2023-2031 HOUSING ELEMENT NOISE AND VIBRATION ASSESSMENT

Atherton, California

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INTRODUCTION

The purpose of this report is to assess potential noise and vibration impacts associated with the proposed update to the Housing Element of the Town of Atherton's General Plan. The proposed amendments and revision of Title 17 of the Town of Atherton Municipal Code would allow for housing to be constructed on these properties, helping meet the Town's regional housing needs allocation. As a policy document, Housing Element Update and the resulting amended Municipal Code does not result in direct physical changes to the environment but would indirectly lead to physical environmental changes by enabling the potential development of additional housing units within the Town's jurisdiction.

The Noise and Vibration Assessment includes a Setting section providing a brief description of the fundamentals of environmental noise and vibration, summarizes the applicable regulatory criteria, and discusses the results of ambient noise monitoring surveys completed to document existing conditions. The General Plan Consistency section evaluates the noise environment at the housing opportunities sites. The Impacts and Mitigation Measures section describes the significance criteria used to evaluate potential impacts, provides a description of each impact, and presents mitigation measures where necessary to facilitate the implementation of the Housing Element Update (HEU) for the Town of Atherton.

SETTING

Fundamentals of Environmental Noise

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

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

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

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

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

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

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m. to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

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

TABLE 2 Typical Noise Levels in the Environment

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

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

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from "Historic and some old buildings" to "Modern industrial/commercial buildings." Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

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

REGULATORY BACKGROUND

This section describes the relevant guidelines, policies, and standards established by State Agencies and the Town of Atherton. The California Environmental Quality Act (CEQA) Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

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

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

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

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

2022 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn} in any habitable room.

Town of Atherton General Plan. The Town of Atherton's General Plan contains policies supporting the goal, "To maintain the serene atmosphere of the Town by minimizing the intrusion of noise generating activities." The applicable policies contained in the Noise Element are as follows:

Policy N-1.1: To protect the peace, health and safety of Atherton citizens from unnecessary and unreasonable noise produced by any person, machine, animal or device.

Policy N-1.2: Noise contours (General Plan Figures N-1 and N-2) have been prepared in accordance with Section 65302(f) of the government Code and accompanies this Element. The noise contours shall be used as a tool for land use decision making.

Policy N-1.3: If complaints about noise increase in the future, procedures for dealing with complaints in the community will be established.

Policy N-1.4: Minimum Contents of Acoustical Reports – Site specific reports should contain a brief description of the project and the sensitivity of the land use type to noise, an accurate map describing the setting with surrounding uses and noise sources identified, and a quantitative description of the noise environment. For multi-story structures, the report should discuss noise effects for the upper floors. Field noise sample measurements should be taken over several days and the average Ldn calculated should be based on daytime, evening and nighttime readings. If the project is located within the vicinity of a previously collected measurement, as shown on the contour map, a measurement should also be duplicated at that point for purposes of updating the Community Noise Level Contour Map.

Policy N-1.5: Qualifications for Preparing an Acoustical Report – Noise reports should be prepared by an acoustical engineer holding a degree in engineering, architecture, physics or allied discipline able to demonstrate a minimum of two years of experience in the following areas of acoustics: transportation noise forecasting, building acoustics, field measurement of noise and noise mitigation.

Policy N-1.6: Consider requiring noise mitigation for a project that results in Ldn increases that are:

a. 5 dBA or greater and the future Ldn is less than 60 dBA, or
b. 3 dBA or greater and the future Ldn is 60 dBA or greater and less than 65 dBA, or
c. 1.5 dBA or greater and the future Ldn is 65 dBA or greater.

