

CITY OF WATSONVILLE GENERAL PLAN UPDATE NOISE AND VIBRATION ASSESSMENT

Watsonville, California

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A. INTRODUCTION

This report summarizes the results of the noise and vibration assessment prepared for the City of Watsonville General Plan Update Project (Project). The report begins with a discussion of the fundamentals of environmental noise and vibration, and an examination of relevant federal, State, and local regulatory guidelines, policies, and standards regarding noise and vibration. The remainder of the report evaluates the potential noise- and vibration-related environmental impacts that could result from future development under the proposed Watsonville General Plan Update. The supporting analysis considers noise levels at existing receptor locations; evaluates potential noise and vibration impacts associated with the Project; and provides mitigation to reduce noise impacts to less-than-significant levels at noise-sensitive locations.

B. ENVIRONMENTAL SETTING

The following information is provided in accordance with Section 15125 of the California Environmental Quality Act (CEQA) Guidelines. The environmental setting described herein provides the baseline for determining whether impacts resulting from the Watsonville General Plan Update are significant.

1. Study Area for Direct Impacts

The direct impact study area is the City of Watsonville and Sphere of Influence Area.

2. Study Area for Cumulative Impacts

This analysis is based on the plan or projection approach to examining cumulative effects, as provided under Section 15130(b)(1)(B) of the State CEQA Guidelines. The analysis utilizes growth and development projections contained in the General Plan. The cumulative impact study area is the City of Watsonville and the Sphere of Influence Area.

3. Noise and Vibration Concepts

a. Fundamentals of Environmental Noise

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

In addition to the concepts of pitch and loudness, there are several noise measurement scales that are 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 tenfold 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, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq} . The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

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

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level (CNEL)* is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 p.m. to 10:00 p.m.) and a 10 dB penalty added to nocturnal (10:00 p.m. to 7:00 a.m.) 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.

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 and 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 sounds are below 20 Hz, and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max} , L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01} , L_{10} , L_{50} , L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after the addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after the addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence, and tonal or informational content, as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime	30 dBA	
		Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

Effects of Noise

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but it may also be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated by chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has established a noise exposure standard, which is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 85 dBA averaged over eight hours. If the noise is above 85 dBA, the allowable exposure time is correspondingly shorter.

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 $L_{dn}/CNEL$. Typically, the highest steady traffic noise level during the daytime is about equal to the $L_{dn}/CNEL$, and nighttime levels are 10 dBA lower.¹ 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.² Sleep and speech interference are therefore possible when exterior noise levels are about 57 to 62 dBA $L_{dn}/CNEL$ with open windows and 65 to 70 dBA $L_{dn}/CNEL$ if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community from 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 $L_{dn}/CNEL$, as a measure of noise, has been found to provide a valid correlation between noise level and the percentage of people who are 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

¹ Kryter, Karl D. *The Effects of Noise on Man*. Menlo Park, Academic Press, Inc., 1985.

² 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.

measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA L_{dn}/C_{NEL} . At a L_{dn}/C_{NEL} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn}/C_{NEL} 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}/C_{NEL} of 60 and 70 dBA. Between a L_{dn}/C_{NEL} of 70 to 80 dBA, each additional decibel increases the percentage of the population highly annoyed by about 3 percent. People appear to respond more adversely to aircraft noise. When the L_{dn}/C_{NEL} 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.³

b. 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 provides damage criteria for buildings during construction vibration exposure.

Low-level vibrations frequently cause irritating secondary vibrations, 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, which 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.

³ Kryter, Karl D. *The Effects of Noise on Man*. Menlo Park, Academic Press, Inc., 1985.

TABLE 3 FTA Construction Vibration Damage Criteria

Building/Structural Category	PPV, in/sec	Approximate L_v^a
Reinforced-concrete, steel or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

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

Typical background vibration levels in residential areas are usually 50 vibration decibels (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 4 illustrates some common sources of vibration and their association with 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.

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.⁴ Human perception of 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.

⁴ Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

TABLE 4 Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level, VdB	Typical Events (50-foot setback)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment Heavy tracked vehicles (Bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	
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	
Lower limit for equipment ultra-sensitive to vibration	50	Background vibration in residential settings in the absence of activity

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

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or it 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 to 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.

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 1×10^{-6} in/sec RMS, which equals 0 VdB, and 1 in/sec equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration 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 of 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.

C. EXISTING NOISE AND VIBRATION CONDITIONS IN WATSONVILLE

1. Noise Sources in Watsonville

The major noise sources in the City of Watsonville are described below. Figure 1 shows new residential growth areas.

a. Roadways

Major roadways are the primary sources of ambient noise in Watsonville. California State Route 1 (SR 1) runs generally north and south along the western boundary of the City of Watsonville, and SR 129 generally runs east and west along the southern boundary of the City. SR 152 generally runs east and west and transects the City. Primary major local roadways include Main Street/Porter Drive, Freedom Boulevard, Lake Avenue, Riverside Road, and Beach Street. Airport Boulevard, Green Valley Road, Ohlone Parkway, Harkins Slough Road/Walker Street, Lincoln Street, Holohan Road, and Martinelli Street are amongst secondary major roadways in the City and would also contribute to noise exposure.

b. Railroads

Rail operations along the Union Pacific Railroad (UPRR) rights-of-way are located south of the City. Additionally, an existing UPRR rail line runs parallel to Beach Street and merges with Walker Street, running between the two travel lanes south of the City and ultimately connecting the UPRR tracks south of the City. Currently, four trains pass along these rail lines in a week. This rail line has also been identified as a future passenger rail line.⁵ The Santa Cruz County Regional Transportation Commission (SCCRTC) has begun preliminary plans for reactivating passenger rail service as part of the Zero Emission Passenger Rail & Trail (ZEPRT) Project, which, if implemented, would provide passenger rail service between Santa Cruz and Pajaro through Watsonville. A potential Downtown Watsonville Passenger Rail Station is also proposed at the Walker Street junction and would create a new regional transit connection. Future phases of the ZEPRT project would require separate environmental reviews and funding. The existing UPRR rail line and the proposed passenger rail line are shown in blue in Figure 1, and the location of the proposed station is also identified.

Community noise equivalent levels commonly range from 65 to 75 dBA CNEL at land uses adjoining a railroad right-of-way.⁶ When railroad trains approach a passenger station or “at-grade” crossing, they are required to sound their warning whistle. When giving a warning to people and/or animals, they are required to produce a succession of sounds with the whistle. Trains are required to sound a long signal followed by a short signal when approaching stations, curves, or other points where view may be obscured, and when approaching passenger or freight trains. When passing a standing train, the moving train is required to sound two long signals followed by a short signal,

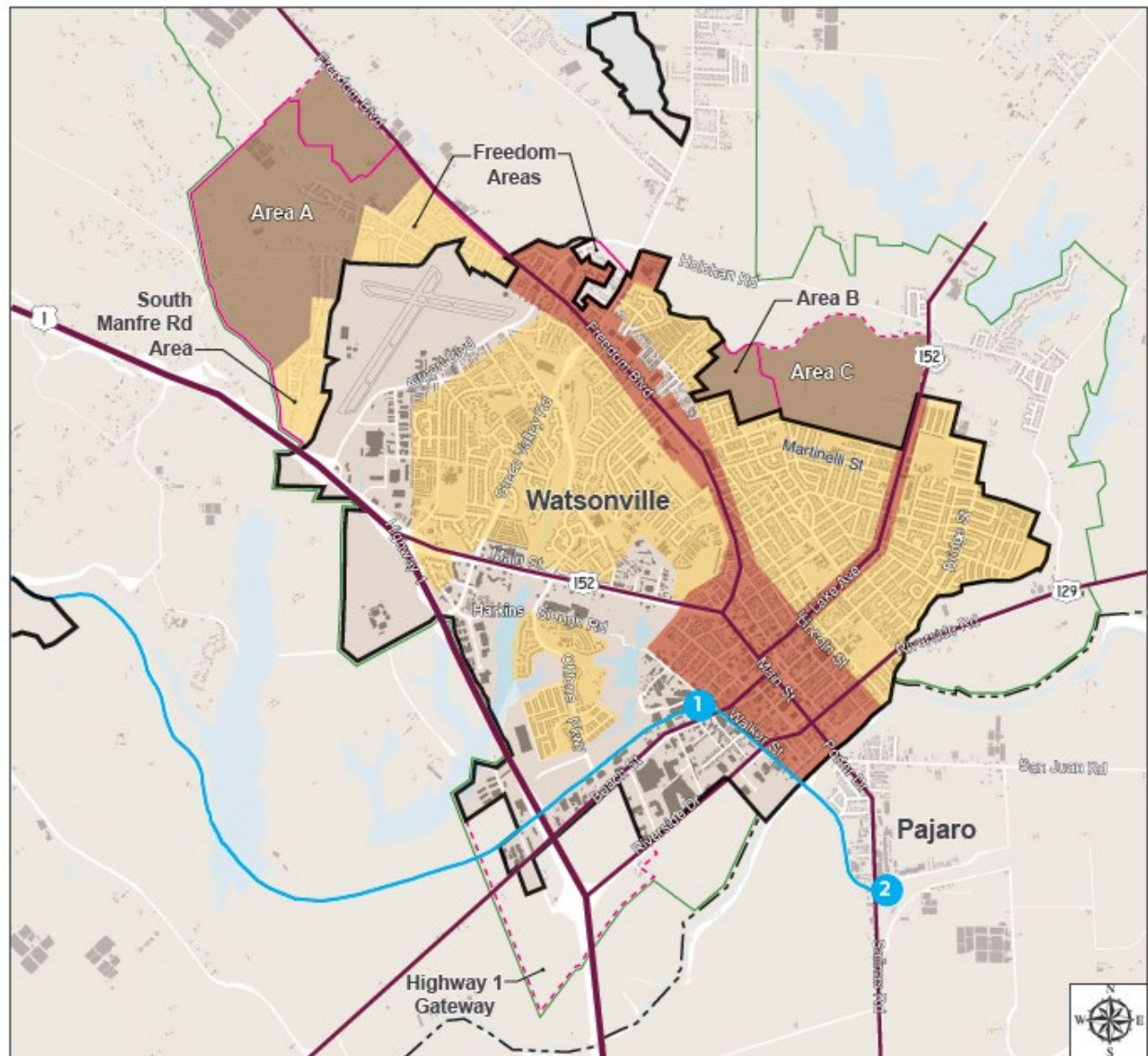
⁵ SCCRTC Zero Emission Passenger Rail and Trail Project: Watsonville to Santa Cruz, “Project Concept Report,” October 24, 2025.

⁶ Federal Transit Administration. Transit Noise and Vibration Impact Assessment Manual. September 2018.

followed by a long signal, the same requirement when signaling for at-grade crossings. Train warning whistles typically generate maximum noise levels of approximately 105 dBA at 100 feet. The community noise equivalent level at locations immediately adjacent to “at-grade” crossings and exposed to multiple train pass-by events during a day can exceed 85 dBA CNEL.⁷

⁷ Federal Railroad Administration (FRA). *49 CFR Part 222—Use of Locomotive Horns at Public Highway-Rail Grade Crossings*, Code of Federal Regulations

FIGURE 1 Primary Areas of Housing Growth, Identifying Rail Line and Proposed Station



Legend

- City Limit
- County Boundary
- Sphere of Influence
- Existing Urban Limit Line
- - - Proposed Urban Limit Line
- Proposed Passenger Rail Line
- Primarily Multi-family Infill
- Mixed Housing Infill
- Single Family New Growth
- ① Potential Downtown Watsonville Passenger Rail Station
- ② Planned Pajaro/ Watsonville Multimodal Transportation Station

c. Airport

The Watsonville Municipal Airport is located in the northwestern portion of the City. Residential areas are adjacent to the airport to the north and northwest and about 800 feet to the east. Additionally, the airport is a regional general aviation airport serving the business aviation requirements and recreational facilities of the City of Watsonville, County of Santa Cruz, and the Monterey Bay Area. The airport includes two runways serving single and twin-engine aircraft and helicopters, as well as turboprops and turbine-powered business jets. Under the ultimate conditions of the adopted 2023 Airport Master Plan, the 65 and 70 dBA CNEL noise contours are largely confined to airport property, with only minor extensions into the adjacent industrial area along Aviation Way (see Figure 12.3 Airport Noise Contours). The 60 and 65 dBA CNEL contours also remain largely within airport property but to a limited extent these contours extend off-airport into the industrial area south of Airport Boulevard and into a residential area to the north along Buena Vista Drive. (see Figure 2).

d. Industry and Commercial

Industrial operations are the primary stationary noise sources that make a significant local contribution to community noise levels. In general, these stationary noise sources (e.g. fabrication, large mechanical equipment, and loading areas) are often located in primarily commercial and industrial areas and are isolated from noise-sensitive land uses. However, sensitive development adjoining these areas could expose sensitive receptors to stationary noise sources and would result in some land use conflicts.

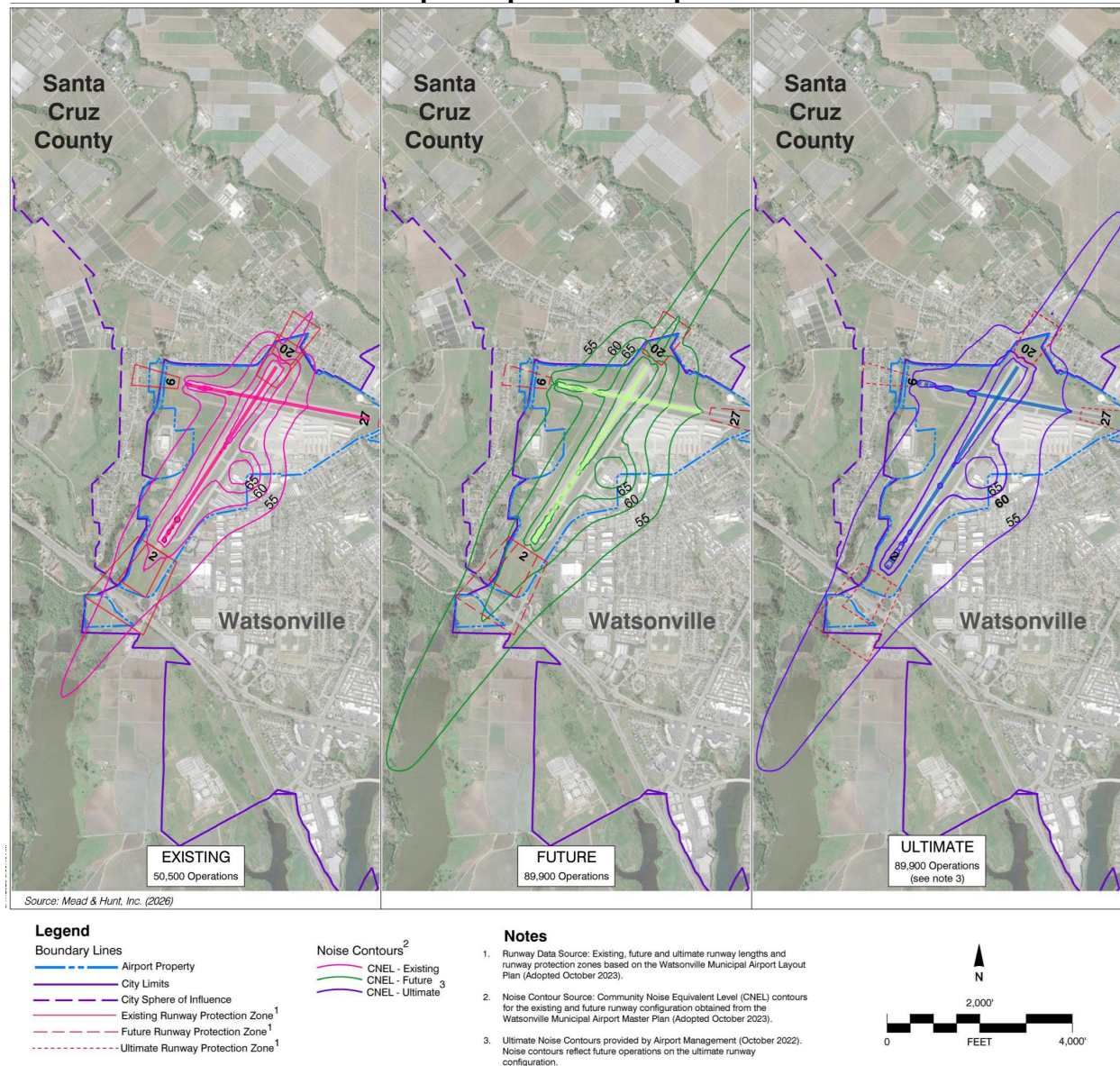
Noise sources that affect sensitive receptors within the community would also include commercial land uses or those normally associated with and/or secondary to residential development. These include nightclubs, outdoor dining areas, gas stations, car washes, fire stations, drive-throughs, air conditioning units, swimming pool pumps, school playgrounds, athletic and music events, and public parks.

e. Construction

Construction is a temporary source of noise for residences and businesses located near construction sites. Construction noise can be significant for short periods of time at any particular location as a result of public improvement projects, private development projects, remodeling, etc. The highest construction noise levels are normally generated during grading and excavation, with lower noise levels occurring during building construction. Large pieces of earth-moving equipment, such as graders, scrapers, and bulldozers, generate maximum noise levels of 85 to 90 dBA at a distance of 50 feet. Typical hourly average construction-generated noise levels are about 80 to 85 dBA measured at a distance of 50 feet from the site during busy construction periods. Some construction techniques, such as impact pile driving, can generate very high levels of noise (105 dBA L_{max} at 50 feet) that are difficult to control. Construction activities can elevate noise levels at adjacent businesses and residences by 15 to 20 dBA or more.⁸

⁸ Federal Highway Administration (FHWA). *Roadway Construction Noise Model (RCNM)*. U.S. Department of Transportation.

FIGURE 2 Watsonville Municipal Airport 2020 Airport Noise Contours



Source: Mead & Hunt, Inc. (2026)

Source: General Plan and Local Coastal Program, County of Santa Cruz, California, effective date of March 18, 2024.

2. Groundborne Vibration Sources in Watsonville

a. Railroads

Groundborne vibration occurs in areas adjacent to fixed rail lines when railroad trains pass through Watsonville. Ground vibration levels along the railroad corridor (shown by the blue line in Figure 1) are proportional to the speed and weight of the trains, as well as the condition of the tracks and train engine and car wheels. Vibration levels resulting from railroad trains vary by site but are generally perceptible within 100 feet of the tracks.

b. Construction

Construction activities, such as demolition, site preparation work, excavation, and foundation work, can generate groundborne vibration at land uses adjoining construction sites. Impact pile driving has the potential of generating the highest ground vibration levels and is of primary concern for structural 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.), can generate substantial vibration levels in the immediate vicinity.

3. Sensitive Receptors

Sensitive receptors in the City of Watsonville include residences, hospitals, parks, churches, and schools. Hospitals in Watsonville include Sutter Health Medical Center, Watsonville Community Hospital, Watsonville Health Center, Watsonville Specialty Center, Kaiser Permanente Watsonville Medical Offices, Family Medicine – Dignity Health Medical Group – Watsonville, Coastal Healthcare Medical Center, and Salud Para La Gente Health. The larger parks in Watsonville include Hope Drive Park, Peace Drive Park, Marinovich Park and Community Center, Las Brisas Park, Seaview Ranch Park, Callaghan Park Cultural Center, Franich Park, Joyce-McKenzie Park, Bronte Park, Atri Park, and Pajaro Park. Churches in the City include Cornerstone United Pentecostal, Green Valley, Our Lady Help of Christians, All Saints' Episcopal, Lutheran Community, First United Methodist, Arthur Road Baptist, Church of Christ, St Patrick's Catholic Parish, First Baptist, First Christian, Bethel Tabernacle, Iglesia De Cristo Camino De Santidad, Westview Presbyterian, Our Lady of the Assumption, Calvary Chapel Watsonville, and Victory Outreach of Watsonville. The high schools in Watsonville include St. Francis, Watsonville, Oasis, Ceiba College Preparatory, New School Senior, Green Valley Christian School, the Pacific Coast Charter School, Sequoia, and Pajaro Valley. Colleges within the City include Watsonville/Aptos/Santa Cruz Adult Education, Monsbey College, Center for Employment – CET Watsonville, College Lake, Cabrillo College Watsonville Center, and Diamond Technology Institute.

4. Noise Monitoring Survey

A noise monitoring survey was completed to establish existing noise levels in the City of Watsonville. The survey included six long-term (24+ hour) noise measurements and 10 short-term (10-minute) noise measurements. Long-term (LT) measurements, made hour-by-hour over a

period of 24 hours or more, are unattended and provide information on how noise levels vary throughout the day and night and may vary from day to day. Short-term (ST) measurements are attended, allowing the technician to identify the noise sources contributing to the measurement and note the level of noise associated with these identifiable sources. This assists in quantitatively and qualitatively characterizing the noise environments along the major roadways and in the quieter areas of the City.

The noise monitoring survey was conducted between Wednesday, January 21, 2026, and Friday, January 23, 2026. All measurement locations are shown in Figure 3. During the noise survey, weather conditions were moderate in terms of temperature and wind. The noise survey was conducted with Larson Davis Laboratories Type 831 and LXT precision sound level meters. Instrumentation was calibrated at the beginning of the noise survey and post-calibrated at the end of the survey. No calibration corrections were necessary. During the survey, the microphones were fitted with windscreens.

Measurement LT-1 was installed on a light pole at the edge of the Safeway parking lot located at 2010 Freedom Boulevard. LT-1 was approximately 30 feet east of the Airport Boulevard centerline, and the measurement position was representative of residential uses located along Airport Boulevard, north of Freedom Boulevard. Vehicular traffic on Airport Boulevard was the dominant noise source affecting the noise measurement.

LT-2 was installed on a light pole at the corner of SR 152 and Menasco Drive. LT-2 was set back approximately 80 feet from the SR 152 centerline and approximately 25 feet from the Menasco Drive centerline. The measurement position was representative of residential uses located along SR 152 and the nearby Ann Soldo Elementary School. Vehicular traffic on SR 152 was the dominant noise source affecting the noise measurement.

