level increases, and noise abatement protocol provided in Action NOI-1.1 would help reduce cumulative traffic noise increases generated by projects within the Plan Area. For all roadways resulting in a significant noise level increase where noise-sensitive receptors are located, the measures provided in Policy NOI-1.9 and Action NOI-1.1 would reduce the noise level increase to a less-than-significant level.

Mitigation Measure 1c: No further mitigation required.

Impact 2: Exposure to Excessive Groundborne Vibration due to Construction. Construction-related vibration levels resulting from activities within the Plan Area would potentially exceed the thresholds at existing conventional buildings. This is a **potentially 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. Detailed information regarding construction equipment and phasing are not available at this time. Therefore, impact or vibratory pile driving activities, which can cause excessive vibration, may be required for the projects within the Plan Area.

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, which typically consist of buildings constructed since the 1990s. Conservative vibration limits of 0.25 to 0.3 in/sec PPV has been used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 4 above for further explanation). For buildings that are documented to be structurally weakened, a cautious limit of 0.08 in/sec PPV is often used to

provide the highest level of protection. No historical buildings or buildings that are documented to be structurally weakened adjoin the Plan Area. For the purposes of this study, groundborne vibration levels exceeding the conservative 0.3 in/sec PPV limit for conventional buildings would have the potential to result in a significant vibration impact.

Table 12 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet, as well as distances to the 0.08 in/sec and 0.3 in/sec PPV thresholds. 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.

Pile driving has the potential of generating the highest ground vibration levels and is of primary concern to architectural damage, particularly when it occurs within 100 to 200 feet of structures. Vibration levels generated by pile driving activities would vary depending on project conditions, such as soil conditions, construction methods, and equipment used, but could exceed the recommended PPV thresholds to avoid architectural damage. Other project construction activities, such as caisson drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may also potentially generate substantial vibration in the immediate vicinity.

Depending on the proximity of existing structures to each construction site, the structural soundness of the existing buildings, and the methods of construction used, vibration levels may be high enough to damage existing structures. Given the scope of the proposed project and the location of Plan Area with respect to existing structures in the immediate vicinity (i.e., within 200 feet), groundborne vibration impacts would be potentially significant.

As with any type of construction, vibration levels may at times be perceptible. However, construction phases that have the highest potential of producing vibration (pile driving and use of jackhammers and other high-power tools) would be intermittent and would only occur for short periods of time for any individual project site. 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 to hours with least potential to affect nearby businesses, perceptible vibration can be kept to a minimum and as such would not result in a significant impact with respect to perception.

TABLE 12 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 0.3 in/sec PPV (feet)
Pile Driver (Impact)	upper range	1.158	271	86
	typical	0.644	160	51
Pile Driver (Sonic)	upper range	0.734	180	57
	typical	0.170	48	15
Clam shovel drop		0.202	56	18
Hydromill (slurry wall)	in soil	0.008	3	1
	in rock	0.017	6	2
Vibratory Roller		0.210	58	19
Hoe Ram		0.089	27	9
Large bulldozer		0.089	27	9
Caisson drilling		0.089	27	9
Loaded trucks		0.076	23	8
Jackhammer		0.035	12	4
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, modified by Illingworth & Rodkin, Inc. January 2025.

Mitigation Measure 2:

For projects proposing construction equipment within the Table 12 screening distances of vibration-sensitive receptors, a construction vibration control plan shall be prepared by a qualified professional in accordance with industry-accepted methodology. The plan shall identify necessary construction vibration controls to reduce the potential of cosmetic damage to buildings and to minimize annoyance. Controls may include, but would not be limited to, the following measures:

- Comply with the construction noise ordinance to limit hours of exposure. The City's Municipal Code allows construction activities between the hours 8:00 a.m. and 6:00 p.m. on weekdays and between 9:00 a.m. and 5:00 p.m. on weekends. Construction activity is not permitted on the following holidays: New Year's Day, Martin Luther King Jr. Day, President's Day, Memorial Day, 4th of July, Labor Day, Veteran's Day, Thanksgiving Day and Christmas Day.

- A list of all heavy construction equipment to be used for the project known to produce high vibration levels (tracked vehicles, vibratory compaction, jackhammers, hoe rams, etc.) shall be submitted to the City by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort for reducing vibration levels below the thresholds.

- Place operating equipment on the construction site a far as possible from vibration-sensitive receptors.

- Use smaller equipment along project boundaries to minimize vibration levels below the limits.
- Avoid using vibratory rollers and tampers near sensitive areas.
- Select demolition methods not involving impact tools.
- Modify/design or identify alternative construction methods to reduce vibration levels below the limits.
- Avoid dropping heavy objects or materials near sensitive uses.
- For projects requiring impact or vibratory pile driving, develop a vibration monitoring and construction contingency plan to identify structures where monitoring would be conducted, set up a vibration monitoring schedule, define structure-specific vibration limits, and address the need to conduct photo, elevation, and crack surveys to document before and after construction conditions. Construction contingencies shall be identified for when vibration levels approached the limits. Conduct a post-construction survey on structures where either monitoring has indicated high vibration levels or complaints of damage has been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities.

The implementation of a construction vibration control plan would reduce construction vibration levels for projects in the Plan Area to a less-than-significant level.

Impact 3: **Excessive Aircraft Noise.** The project would not expose people working in the project area to excessive aircraft noise levels. **This is a less-than-significant impact.**

The San Carlos Airport is located approximately 0.2 mile southeast of the Plan Area. As shown in Figure 7, the eastern portion of the Plan Area lies along the 60 dBA CNEL noise contour. The City's General Plan includes the following policies regarding noise from San Carlos Airport:

> **Policy NOI-1.11.** Ensure that proposed noise sensitive land uses include appropriate mitigation to reduce noise impacts from aircraft operations at San Carlos Airport. Work with the San Carlos Airport Pilots Association and San Mateo County to continue to refine and implement the Airport's noise abatement procedures.
>
> **Policy NOI-1.12.** Ensure consistency with the noise compatibility policies and criteria contained in the San Carlos Airport Land Use Plan.
>
> **Policy NOI-1.13.** Require a noise analysis for new residential uses located within the 55 CNEL impact area of the San Carlos Airport. If recommended in the report, mitigation measures shall be required as conditions of project approval.