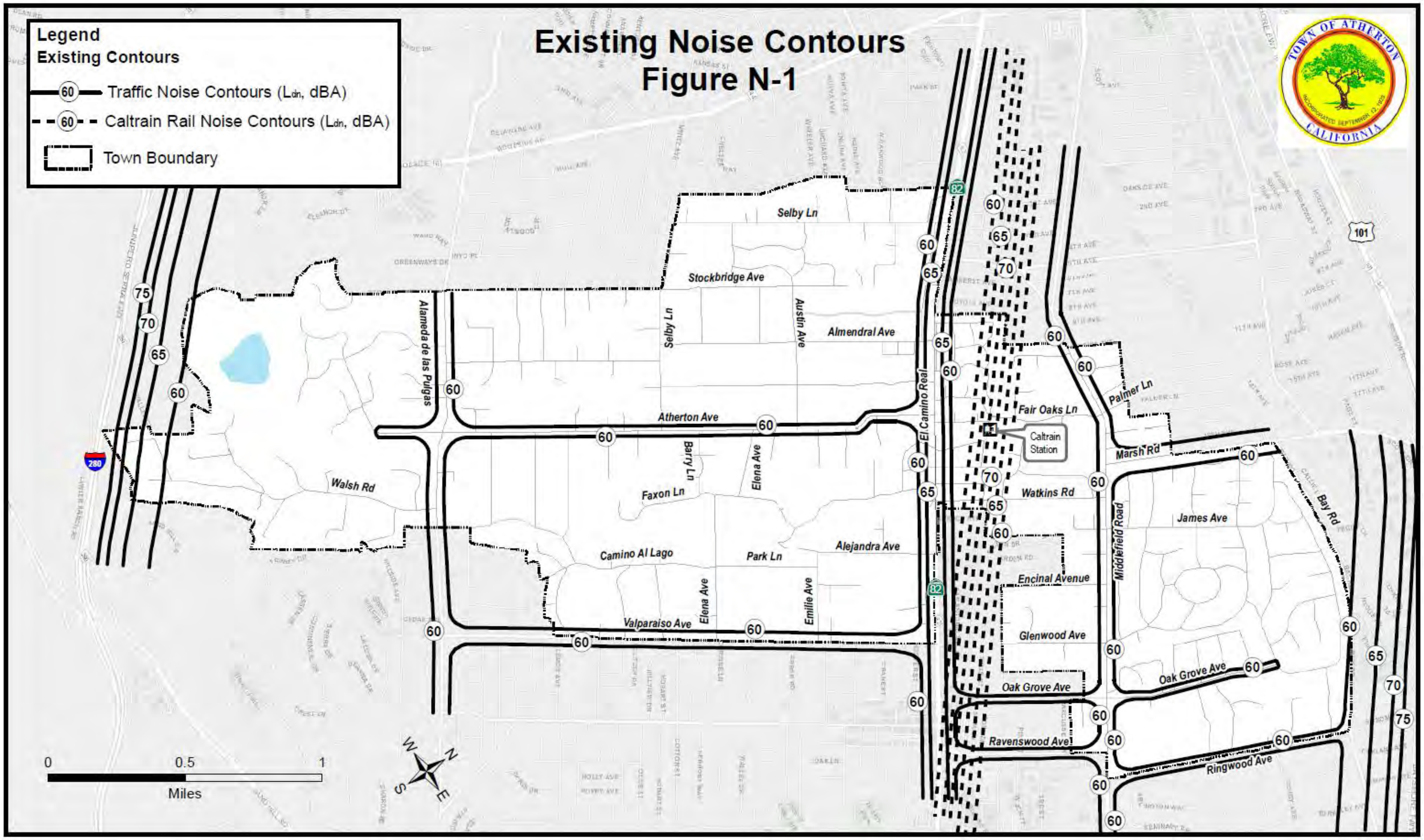
Policy N-1.7: Recognizing that aircraft and any associated issues thereto are federally regulated, the Town will work with nearby communities and other interested agencies to bring about a reduction of noise levels by private, military, public and commercial airplanes and helicopters.

General Plan Table N-2 summarizes the compatibility of new development relative to existing and future noise levels by identifying normally acceptable, conditionally acceptable and clearly unacceptable noise levels for various land uses.

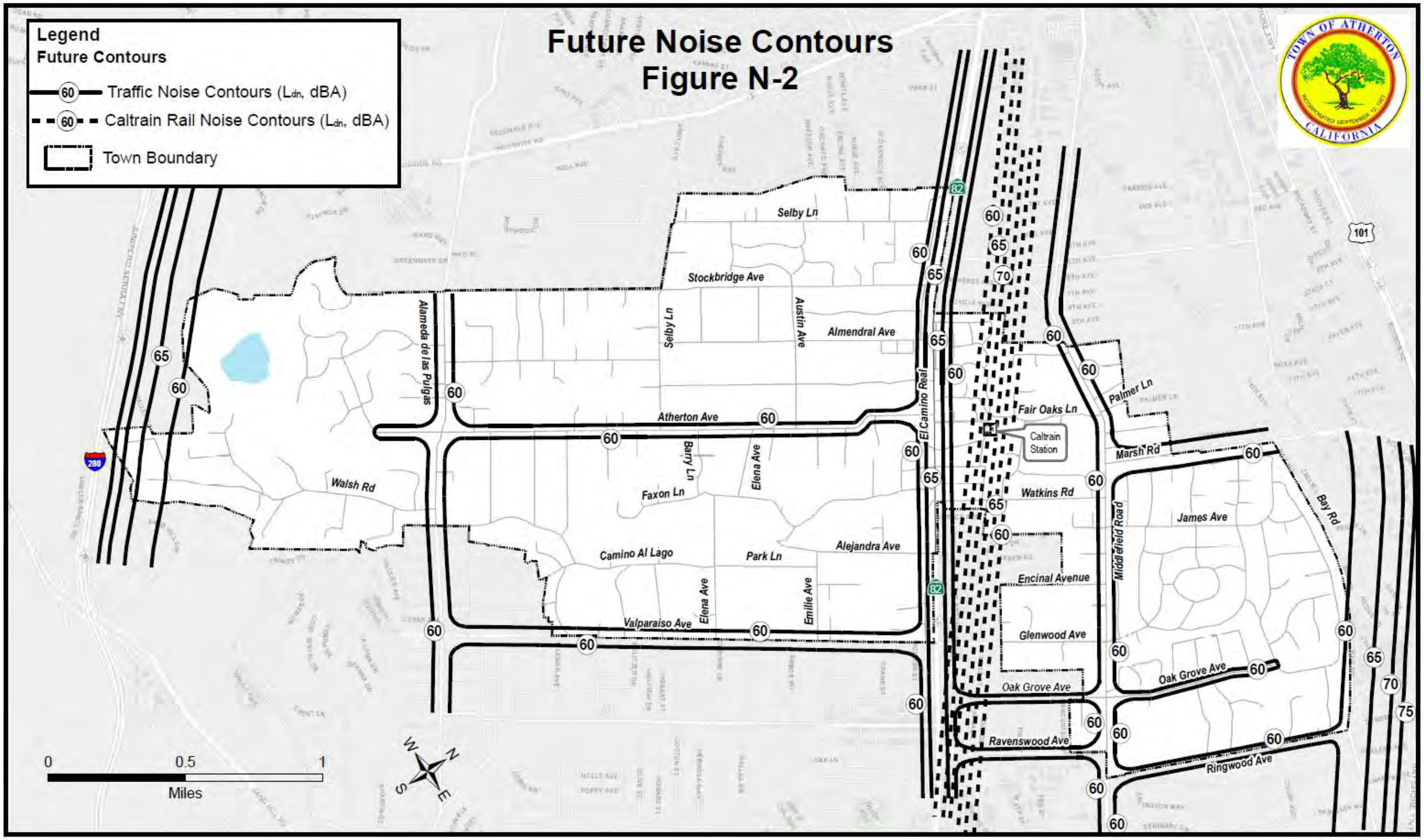
Table N-2: Land Use Compatibility for Community Environments