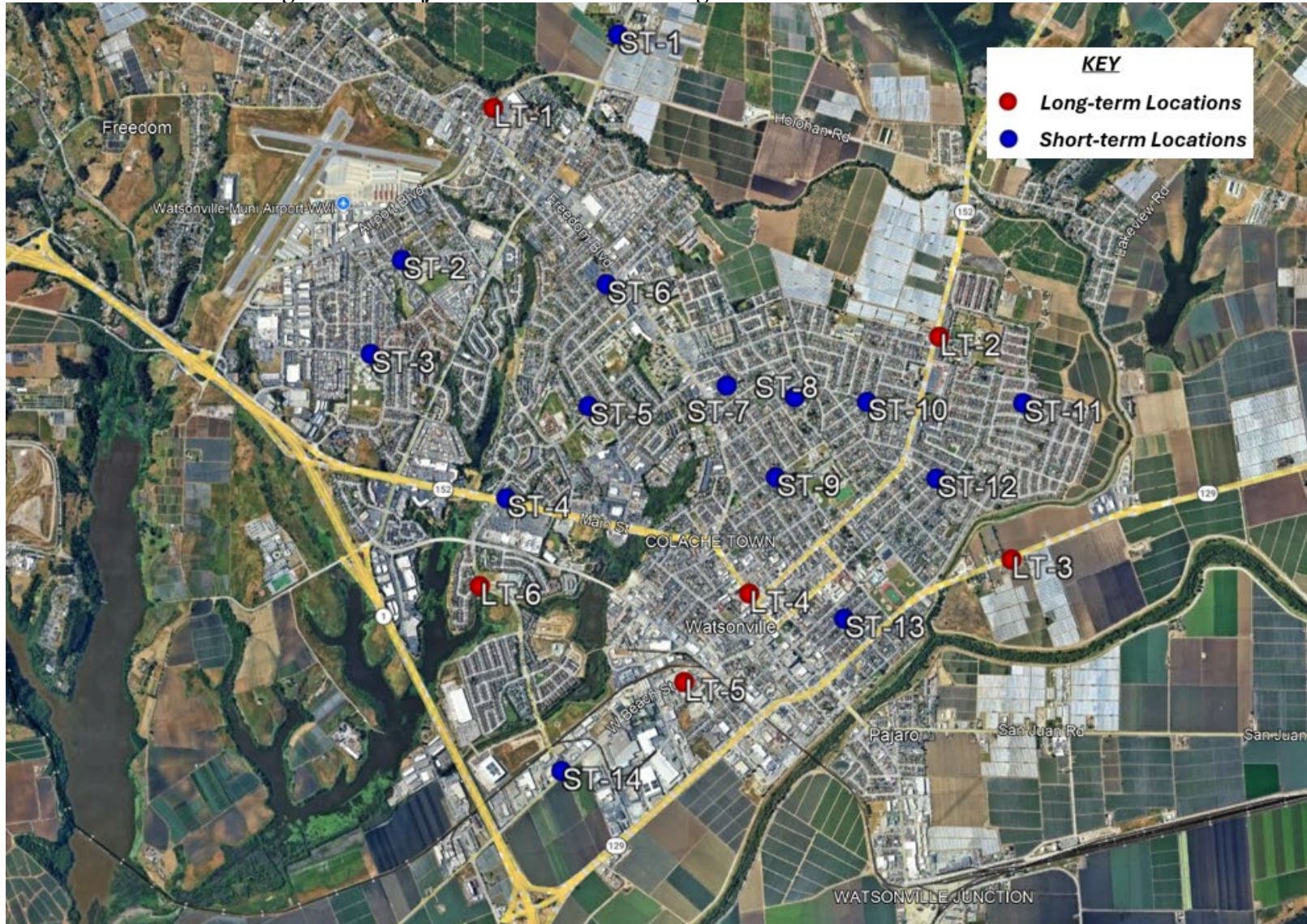
LT-3 was installed in a tree outside the residences along SR 129, east of the Salsipuedes Creek. LT-3 was set back approximately 30 feet from the SR 129 centerline. The measurement position was representative residential uses located along SR 129, which was the dominant noise source affecting the noise measurement.

LT-4 was installed in a tree outside 518 Main Street, approximately 25 feet east of the centerline of Main Street. The measurement position was representative of noise levels in downtown Watsonville. Main Street traffic was the dominant noise source affecting the noise measurement.

LT-5 was installed on a utility pole near the West Beach Street/Pine Street intersection. LT-5 was set back approximately 25 feet from the West Beach Street centerline, which was the dominant noise source at this location. The measurement position was representative of the existing noise environment at the commercial and light industrial uses located along West Beach Street.

LT-6 was installed on a utility pole near the Ohlone Parkway/Kingfisher Drive intersection. LT-6 was set back approximately 65 feet from the Ohlone Parkway centerline, which was the dominant noise source at this location. The measurement position was representative of the existing noise environment at the residential uses located along Ohlone Parkway.

FIGURE 3 Aerial Image of the Project Site and Surrounding Area with the Noise Measurement Locations Identified



Source: Google Earth, 2026.

The daily trend in noise levels for each LT measurement is shown in Appendix A of this report, and hourly average noise levels and community noise equivalent levels measured at each of the LTs is summarized in Table 6.

TABLE 6 Summary of Long-Term Noise Measurement Data at LT-1 through LT-6 from Wednesday, January 21, 2026, through Friday, January 23, 2026

Receptor ID	Location	Hourly Average Noise Levels, dBA L_{eq}			Community Noise Equivalent Level, dBA CNEL
		Daytime Hours ^a	Evening Hours ^b	Nighttime Hours ^c	
LT-1	Southwest corner of the Safeway parking lot, ~30 feet from the Airport Boulevard centerline	70 to 73	67 to 76	57 to 71	74
LT-2	Northeast corner of the SR 152/ Menasco Drive intersection, ~80 feet from the SR 152 centerline	65 to 71	62 to 66	51 to 66	69
LT-3	~30 feet from the SR 129 centerline	74 to 77	71 to 73	65 to 76	79
LT-4	Front of 518 Main Street, ~25 feet from the Main Street centerline	68 to 79	72 to 78	65 to 78	80
LT-5	Southeast corner of the West Beach Street/Pine Street intersection, ~30 feet from the West Beach Street centerline	68 to 72	64 to 69	58 to 71	74
LT-6	Northwest corner of the Ohlone Parkway/Kingfisher Drive intersection, ~65 feet from the Ohlone Parkway centerline	59 to 68	58 to 61	49 to 61	65

^a Daytime hours = between 7:00 a.m. and 7:00 p.m.

^b Evening hours = between 7:00 p.m. and 10:00 p.m..

^c Nighttime hours = between 10:00 p.m. and 7:00 a.m.

Short-term noise measurements were made on Thursday, January 22, 2026, between 8:20 a.m. and 1:40 p.m. in 10-minute intervals at each site. Table 7 summarizes the noise measurement results at each location.

ST-1 was made in front of 327 Green Valley Road and was set back approximately 40 feet from the centerline of the roadway. Traffic along Green Valley Road was the dominant noise source at ST-1 and consisted of 290 passenger cars (66 to 82 dBA), three heavy and two medium trucks (76 to 82 dBA), and two buses (78 to 79 dBA). The 10-minute L_{eq} measured at ST-1 was 74 dBA.

ST-2 was made in front of 40 Holly Drive and was set back approximately 20 feet from the centerline of the roadway. Traffic along Holly Drive was the dominant noise source at ST-2 and consisted of 29 passenger cars (59 to 70 dBA). Other noise contributors at ST-2 included jets (49 to 50 dBA) and a car alarm (56 dBA). The 10-minute L_{eq} measured at ST-2 was 56 dBA.

TABLE 7 Summary of Short-Term Noise Measurement Data at ST-1 through ST-14 on Thursday, January 22, 2026

Noise Measurement Location	L ₍₁₎	L ₍₁₀₎	L ₍₅₀₎	L ₍₉₀₎	L _{eq}	Primary Noise Source
ST-1: Front of 327 Green Valley Road (1/22/2026, 8:20 to 8:30)	81	77	72	63	74	Green Valley Road traffic
ST-2: Front of 40 Holly Drive (1/22/2026, 8:40 to 8:50)	66	61	49	45	56	Holly Drive traffic
ST-3: Front of 120 Anna Street (1/22/2026, 9:00 to 9:10)	75	65	53	45	62	Anna Street traffic
ST-4: Back of 128 Terry Loop (1/22/2026, 9:30 to 9:40)	76	74	66	55	69	SR 152 traffic
ST-5: Front of 341 Arthur Road (1/22/2026, 9:50 to 10:00)	72	64	57	50	61	Arthur Road traffic
ST-6: Front of 25 Clifford Avenue (1/22/2026, 10:10 to 10:20)	72	67	55	50	62	Clifford Avenue traffic
ST-7: Front of 31 Broadis Street (1/22/2026, 10:30 to 10:40)	60	53	43	39	50	Madison Street traffic
ST-8: Front of 702 Brewington Avenue (1/22/2026, 11:20 to 11:30)	71	63	55	50	60	Stanford Street traffic
ST-9: Front of 828 Lincoln Street (1/22/2026, 11:40 to 11:50)	75	66	57	47	64	Lincoln Street traffic
ST-10: Front of 638 Oregon Street (1/22/2026, 12:00 to 12:10)	70	65	50	37	60	Tuttle Avenue traffic
ST-11: Front of 498 Vivienne Drive (1/22/2026, 12:20 to 12:20)	68	61	48	41	56	Local traffic
ST-12: Front of 557 East Beach Street (1/22/2026, 12:50 to 13:00)	70	63	54	43	60	Local traffic
ST-13: Front of 213 Marchant Street (1/22/2026, 13:10 to 13:20)	67	58	47	40	56	Local traffic
ST-14: Front of 1080 West Beach Street (1/22/2026, 13:40 to 13:50)	79	72	63	57	68	Local traffic

ST-3 was made in front of 120 Anna Street and was set back approximately 30 feet from the centerline of the roadway. Traffic along Anna Street was the dominant noise source at ST-3 and consisted of 18 passenger cars (56 to 69 dBA), one heavy truck (69 dBA), and one bus (79 dBA). Traffic from Shady Oaks Drive also contributed to the noise measurement, with seven passenger cars and one bus. Other noise contributors included chirping birds (47 to 57 dBA). The 10-minute L_{eq} measured at ST-3 was 62 dBA.

ST-4 was made in the backyard equivalent of 128 Terry Loop and was set back approximately 80 feet from the centerline of SR 152, which was the dominant noise source at ST-4. Traffic along SR 152 consisted of 232 passenger cars (62 to 77 dBA), three large and three medium trucks (69 to 76 dBA), and two buses (75 dBA). The 10-minute L_{eq} measured at ST-4 was 69 dBA.

ST-5 was made in front of 341 Arthur Road and was set back approximately 25 feet from the centerline of the roadway. Traffic along Arthur Road was the dominant noise source at ST-5 and consisted of 51 passenger cars (58 to 79 dBA). Other noise contributors included an airplane (60 dBA). The 10-minute L_{eq} measured at ST-5 was 61 dBA.

ST-6 was made in front of 25 Clifford Avenue and was set back approximately 25 feet from the centerline of the roadway. Traffic along Clifford Avenue was the dominant noise source at ST-6 and consisted of 26 passenger cars (48 to 76 dBA) and one bus (74 dBA). Background traffic from nearby Freedom Boulevard generated noise levels of 48 to 56 dBA. Other noise contributors at ST-6 included an airplane (56 dBA). The 10-minute L_{eq} measured at ST-6 was 62 dBA.

ST-7 was made in front of 31 Broadis Street and was set back approximately 20 feet from the centerline of Broadis Street and approximately 35 feet from the centerline of Madison Street. Traffic along Madison Street was the dominant noise source at ST-7, generating noise levels of 40 to 55 dBA. Additionally, one passenger car along Broadis Street generated noise levels of 68 dBA at ST-7. Other noise contributors included airplanes (43 to 60 dBA). The 10-minute L_{eq} measured at ST-7 was 50 dBA.

ST-8 was made in front of 702 Brewington Avenue, in the northeast corner of the Brewington Avenue/Stanford Street intersection. ST-8 was set back approximately 20 feet from the centerline of Brewington Avenue and approximately 35 feet from the centerline of Stanford Street. Traffic along Stanford Street was the dominant noise source, with 36 passenger cars. Traffic along Brewington Avenue also contributed, with 19 passenger cars. Traffic noise levels ranged from 54 to 75 dBA. Other noise contributors included a distant leaf blower (44 to 50 dBA). The 10-minute L_{eq} measured at ST-8 was 60 dBA.

ST-9 was made in front of 828 Lincoln Street and was set back approximately 20 feet from the centerline of Lincoln Street and approximately 45 feet from the California Street centerline. Traffic along Lincoln Street was the dominant noise source at ST-9. Total traffic during the ST-9 measurement included 39 passenger cars at Lincoln Street and seven passenger cars at California Street (55 to 75 dBA) and two buses (77 to 82 dBA). Other noise contributors included airplanes (52 to 70 dBA). The 10-minute L_{eq} measured at ST-9 was 64 dBA.

ST-10 was made in front of 638 Oregon Street and was set back approximately 20 feet from the centerline of Oregon Street and approximately 45 feet from the centerline of Tuttle Avenue. Traffic from Tuttle Avenue was the dominant noise source at ST-10. Total traffic during the ST-10 measurement included 39 passenger cars at Tuttle Avenue and two passenger cars at Oregon Street (55 to 72 dBA). The 10-minute L_{eq} measured at ST-10 was 60 dBA.

ST-11 was made in front of 498 Vivienne Drive, northeast of the Vivienne Drive/Bridge Street intersection. ST-11 was set back approximately 35 feet from the centerline of Vivienne Drive and approximately 40 feet from the centerline of Bridge Street. Local traffic from the surrounding roadways dominated the noise environment at ST-11, with 21 passenger cars along Bridge Street and five passenger cars along Vivienne Drive (58 to 68 dBA). Other noise contributors included an airplane (60 dBA). The 10-minute L_{eq} measured at ST-11 was 56 dBA.

ST-12 was made in front of 557 East Beach Street, southwest of the East Beach Street/Hushbeck Avenue intersection. ST-12 was set back approximately 20 feet from the East Beach Street centerline and approximately 40 feet from the Hushbeck Avenue centerline. Local traffic from the surrounding roadways dominated the noise environment at ST-12, with 27 passenger cars along Hushbeck Avenue and 19 passenger cars along East Beach Street (55 to 75 dBA) and a bus on each roadway (70 dBA). Other noise contributors at ST-12 included an airplane (64 dBA) and birds (45 to 54 dBA). The 10-minute L_{eq} measured at ST-12 was 60 dBA.

ST-13 was made in front of 213 Marchant Street and was set back approximately 50 feet from the Marchant Street centerline and approximately 15 feet from the Grant Street centerline. Local traffic from the surrounding roadways dominated the noise environment at ST-13, with 22 passenger cars along Marchant Street and seven passenger cars along Grant Street (52 to 74 dBA) and a heavy truck along Marchant Street (68 dBA). Other noise contributors included airplanes (41 to 51 dBA). The 10-minute L_{eq} measured at ST-13 was 56 dBA.

ST-14 was made in front of the recycling building located at 1080 West Beach Street, set back approximately 60 feet from the centerline of West Beach Street and approximately 45 feet from the centerline of Ohlone Parkway. Local traffic from the surrounding roadways dominated the noise environment at ST-14, with 62 passenger cars along West Beach Street and 41 along Ohlone Parkway (60 to 72 dBA); six large and four medium trucks along West Beach Street and two large and one medium truck along Ohlone Parkway (66 to 82 dBA); one bus along each roadway (79 dBA); and three motorcycles along West Beach Street (71 to 83 dBA). The 10-minute L_{eq} measured at ST-14 was 68 dBA.

D. NOISE EXPOSURE MAPS

SoundPLAN Version V9.1, a three-dimensional ray-tracing computer program, was used to calculate traffic noise levels along major roadways throughout Watsonville. Calculations took into account the source of noise, the frequency spectra of the noise source, and the topography of the area. The geometric data used to create the model were based on geographic information system (GIS) information provided by Circlepoint. Existing average daily trip (ADT) data and travel speeds were also input into the model. For CA SR 1, traffic volumes and truck mix data input into the model were based on information published by the California Department of Transportation (Caltrans). The predicted noise levels were then compared to measured noise levels for calibration purposes, and adjustments were made as necessary to create an accurate model.

Noise exposure contours for Existing conditions along the major roadways in the City are depicted in Figure 4.

FIGURE 4 Existing Traffic Noise Contours in Watsonville, CA



E. REGULATORY FRAMEWORK

The federal government, State of California, and the City of Watsonville establish regulatory criteria in the form of guidelines, regulations, and policies that are designed to limit noise exposure at noise sensitive land uses. Federal and State Agencies, Appendix G of the State CEQA Guidelines, the City of Watsonville General Plan, and the City of Watsonville Municipal Code present the following:

1. Federal Policies

a. Department of Housing and Urban Development (HUD)

HUD environmental criteria and standards are presented in Title 24 of the Code of Federal Regulations, Part 51 (24 CFR Part 51). New residential construction qualifying for HUD financing proposed in high noise areas (exceeding 65 dBA L_{dn}/CNEL) must incorporate noise attenuation features to maintain acceptable interior noise levels. A goal of 45 dBA L_{dn}/CNEL 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}/CNEL or less if the exterior level is 65 dBA L_{dn}/CNEL or less. Approvals in a "normally unacceptable noise zone" (exceeding 65 decibels but not exceeding 75 decibels) require a minimum of 5 decibels additional noise attenuation for buildings if the day-night average is greater than 65 decibels but does not exceed 70 decibels, or minimum of 10 decibels of additional noise attenuation if the day-night average is greater than 70 decibels but does not exceed 75 decibels.

b. 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 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}. 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).⁹

⁹ Traffic Noise Analysis Protocol, Caltrans Division of Environmental Analysis, May 2011.

c. Federal Transit Administration – Construction Noise

The FTA has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,¹⁰ which limits daytime construction noise to 80 dBA L_{eq} at residential land uses, 85 dBA L_{eq} at commercial and office land uses, and to 90 dBA L_{eq} at industrial land uses.

d. Federal Transit Administration – Construction Vibration

FTA also provides damage criteria during construction vibration exposure. The criteria is summarized in Table 8.

TABLE 8 FTA Construction Vibration Damage Criteria

Building/Structural Category	PPV, in/sec	Approximate L_v^a
Reinforced-concrete, steel or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

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

e. Federal Transit Administration – Train Vibration

The City of Watsonville has not identified quantifiable vibration limits that can be used to evaluate the compatibility of land uses with vibration levels experienced at a project site. Although there are no local standards that control the allowable vibration in a new residential development, the U.S. DOT has developed vibration impact assessment criteria for evaluating vibration impacts associated with transit projects.¹¹ The FTA has proposed vibration impact criteria, based on maximum overall levels for a single event. The impact criteria for groundborne vibration are shown in Table 5 above. 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).

2. State of California Regulations

a. California Administrative Code Section 65302(f)

California Government Code Section 65302(f) requires that all General Plans include a Noise Element to address noise problems in the community. The Noise Element shall recognize the guidelines established by the Office of Noise Control in the State Department of Health Services

¹⁰ Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

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

and shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

- Highways and freeways.
- Primary arterials and major local streets.
- Passenger and freight on-line railroad operations and ground rapid transit systems.
- Commercial, general aviation, heliport, and military airport operations, aircraft flyovers, jet engine tests stands, and all other ground facilities and maintenance functions related to airport operation.
- Local industrial plants, including, but not limited to, railroad classification yards.
- Other stationary ground noise sources identified by local agencies as contributing to the community noise environment.

Noise contours shall be shown for all of these sources and stated in terms of CNEL or L_{dn} . The noise contours shall be prepared on the basis of noise monitoring or following generally accepted noise modeling techniques for the various sources identified above.

The noise contours shall be used as a guide for establishing a pattern of land uses in the land use element that minimizes the exposure of community residents to excessive noise. The noise element shall include implementation measures and possible solutions that address existing and foreseeable noise problems, if any. The adopted noise element shall serve as a guideline for compliance with the state's noise insulation standards.

b. 2025 California Building Code

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.

c. 2025 California Building Cal Green Code

The State of California established exterior sound transmission control standards for new nonresidential buildings as set forth in the 2025 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 or addition envelope or altered 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} /CNEL noise contour of an airport or within the 65 dBA L_{dn} /CNEL noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source, as determined by the Noise Element of the General Plan.

5.507.4.1.1 Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dBA $L_{eq(1-hr)}$ during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source

meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance method. For buildings located, as defined by Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq(1-hr)}$) of 50 dBA in occupied areas during any hour of operation

The performance method, which establishes the acceptable interior noise level, is the method typically used when applying these standards.

d. 2025 California Code of Regulations Title 21, Division 2.5 - Division of Aeronautic (Department of Transportation)

Chapter 6, Section 5012 of the 2025 California Code of Regulations Title 21, Division 2.5, includes acceptable noise levels for airports. The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels. Section 5014 further identifies the following incompatible land uses within the noise impact boundary: residences (including, but not limited to, detached single-family dwellings, multi-family dwellings, high-rise apartments or condominiums, and mobile homes) unless interior noise is 45 dBA CNEL or less; public and private schools of standard construction; hospitals and convalescent homes where interior noise exceeds 45 dBA CNEL; or churches, synagogues, temples, and other places of worship where interior levels exceed 45 dBA CNEL.

3. City of Watsonville Regulations

a. City of Watsonville, 2005 General Plan, adopted May 24, 1994

The Public Safety Chapter of the City of Watsonville includes Goal 12.8 for Noise Hazard Control. This goal states the following:

Goal 12.8 Noise Hazard Control. Evaluate new and existing land uses in the City for compatibility related to noise effects and require, as appropriate, mitigation where harmful effects can be identified and measurable improvements will result.

The General Plan also includes the following Policies and Implementation Measures associated with noise and vibration:

Policy 12.M Noise. The City shall utilize land use regulation and enforcement to ensure that noise levels in developed areas are kept at acceptable levels, and that future noise-sensitive land uses are protected from noise that is harmful.

12.M.1 Traffic Noise – The City shall enforce provisions of the California Vehicle Code and local ordinances to reduce vehicular noise intrusion in residential areas and near other noise sensitive land uses such as schools and hospitals.

12.M.2 Truck Routes – The City shall continue efforts to designate truck routes that bypass residential areas and other noise sensitive areas.

12.M.3 Equipment Maintenance – The City shall maintain all vehicles and mechanical equipment in peak operating condition and correctly fitted with noise control devices.

12.M.4 Soundproofing – The City shall use the development review process and provisions of the Uniform Building Code to ensure adequate levels of soundproofing in all new construction.