As shown in Figure 8, residential mixed-use developments are proposed in the southwestern part of the Area Plan, with the nearest potential residences located west of Industrial Road and south

of Taylor Way. While the 2035 Noise Contours for the San Carlos Airport (shown in Figure 7) does not include the 55 dBA CNEL contour line, these proposed residential uses could potentially fall within the 55 dBA CNEL impact area of the San Carlos Airport. In accordance with these General Plan policies, this would require a noise analysis.

When project-level development information, such as site plans, building elevations, floor plans, and the position of buildings and outdoor use areas within the Plan Area are known, site-specific project-level noise studies should be conducted to confirm the recommendations for exterior and interior noise reduction methods for residential uses proposed between Glenn Way and Industrial Road, which could potentially fall within the 55 dBA CNEL impact area of San Carlos Airport, in accordance with the General Plan policies. The study shall determine compliance with the noise and land use compatibility standards for the City of San Carlos and included in the San Carlos Airport Land Use Plan, identify potential noise impacts, and propose site-specific measures to reduce exposure to exterior and interior noise levels that exceed maximum permissible levels.

Exterior and interior noise levels resulting from aircraft associated with San Carlos Airport would be compatible with the proposed project, assuming the incorporation of noise-reducing measures, in accordance with the General Plan policies. Other airports in the vicinity of the project site include the Moffett Federal Airfield (12 miles southeast), Norman Y. Mineta San José International Airport (19 miles southeast), and San Francisco International Airport (8 miles northwest). The project site lies outside the areas of influence for each of the airports, and the noise environment at the site would not substantially increase due to aircraft noise from these airports.