Land Use Category	Community Noise Exposure Levels	Ldn
Residential – Low Density, Single Family Homes	Normally Acceptable Conditionally Acceptable Normally Unacceptable Unacceptable	60 dBA or less 60 – 65 dBA 65 – 75 dBA > 75 dBA
Schools, Libraries, Churches	Normally Acceptable Conditionally Acceptable Normally Unacceptable Unacceptable	60 dBA or less 60 – 70 dBA 70 – 80 dBA > 80 dBA
Playgrounds and Neighborhood Parks	Normally Acceptable Normally Unacceptable Unacceptable	70 dBA or less 70 – 75 dBA > 75 dBA

Source: Town of Atherton General Plan 2019, January 2020.



Source: Town of Atherton General Plan 2019, January 2020.



Source: Town of Atherton General Plan 2019, January 2020.

Town of Atherton Municipal Code. The Municipal Code contains noise limits for noise sources within the Town of Atherton based on the land use of the receiving property. The applicable sections read as follows:

8.16.030 Basic noise regulation.

Except as otherwise permitted under this chapter, no person shall cause and no property owner, tenant, or other agent shall permit on their property a noise produced by any person, machine, animal or device, or any combination thereof, in excess of the sound level limits set forth in this section to emanate from any property, public or private, beyond the property line. Any sound in excess of the sound level limits set forth in this section shall constitute a noise disturbance. For purposes of determining sound levels, sound level measurements shall be made at the outside perimeter of the complaining property.

Sound Level Limits

7 a.m. to 10 p.m.	60 dBA
10 p.m. to 7 a.m.	50 dBA

A. In the event the alleged offensive noise contains a steady, audible tone, such as a whine, beating, pulsating, throbbing, or hum, the standards set forth in this section shall be reduced by five dBA.

B. In the event the ambient sound level equals or exceeds the sound level limit then the limit shall be five dBA over the ambient. (Ord. 657 § 2, 2023; Ord. 509 § 1 (part), 1999)

8.16.040 Noise disturbance prohibited.

A. Any and all excessively annoying, loud or unusual noises or vibrations (as measured by the sound level limits set forth in Section 8.16.030) that offend the peace and quiet of persons of ordinary sensibilities and which interfere with the comfortable enjoyment of life or property and affect at the same time an entire neighborhood, or any considerable number of persons, shall be considered noise disturbances and are prohibited.

B. It shall be unlawful to create, permit, allow, or maintain a noise disturbance in the town of Atherton.

8.16.050 Special provisions and exceptions.

The basic noise regulation specified in Section 8.16.030 may be exceeded without permit in any instances listed below. At all other times, noise from illicit activities shall not exceed the basic noise regulation established in Section 8.16.030:

A. *Construction.*

1. Construction and delivery are exempt from the basic noise regulation during the times and on the days when construction activities are allowed pursuant to the terms and provisions of Chapter 15.40.

2. Residents/property owners when personally operating equipment are exempt from the basic noise regulation when they are personally undertaking construction activities to maintain or improve their property on Saturdays, Sundays, or holidays between the hours of ten a.m. and five p.m. Such activities are restricted to the use of hand and power tools only.

8.16.060 Aircraft regulations.

It shall be the policy of the town to work with nearby communities and other interested agencies to bring about a reduction of noise levels by private, military, public and commercial airplanes and helicopters. (Ord. 657 § 2, 2023; Ord. 509 § 1 (part), 1999)

15.40.050 Noise.

Construction shall be permitted only within the noise standards incorporated in Chapter 8.16 of this code. (Ord. 498 § 4, 1998)

15.40.120 Time Limits.

A. Except as otherwise provided in this chapter, construction, pickup and delivery shall be prohibited on any property within the town between the hours of five p.m. in the evening and eight a.m. of the following day, Monday through Friday.

B. Construction, pickup and delivery shall be prohibited on any property within the town on Saturday, Sunday and any holiday.

NOISE MEASUREMENT SURVEY

A noise monitoring survey for the project was performed in two parts: from Wednesday, November 1, 2023, through Friday, November 3, 2023, and from Monday, December 11, 2023, through Wednesday, December 13, 2023. The survey included six (6) long-term (LT) noise measurements and twelve (12) short-term (ST) noise measurements to quantify existing ambient noise levels in and around the identified housing opportunity sites. Long-term noise measurement data is provided in Appendix A. Noise measurement locations are shown in Figures 1A and 1B.