12.M.5 Noise Ordinance – The City shall prepare, adopt and enforce a comprehensive noise control ordinance.

12.M.6 Site Planning – The City shall evaluate sire orientation and building design to decrease the potential for noise intrusion, using the noise contour map and compatibility guidelines.

12.M.7 Aircraft Noise – The City shall periodically review and update noise contour measurements as aircraft operations increase or change in nature. Recommendations for noise attenuation contained in the Watsonville Airport Master Plan shall be implemented on a project-by-project basis.

b. City of Watsonville Municipal Code.

Title 5, Chapter 8 of the City of Watsonville Municipal Code addresses noise and includes the following sections:

5-8.01 Offensive noise prohibited. It shall be unlawful for any person on residential property or a public way to make or continue, or cause to be made or continued, any offensive, excessive, unnecessary, or unusually loud noise or any noise which either annoys, disturbs, injures, or endangers the comfort, repose, health, peace, or safety of others on residential property or public ways within the City. (§ 1, Ord. 776-88 C-M, eff. May 12, 1988)

5-8.02 Offensive noise standards. The following acts, among others, are declared to be offensive, loud, disturbing, and unnecessary noises originating from residential properties or on public ways in violation of this chapter, but such enumeration shall not be deemed to be exclusive:

- a) The using, operating, or permitting to be played, used, or operated of any radio receiving set, musical instrument, phonograph, stereo, television, or other machine or device for producing or reproducing sound in such a manner as to disturb the peace, quiet, and comfort of neighboring residential inhabitants at any time with volume louder than is necessary for convenient hearing for the persons who are in the room, vehicle, or chamber in which such machine or device is operating and who are voluntary listeners thereto. The operation of any such set, instrument, phonograph, stereo, machine, or device between the hours of 10:00 p.m. and 7:00 a.m. in such a manner as to be plainly audible at a distance of fifty

(50') feet from the residential building, structure, or vehicle in which it is located shall be prima facie evidence of a violation of this chapter;

- b) The using, operating, or permitting to be played, used, or operated of any radio receiving set, stereo, tape recorder, sound amplifier, or other machine or device for producing or reproducing sound from any motor vehicle on any public street at any time with volume louder than is necessary for convenient hearing for the persons who are in the motor vehicle in which such sound machine or device is operating and who are voluntary listeners thereto. The operation of any such sound machine or device in such a manner as to be plainly audible at any time at a distance of ten (10') feet from the motor vehicle in which it is located shall be prima facie evidence of a violation of this chapter; and
- c) Yelling, shouting, hooting, whistling, or singing originating from any residential property or upon any public way at any time so as to annoy or disturb the quiet comfort or repose of persons in the vicinity. (§ 1, Ord. 776-88 C-M, eff. May 12, 1988)

5-8.03 Violations: Subsequent offenses within 48 hours. Any person who shall violate, or refuse to abide by, any provision of this chapter shall be subject to the penalties set forth in Chapter 2 of Title 1 of this Code; provided, further, any person who violates any section of this chapter and is cited for such violation and who, within forty-eight (48) hours after receiving such a citation, again violates the same section shall be guilty of a misdemeanor. A person is cited for a violation when such person is issued and signs an infraction or misdemeanor citation, or when such person is arrested and booked, or when a complaint is filed, and the person is notified of the filing of such complaint. (§ 1, Ord. 776-88 C-M, eff. May 12, 1988)

5-8.04 Exceptions. The provisions of this chapter shall not apply to any noise which is subject to the regulations concerning noise set forth in Title 14 of this Code or for which a permit has been issued pursuant to Chapter 34 of this title. (§ 1, Ord. 776-88 C-M, eff. May 12, 1988)

Title 13, Chapter 9 of the Municipal Code includes a section on sound transmission of condominium conversions:

13-9.10 Specific physical standards. The Community Development Director shall require conformance with the standards of this section in reviewing the proposed condominium conversion.

d) Sound Transmission.

- 1) Shock Mounting of Mechanical Equipment. All permanent mechanical equipment such as motors, compressors, pumps, and compactors which is determined by the Building Official to be a source of structural vibration or structure-borne noise shall be shock mounted with inertia blocks or bases and/or vibration isolators in a manner approved by the Building Official;
- 2) Noise Standards.

- i) The structure shall conform to all interior sound-transmission standards of Chapter 35 (Appendix) of the Uniform Building Code in a manner approved by the Building Official;
- ii) The subdivision shall conform to all exterior noise standards of the general plan;
- iii) In such cases where present standards cannot reasonably be met by conditions of subdivision approval, the applicant shall be required to notify potential buyers of the noise deficiency currently existing within these units.

Title 14, Chapter 35 of the Municipal Code includes a section regulating testing of emergency generators:

14-35.050 Telecommunications sites. The following standards apply to all telecommunications sites as defined in Chapter 18 of this title:

- e) Noise. Backup generators may only be operated during power outages and for testing and maintenance purposes. Testing and maintenance shall only take place on weekdays between the hours of 8:00 a.m. and 7:00 p.m.
- 2) Backup generators may not exceed the normally acceptable decibel level as established by the City of Watsonville General Plan, Watsonville Municipal Code and performance standards.

F. FUTURE NOISE ENVIRONMENT

Using the same assumptions and parameters for the Existing conditions model in SoundPLAN Version V9.1, traffic noise contours were generated for the future cumulative (2050 no project), and future cumulative plus project (2050 with project) traffic conditions specific to the General Plan project and are shown in Figures 5 and 6, respectively. Contours presented in this report represent the primary traffic noise sources in the City, which were identified above. Localized sources of noise, such as industrial plants and other stationary equipment or operations, were not included in the model because these sources only affect limited areas.

Table 9 summarizes the Existing, Cumulative, and Cumulative Plus Project CNEL noise levels, as measured at a distance of 75 feet from the centerline of each roadway.

Additionally, the new passenger rail line, which will run parallel to West Beach Street and continue along Walker Street, would contribute to the future noise environment once operational. However, the *Zero Emission Passenger Rail and Trail Project*³ is still in the planning process and has not established a train schedule or future noise levels expected by the electric passenger trains. Similar types of trains (VTA light rail) currently run through downtown San José and were measured by

I&R in August 2005.¹² The VTA light rail track runs along South 2nd Street, with a bus lane and traffic lane adjoining the rail line. VTA trains typically generated noise levels of 74 to 77 dBA when moving and 60 to 65 dBA when idling. A VTA bell generated noise levels of 75 dBA, and an announcement generated noise levels of 65 dBA. Combined with local traffic, typical hourly average noise levels ranged from 64 to 69 dBA L_{eq} during the day and from 58 to 68 dBA L_{eq} at night. The day-night average noise level over the course of the measurement period was 70 dBA L_{dn} /CNEL. However, it is expected that the electric passenger trains in Watsonville would have fewer daily trips than the VTA in downtown San José. Therefore, future CNEL due to rail activity is expected to be less than 70 dBA CNEL.

Future noise levels due to aircraft are not expected to change from existing conditions.

¹² Illingworth & Rodkin, Inc., “27 South First Street Project Environmental Noise and Vibration Report,” December 14, 2018.

FIGURE 5 Cumulative Traffic Noise Contours in Watsonville, CA

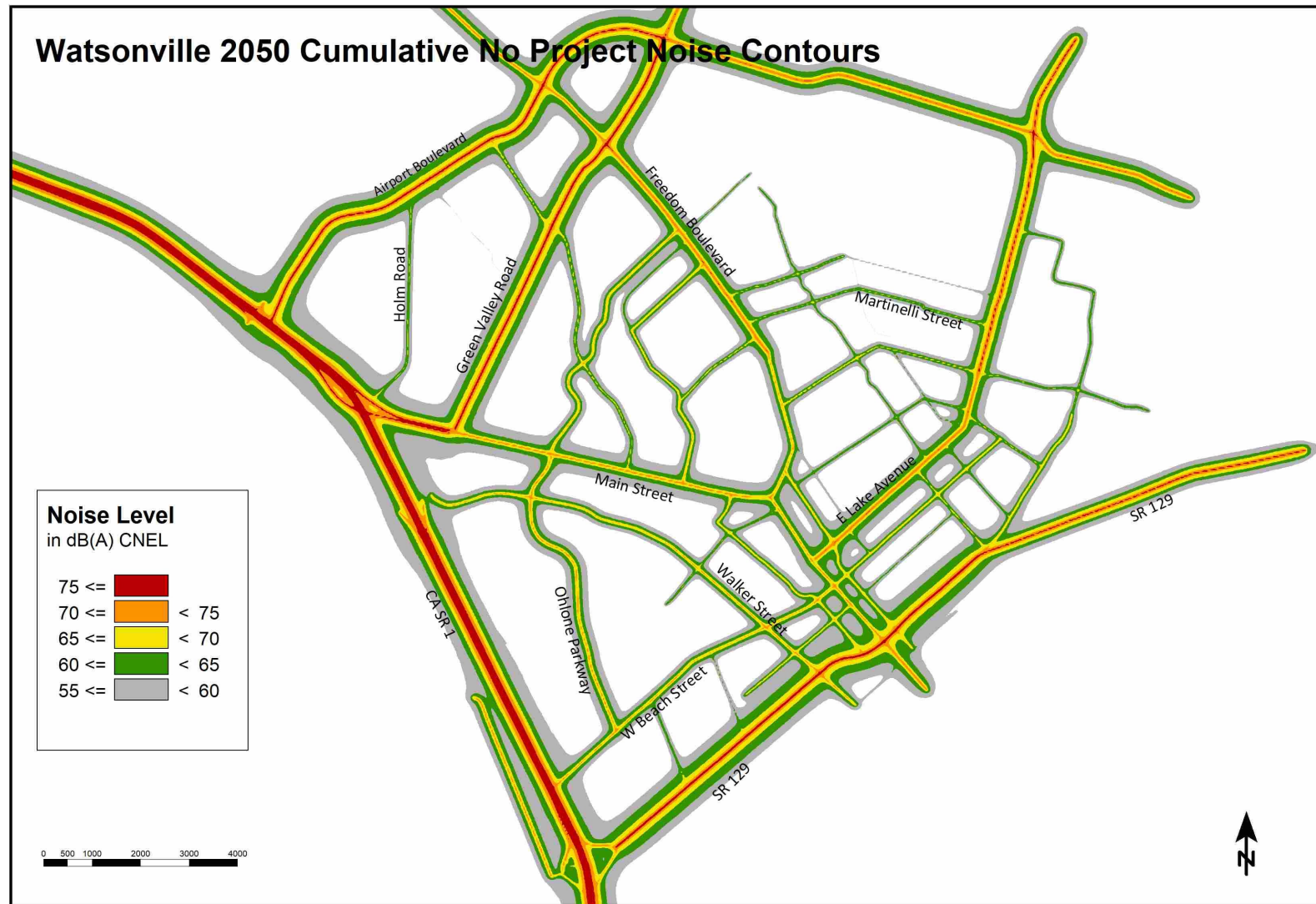


FIGURE 6 Cumulative Plus Project Traffic Noise Contours in Watsonville, CA

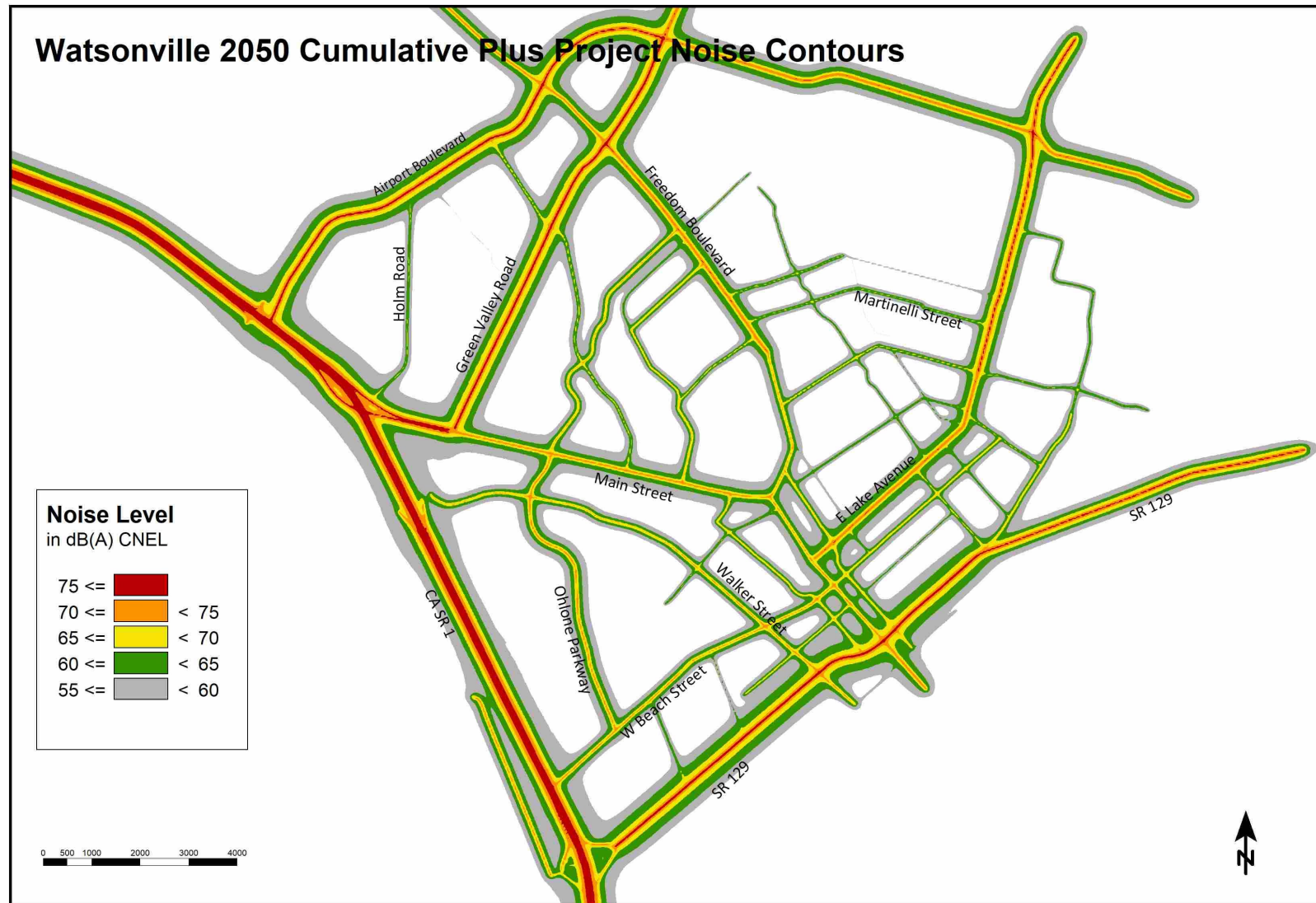


TABLE 9 Existing and Future Modeled Noise Levels Along Roadways in the Plan Area Vicinity

Roadway	Segment	CNEL at 75 feet from the Roadway Centerline, dBA			Increase Over Existing, dBA CNEL		Increase of Cumulative Build Scenario Over Cumulative No Build Scenarios, dBA
		Existing	Cumulative without Plan (No Build)	Cumulative with Plan (Build)	Cumulative without Plan (No Build)	Cumulative with Plan (Build)	
Airport Boulevard	Larkin Valley Road to Nielson Street	67.6	67.8	68.0	0.2	0.4	0.2
	Freedom Boulevard to Pajaro Lane	66.0	67.5	67.4	0.5	0.4	-0.1
Green Valley Road	Hope Drive to Pennsylvania Drive	67.9	68.1	68.3	0.2	0.4	0.2
	Amesti Road to Holohan Road	65.1	65.4	65.5	0.3	0.4	0.1
E Lake Avenue/ SR 152	Wagner Avenue to Nugent Avenue	66.2	67.0	67.2	0.8	1.0	0.2
	Manor Avenue to Tuttle Avenue	63.4	64.0	64.3	0.6	0.9	0.3
Freedom Boulevard	Airport Boulevard to Roache Road	62.4	62.5	62.7	0.1	0.3	0.2
	Davis Avenue to Blanca Lane	64.0	64.1	64.2	0.1	0.2	0.1
	Prospect Street to Stanford Street	60.4	60.6	60.7	0.2	0.3	0.1
Main Street	Green Valley Road to SR 1	68.0	68.2	68.4	0.3	0.4	0.2

Roadway	Segment	CNEL at 75 feet from the Roadway Centerline, dBA			Increase Over Existing, dBA CNEL		Increase of Cumulative Build Scenario Over Cumulative No Build Scenarios, dBA
		Existing	Cumulative without Plan (No Build)	Cumulative with Plan (Build)	Cumulative without Plan (No Build)	Cumulative with Plan (Build)	
	Front Street to San Juan Road	63.0	63.0	63.1	0.0	0.1	0.1
	Rodriguez Street to Main Street	62.4	62.5	62.8	0.1	0.4	0.3
	5 th Street to E Lake Avenue	61.7	61.1	61.2	-0.6	-0.5	0.1
Riverside Drive/SR 129	Bridge Street to Lakeview Road	65.8	67.2	67.4	1.4	1.6	0.2
	SR 1 to Industrial Road	68.5	68.5	68.5	0.0	0.0	0.0
Beach Street	Harvest Drive to Pine Street	59.6	60.6	61.4	1.0	1.8	0.8
	Marchant Street to Lincoln Street	57.9	58.5	58.5	0.6	0.6	0.0
Walker Street	Lake Avenue to Beach Street	60.7	60.7	61.1	0.0	0.4	0.4
Martinelli Street	Virginia Street to Washington Street	55.7	56.0	56.0	0.3	0.3	0.0
Ohlone Parkway	Kingfisher Drive to Landmark Elementary School Driveway	60.7	61.5	62.1	0.2	0.8	0.6
California State Route 1	Airport Boulevard to SR 129	70.4	71.4	71.4	1.0	1.0	0.0

G. PLAN CONSISTENCY ANALYSIS

The State of California, through its General Plan Guidelines, discusses how ambient noise should influence land use and development decisions and includes a table of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable uses at different noise levels. These suggested noise and land use compatibility standards provide local governments with a basis for setting limits appropriate to their jurisdiction.

1. Noise and Land Use Compatibility

a. Future Exterior and Interior Noise Environment

The Watsonville General Plan 2050 envisions the addition of up to 5,980 new residential units and 2.672 million square feet of nonresidential development, as summarized in Table 10. Project growth includes opportunity sites identified by the *2023-2031 Housing Element* and growth sites identified in the *Downtown Watsonville Specific Plan*. Parcels assumed to change are shown in Figures 7 and 8, for purposes of the EIR.

TABLE 10 Watsonville 2050 Projected Growth (Preferred Project)

	Location	Residential, number of units	Nonresidential, square feet
Infill	Corridor Infill	581	127,000
	Downtown Infill	3,883	115,000
	Neighborhood Infill	96	0
	Employment	0	271,000
	Total Infill	4,560	513,000
New Growth	Buena Vista	716	20,000
	Atkinson Lan/Area C	704	10,000
	Highway 1 Gateway	0	2,129,000
	Total New Growth	1,420	2,159,000
Total		5,980	2,672,000

The No Project Alternative assumes the same development as the Preferred Project, except:

- Infill Growth – with the exception of the TAZs in the north Freedom Boulevard area, the No Project Alternative assumes the same growth within the City Limits as the Preferred Project. Due to the presence of the Watsonville Municipal Airport crosswind runway (9-27) and the limitations of the associated airport safety zones, residential and mixed-use development is not included within the north Freedom Boulevard area.