Mitigation Measure 3: **No further mitigation required.**

Appendix A

FIGURE A1 Daily Trend in Noise Levels at LT-1, Wednesday, January 25, 2023

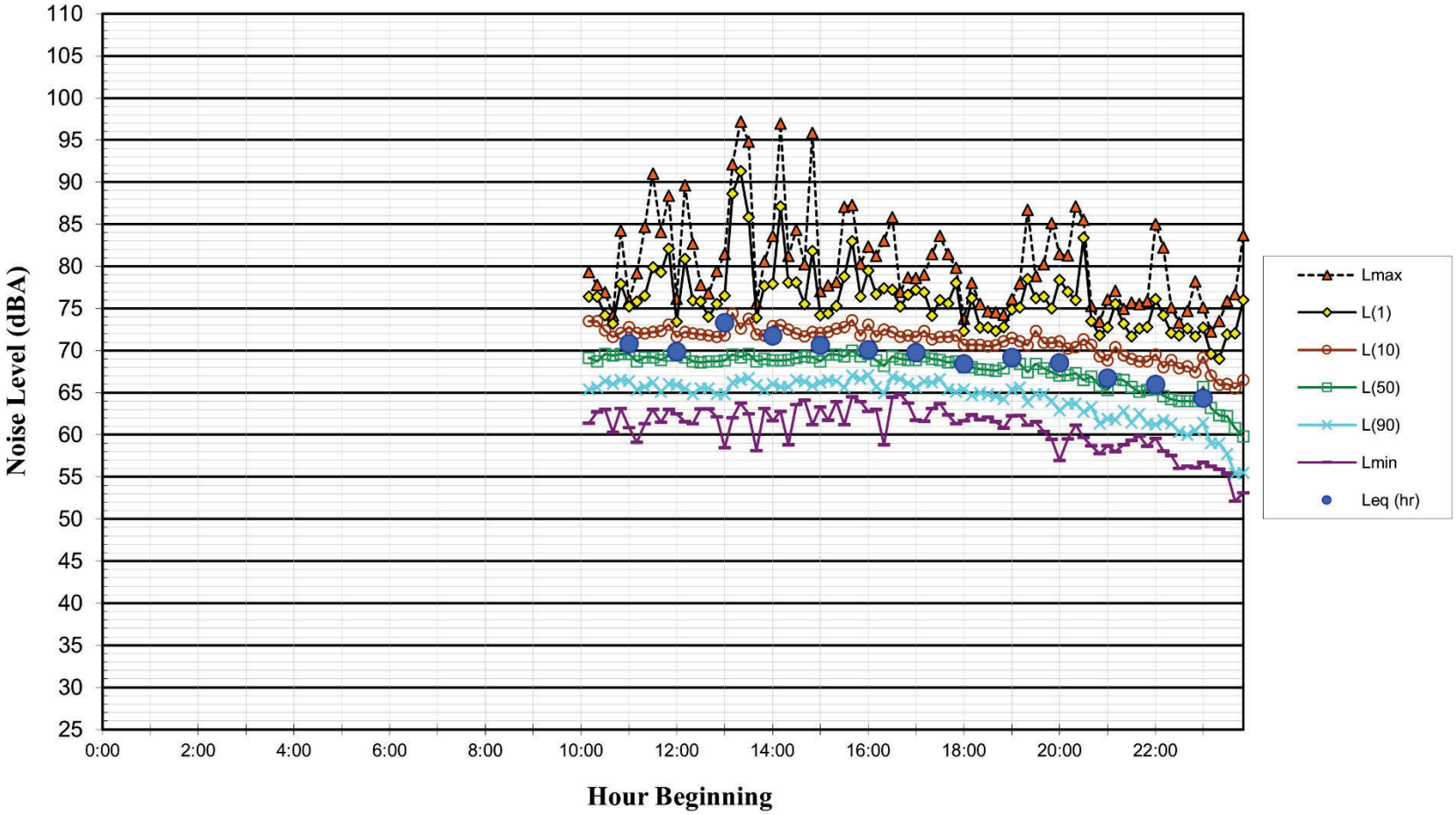


FIGURE A2 Daily Trend in Noise Levels at LT-1, Thursday, January 26, 2023