Long-Term Noise Measurements

Noise measurement LT-1 was located near 290 Polhemus Avenue, approximately 25 feet east of the Polhemus Avenue centerline and about 135 feet north of the centerline of Alameda de las Pulgas. Traffic along Alameda de las Pulgas was the primary source of noise in the area, with traffic along Polhemus Avenue also contributing to the noise environment. Figures A1 through A3 in Appendix A show the trend in noise levels throughout the measurement period from November 1, 2023 to November 3, 2023.

Hourly average noise levels ranged from 55 to 68 dBA L_{eq} during the day and from 38 to 57 dBA L_{eq} at night. The day-night average noise level at this location on Thursday, November 2, 2023 was 61 dBA L_{dn}.

Noise measurement LT-2 was located near 15 Monte Vista Avenue, approximately 25 feet west of the centerline of Atherton Avenue. Traffic along Atherton Avenue was the primary source of noise in the area. Figures A4 through A6 in Appendix A show the trend in noise levels throughout the measurement period from November 1, 2023 to November 3, 2023. Hourly average noise levels ranged from 59 to 68 dBA L_{eq} during the day and from 45 to 62 dBA L_{eq} at night. The day-night average noise level at this location on Thursday, November 2, 2023 was 66 dBA L_{dn}.

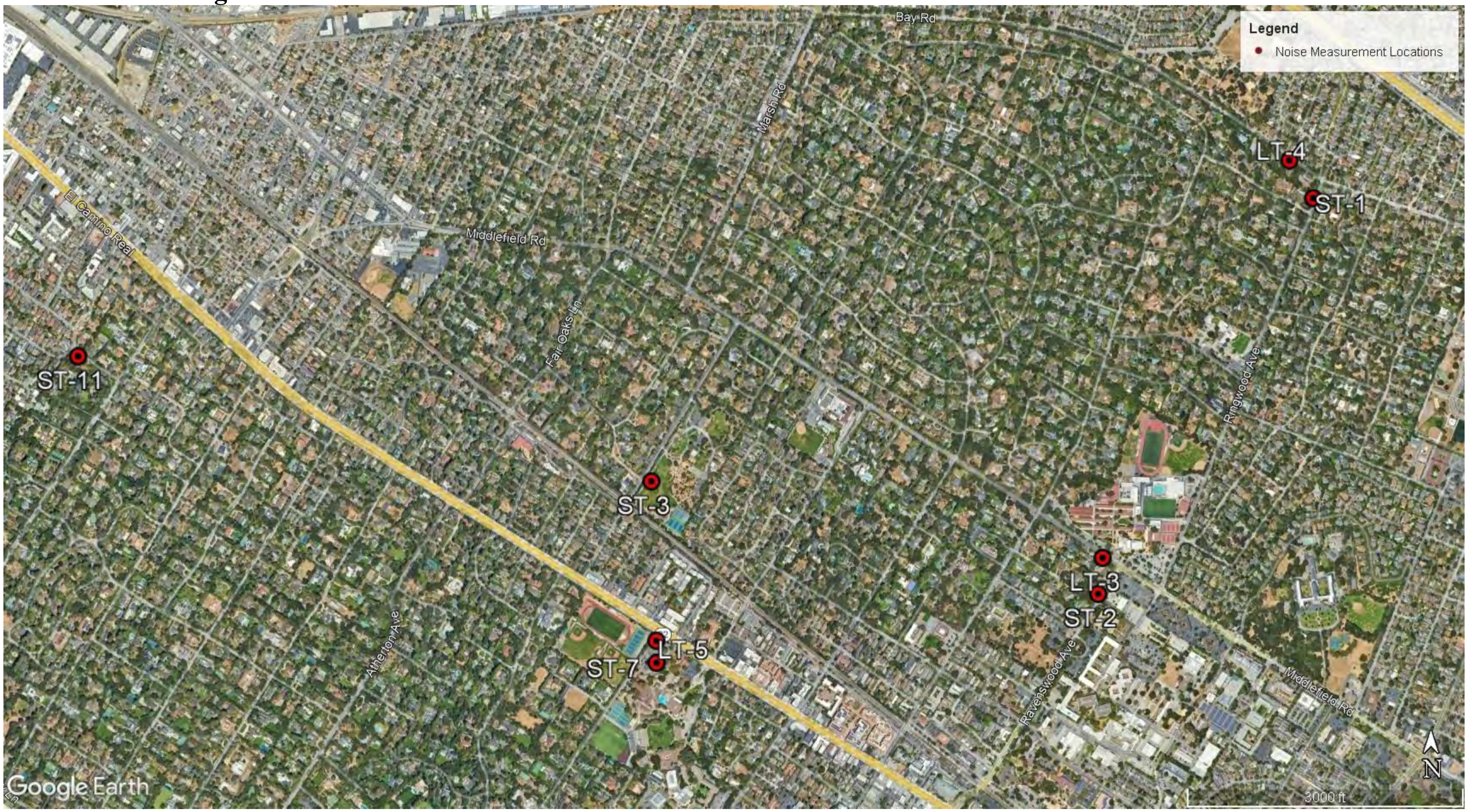
Noise measurement LT-3 was located near 197 Ravenswood Avenue, approximately 25 feet south of the Middlefield Road centerline and about 200 feet west of the centerline of Ravenswood Avenue. Traffic along Middlefield Road was the primary source of noise in the area, with traffic along Ravenswood Avenue also contributing to the noise environment. Figures A7 through A9 in Appendix A show the trend in noise levels throughout the measurement period from November 1, 2023 to November 3, 2023. Hourly average noise levels ranged from 63 to 72 dBA L_{eq} during the day and from 54 to 66 dBA L_{eq} at night. The day-night average noise level at this location on Thursday, November 2, 2023 was 68 dBA L_{dn}.