FIGURE 7 Growth Projections Throughout the City of Watsonville (Preferred Project)

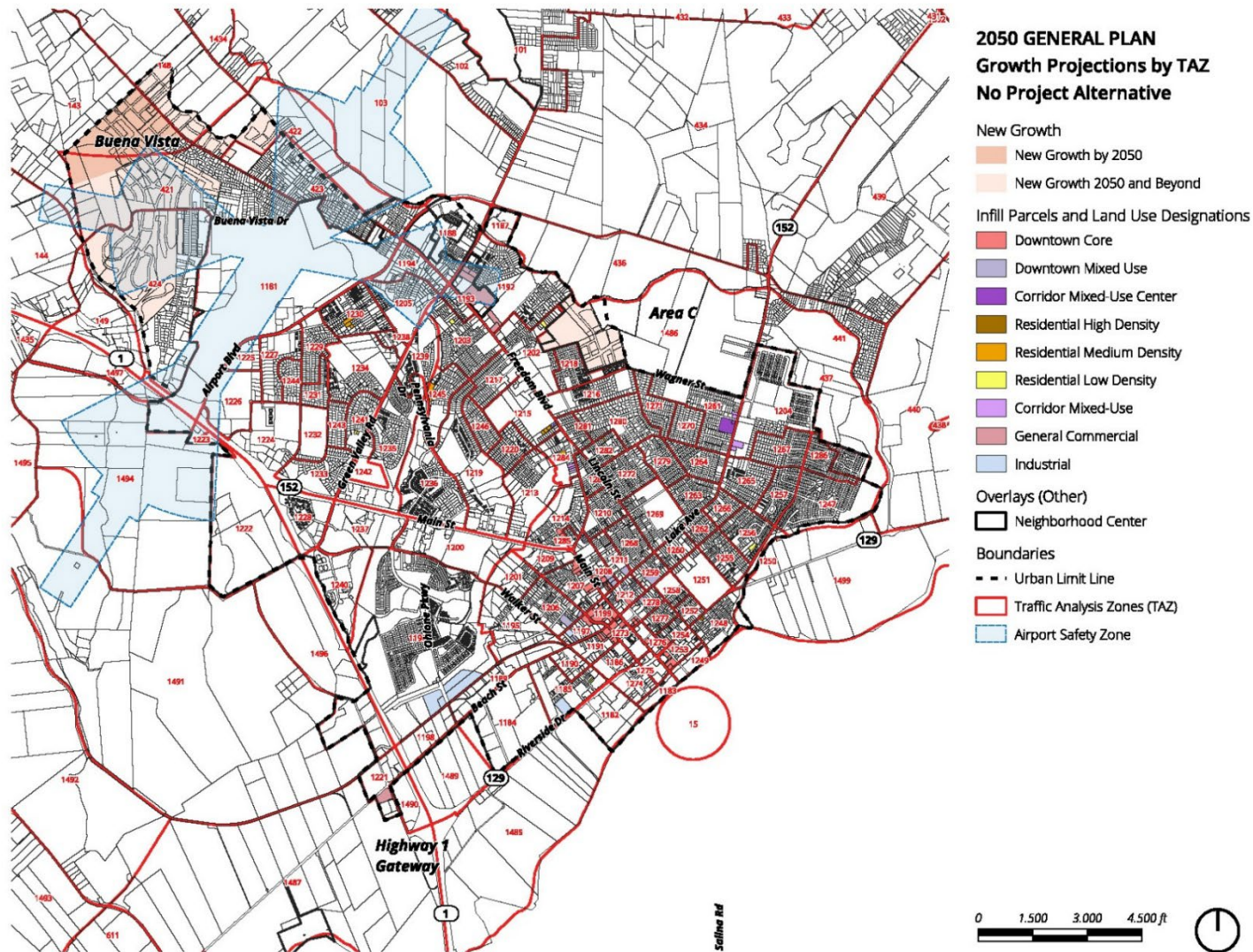
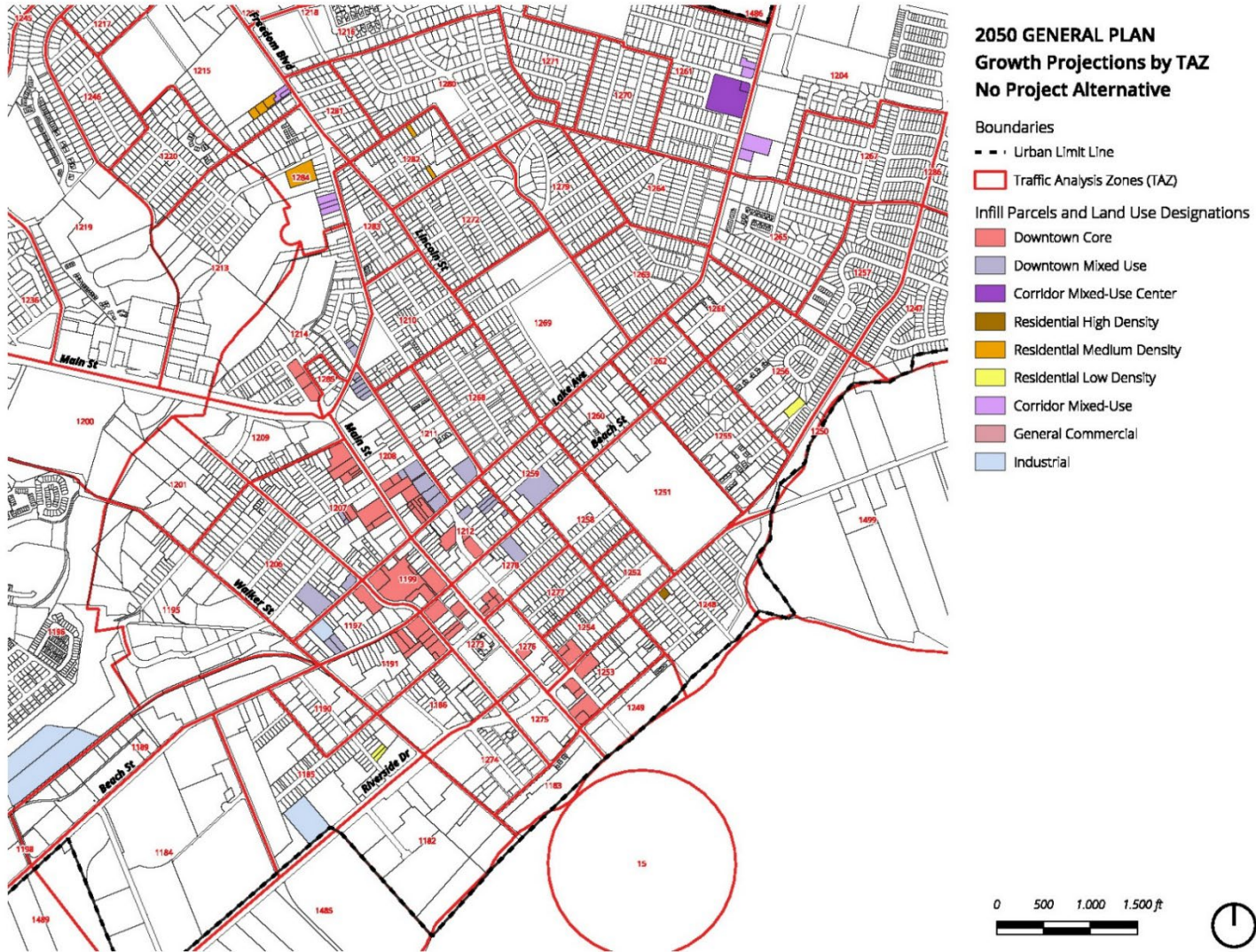


FIGURE 8 Growth Projections in Downtown Watsonville (Preferred Project)



- New Growth Areas – in addition, since Area C and the Highway 1 Gateway are located outside the current Urban Limit Line, the No Project Alternative does not include any development within these new growth areas.

The resultant growth projections are summarized in Table 11.

TABLE 11 Watsonville 2050 Projected Growth (No Project Alternative)

	Location	Parcel Area, acres	Residential, number of units	Nonresidential, square feet
Infill	Corridor Infill	24.39	206	127,000
	DWSP Infill	36.83	3,883	115,000
	Neighborhood Infill	10.89	96	0
	Employment	27.92	0	271,000
	Total Infill	100.03	4,185	513,000
New Growth	Buena Vista	41.49	716	20,000
	Atkinson Lan/Area C	0	0	0
	Highway 1 Gateway	0	0	0
	Total New Growth	216.27	716	20,000
Total		316.30	4,901	533,000

The primary noise sources in the City of Watsonville include ground transportation noise sources, such as roadway traffic and trains, and local stationary noise sources, such as equipment used for industrial operations. Residential developments, schools, libraries, hospitals, convalescent homes, and places of worship are considered to be the land uses that are the most noise-sensitive because of the quiet nature of the use.

The future noise exposure levels were calculated using the Cumulative 2050 Plus Project traffic volumes provided by the traffic consultant and modeled in SoundPLAN (see Figure 6 and Table 9). Proposed Goal N-2 and Policy N-2.1 are designed to protect the future noise environments of proposed noise-sensitive receptors and state the following:

Goal N-2: PROMOTE EXISTING AND FUTURE LAND COMPATIBILITY. Promote a land use pattern and development design that minimizes exposure to excessive noise levels, protects noise-sensitive uses, and ensures that new construction incorporates effective measures to reduce noise impacts.

N-2.1 Future Development. Require future development to adhere to the land use compatibility standards in Table 12-2 Land Use Compatibility for Community Noise Environments.

TABLE 12.2 | LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

Land Use Category	Community Noise Exposure (dBA CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential — Low Density, Single-Family, Duplex, Multiple Family, Mobile Homes	65	70	75	75+
Transient Lodging-Motels, Hotels	65	70	80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	65	70	75	75+
Auditoriums, Concert Halls, Amphitheaters	NA	70	75	75+
Sport Arenas, Outdoor Spectator Sports	NA	70	80	80+
Playgrounds, Neighborhood Park	70	75	80	80+
Golf Course, Riding Stables, Water Recreation, Cemeteries	70	75	80	80+
Office Buildings, Business, Commercial and Professional	70	75	80	80+
Industrial Manufacturing, Utilities, Agriculture	70	75	80	80+

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

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise barriers or noise insulation features have been included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Normally Unacceptable: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise-insulation features must be included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

Suitable Interior Environments: One objective of locating both single and multi-family residential units relative to a known noise source is to maintain a suitable interior noise environment at no greater than 45 dB CNEL. This requirement, coupled with the measured or calculated noise reduction performance of the type of structure under consideration, should govern the minimum acceptable distance to a noise source. Interior noise environment is considered habitable rooms; excluding bathrooms, kitchens, toilets, closets, and corridors.

Note: The above exterior noise level standards typically apply to common outdoor use areas..

From Table 12-2, future exterior noise levels at or below 65 dBA CNEL would be considered normally acceptable at outdoor use areas at residential land uses (i.e., low density, single-family, duplex, multiple family, and mobile homes); transient lodging-motels and hotels; and schools, libraries, churches, hospitals, and nursing homes. Common use outdoor areas at playgrounds and neighborhood parks; golf courses, riding stables, water recreation, and cemeteries; office buildings, businesses, commercial and professional uses; and industrial manufacturing, utilities, and agricultural uses would have a normally acceptable exterior noise environment with noise

levels at or below 70 dBA CNEL. The distances to the 70 and 65 dBA CNEL future traffic noise contours for the major roadways located in the City of Watsonville are summarized in Table 12.

TABLE 12 Preferred Project Noise Contour Distances within the City

Roadway	Segment	Distance from Centerline to Traffic Noise Contour, feet	
		70 dBA CNEL	65 dBA CNEL
Airport Boulevard	Larkin Valley Road to Nielson Street	50	130
	Freedom Boulevard to Pajaro Lane	45	130
Green Valley Road	Hope Drive to Pennsylvania Drive	50	140
	Amesti Road to Holohan Road	30	85
E Lake Avenue/SR 152	Wagner Avenue to Nugent Avenue	40	115
	Manor Avenue to Tuttle Avenue	20	65
Freedom Boulevard	Airport Boulevard to Roache Road	15	45
	Davis Avenue to Blanca Lane	20	65
	Prospect Street to Stanford Street	10	30
Main Street	Green Valley Road to SR 1	55	140
	Front Street to San Juan Road	15	50
	Rodriguez Street to Main Street	15	45
	5 th Street to E Lake Avenue	10	35
Riverside Drive/SR 129	Bridget Street to Lakeview Road	45	120
	SR 1 to Industrial Road	55	145
Beach Street	Harvest Drive to Pine Street	10	35
	Marchant Street to Lincoln Street	<10	20
Walker Street	Lake Avenue to Beach Street	10	30
Martinelli Street	Virgina Street to Washington Street	<10	10
Ohlone Parkway	Kingfisher Drive to Landmark Elementary School Drive	15	40
California SR 1	Airport Boulevard to SR 129	105	215

Where exterior noise levels would exceed 65 dBA CNEL in new residential or noise-sensitive use developments, interior levels may exceed 45 dBA CNEL, assuming that windows and doors are open for ventilation. Interior noise levels within residential units are 20 to 25 dBA lower than exterior noise levels with the windows closed, assuming typical California Building Code construction methods. Where exterior noise levels are 60 to 70 dBA CNEL, interior noise levels can typically be maintained below 45 dBA CNEL with the incorporation of an adequate forced-air mechanical ventilation system in the residential units to allow residents the option of controlling noise by keeping the windows closed. In areas exceeding 70 dBA CNEL, the inclusion of windows and doors with high Sound Transmission Class (STC) ratings, and the incorporation of forced-air mechanical ventilation systems, may be necessary to meet 45 dBA CNEL.

Implementation of Goals N-1 and N-2, Policies N-1.1 and N-2.1, Proposed Actions N-1.1.5, N-1.1.6, N-2.1.1, N-2.1.2, N-2.1.3, and N-2.1.5 would result in new noise-sensitive land uses to be compatible with future exterior and interior noise environments at project sites within the City of Watsonville.

Goal N-1: NOISE CONTROL. A City with appropriate noise and vibration levels that supports a range of places to promote the health, safety, and general welfare of the public and protects from adverse noise impacts.

N-1.1 Noise. Support design standards and code enforcement to ensure that noise levels in developed areas are kept at acceptable levels, and that future noise-sensitive land uses are protected from noise that is harmful.

***N-1.1.5 Traffic Calming and Complete Streets Design.** The City shall reduce vehicular noise impacts in residential and mixed-use areas by incorporating traffic-calming and Complete Streets improvements that encourage lower vehicle speeds. Such measures may include narrower travel lanes, speed bumps, curb extensions, raised crosswalks, roundabouts, street trees, enhanced pedestrian and bicycle facilities, and “quiet” pavement materials. The City shall prioritize these improvements in areas with documented noise complaints or where measured traffic speeds exceed posted limits.*

***N-1.1.6 Reduce Vehicular Noise Impacts through Building and Site Design.** The City shall minimize vehicular noise impacts on adjacent development by promoting the use of sound-dampening or sound-insulating building materials and site design techniques rather than the construction of CMU or other solid sound walls. New development located along major roadways shall incorporate design strategies—such as acoustically rated windows and building orientation—to achieve interior and exterior noise standards in a visually and environmentally sensitive manner.*

Goal N-2: PROMOTE EXISTING AND FUTURE LAND COMPATIBILITY. Promote a land use pattern and development design that minimizes exposure to excessive noise levels, protects noise-sensitive uses, and ensures that new construction incorporates effective measures to reduce noise impacts.

N-2.1 Future Development. Require future development to adhere to the land use compatibility standards in Table 12-2 Land Use Compatibility for Community Noise Environments.

***N-2.1.1 Guide Noise-Tolerant Uses.** Plan and promote noise-tolerant land uses in noise-generating areas such as transportation corridors adjacent to major transportation corridors and the airport.*

***N-2.1.2 Protect Noise-Sensitive Land Uses.** The City shall discourage the siting of noise-sensitive land uses, such as residences, schools, and hospitals, in areas where noise levels exceed the applicable standards.*

***N-2.1.3 Noise and Land Use Compatibility.** New development of noise-sensitive land uses in noise-impacted areas shall incorporate effective mitigation measures into the project design to reduce exterior and interior noise consistent with Table 12-2 | Land Use Compatibility for Community Noise Environments.*

***N-2.1.5 Site Planning.** The City shall evaluate site orientation and building design to decrease the potential for noise intrusion, using the noise contour map and compatibility guidelines.*

2. Vibration and Land Use Compatibility

a. Future Vibration Environment

Details regarding the number of passenger trains passing through the proposed Downtown Watsonville Passenger Rail Station are unavailable at this time. SCCRTC has begun preliminary plans for reactivating passenger rail service as part of the ZEPRT Project, which, if implemented, would provide passenger rail service between Santa Cruz and Pajaro through Watsonville. There are currently no near term plans for passenger rail services. SCCRTC has begun to explore a “interim trail” that explores using the existing rail corridor for a temporary multi-use path while retaining the rail tracks. Therefore there is no schedule detailing the number of passenger trains because reactivating passenger rail service is uncertain and would be in the long term.

Details regarding the number of passenger trains that may operate along the Santa Cruz Branch Rail Line in the future are not yet finalized; however, the ZEPRT Concept Report included a conceptual operating schedule for potential zero-emission passenger rail service on the corridor. This conceptual schedule was developed for service with 30-minute headways totaling 33 train trips per day between 6:00 a.m. and 10:00 p.m.

The number of UPRR trains in the future is expected to remain four per week. onto provide a conservative worst-case future usage of the UPRR and proposed passenger trains, up to 37 train events per day are assumed along the tracks at Walker Street, which falls within the occasional usage category for the FTA thresholds. Depending on the type of noise-sensitive receptor, thresholds range from 65 to 78 VdB. To ensure the FTA thresholds are met, Goal N-1, Policy N-1.1, and Action N-1.1.2 would result in new noise-sensitive land uses to be compatible with future vibration environments at project sites within the City of Watsonville.

Goal N-1: NOISE CONTROL. A City with appropriate noise and vibration levels that supports a range of places to promote the health, safety, and general welfare of the public and protects from adverse noise impacts.

N-1.1 Noise. Support design standards and code enforcement to ensure that noise levels in developed areas are kept at acceptable levels, and that future noise-sensitive land uses are protected from noise that is harmful.

N-1.1.2 Vibration Assessment. *Require all vibration-sensitive buildings (e.g., residences, hospitals, buildings containing sensitive manufacturing equipment, etc.) to be at least 100 feet from the centerline of railroad tracks, unless a detailed study demonstrates compatibility at closer distances. The Federal Transit Administration's vibration impact criteria summarized in Table 12-4 Groundborne Vibration Impact Criteria and Potential Annoyance Levels shall be used to evaluate the compatibility of train vibration with proposed land uses adjoining the train corridor. Site specific vibration studies shall be completed for vibration-sensitive uses proposed within 100 feet of active railroad tracks.*

TABLE 12.4 | GROUNDBORNE VIBRATION IMPACT CRITERIA AND POTENTIAL ANNOYANCE LEVELS

Land Use/Building Category	Impact Criteria (Leq, dBA)		
	Frequent Events ¹	Occasional Events ²	Infrequent Events ³
1: Buildings where vibration would interfere with interior operations.	65 ⁴	65 ⁴	65 ⁴
2: Residences and buildings where people normally sleep.	72	75	80
3: Institutional land uses with primarily daytime use.	75	78	83

Source: Federal Transit Administration (FTA). 2018, September. Transit Noise and Vibration Impact Assessment Manual.

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.

H. STANDARDS OF SIGNIFICANCE

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

1. 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;
2. Generation of excessive groundborne vibration or groundborne noise levels; and
3. 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.

I. IMPACT DISCUSSION

NOI-1 The project would potentially generate 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.

a. Temporary Construction Noise

Noise impacts resulting from construction depend on 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 receptors. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), when construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction durations last over extended periods of time.

Major noise-generating construction activities associated with new projects would include removal of existing pavement and structures, site grading and excavation, installation of utilities, the construction of building foundations, cores, and shells, paving, and landscaping. The highest noise levels are typically generated during the demolition of existing structures when impact tools are used (e.g., jackhammers, hoe rams) and during the construction of building foundations when impact pile driving may be required to support the structure. Site grading and excavation activities would also generate high noise levels, as these phases often require the simultaneous use of multiple pieces of heavy equipment, such as dozers, excavators, scrapers, and loaders. Lower noise levels result from building construction activities when these activities move indoors and require less heavy equipment to complete the tasks.

Construction equipment would typically include, but would not be limited to, earth-moving equipment and trucks, pile driving rigs, mobile cranes, compressors, pumps, generators, paving equipment, and pneumatic, hydraulic, and electric tools. Construction noise levels would vary by phase and vary within phases based on the amount of equipment in operation and the location of operational equipment. Typical construction noise levels at a distance of 50 feet are shown in Tables 13 and 14. Table 13 shows the average noise level range by construction phase, and Table 14 shows the maximum noise level range for different construction equipment. Typical hourly average construction-generated noise levels are about 77 to 89 dBA L_{eq} measured at a distance of 50 feet from the site during busy construction periods. Large pieces of earth-moving equipment, such as graders, scrapers, and dozers, generate maximum noise levels of 85 to 90 dBA L_{max} at a distance of 50 feet. Construction noise levels drop off at a rate of about 6 dBA per doubling of distance between the noise source and receptor. Intervening structures or terrain would result in lower noise levels at distant receptors.

TABLE 13 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 14 Construction Equipment, 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA) ^{1,2}	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor ³	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous

Equipment Category	L _{max} Level (dBA) ^{1,2}	Impact/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.

Source: U.S. Department of Transportation, Federal Highway Administration. 2017 (updated). FHWA Highway Construction Noise Handbook. Available: https://www.fhwa.dot.gov/ENVIRONMENT/noise/construction_noise/handbook/handbook00.cfm

The City of Watsonville does not currently define allowable construction hours or construction noise limits in the General Plan or Municipal Code. However, the proposed Action N-1.1.1 would establish noise limits for temporary construction noise.

N-1.1.1 Construction Noise. *Require the construction of new developments to minimize the exposure of neighboring properties to excessive construction noise levels shall meet the Federal Transit Administration’s construction noise criteria at receiving sensitive receptors in the project vicinity during all phases of construction. These criteria are summarized in Table 12-1 Construction Noise Criteria.*

TABLE 12.1 | CONSTRUCTION NOISE CRITERIA

Land Use Category	Impact Criteria (Leq, dBA)	
	Day	Night
Residential	80	70
Commercial	85	85
Industrial	90	90

Source: Federal Transit Administration (FTA). 2018, September. Transit Noise and Vibration Impact Assessment Manual.

If operational hourly average noise levels during construction days would exceed the noise levels in Table 12-1 at the nearest property lines of receptors surrounding the construction site, then the temporary noise impact would be considered a potentially significant impact.

Significance without Mitigation: Potentially significant.

Mitigation Measure NOI-1, which recommends common best construction noise control practices, would be required to ensure that construction noise impacts are reduced to a less-than-significant level.

Mitigation Measure NOI-1: Project applicants shall minimize the exposure of nearby properties to excessive noise levels from construction-related activity through CEQA review, conditions of approval, and/or enforcement of the City's Noise Ordinance. Prior to issuance of demolition, grading, and/or building permits for development projects, a note shall be provided on development plans indicating that during on-going grading, demolition, and construction, the property owner/developer shall be responsible for requiring contractors to implement. The following standard construction noise controls shall be implemented at a project site within the City of Watsonville:

- Construction activities shall be limited to the hours between 7:00 a.m. and 7:00 p.m., Monday through Friday, and between 8:00 a.m. and 5:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays, unless permission is granted with a development permit or other planning approval.
- Utilize the best available noise suppression devices and techniques during construction activities.
- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Unnecessary idling of internal combustion engines shall be strictly prohibited.
- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses.
- Utilize "quiet" air compressors and other stationary noise sources where technology exists.
- Construction staging areas shall be established at locations that would create the greatest distance between the construction-related noise source and noise-sensitive receptors near the project site during all project construction.
- Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential receptors.
- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.
- Notify all adjacent businesses, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.

- Designate a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.
- If receptors adjoin the project site, construct a solid plywood fence along the shared property line, where feasible. A temporary noise barrier, tall enough to block direct line-of-sight with ground-level receptors, would provide about 5 dBA attenuation for adjacent noise-sensitive receptors when construction activities occur at the ground level.
- 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.
- 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 from 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 the hammer is shrouded, about 3 to 5 dBA of noise reduction could be expected, and more reduction could be achieved with the inclusion of a property line barrier. If a noise control blanket is erected on the receiving buildings, 5 to 10 dB of noise reduction could be achieved, depending upon how much shielding can be reasonably achieved.
- If pile driving is proposed and geological conditions permit, Cast-In-Drilled-Hole (CIDH) foundation systems shall be used instead of impact or vibratory pile driving. CIDH methods could reduce noise levels by 20 dB, as compared to impact pile driving.

The potential short-term noise impacts associated with the construction of future development facilitated by the Watsonville General Plan 2050 project would be mitigated to a less-than-significant level with the adoption and implementation of the above standard controls that require reasonable noise reduction measures to be incorporated into the construction plan and implemented during all phases of construction activity to minimize the exposure of neighboring properties.