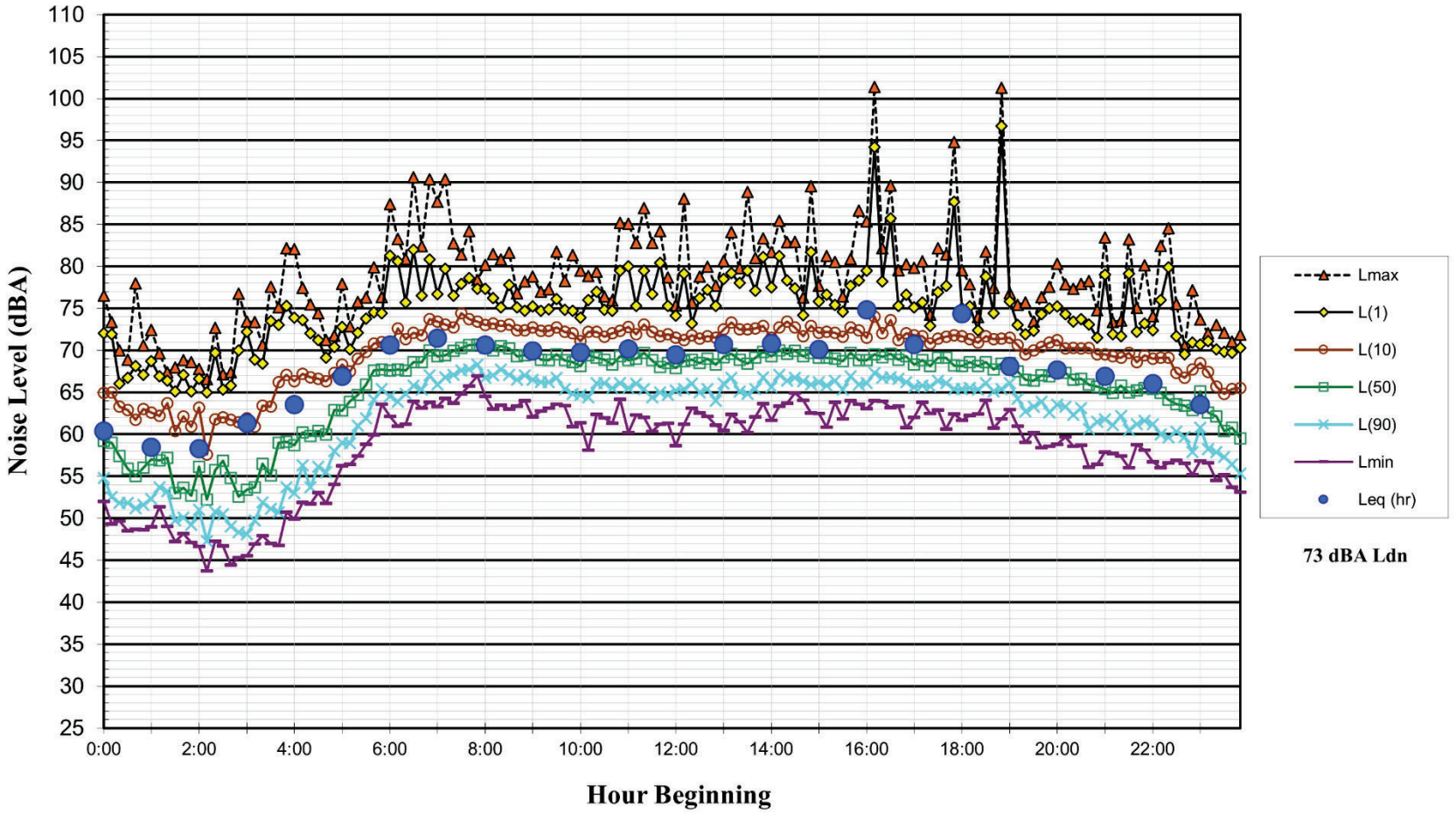


FIGURE A3 Daily Trend in Noise Levels at LT-1, Friday, January 27, 2023

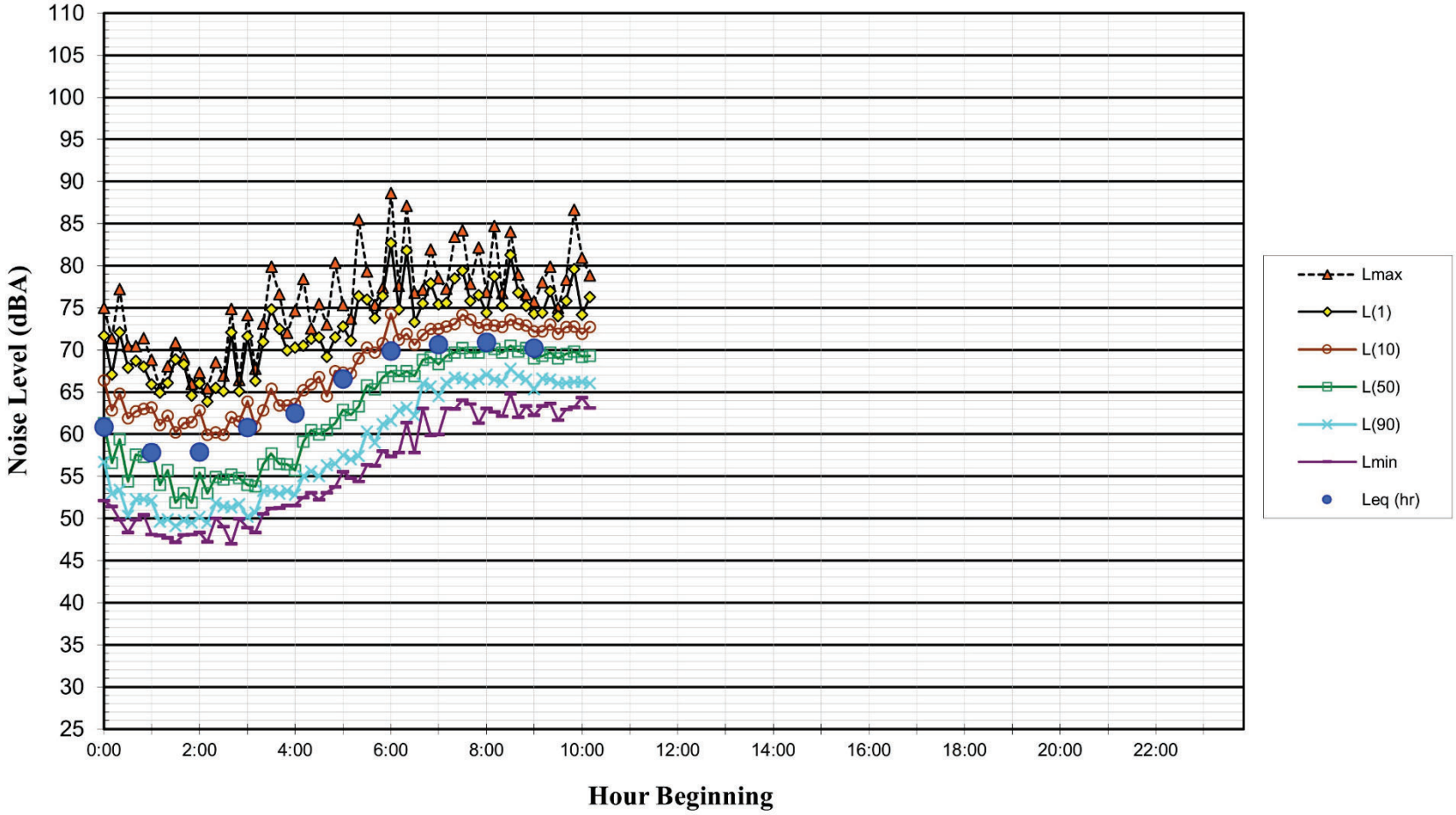


FIGURE A4 Daily Trend in Noise Levels at LT-2, Wednesday, January 25, 2023