Noise measurement LT-4 was located near 352 Bay Road, approximately 20 feet south of the centerline of the road. Traffic along Bay Road was the primary source of noise in the area. Figures A10 through A12 in Appendix A show the trend in noise levels throughout the measurement period from November 1, 2023 to November 3, 2023. Hourly average noise levels ranged from 61 to 68 dBA L_{eq} during the day and from 51 to 64 dBA L_{eq} at night. The day-night average noise level at this location on Thursday, November 2, 2023 was 67 dBA L_{dn}.

Noise measurement LT-5 was located at Menlo College, approximately 95 feet south of the El Camino Real centerline and about 40 feet east of the centerline of Alejandra Avenue. Traffic along El Camino Real was the primary source of noise in the area, with traffic along Alejandra Avenue also contributing to the noise environment. Figures A13 through A15 in Appendix A show the trend in noise levels throughout the measurement period from December 11, 2023 to December 13, 2023. Hourly average noise levels ranged from 64 to 71 dBA L_{eq} during the day and from 54 to 66 dBA L_{eq} at night. The day-night average noise level at this location on Tuesday, December 12, 2023 was 69 dBA L_{dn}.

Noise measurement LT-6 was located at Menlo School, approximately 55 feet west of the Valparaiso Avenue centerline. Traffic along Valparaiso Avenue was the primary source of noise in the area. Figures A16 through A18 in Appendix A show the trend in noise levels throughout the measurement period from December 11, 2023 to December 13, 2023. Hourly average noise levels ranged from 57 to 66 dBA L_{eq} during the day and from 41 to 58 dBA L_{eq} at night. The day-night average noise level at this location on Tuesday, December 12, 2023 was 62 dBA L_{dn}.

FIGURE 1A Long-Term and Short-Term Noise Measurement Locations



Source: Google Earth 2023

FIGURE 1B Long-Term and Short-Term Noise Measurement Locations

Source: Google Earth 2023

Short-Term Noise Measurements

A series of twelve attended short-term (10-minute duration) measurements were also made to identify noise sources and to note the level of noise associated with these identifiable events. The attended measurements assist in quantitatively and qualitatively characterizing the noise environments along the major roadways and in the quieter areas of the town. Noise data collected at short-term sites ST-1 through ST-12 are summarized in Table 4.

Short-term noise measurement ST-1 was made on Wednesday, November 1, 2023, between 11:20 a.m. and 11:30 a.m. to document typical noise levels along Ringwood Avenue. This location was approximately 25 feet west of the centerline of Ringwood Avenue. Traffic along Ringwood Avenue produced noise levels ranging from 65 to 86 dBA. The 10-minute L_{eq} measured at ST-1 was 67 dBA.

Short-term noise measurement ST-2 was made on Wednesday, November 1, 2023, between 11:40 a.m. and 11:50 a.m. to document typical noise levels along Ravenswood Avenue. This location was approximately 30 feet west of the centerline of Ravenswood Avenue. Traffic along Ravenswood Avenue produced noise levels ranging from 67 to 81 dBA. A jet flyover produced noise levels up to 53 dBA. The 10-minute L_{eq} measured at ST-2 was 70 dBA.

Short-term noise measurement ST-3 was made on Wednesday, November 1, 2023, between 12:20 p.m. and 12:30 p.m. to document typical noise levels along Watkins Avenue. This location was approximately 115 feet east of the centerline of Watkins Avenue. Traffic along Watkins Avenue produced noise levels ranging from 46 to 53 dBA. A jet produced noise levels up to 69 dBA, while a plane produced noise levels up to 58 dBA. The 10-minute L_{eq} measured at ST-3 was 54 dBA.

Short-term noise measurement ST-4 was made on Friday, November 3, 2023, between 9:30 a.m. and 9:40 a.m. to document typical noise levels along Valparaiso Avenue. This location was approximately 95 feet west of the centerline of Valparaiso Avenue. Traffic along Valparaiso Avenue produced noise levels ranging from 59 to 72 dBA. Minimal traffic along Santiago Avenue also slightly contributed to the noise environment. The 10-minute L_{eq} measured at ST-4 was 61 dBA.

Short-term noise measurement ST-5 was made on Friday, November 3, 2023, between 9:50 a.m. and 10:00 a.m. to document typical noise levels along Faxton Road and Faxton Forrest. Landscaping equipment was the main nose source in the area, producing noise levels that ranged from 46 to 52 dBA. Two planes produced noise levels up to 52 dBA. A single vehicle passed by at a distance of approximately 15 feet, producing noise levels up to 64 dBA. The 10-minute L_{eq} measured at ST-5 was 50 dBA.

Short-term noise measurement ST-6 was made on Friday, November 3, 2023, between 10:10 a.m. and 10:20 a.m. to document typical noise levels along Monte Vista Avenue. Atherton Avenue traffic was the main nose source in the area, producing noise levels ranging from 44 to 50 dBA. Two planes produced noise levels ranging from 47 to 55 dBA. A single vehicle passed by at a distance of approximately 15 feet, producing noise levels up to 69 dBA. The 10-minute L_{eq} measured at ST-6 was 49 dBA.