Significance with Mitigation: Less-than-significant.

b. Permanent Traffic and Operational Noise

Potential permanent traffic and operational noise sources for projects within the City of Watsonville would depend on the type of project, but may include traffic noise increases due to projects, mechanical equipment noise, truck loading/unloading activities, and outdoor use activities such as playgrounds or events, which may include amplified sound. Proposed Action N-1.1.4 would define a significant impact generated by a new development.

N-1.1.4 Permanent Noise Increase. *Minimize the noise impacts of new developments on noise-sensitive land uses to increased noise levels by limiting noise generation and by requiring use of noise attenuation measures, such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:*

- *Result in a permanent noise level increase of 5 dBA CNEL or more at noise-sensitive receptors where noise levels would remain at or below 65 dBA CNEL; or*
- *Result in a permanent noise level increase of 3 dBA CNEL or more at noise-sensitive receptors where noise levels would exceed 65 dBA CNEL.*

Traffic Noise Increase

The increased development allowed under the General Plan 2050 would result in an increase in vehicular traffic as development occurs and population increases. These projected increases in traffic would occur over time and would increase noise levels throughout the City of Watsonville and its vicinity. Traffic volumes provided by transportation consultants were used to calculate the change in traffic noise levels attributable to the growth planned in the General Plan buildout. To assess the noise level increase due to the planned growth under the buildout, the Existing Plus Project traffic volumes were compared to the Existing traffic volumes. Table 10 shows the calculated traffic noise increases along all major roadways in the City of Watsonville under the Cumulative with Project (Build) traffic scenario. Traffic noise level contours under Existing and Cumulative with Project (Build) traffic scenarios are shown graphically in Figures 4 and 6, respectively.

Based on the calculated noise level increase summarized in Table 10 under the Cumulative with Project (Build) scenario, the permanent noise increase under full buildout conditions over existing would be 2 dBA CNEL or less, which would not exceed the increases established in proposed Action N-1.1.4. This would be a less-than-significant impact.

Significance without Mitigation: Less-than-significant.

New Operational Noise Sources

Development projects within the City of Watsonville may include residential, mixed-use residential, commercial, industrial, etc., projects, which would have varying noise-generating sources, such as mechanical equipment noise, noise due to truck loading/unloading activities (including both maneuvering and pass-by noise), project-specific noise (including playground noise, outdoor event noise with or without amplified sound, etc.).

The City's Municipal Code prohibits audible music and amplified noise at a distance of 50 feet from residential buildings or structures where the noise source originates. Additionally, testing of

emergency generators is limited to between 8:00 a.m. and 7:00 p.m. on weekdays. With no other quantitative noise limits associated with the new noise sources, the proposed Action N-1.1.4 would apply to these sources. Additionally, a significant impact would occur if the following operational noise limits due to new projects in the City of Watsonville are exceeded at the property lines of noise-sensitive receptors:

- Where existing ambient noise levels are at or below 60 dBA CNEL, the applicable noise limit would be 5 dBA above average L_{eq} during daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours; or
- Where existing ambient noise levels exceed 60 dBA CNEL, the applicable noise limit would be 3 dBA above average L_{eq} during daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) hours.

Conservatively, continuous operation of these types of noise sources would potentially result in a permanent noise level increase.

The implementation of proposed Actions N-1.1.5, N-1.1.6, N-1.1.7, N-1.1.8, N-2.1.4, and N-2.1.5 would reduce potential impacts due to traffic and other operational sources in noise-sensitive areas to a less-than-significant level:

N-1.1.5 Traffic Calming and Complete Streets Design. *The City shall reduce vehicular noise impacts in residential and mixed-use areas by incorporating traffic-calming and Complete Streets improvements that encourage lower vehicle speeds. Such measures may include narrower travel lanes, speed bumps, curb extensions, raised crosswalks, roundabouts, street trees, enhanced pedestrian and bicycle facilities, and “quiet” pavement materials. The City shall prioritize these improvements in areas with documented noise complaints or where measured traffic speeds exceed posted limits.*

N-1.1.6 Reduce Vehicular Noise Impacts through Building and Site Design. *The City shall minimize vehicular noise impacts on adjacent development by promoting the use of sound-dampening or sound-insulating building materials and site design techniques rather than the construction of CMU or other solid sound walls. New development located along major roadways shall incorporate design strategies—such as acoustically rated windows and building orientation—to achieve interior and exterior noise standards in a visually and environmentally sensitive manner.*

N-1.1.7 Truck Routes. *The City shall continue efforts to designate truck routes that bypass residential areas and other noise sensitive areas.*

N-1.1.8 Noise Ordinance. *The City shall revise the noise ordinance to include provisions for minimizing noise during nighttime hours, allowances for construction needs, party noise, live events, methods for reducing noise impacts such as walls, berms, building placement, and specialized pavement for projects that will either generate significant noise, or be exposed to noise from existing sources.*

N-2.1.4 Truck Deliveries. *Require that commercial or industrial truck delivery hours be limited when adjacent to noise-sensitive land uses unless there is no feasible alternative or there are overriding transportation benefits.*

N-2.1.5 Site Planning. *The City shall evaluate site orientation and building design to decrease the potential for noise intrusion, using the noise contour map and compatibility guidelines.*

With the implementation of the above actions, new developments would potentially produce noise levels from mechanical equipment, amplified noise, or other project-specific noise sources exceeding the Action N-1.1.4 limits.

Significance without Mitigation: Potentially significant.

Mitigation Measure NOI-2: One or more of the following shall be implemented as standard conditions of project approval within the City of Watsonville if operation of a new project would result in a permanent noise increase exceeding the limits in Action N-1.1.4 or exceeds existing ambient daytime or nighttime L_{eq} noise levels by a significant amount:

- Mechanical equipment shall be selected and designed to reduce noise levels to meet City requirements at the nearby noise-sensitive land uses. A detailed acoustical study shall be prepared during final building design to evaluate the potential noise generated by building mechanical equipment and demonstrate the necessary noise control to meet the City's Action N-1.1.4 threshold and would not exceed ambient noise levels by a significant amount. Noise control features, such as sound attenuators, baffles, and barriers, shall be identified and evaluated to demonstrate that mechanical equipment noise would not exceed the City's Action N-1.1.4 threshold or existing ambient noise levels by a significant amount at noise-sensitive locations around the project site. The noise control features identified by the study shall be incorporated into the project prior to issuance of a building permit.
- For truck loading/unloading operations exceeding the City's noise limits at the property lines of noise-sensitive receptors, a qualified acoustical consultant shall be retained to review that one or more of the following measures have been incorporated into the project and to verify that the project does not result in a permanent noise level increase or that daytime ambient L_{eq} is not exceeded by a significant amount:
 - Implement a no idling policy that requires engines to be turned off after five minutes;
 - Ensure the truck docks are recessed into the ground;
 - Equip loading bay doors with rubberized gasket type seals to allow little loading noise to escape;
 - Locate loading docks in less sensitive locations, away from noise-sensitive receptors or shielded from noise-sensitive receptors; and

- Construct a noise barrier between the loading docks and noise-sensitive receptors. The proposed barrier shall be continuous from grade to top, with no cracks or gaps, and have a minimum surface density of three lbs/ft² (e.g., one-inch-thick marine-grade plywood, ½-inch laminated glass, concrete masonry units (CMU)). The minimum height of the barrier shall be determined by the acoustical consultant and shall be tall enough to break the line-of-sight between the noise source and the sensitive receptor.
- To reduce noise levels exceeding the City limits during events, sporting activities, concerts, etc., involving amplified speech and/or music, a qualified acoustical consultant shall be retained to review that one or more of the following measures has been incorporated into the project and to verify that the project does not result in a permanent noise level increase or that daytime ambient L_{eq} is not exceeded by a significant amount:
 - Allowable hours of the events and the use of amplified speech and/or music shall be limited to daytime (7:00 a.m. to 10:00 p.m.) hours only; and
 - PA systems, music equipment, and speakers shall be set up such that they are oriented away from noise-sensitive receptors. The volume shall be controlled such that noise levels do not exceed existing ambient L_{eq} is not exceeded by a significant amount at the property lines of noise-sensitive receptors or does not result in a significant permanent noise level increase;

The potential for new development projects to generate noise levels exceeding the City's thresholds and/or exceeding the existing daytime or nighttime ambient L_{eq} by a significant amount would be mitigated to a less-than-significant level by proposed actions.

Significance with Mitigation: Less-than-significant.

NOI-2 The project would potentially expose persons and buildings to excessive vibration levels.

Construction activities occurring at project sites within the City of Watsonville may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include demolition, site preparation work, foundation work, and new building framing and finishing. Pile driving equipment, including impact and vibratory pile driving, can cause excessive vibration. The severity of a construction vibration impact is determined by the proximity of the project with respect to buildings and receptors and the sensitivity of surrounding buildings.

Construction vibration levels may be perceptible; however, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

The goal in establishing construction vibration limits is to mitigate potential vibration impacts associated with demolition and construction activities to a less-than-significant level by establishing safe limits to protect structures from potential damage and to minimize vibration impacts on people and businesses. Building damage generally falls into three categories:

- Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects;
- Minor damage is defined as hairline cracking in masonry or the loosening of plaster; and
- Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls

The City's proposed Action N-1.1.3 defines significance criteria based on damage to buildings:

***N-1.1.3 Construction Vibration.** Potential damage to off-site buildings surrounding new developments shall be assessed using FTA's vibration criteria summarized in Table 12-3 Velocity Level and Potential Building Effects during temporary construction activities.*

TABLE 12.3 | VELOCITY LEVEL AND POTENTIAL BUILDING EFFECTS

Velocity Level, PPV, in/sec	Building/Structural Category	Potential Buildings Effects
0.12	IV Buildings extremely susceptible to vibration damage	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.2	III Non-engineered timber and masonry buildings	Threshold at which there is a risk of damage to historic and some old buildings
0.3	II Engineered concrete and masonry (no plaster)	Threshold at which there is a risk of damage to older residential structures
0.5	I Reinforced-concrete, steel or timber (no plaster)	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Most buildings in the City of Watsonville would fall in the last three categories:

- 0.2 in/sec PPV threshold – for historic and some old buildings, which would include documented historic buildings or buildings constructed prior to the 1940s;
- 0.3 in/sec PPV threshold – for older residential buildings or buildings constructed between the 1940s and 1990s; and
- 0.5 in/sec PPV threshold – for new residential and modern commercial office buildings, which would include buildings constructed since the 1990s.

Table 15 presents typical vibration source levels for construction equipment at 25 feet. Heavy tracked vehicles (e.g., bulldozers or excavators) can generate distinctly perceptible groundborne vibration levels when this equipment operates within approximately 25 feet of sensitive land uses.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

TABLE 15 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft., in/sec	Approximate L_v at 25 feet, VdB
Pile Driver (Impact)	upper range	1.158	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., May 2026.

Pile driving has the potential to generate the highest ground vibration levels and is of primary concern for architectural damage. Impact pile drivers can generate distinctly perceptible groundborne vibration levels at distances up to about 100 feet and may exceed building damage thresholds within 25 feet of any building, and within 50 to 100 feet of a historical building or building in poor condition.

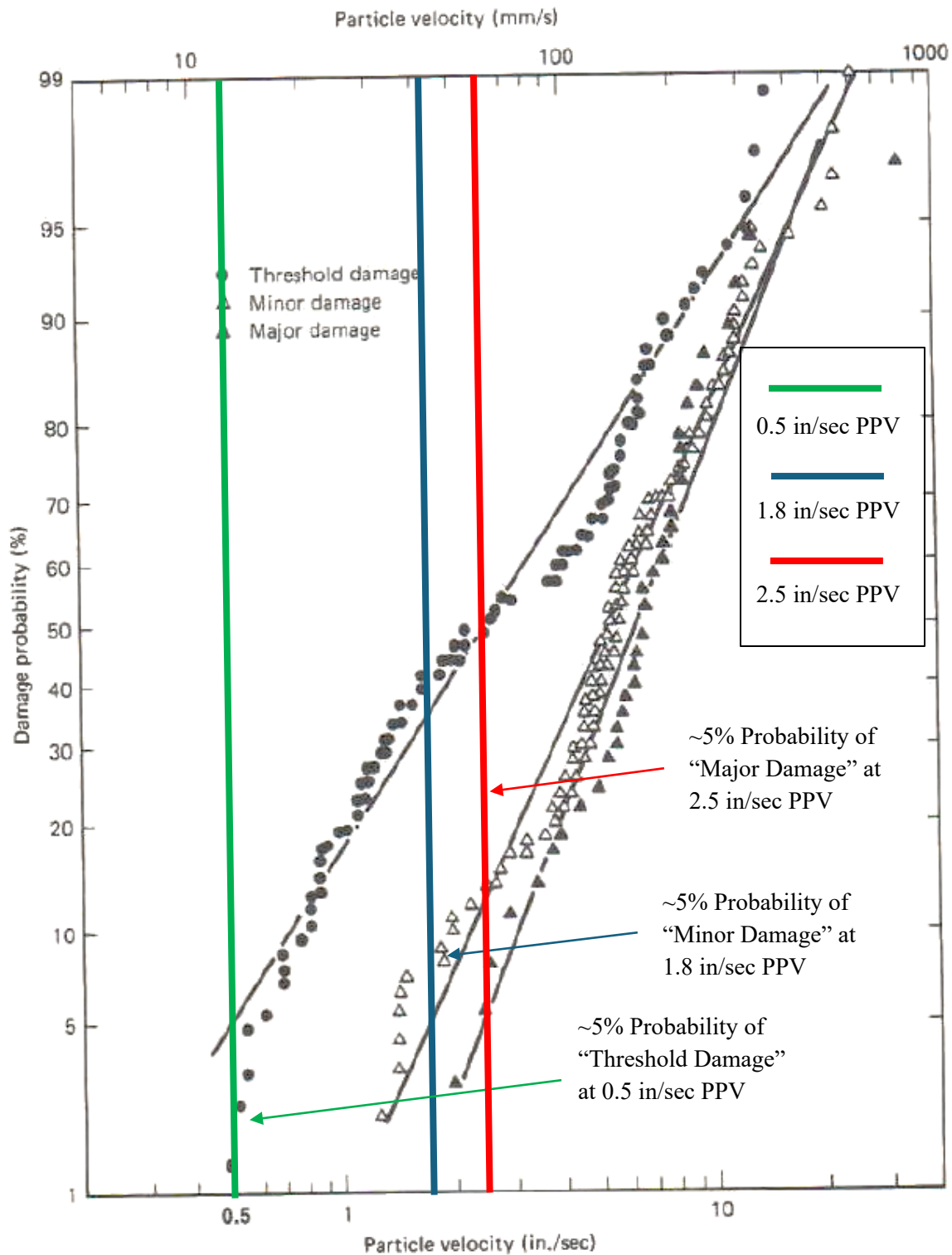
A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.¹³ The findings of this study have been applied to buildings affected by construction-generated vibrations.¹⁴ As reported in USBM RI 8507¹⁰ and reproduced by Dowding,¹¹ Figure 9 presents the damage probability, in terms of “threshold damage” (described above as cosmetic damage), “minor damage,” and “major damage,” at varying vibration levels.

As shown in Figure 9, maximum vibration levels of 0.5 in/sec PPV or lower would result in about 5% chance of cosmetic damage and no minor or major damage. There would be about 5% chance of minor damage with vibration levels of about 1.8 in/sec PPV and about 5% chance of major damage with vibration levels of about 2.5 in/sec PPV. Vibration levels this high would not be expected at construction sites within the City of Watsonville.

¹³ Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration from Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.

¹⁴ Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

FIGURE 9 Probability of Cracking and Fatigue from Repetitive Loading



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

Vibration levels are highest close to the source and attenuate with increasing distance at the rate $\left(D_{ref}/D\right)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet. Vibration levels would also vary depending on soil conditions, construction methods, and equipment used. Table 16 presents minimum distances at which receiving buildings would not exceed the 0.5, 0.3, and 0.25 in/sec PPV vibration limits using the source levels in Table 16 and this propagation rate.

TABLE 16 Minimum Distances to Meet the Caltrans Vibration Limits

Equipment		Minimum Distances to Meet the Vibration Limit, feet		
		0.5 in/sec PPV	0.3 in/sec PPV	0.2 in/sec PPV
Pile Driver (Impact)	upper range	69	110	159
	typical	32	51	73
Pile Driver (Sonic)	upper range	36	57	82
	typical	10	15	22
Clam shovel drop		11	18	26
Hydromill (slurry wall)	in soil	1	1	2
	in rock	2	2	3
Vibratory Roller		12	19	27
Hoe Ram		6	9	13
Large bulldozer		6	9	13
Caisson drilling		6	9	13
Loaded trucks		5	8	6
Jackhammer		3	4	5
Small bulldozer		1	1	1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., May 2026.

Conservatively, construction equipment used at project sites within the City could be used within the screening distances summarized in Table 16. This would be a potentially significant impact.

Significance without Mitigation: Potentially significant.

Mitigation Measure NOI-3: Where vibration limits are exceeded at off-site buildings surrounding construction sites within the City of Watsonville, the following best available controls shall be incorporated:

- A list of all heavy construction equipment to be used for this 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 as far as possible from vibration-sensitive receptors.

- Smaller, non-pile-driving equipment (less than 18,000 pounds) shall be used near the property lines or adjacent sensitive buildings to minimize vibration levels. For example, a smaller vibratory roller similar to a Caterpillar model CP433E vibratory compactor could be used when compacting materials within 12 feet of modern buildings, within 19 feet of older buildings, and within 27 feet of historic buildings. The smaller equipment intended to implement this requirement shall be individually identified among the list of equipment required under the above condition as a subset of equipment allowed for use at the property lines.
- Avoid dropping heavy equipment and using vibratory rollers within 12 feet of modern buildings, within 19 feet of older buildings, and within 27 feet of historic buildings. Use alternative methods for breaking up existing pavement, such as a pavement grinder, instead of dropping heavy objects, within 12 feet of modern buildings, within 19 feet of older buildings, and within 27 feet of historic buildings. Select demolition methods that do not involve large impact tools, such as hoe-rams, within 12 feet of modern buildings, within 19 feet of older buildings, and within 27 feet of historic buildings. Portable jackhammers, saws, or grinders shall be used to minimize impacts to the ground.
- Notify neighbors within 500 feet of the construction site of the construction schedule and that there could be noticeable vibration levels resulting from impact or vibratory pile driving, if applicable.
- For all projects requiring impact pile driving, foundation pile holes shall be pre-drilled to minimize the number of impacts required to seat the pile.
- For all projects requiring impact pile driving, jet or partially jet piles into place to minimize the number of impacts required to seat the pile.
- If the above measures are not feasible to reduce the impact to a less-than-significant level at adjoining historic buildings or at any building adjoining pile driving activities, a Construction Vibration Monitoring Plan (Plan) shall be implemented to document conditions prior to, during, and after construction or pile driving activities. The Plan shall be developed by a qualified acoustical consultant, and all plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry-accepted standard methods. The Plan shall include, but not be limited to, the following tasks:
 - Identify the sensitivity of nearby structures to groundborne vibration activities. A vibration survey (generally described below) would need to be performed.
 - Perform a photo survey, elevation survey, and crack monitoring survey at all identified sensitive structures. Surveys shall be performed prior to any demolition or pile driving activity, at regular intervals during construction or pile driving, and after completion, and shall include internal and external crack monitoring in structures, settlement, and distress, and shall document the condition of foundations, walls, and other structural elements in the interior and exterior of said structures.

- Develop a vibration monitoring and construction contingency plan to identify structures where monitoring would be conducted, set up a vibration monitoring schedule, define structure-specific vibration limits, and address the need to conduct photo, elevation, and crack surveys to document before and after demolition/construction or pile driving. Alternative construction methods would be identified for when vibration levels approach 0.5 in/sec PPV at modern buildings, 0.3 in/sec PPV at older buildings, and 0.2 in/sec PPV at historic buildings.
- If vibration levels approach limits, suspend construction and implement alternative construction methods to either lower vibration levels or secure the affected structures.
- Conduct post-surveys on structures where either monitoring has indicated high levels or complaints of damage have been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities.
- The results of all vibration monitoring shall be summarized and submitted in a report shortly after substantial completion of each phase identified in the project schedule. The report will include a description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations. An explanation of all events that exceeded the vibration limits will be included, together with proper documentation supporting any such claims.
- Designate a person responsible for registering and investigating claims of excessive vibration. The contact information of such a person shall be clearly posted on the construction site.

Significance with Mitigation: Less-than-significant.

NOI-3 New developments within the City of Watsonville would be exposed to a less-than-significant noise environment due to aircraft.

As shown in Figure 2, under the ultimate conditions of the adopted 2023 Airport Master Plan, the 65 and 70 dBA CNEL noise contours are largely confined to airport property with only minor exteriors into the adjacent industrial area along Aviation Way. The 60 and 65 dBA CNEL noise contours also remain largely within airport property, but to a limited extent these contours extend off-airport property into the industrial area south of Airport Boulevard and into a residential area to the north along Buena Vista Drive. This would be a less-than-significant impact.

The General Plan 2050 Airport Element and ALUCP include the following goals and policies.

Goal A-2 Protect Public Health and Safety Around The Airport. Minimize the community's exposure to excessive noise and aviation-related safety hazards affecting people and property on the ground, as well as aviation users, by guiding land use development in the Airport Influence Area using established noise, overflight, safety, and airspace protection compatibility criteria.

Policy A-2.1 Promote Compatible Land Use Patterns in the Airport Influence Area. Guide future development within the Airport Influence Area to ensure compatibility with existing and planned airport operations, while recognizing established land uses and applicable development rights.

Action A-2.1.1 Airport Land Use Compatibility Zoning Overlay. Adopt, maintain, and enforce a zoning overlay district to implement the noise, safety, overflight, and airspace protection criteria established in the Airport Land Use Compatibility Plan and guide future land use development within the Airport Influence Area (AIA) consistent with that Plan.

ALUCP Policy 2.1.1. Evaluating Acceptable Noise Levels for New Development: The noise compatibility of proposed land uses within the Watsonville Municipal Airport Influence Area shall be evaluated in accordance with the policies set forth in this section, including the criteria listed in Table 2-1 and the noise contours depicted on Map 2-1. These criteria shall take precedence over any conflicting lesser criteria in the Noise Element of the Watsonville General Plan 2050.

ALUCP Policy 2.1.2. Maximum Acceptable Exterior Noise Exposure: To minimize Noise-Sensitive development in noisy areas around the Airport, new land use development shall be restricted in accordance with the following.