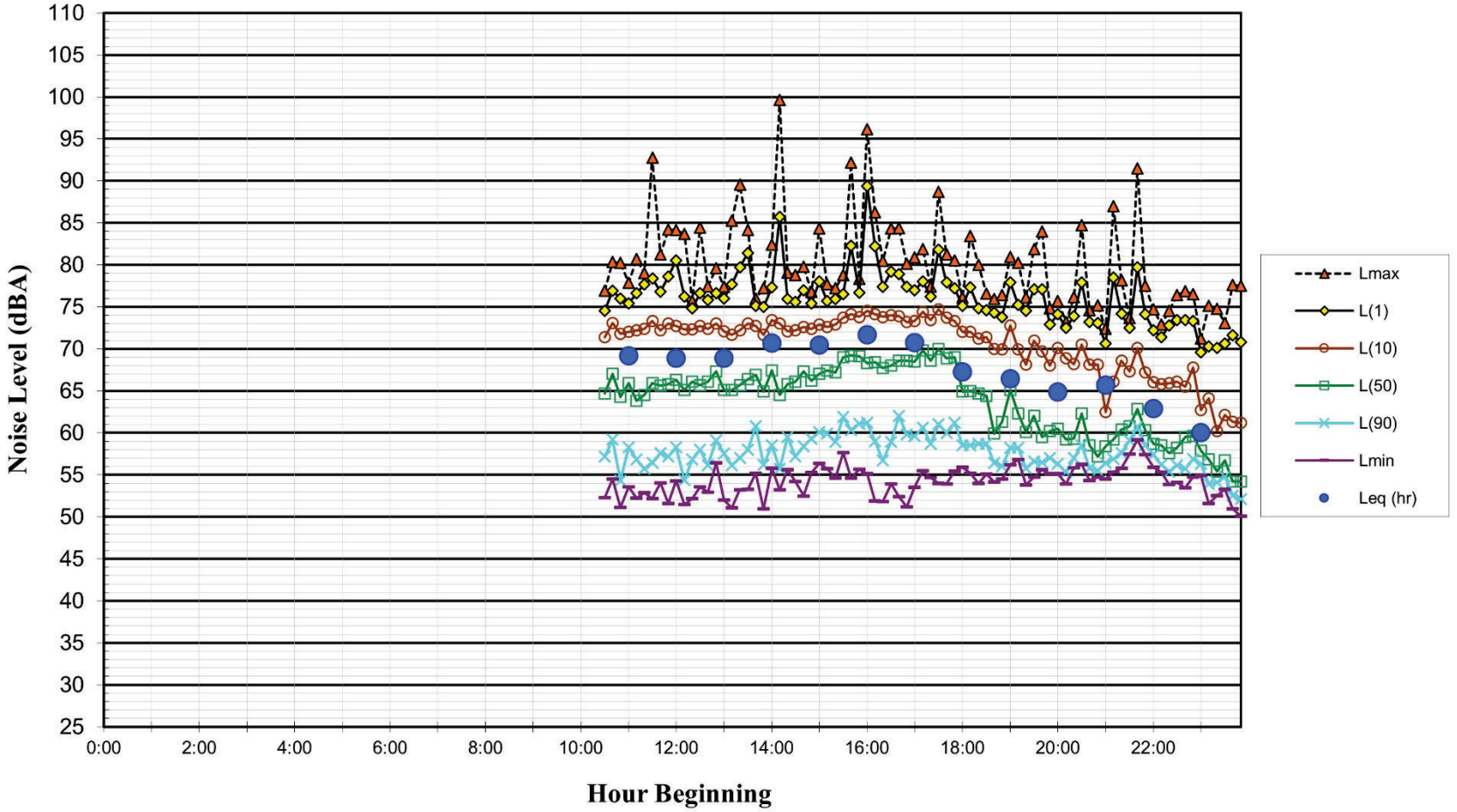


FIGURE A5 Daily Trend in Noise Levels at LT-2, Thursday, January 26, 2023

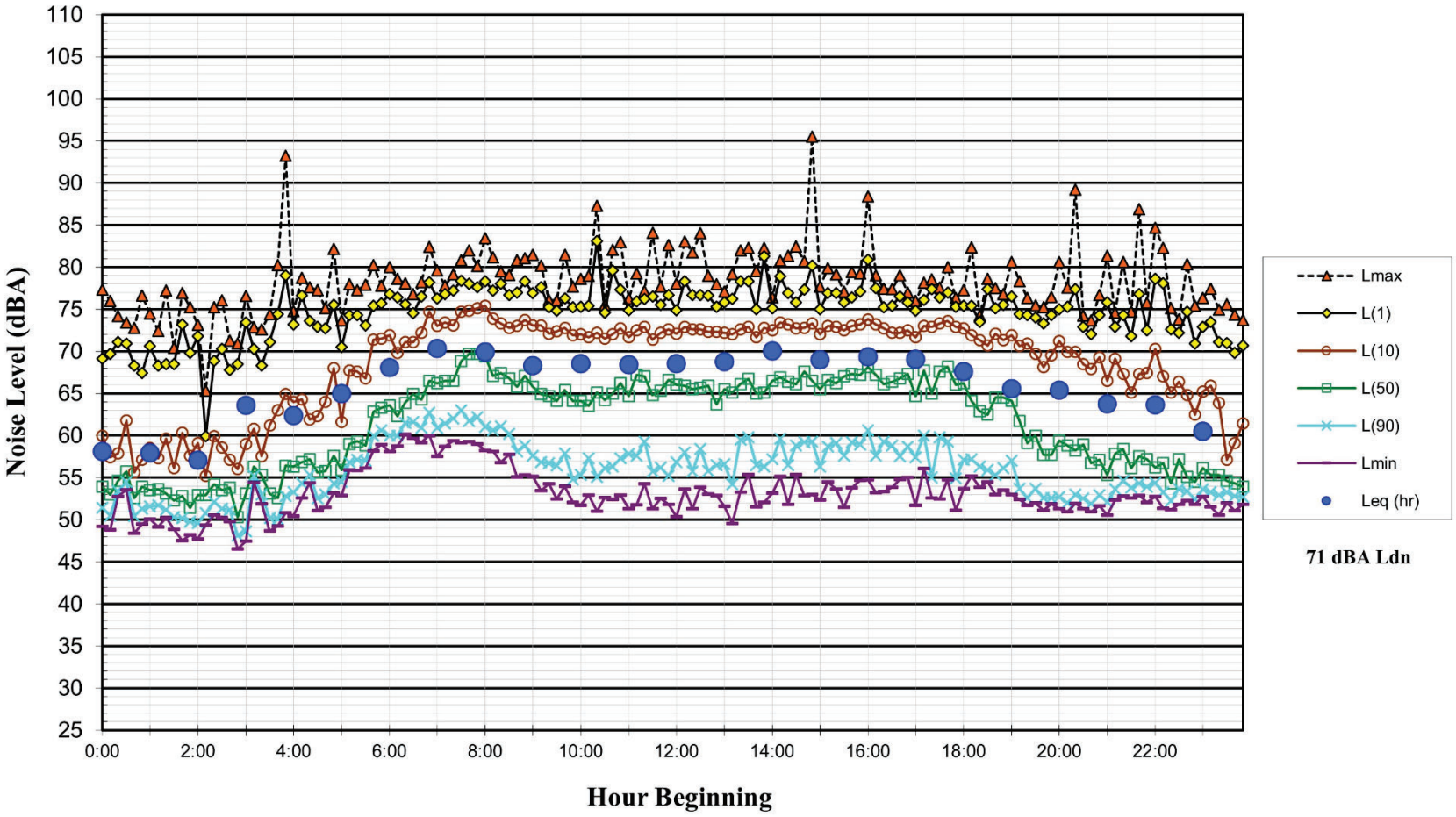


FIGURE A6 Daily Trend in Noise Levels at LT-2, Friday, January 27, 2023