Short-term noise measurement ST-7 was made on Monday, December 11, 2023, between 9:50 a.m. and 10:00 a.m. to document typical noise levels at the Menlo College site. El Camino Real traffic was the main nose source in the area, producing noise levels that ranged from 47 to 56 dBA. Intermittent traffic on Alejandra Avenue produced noise levels ranging from 48 to 58 dBA. Occasional parking lot noises such as car doors shutting slightly contributed to the noise environment. A distant train horn produced noise levels up to 56 dBA. The 10-minute L_{eq} measured at ST-7 was 53 dBA.

Short-term noise measurement ST-8 was made on Monday, December 11, 2023, between 11:00 a.m. and 11:10 a.m. to document typical noise levels at the Menlo School site. Traffic noise from Valparaiso Avenue was the main nose source, ranging from 50 to 57 dBA. Two jets produced noise levels ranging from 50 to 51 dBA. The 10-minute L_{eq} measured at ST-8 was 51 dBA.

Short-term noise measurement ST-9 was made on Monday, December 11, 2023, between 11:20 a.m. and 11:30 a.m. to document typical noise levels at the Sacred Heart School site. Distant traffic noise ranged from 38 to 42 dBA. Occasional parking lot noises such as car doors shutting slightly contributed to the noise environment. Two planes produced noise levels ranging from 52 to 63 dBA. The 10-minute L_{eq} measured at ST-9 was 52 dBA.

Short-term noise measurement ST-10 was made on Monday, December 11, 2023, between 11:40 a.m. and 11:50 a.m. to document typical noise levels at the Circus Club site. Distant traffic noise ranged from 35 to 40 dBA. Occasional parking lot noises such as car doors shutting slightly contributed to the noise environment. A jet produced noise levels up to 45 dBA. The 10-minute L_{eq} measured at ST-10 was 41 dBA.

Short-term noise measurement ST-11 was made on Monday, December 11, 2023, between 12:10 p.m. and 12:20 p.m. to document typical noise levels at 23 Oakwood Boulevard. Fifteen vehicles passed by, with noise levels ranging from 59 to 69 dBA at approximately 15 feet. Occasional landscaping equipment noise slightly contributed to the noise environment. A plane produced noise levels up to 52 dBA. The 10-minute L_{eq} measured at ST-11 was 53 dBA.

Short-term noise measurement ST-12 was made on Monday, December 11, 2023, between 12:40 p.m. and 12:50 p.m. to document typical noise levels at the California Water Service site. Overhead aircraft were the main noise source. Four planes generated noise levels ranging from 46 to 57 dBA, while two jets produced noise levels up to 45 dBA. Distant landscaping equipment noise slightly contributed to the noise environment. The 10-minute L_{eq} measured at ST-12 was 45 dBA.

TABLE 4 Summary of Short-Term Noise Measurement Data

Noise Measurement Location (Date, Time)	Measured Noise Level, dBA						
	L_{max}	L_{min}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: ~25 feet from Ringwood Avenue centerline (11/1/2023, 11:20 – 11:30 a.m.)	86	46	77	70	61	50	67
ST-2: ~30 feet from Ravenswood Avenue centerline (11/1/2023, 11:40 – 11:50 a.m.)	81	41	77	74	68	50	70
ST-3: ~115 feet from Watkins Avenue centerline (11/1/2023, 12:20 – 12:30 p.m.)	69	40	67	55	47	41	54
ST-4: ~95 feet from Valparaiso Avenue centerline (11/3/2023, 9:30 – 9:40 a.m.)	72	44	68	64	59	51	61
ST-5: ~15 feet from Faxton Road centerline (11/3/2023, 9:50 – 10:00 a.m.)	64	44	57	51	49	46	50
ST-6: ~15 feet from Monte Vista Avenue centerline (11/3/2023, 10:10 – 10:20 a.m.)	69	39	58	48	43	41	49
ST-7: ~300 feet from El Camino Real centerline (12/11/2023, 9:50 – 10:00 a.m.)	73	47	60	55	52	49	53
ST-8: ~240 feet from Valparaiso Avenue centerline (12/11/2023, 11:00 – 11:10 a.m.)	57	45	55	53	50	48	51
ST-9: ~330 feet from Park Lane centerline (12/11/2023, 11:20 – 11:30 a.m.)	67	38	64	53	42	40	52
ST-10: ~550 feet from Park Lane centerline (12/11/2023, 11:40 – 11:50 a.m.)	54	35	48	44	39	37	41
ST-11: ~15 feet from Oakwood Boulevard centerline (12/11/2023, 12:10 – 12:20 p.m.)	69	37	65	57	46	41	53
ST-12: ~20 feet from Reservoir Road centerline (12/11/2023, 12:40 – 12:50 p.m.)	57	38	56	47	41	39	45

GENERAL PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The applicable Atherton General Plan policies and Municipal Code standards were presented in detail in the Regulatory Background section. Noise and Land Use Compatibility guidelines for new development are identified in General Plan Table N-2. Residential land uses are considered "Normally Acceptable" up to 60 dBA L_{dn}. In the following discussion, the noise and land use compatibility is evaluated for each site.