- (a) The maximum CNEL considered normally acceptable for new noise-sensitive uses, including residential, schools, and outdoor theaters, in the vicinity of the Watsonville Municipal Airport is 60 dBA.
- (b) New nonresidential development shall be deemed incompatible in locations where the Airport-related noise exposure would be highly disruptive to the specific land use as indicated in Table 2-1.
- (c) Land uses not specifically listed in Table 2-1 shall be evaluated using the criteria for similar listed uses together with the above factors.

ALUCP Policy 2.1.3. Maximum Acceptable Interior Noise Levels: Land uses for which interior activities may be easily disrupted by noise shall incorporate sound attenuation design features sufficient to meet the interior noise level criteria specified by this policy. To minimize disruption of indoor activities by aircraft noise, new structures be required to comply with the following interior noise level criteria.

Significance without Mitigation: Less-than-significant.

APPENDIX A

FIGURE A1 Daily Trend in Noise Levels at LT-1, Wednesday, January 21, 2026

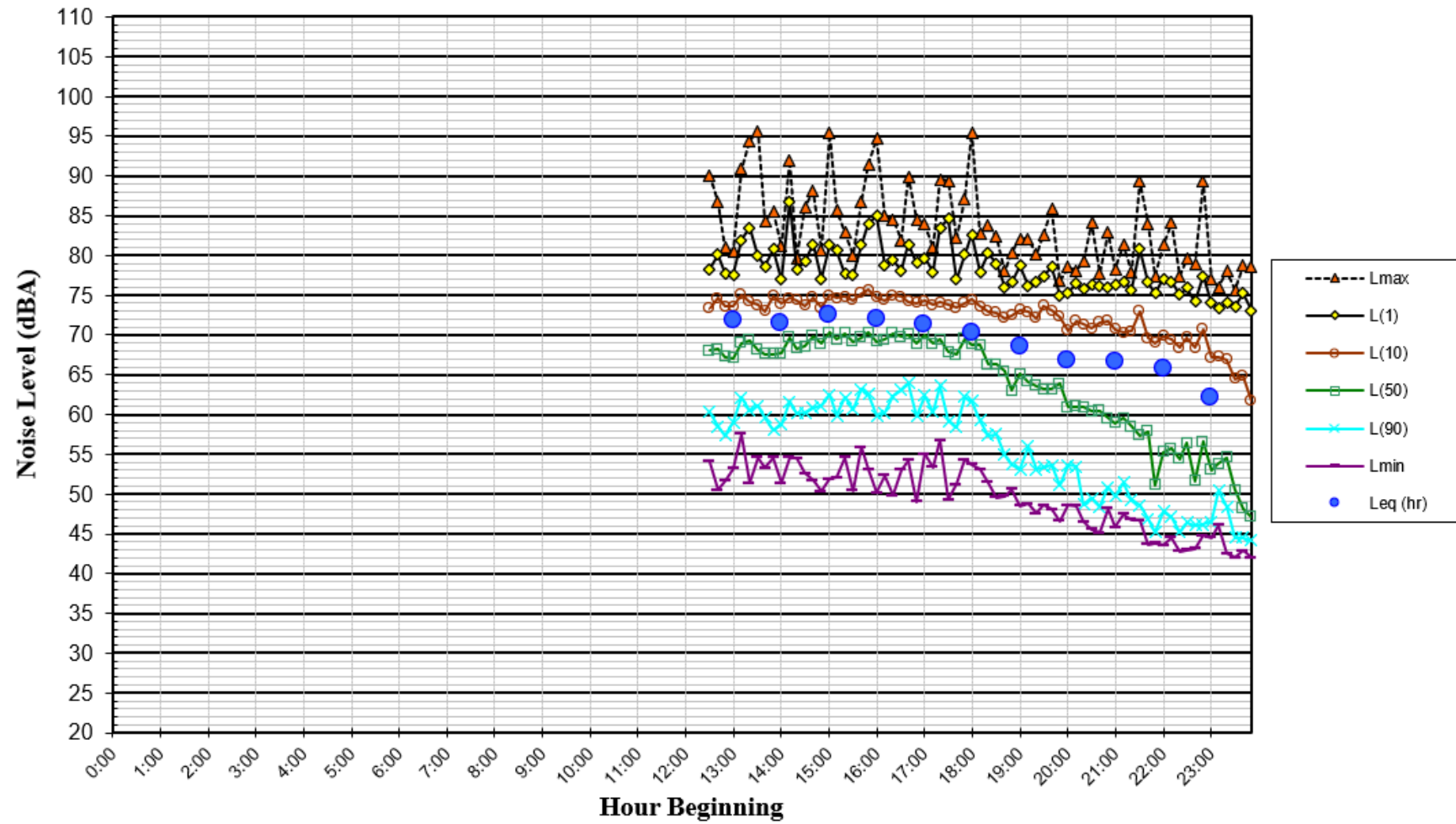


FIGURE A2 Daily Trend in Noise Levels at LT-1, Thursday, January 22, 2026

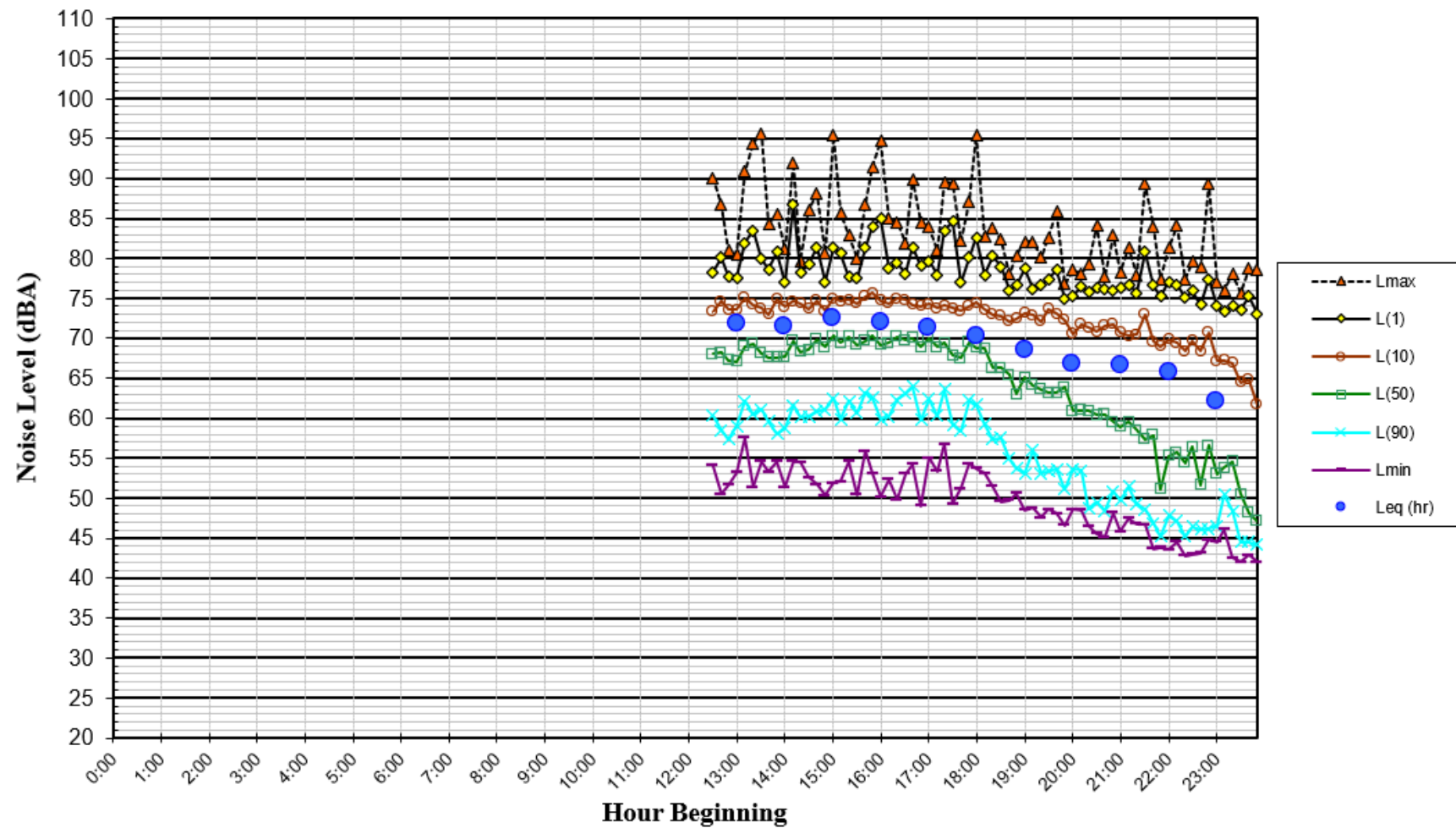


FIGURE A3 Daily Trend in Noise Levels at LT-1, Friday, January 23, 2026

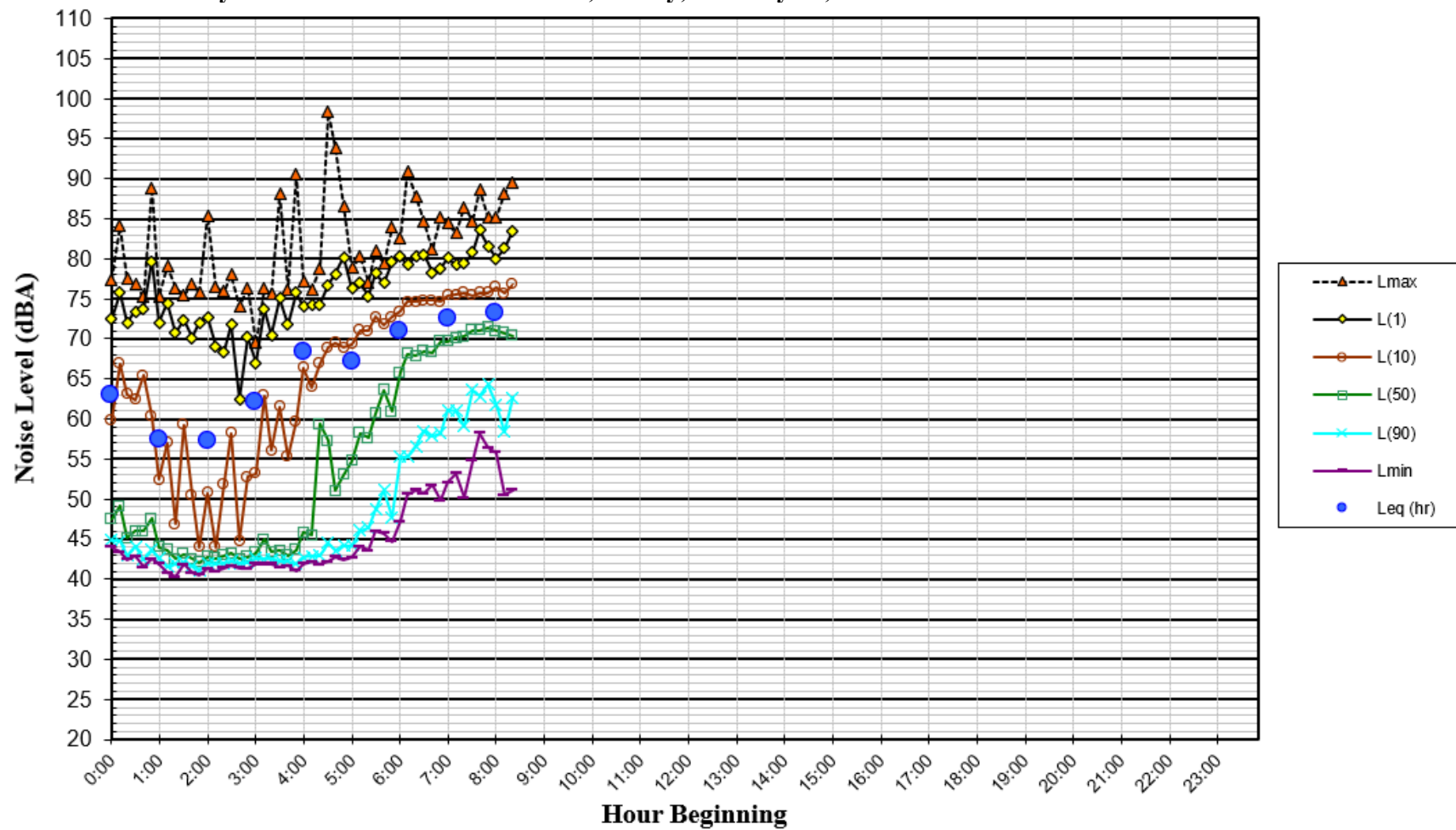


FIGURE A4 Daily Trend in Noise Levels at LT-2, Wednesday, January 21, 2026

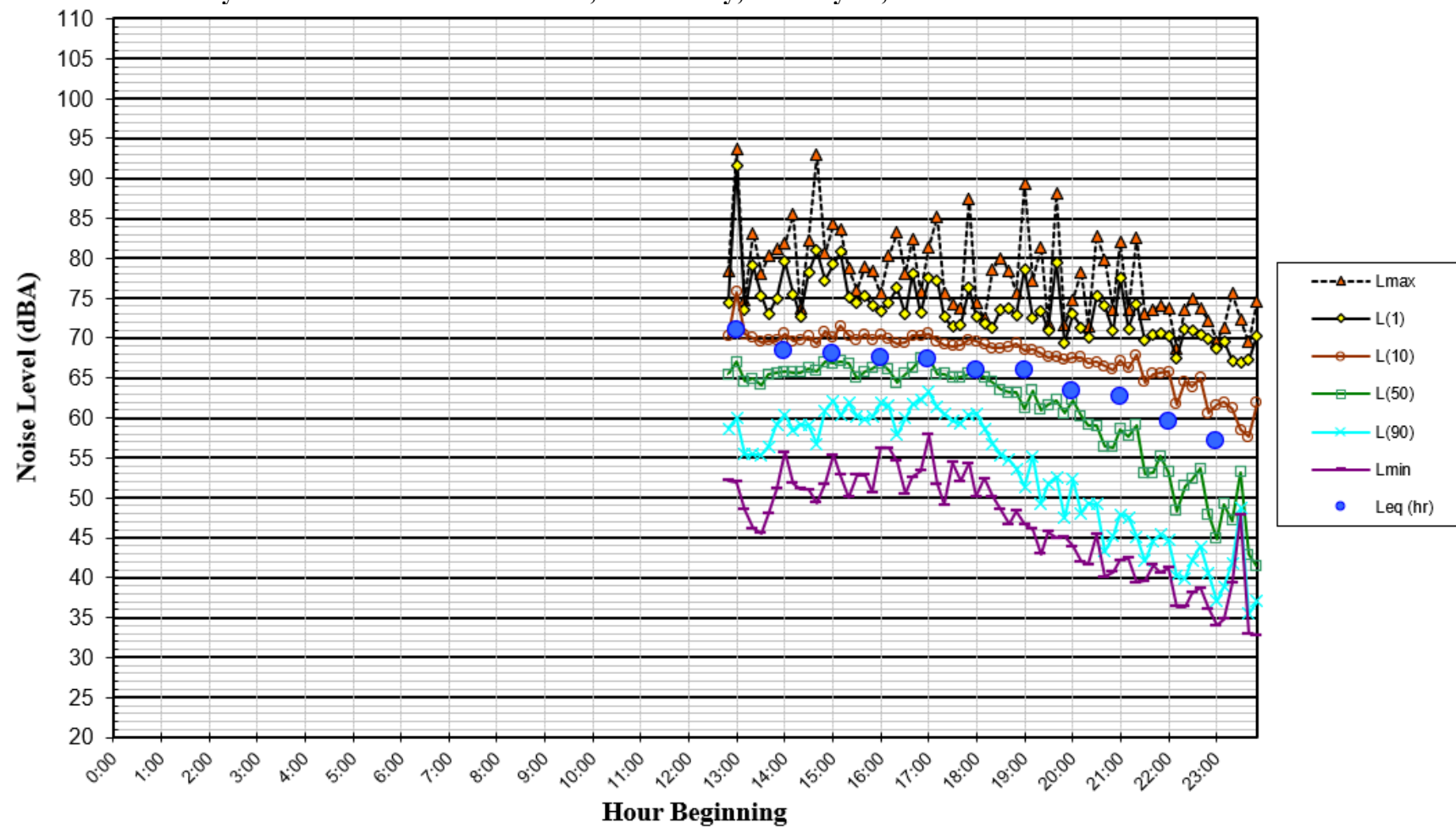


FIGURE A5 Daily Trend in Noise Levels at LT-2, Thursday, January 22, 2026

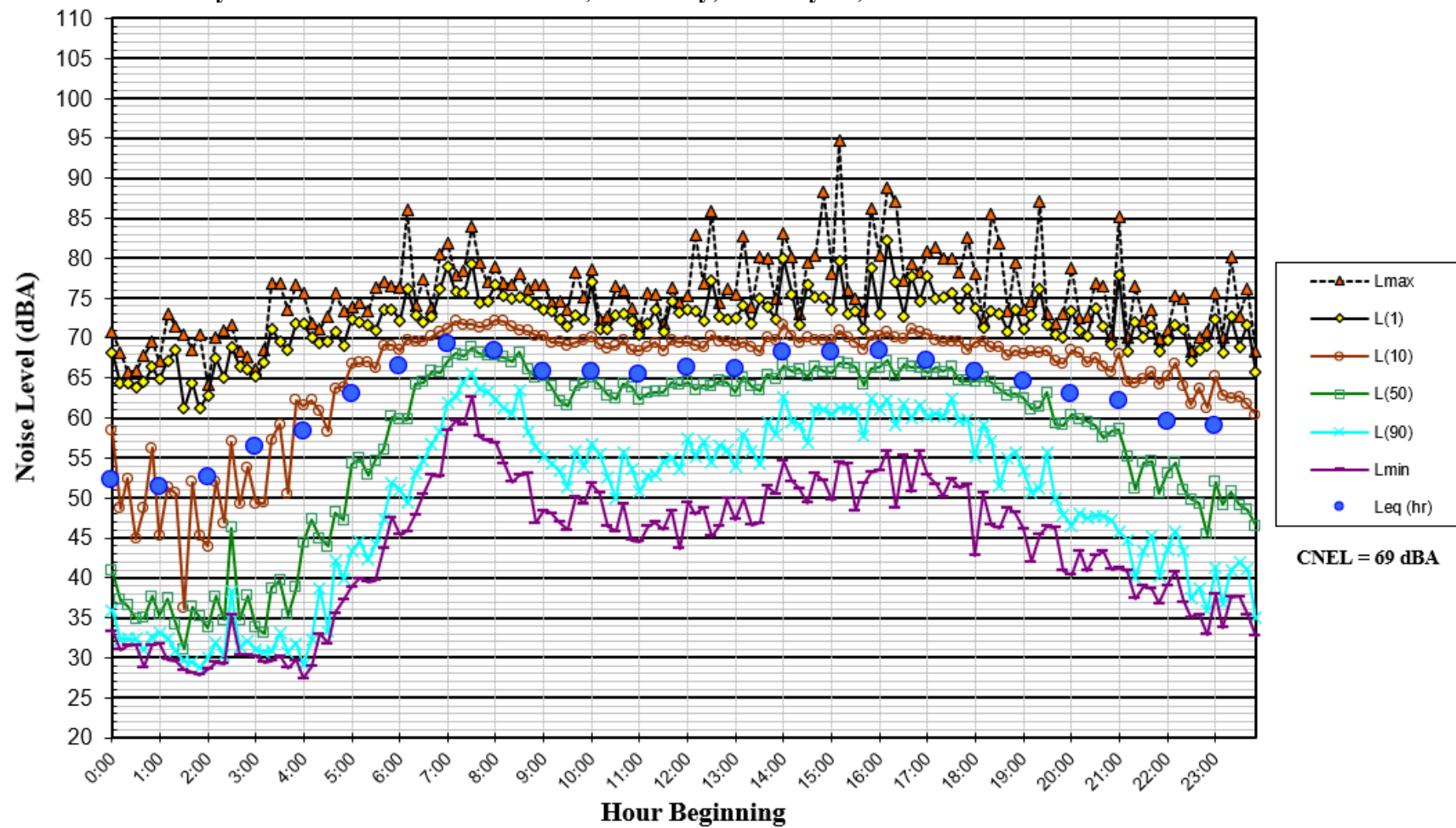


FIGURE A6 Daily Trend in Noise Levels at LT-2, Friday, January 23, 2026

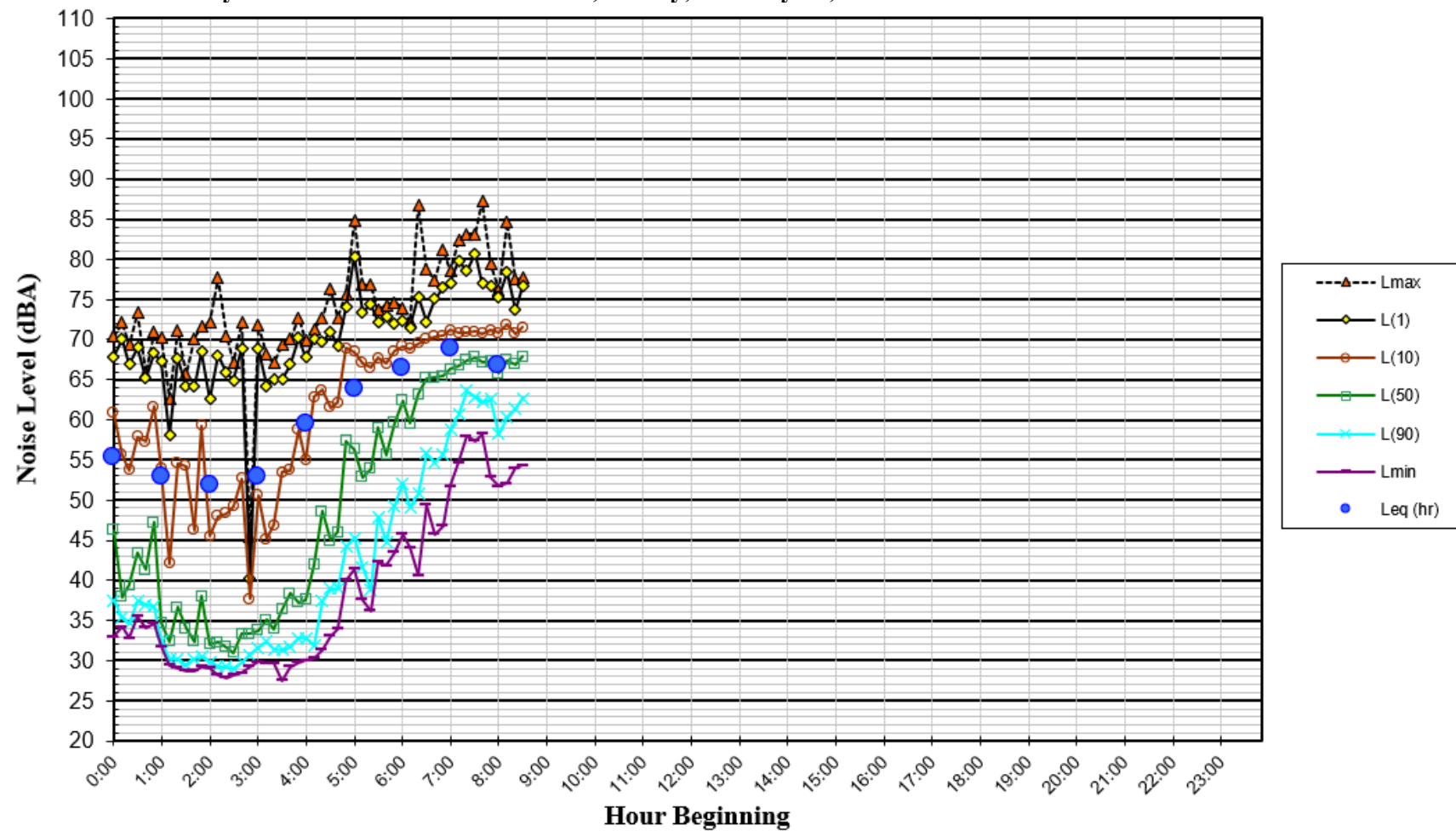


FIGURE A7 Daily Trend in Noise Levels at LT-3, Wednesday, January 21, 2026

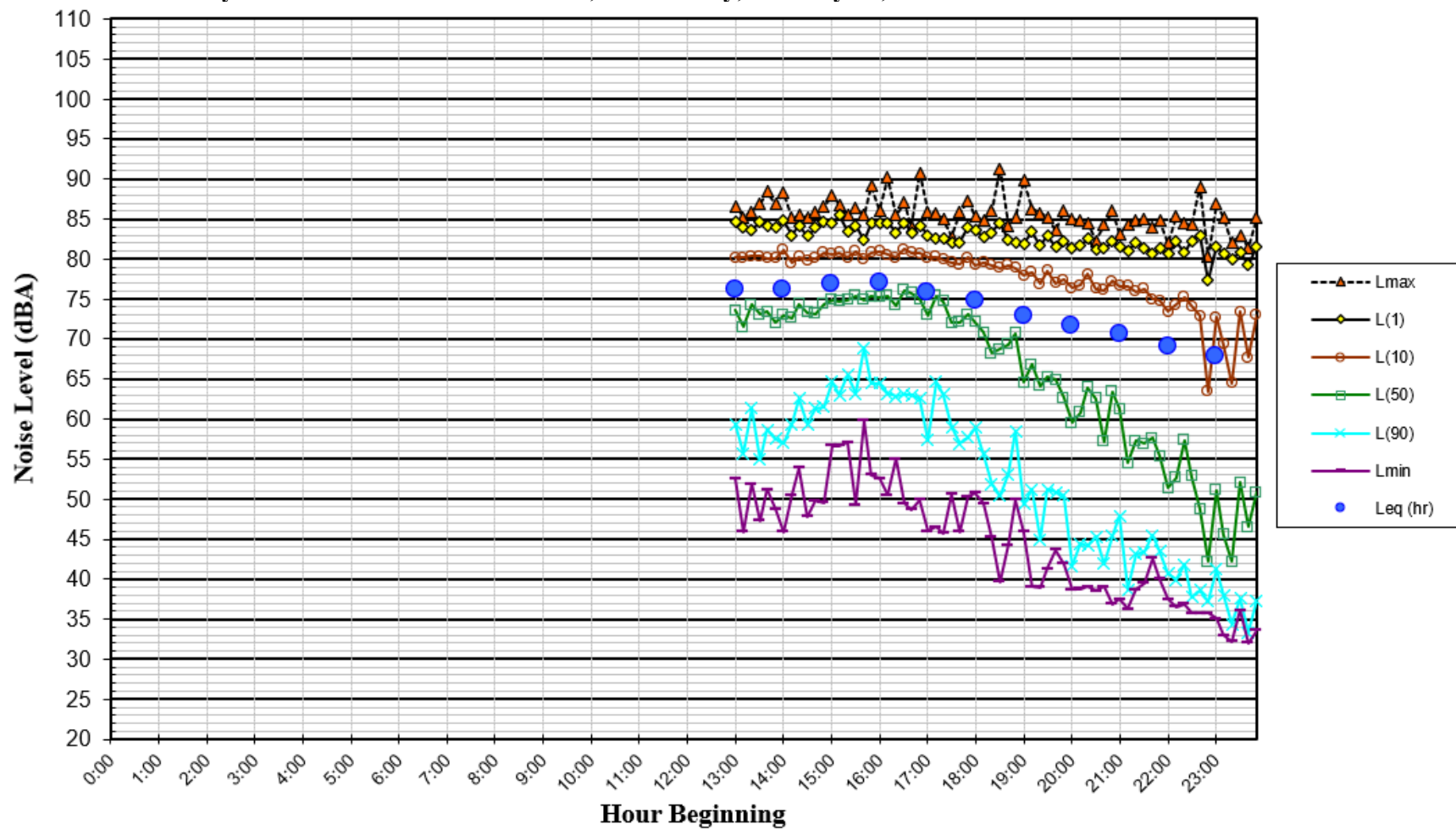


FIGURE A8 Daily Trend in Noise Levels at LT-3, Thursday, January 22, 2026

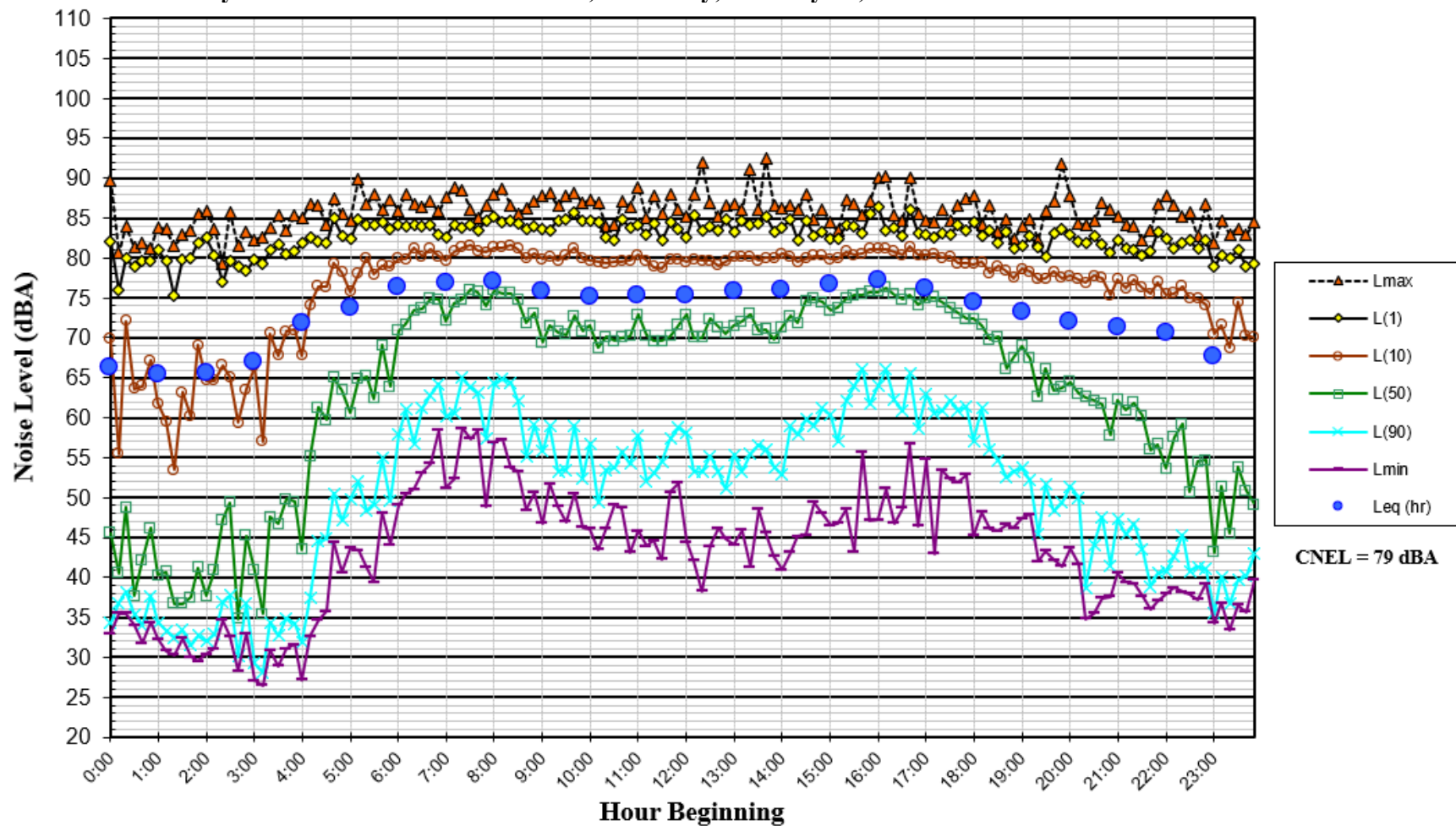


FIGURE A9 Daily Trend in Noise Levels at LT-3, Friday, January 23, 2026

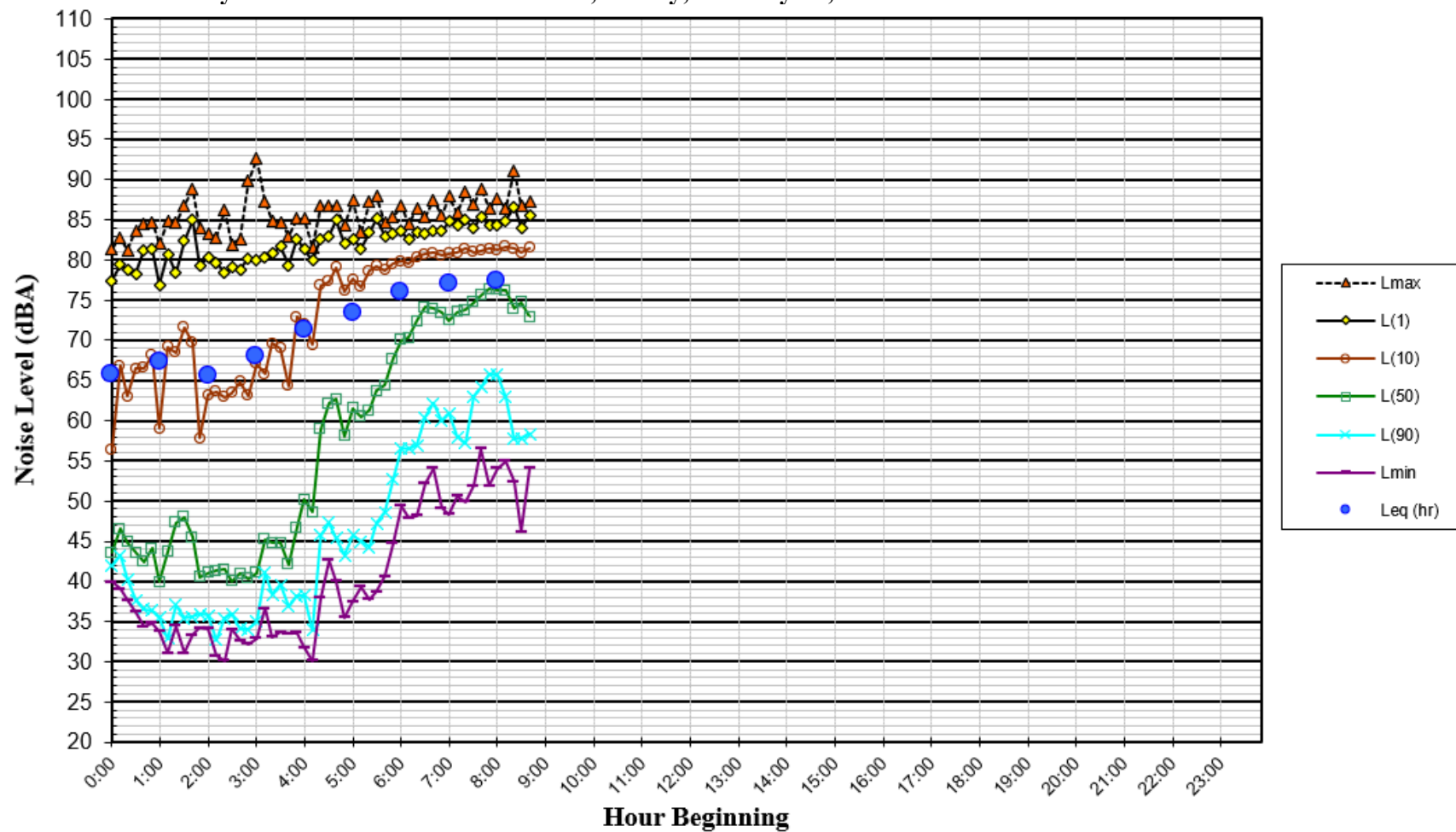