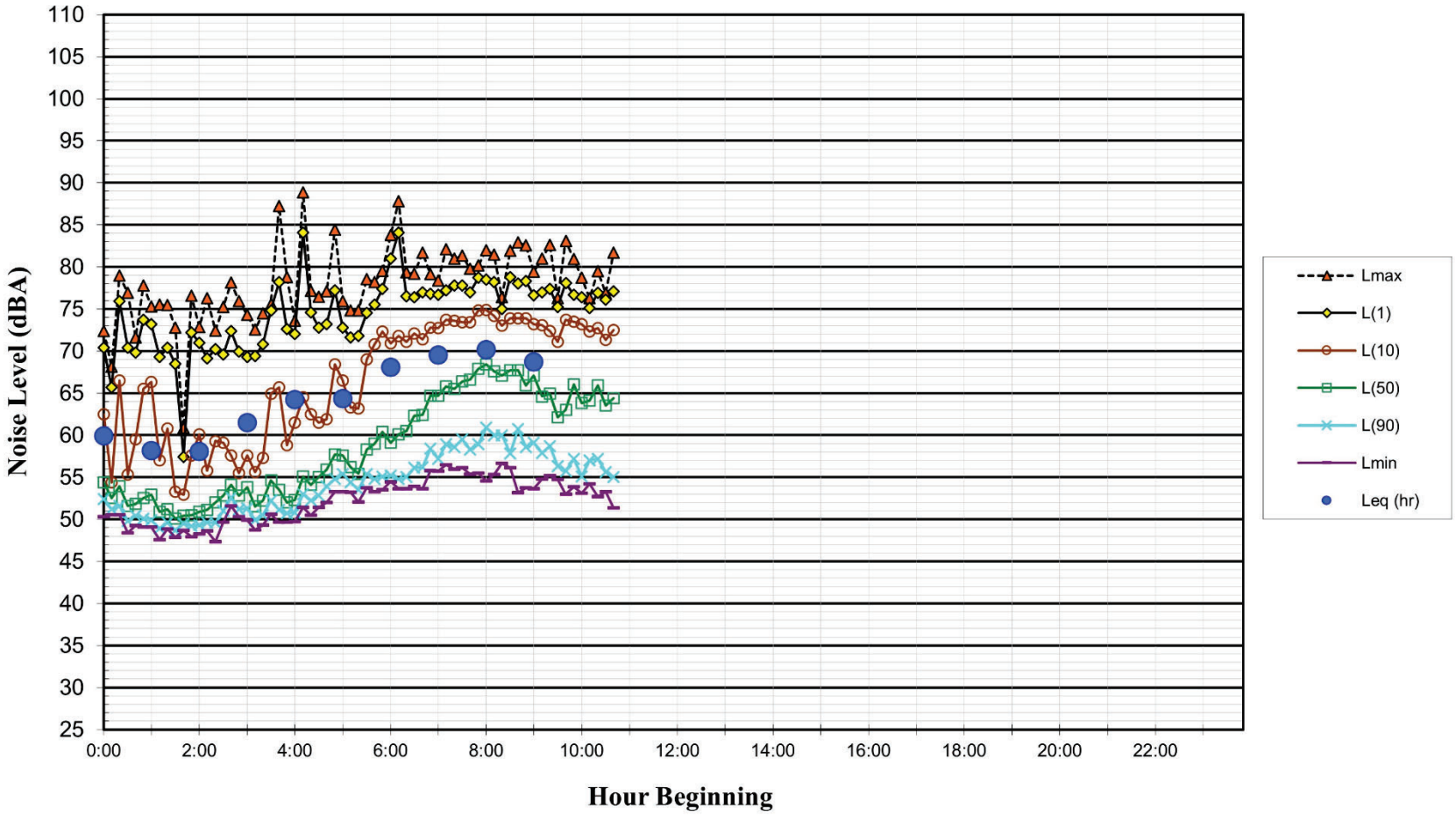


FIGURE A7 Daily Trend in Noise Levels at LT-3, Wednesday, January 25, 2023

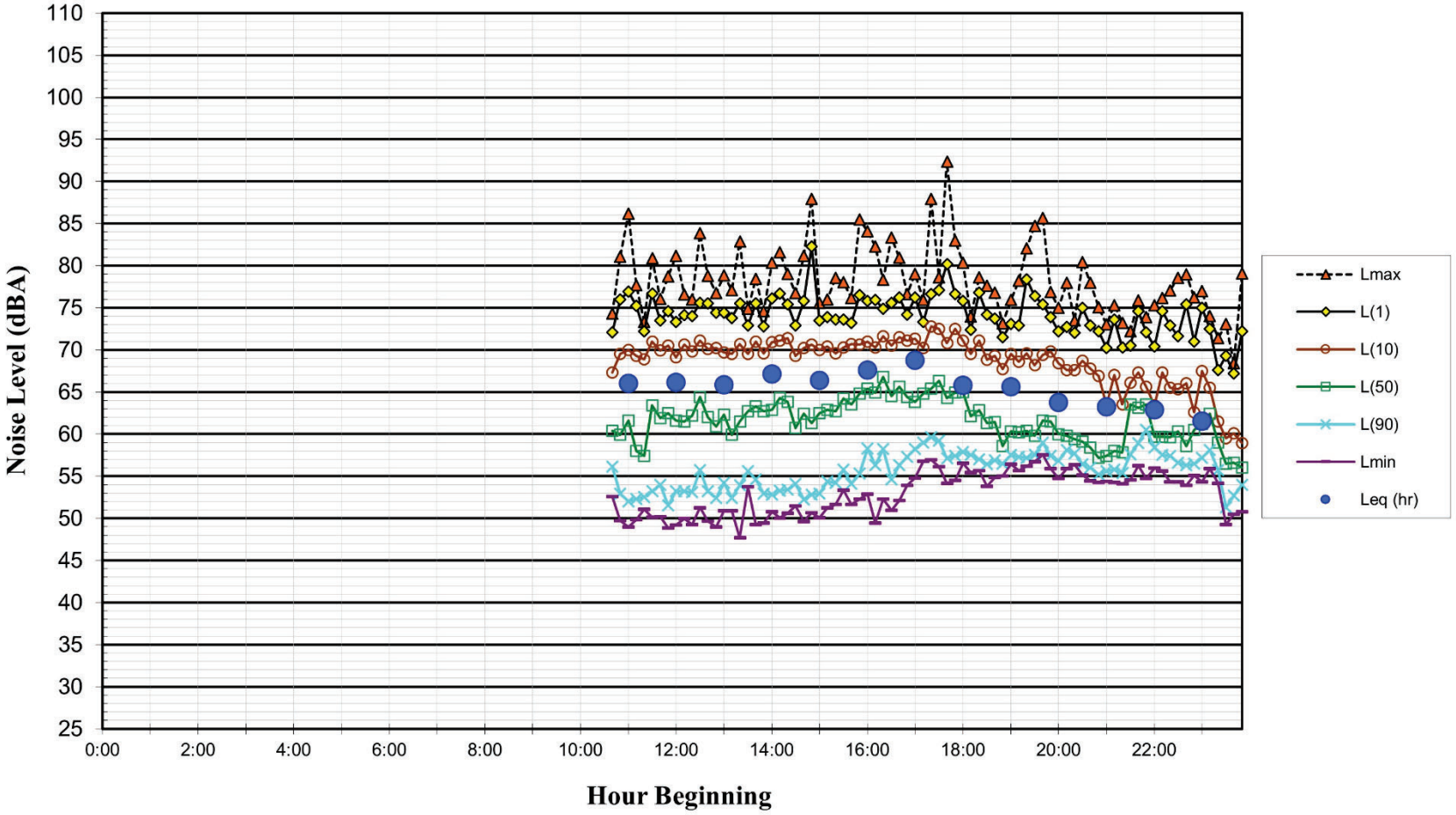


FIGURE A8 Daily Trend in Noise Levels at LT-3, Thursday, January 26, 2023