Menlo College. Three housing opportunity sites are proposed at Menlo College along El Camino Real. The General Plan shows that portions of these sites are within the 65 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at these sites is calculated to be up to 72 dBA L_{dn} at portions of the sites nearest to the roadway. The noise and land use compatibility designation would be within the "Normally Unacceptable" range of 65 to 75 dBA L_{dn}. For these sites, the General Plan states that "New construction or development of the specified land use type should be discouraged. If proposed development is to proceed, a detailed acoustic study must be prepared and needed noise insulation features incorporated into the design."

Menlo School. Two housing opportunity sites are proposed at Menlo School along Valparaiso Avenue. The General Plan shows that portions of these sites are within the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at these sites is calculated to be up to 64 dBA L_{dn} at portions of the sites nearest to the roadway. The noise and land use compatibility designation would be within the "Conditionally Acceptable" range of 60 to 65 dBA L_{dn}. For these sites, the General Plan states that "The range of noise levels in this category is higher than those normally acceptable for the specified land use type. A detailed acoustic study should be undertaken to set forth design features that will reduce exterior noise reaching interior use spaces."

23 Oakwood Boulevard. A housing opportunity site is proposed along Oakwood Boulevard. The General Plan shows that this site is outside of the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at this site is calculated to be less than 60 dBA L_{dn} throughout the site. The noise and land use compatibility designation would be within the "Normally Acceptable" range of 60 dBA L_{dn} or less. For this site, the General Plan states that "The range of noise levels in this category is compatible with the specified land use type. No special noise insulation is required in buildings of conventional construction."

Sacred Heart School. A housing opportunity site is proposed at Sacred Heart School. The General Plan shows that this site is outside of the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at this site is calculated to be less than 60 dBA L_{dn} throughout the site. The noise and land use compatibility designation would be within the "Normally Acceptable" range of 60 dBA L_{dn} or less. For this site, the General Plan states that "No special noise insulation is required in buildings of conventional construction."

Gilmore House. A housing opportunity site is proposed at the Gilmore House along Watkins Avenue. The General Plan shows that this site is outside of the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at this site is calculated to be within the "Conditionally Acceptable" range of 60 to 65 dBA L_{dn}. For this site, the General Plan states that "A detailed acoustic study should be undertaken to set forth design features that will reduce exterior noise reaching interior use spaces."

Circus Club. A housing opportunity site is proposed at the Circus Club located on Park Lane. The General Plan shows that this site is outside of the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at this site is calculated to be less than 60 dBA L_{dn} throughout the site. The noise and land use compatibility designation would be within the "Normally Acceptable" range of 60 dBA L_{dn} or less. For this site, the General Plan states that "No special noise insulation is required in buildings of conventional construction."

California Water Service. A housing opportunity site is proposed at the California Water Service property located on Reservoir Road. The General Plan shows that this site is outside of the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at this site is calculated to be less than 60 dBA L_{dn} throughout the site. The noise and land use compatibility designation would be within the "Normally Acceptable" range of 60 dBA L_{dn} or less. For this site, the General Plan states that "No special noise insulation is required in buildings of conventional construction."

Bay Road and Ringwood Avenue. Four housing opportunity sites are proposed near the intersection on Bay Road and Ringwood Avenue. The General Plan shows that portions of these sites are within the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at these sites is calculated to be up to 66 dBA L_{dn} at portions of the sites nearest to the roadway. The noise and land use compatibility designation would be within the "Normally Unacceptable" range of 65 to 75 dBA L_{dn}. For these sites, the General Plan states that "a detailed acoustic study must be prepared and needed noise insulation features incorporated into the design."

Ravenswood Avenue. Three housing opportunity sites are proposed near the intersection of Ravenswood Avenue and Middlefield Road. The General Plan shows that portions of these sites are within the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure produced by ground transportation at these sites is calculated to be up to 67 dBA L_{dn} at portions of the sites nearest to the roadway. The noise and land use compatibility designation would be within the "Normally Unacceptable" range of 65 to 75 dBA L_{dn}. For these sites, the General Plan states that "a detailed acoustic study must be prepared and needed noise insulation features incorporated into the design."

97 Santiago Avenue. A housing opportunity site is proposed along Santiago Avenue. The General Plan shows that portions of this site are within the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure at this site is calculated to be within the "Normally Unacceptable" range of 65 to 75 dBA L_{dn}. For this site, the General

Plan states that “a detailed acoustic study must be prepared and needed noise insulation features incorporated into the design.”

Faxon Road and Faxon Forest. Four housing opportunity sites are proposed along Faxon Road and Faxon Forest (vacant sites V3-V6). The General Plan shows that these sites are outside of the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure at these sites is calculated to be less than 60 dBA L_{dn} throughout the sites. The noise and land use compatibility designations would be within the “Normally Acceptable” range of 60 dBA L_{dn} or less. For these sites, the General Plan states that “No special noise insulation is required in buildings of conventional construction.”

Monte Vista Avenue. Two housing opportunity sites are proposed along Monte Vista Avenue. The General Plan shows that portions of 15 Monte Vista Avenue are within the 60 dBA L_{dn} noise contour while 25 Monte Vista Avenue is outside of the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure at 15 Monte Vista Avenue is calculated to be up to 65 dBA L_{dn} and within the “Conditionally Acceptable” range of 60 to 65 dBA L_{dn}. For this site, the General Plan states that “A detailed acoustic study should be undertaken to set forth design features that will reduce exterior noise reaching interior use spaces.” Noise measurement data shows that the noise exposure 25 Monte Vista Avenue is calculated to be less than 60 dBA L_{dn} throughout the site, and the noise and land use compatibility designation would be within the “Normally Acceptable” range of 60 dBA L_{dn} or less. For this site, the General Plan states that “No special noise insulation is required in buildings of conventional construction.”