FIGURE A10 Daily Trend in Noise Levels at LT-4, Wednesday, January 21, 2026

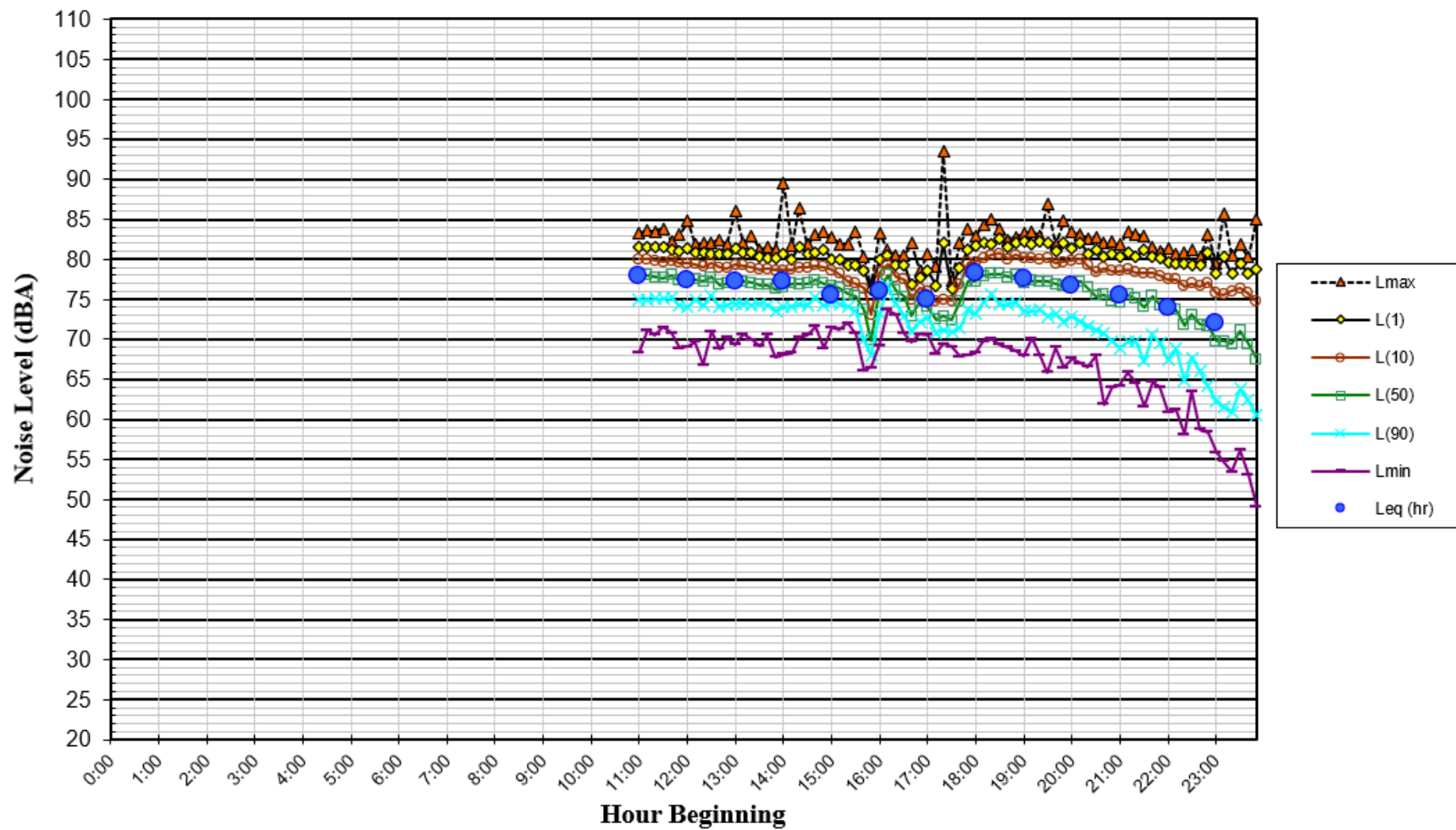


FIGURE A11 Daily Trend in Noise Levels at LT-4, Thursday, January 22, 2026

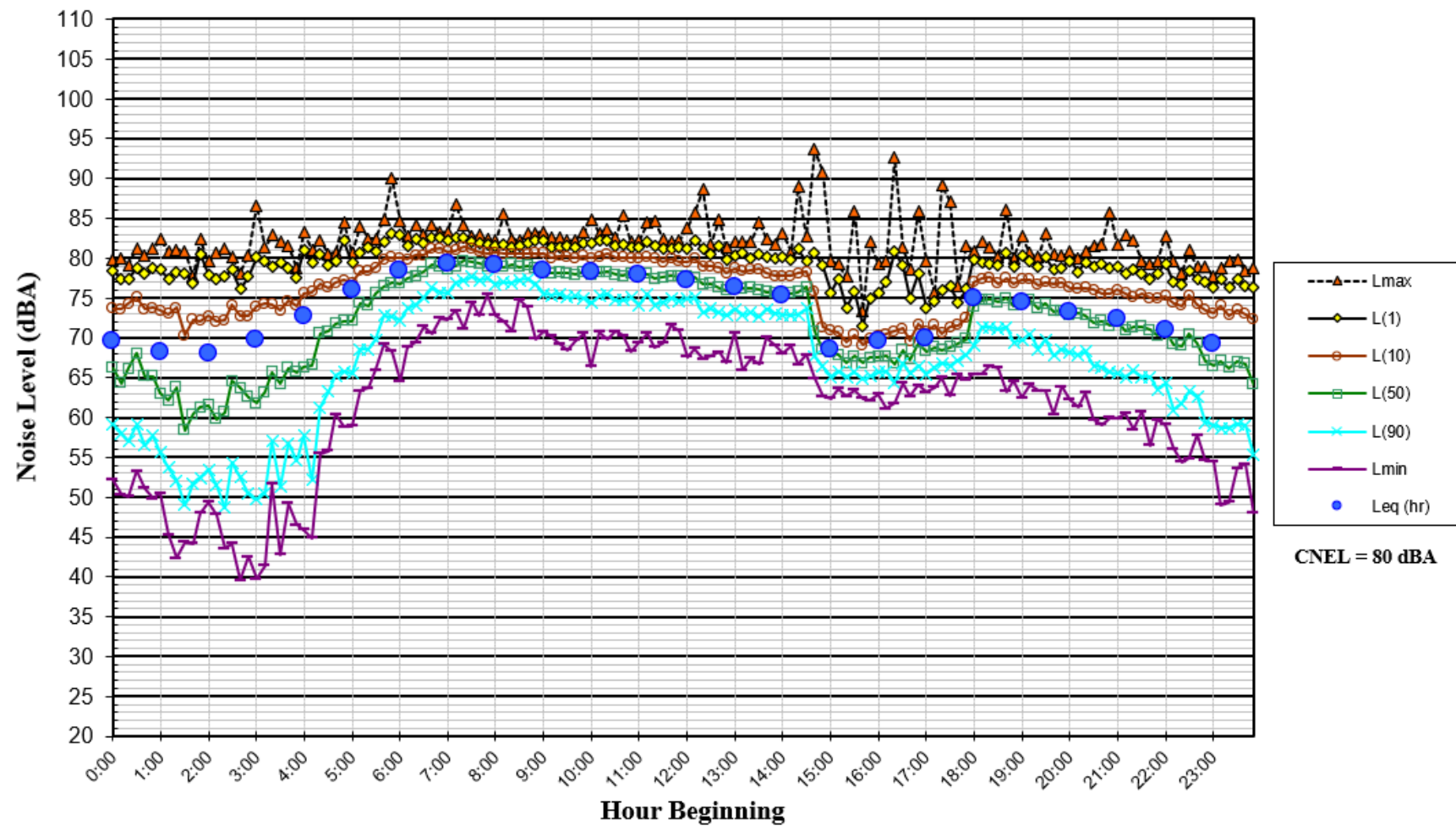


FIGURE A12 Daily Trend in Noise Levels at LT-4, Friday, January 23, 2026

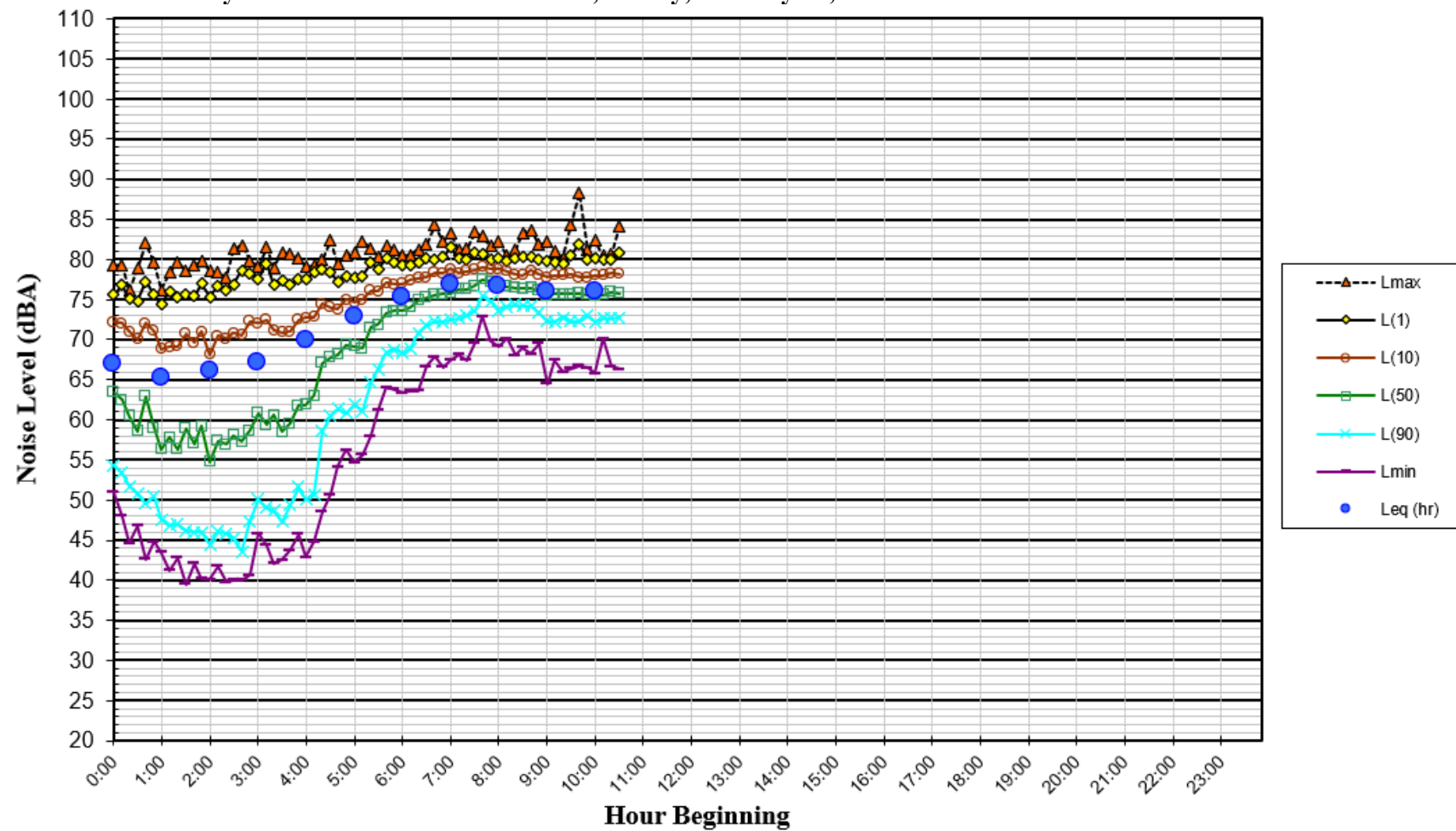


FIGURE A13 Daily Trend in Noise Levels at LT-5, Wednesday, January 21, 2026

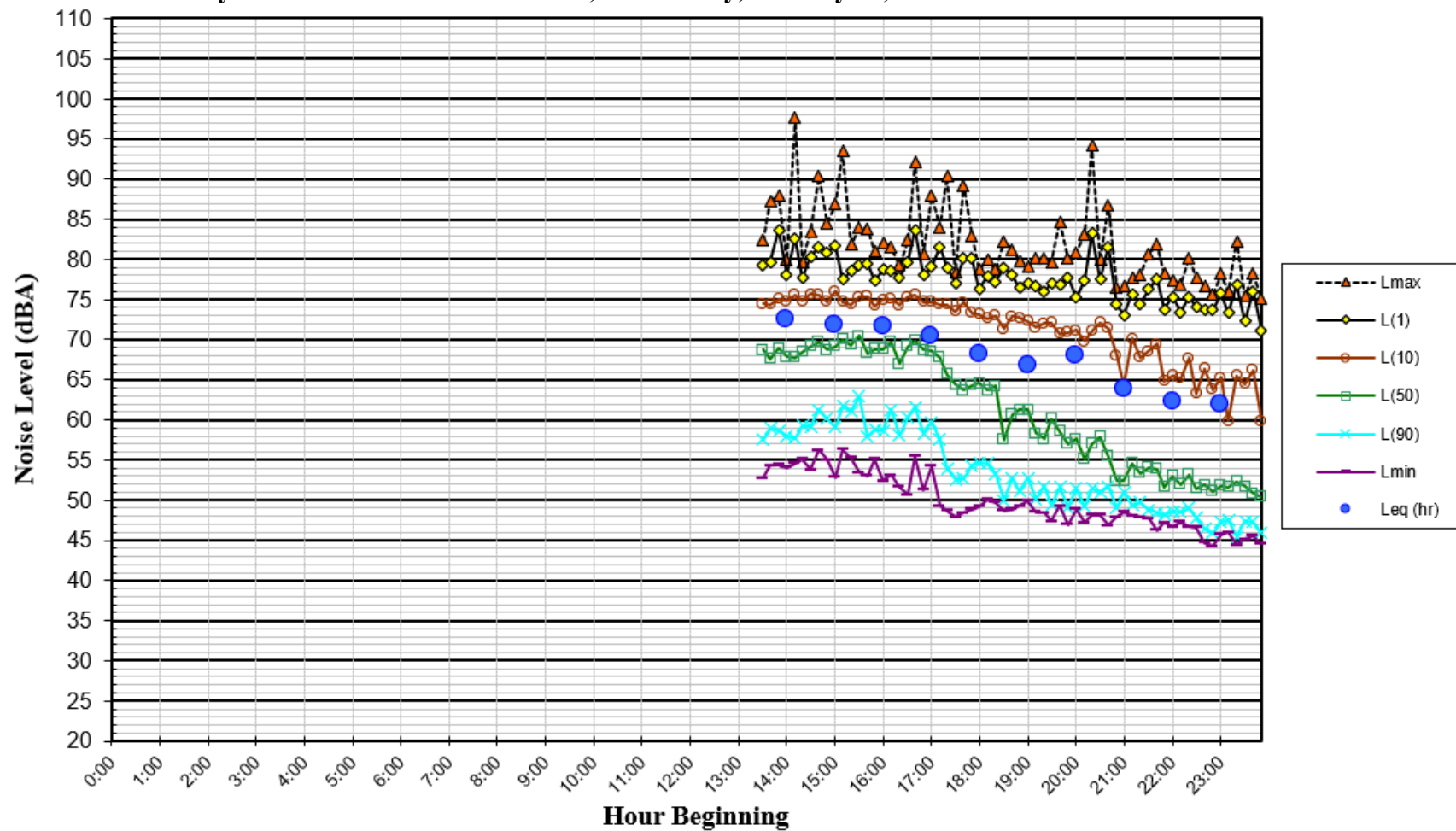


FIGURE A14 Daily Trend in Noise Levels at LT-5, Thursday, January 22, 2026

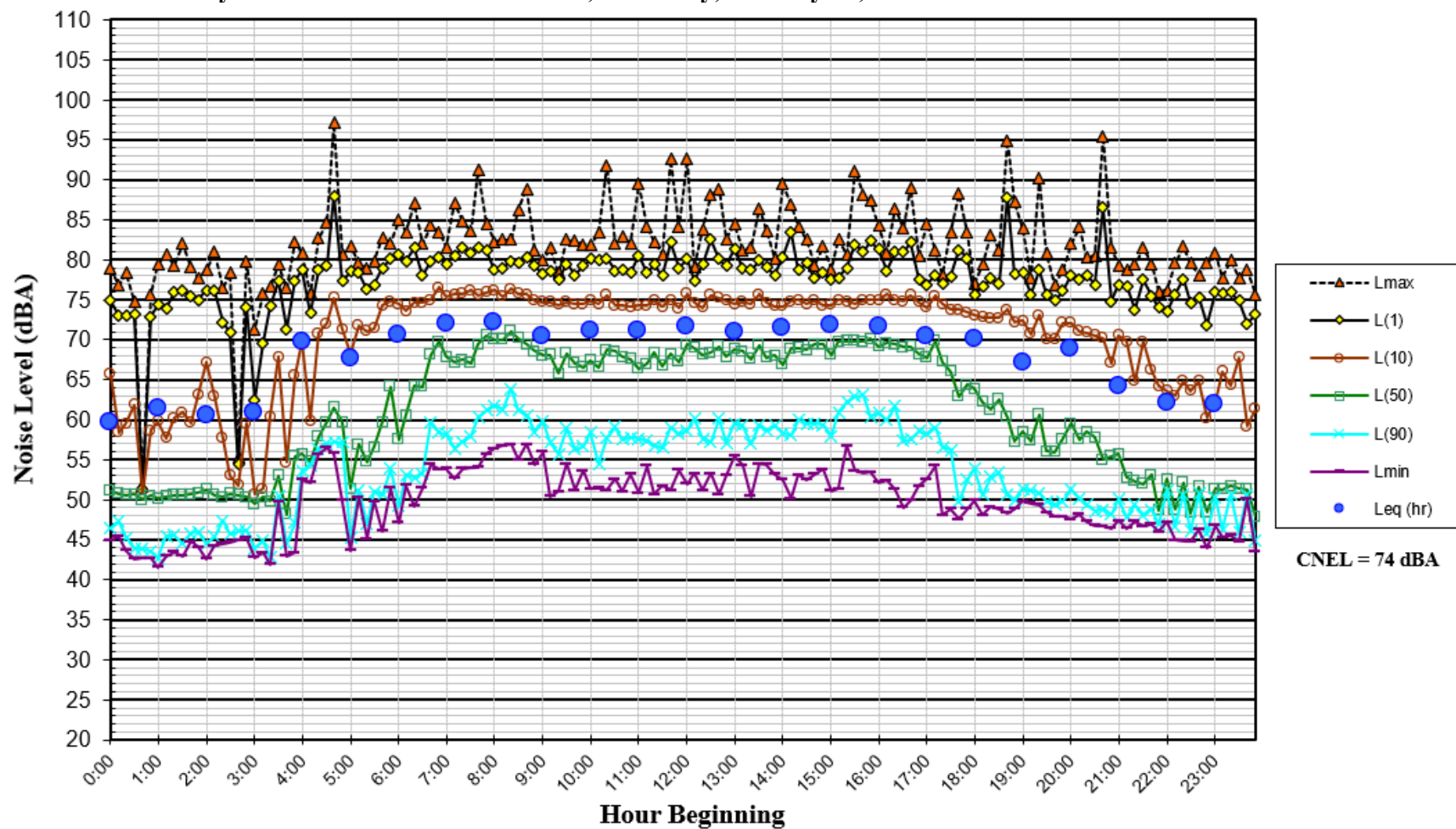


FIGURE A15 Daily Trend in Noise Levels at LT-5, Friday, January 23, 2026

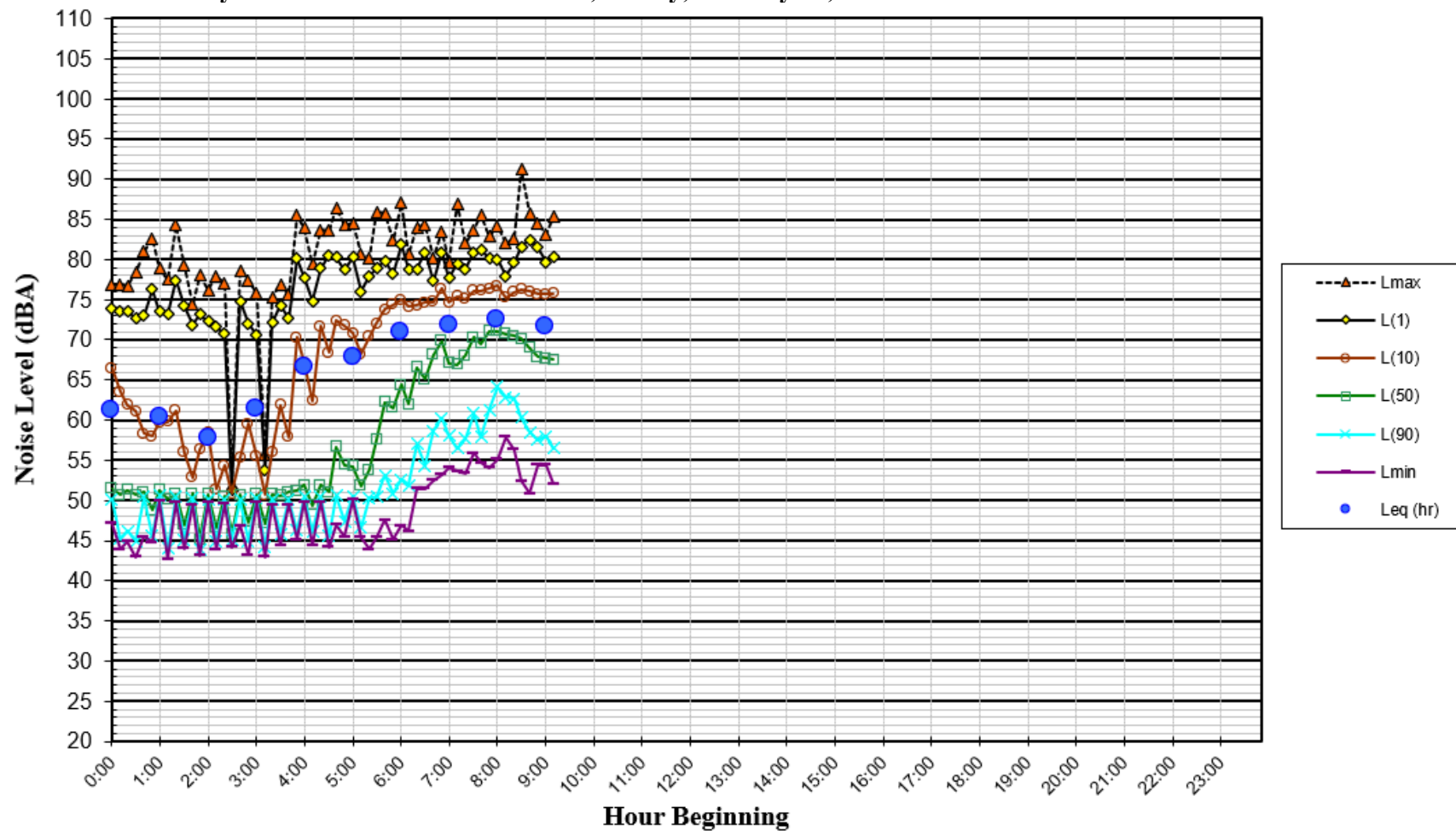


FIGURE A16 Daily Trend in Noise Levels at LT-6, Wednesday, January 21, 2026

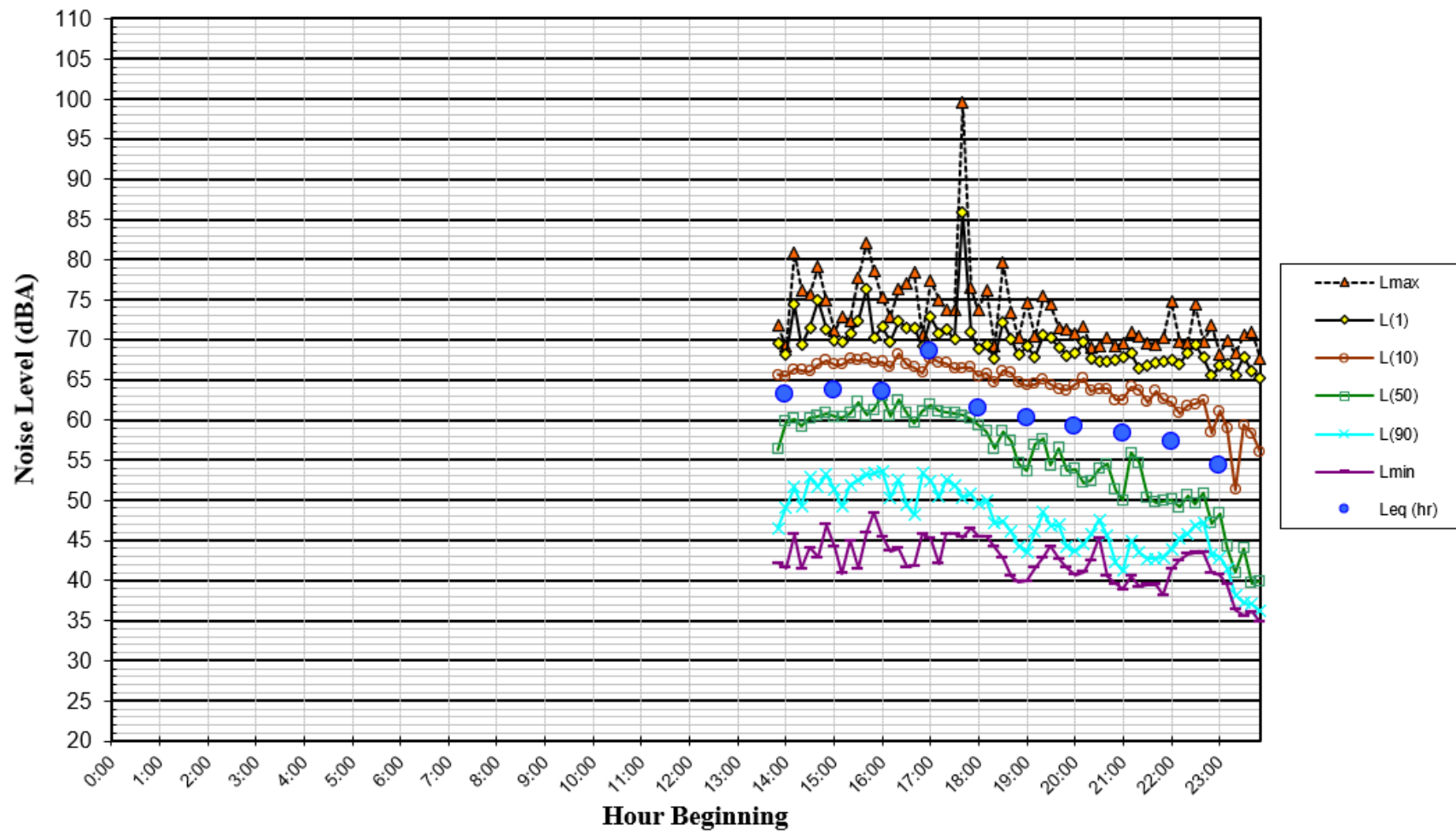


FIGURE A17 Daily Trend in Noise Levels at LT-6, Thursday, January 22, 2026

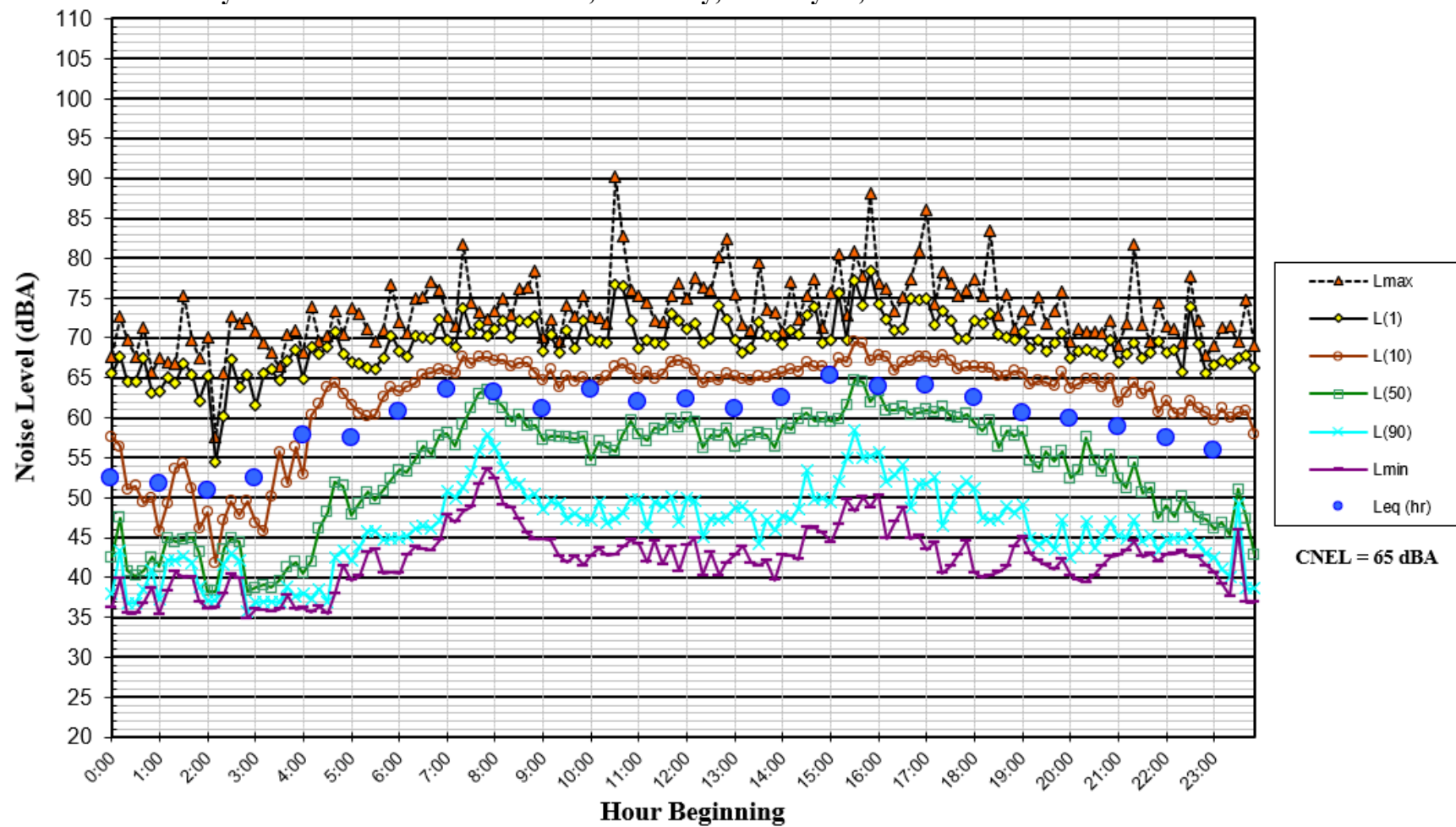


FIGURE A18 Daily Trend in Noise Levels at LT-6, Friday, January 23, 2026