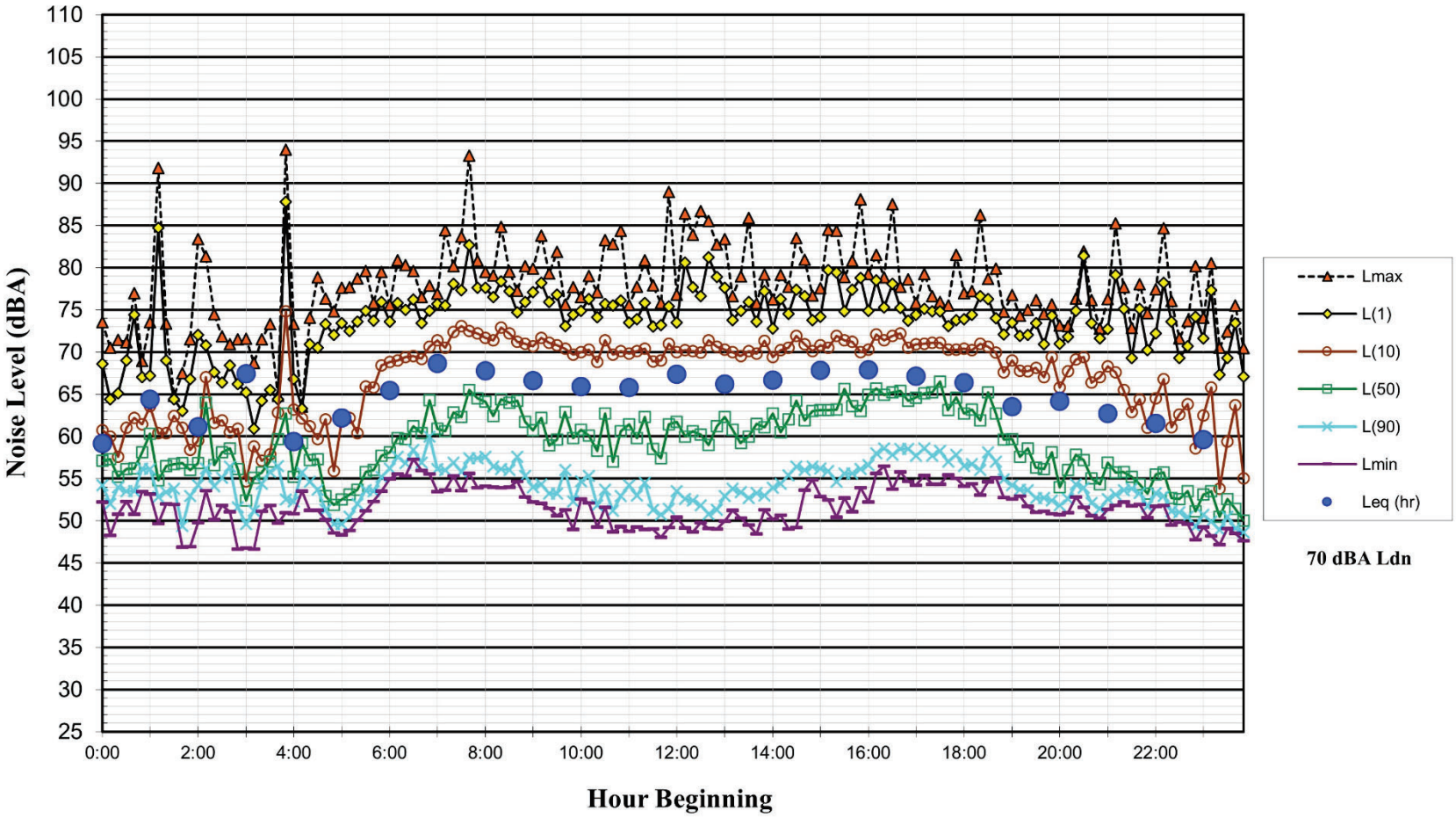


FIGURE A9 Daily Trend in Noise Levels at LT-3, Friday, January 27, 2023

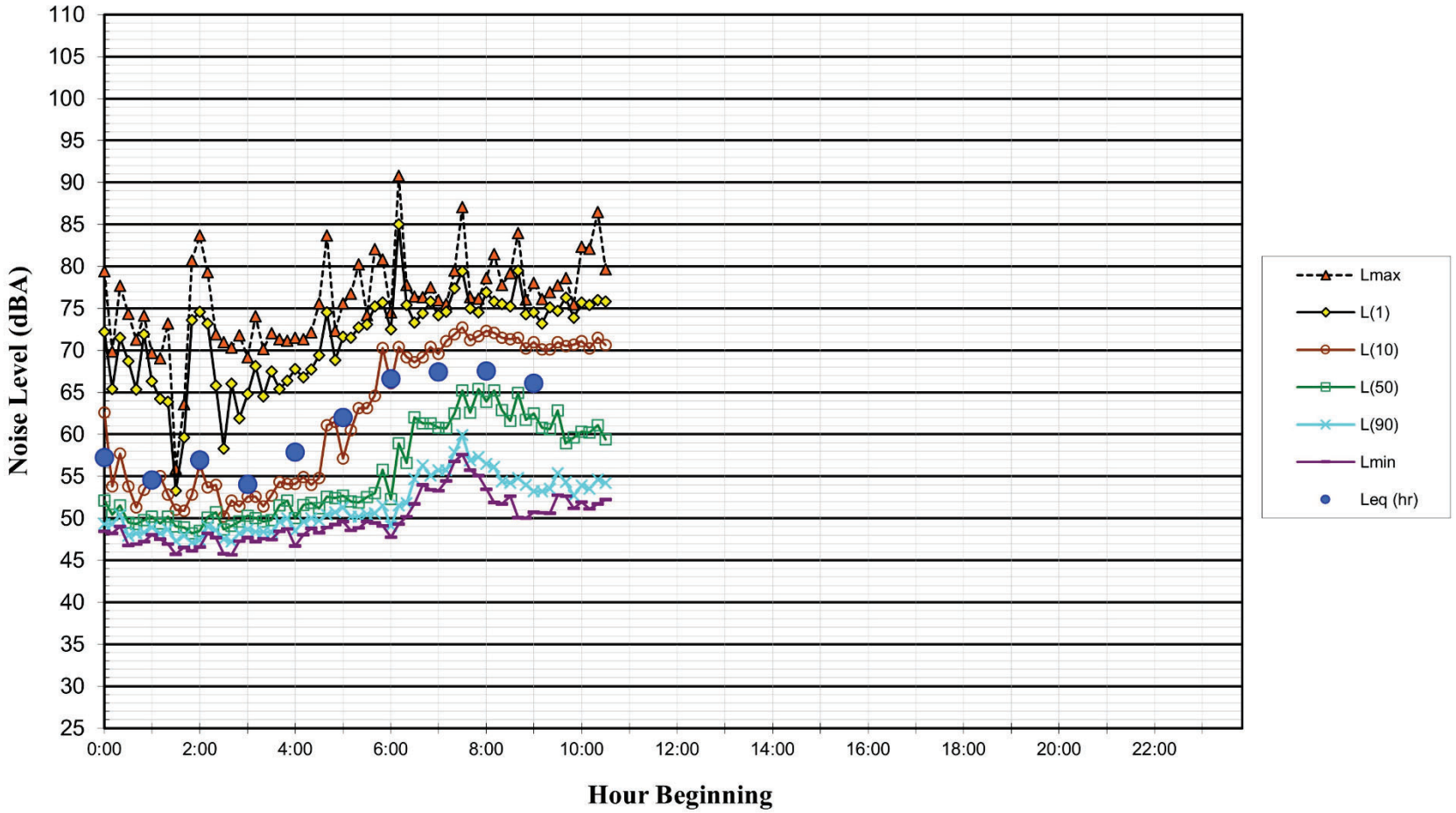


FIGURE A10 Daily Trend in Noise Levels at LT-4, Wednesday, January 25, 2023

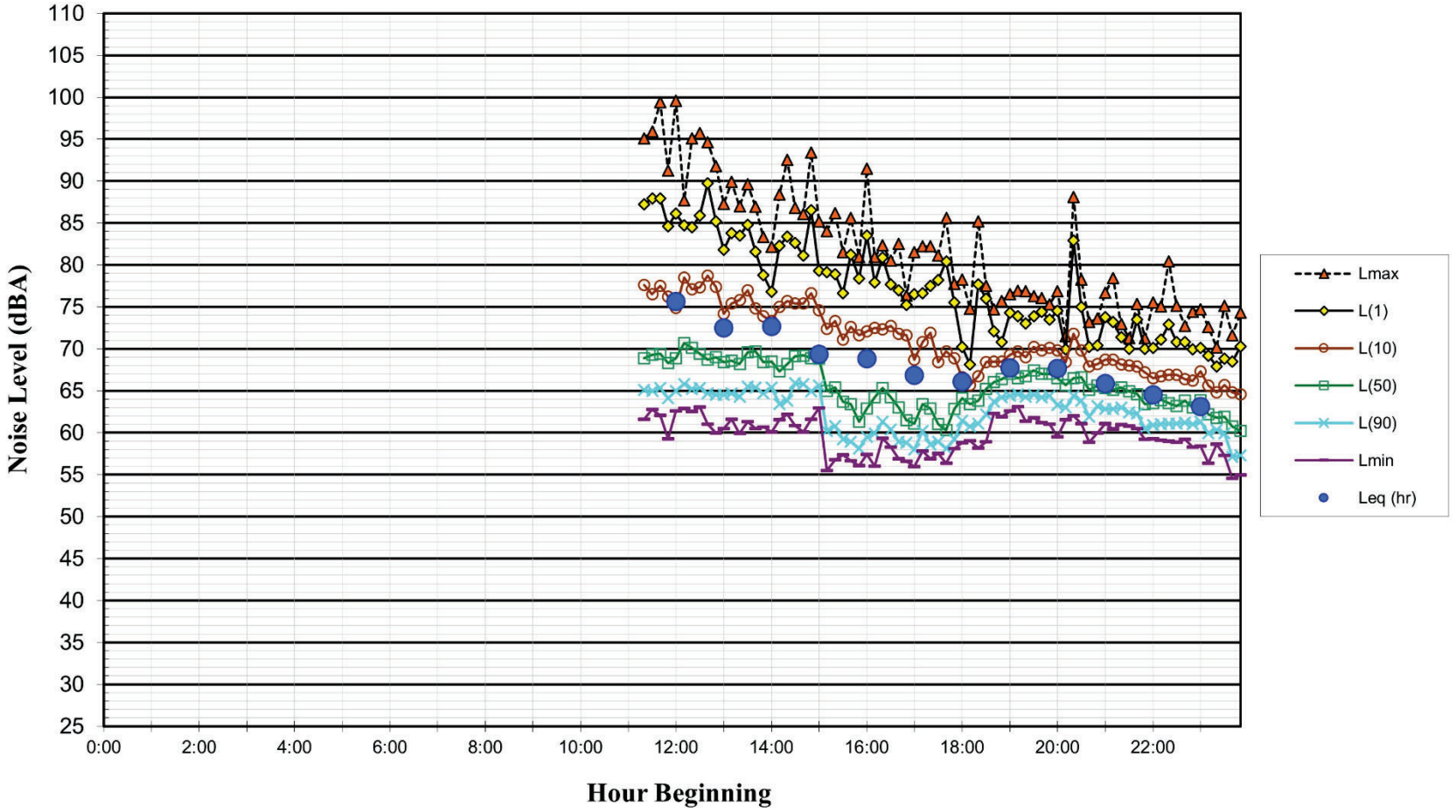


FIGURE A11 Daily Trend in Noise Levels at LT-4, Thursday, January 26, 2023

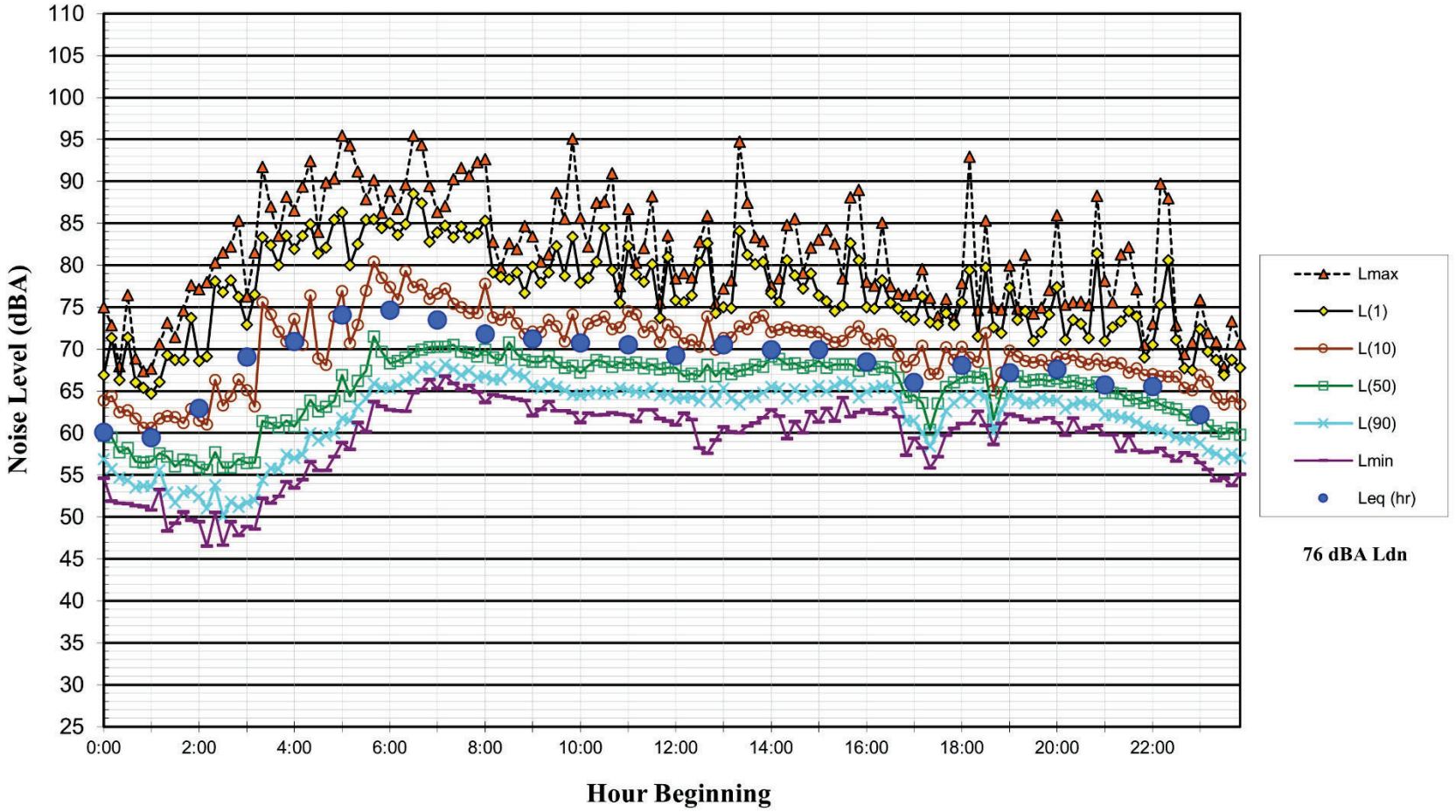


FIGURE A12 Daily Trend in Noise Levels at LT-4, Friday, January 27, 2023