290 Polhemus Avenue. A housing opportunity site is proposed along Polhemus Avenue. The General Plan shows that portions of this site are within the 60 dBA L_{dn} noise contour for existing and future noise conditions. Noise measurement data shows that the noise exposure at this site is calculated to be up to 71 dBA L_{dn} and within the “Normally Unacceptable” range of 65 to 75 dBA L_{dn}. For this site, the General Plan states that “a detailed acoustic study must be prepared and needed noise insulation features incorporated into the design.”

Noise Control Measures

The Noise Element of the General Plan establishes a framework that will result in new housing to be compatible with the noise environments where they would be located. The following measures, applied individually or in combination, are recommended to implement the policies:

Site Planning - By taking advantage of the natural shape and contour of sites it is often possible to orient buildings and other uses in a way that will reduce or eliminate noise impact. The ways in which site planning can be used to reduce noise impacts are as follows:

- Increase the distance between the noise source and the receiver.
- Place non-noise sensitive land uses (parking lots, maintenance facilities, utility areas) between the source and the receiver.
- Use non-noise sensitive structures (garages) to shield noise sensitive areas.
- Orient buildings so outdoor areas are shielded from noise.

Architectural Treatment - By attention to the types of uses being accommodated in a structure, the noise sensitive use can be moved to the quiet side of the building. Some typical examples are listed:

- Put bedrooms on the side of the house farthest from roadways.
- Do not locate outdoor balconies or patios facing major roadways.
- Design "U" shaped buildings to shield patios.

Noise Barriers - Solid barriers between the noise source and the noise-sensitive area block out sound waves. The minimum acceptable surface weight for an effective noise barrier is four pounds per square foot (equivalent to ¾ inch plywood) with no cracks or openings. To be effective, the barrier must interrupt the line of sight between the noise source and the receiver. Noise barriers are created by topographical features in some situations. Earth berms can be created by grading to achieve the same result. It should be noted that short barriers are not effective regardless of height because sound waves will pass around the end of them and still reach the receiver. This effect, called flanking, can be minimized by bending the wall or barrier back from the noise source at the ends of the barrier.

Construction Modification - Indoor noise levels due to exterior noise sources can be controlled by the noise reduction characteristics of the building's shell. In general, windows and doors are the weakest links in the acoustic skin of a building. The amount of insulation and sealing required depends on the amount of noise reduction required. The following approaches may be considered:

- Use solid core doors having an acoustic door gasket.
- Use double-paned glass and gasketed window systems.
- Add insulation material to walls, ceilings and floors.

In addition, residential developers shall comply with relevant noise insulation standards to maintain indoor noise levels at or below 45 dBA L_{dn}. Where exterior noise levels would exceed 60 dBA L_{dn}, an analysis detailing the treatments incorporated into the building plans shall be prepared and submitted to the Town Building Department prior to issuance of a building permit. The report shall demonstrate that the design would achieve an interior level of 45 dBA L_{dn} or less in all habitable residential areas.

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

Significance Criteria

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

1. **Temporary or Permanent Noise Increases in Excess of Established Standards.** A significant impact would be identified if project construction or operations would result in a substantial temporary or permanent increase in ambient noise levels at sensitive receivers in excess of the local noise standards contained in the Atherton General Plan or Municipal Code, as follows:

   - Temporary Noise Increase. A significant temporary noise impact would be identified if construction would occur outside of the hours specified in the Municipal Code or if construction noise levels would increase ambient noise levels resulting in measurable annoyance. The noise increase threshold adjusts based on the ambient noise level with the expectation that communities already exposed to high levels of noise can only tolerate a small increase. In contrast, if the existing noise levels are low, it is reasonable to allow a greater change in the community noise.

   - Permanent Noise Increase. A significant impact would be identified if traffic noise generated by the project would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA L_{dn} or greater, with a future noise level of less than 60 dBA L_{dn}, or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 to 65 dBA L_{dn}, or c) the noise level increase is 1.5 dBA L_{dn} or greater, with a future noise level of 65 dBA L_{dn} or greater.

2. **Generation of Excessive Groundborne Vibration.** A significant impact would be identified if the construction of the project would generate excessive vibration levels. Groundborne vibration levels exceeding 0.25 in/sec PPV would be considered excessive as such levels would have the potential to result in cosmetic damage to historic and some old buildings. Groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to buildings that are found to be structurally sound but where structural damage is a major concern, and groundborne vibration levels exceeding 0.5 in/sec PPV would have the potential to result in cosmetic damage to buildings that are structurally sound and designed to modern engineering standards.

3. **Exposure to Excessive Aircraft Noise Levels.** A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1: Permanent or Temporary Noise Increases in Excess of Established Standards. Increased vehicle traffic due to the HEU would not result in a substantial permanent increase traffic noise levels along area roadways. Construction activities facilitated by the HEU would result in substantial temporary noise increases that would be in excess of applicable local standards at nearby sensitive receptors if not mitigated. With proper mitigation and adherence to the applicable local guidelines, this is a **less-than-significant** impact.

Permanent Noise Increases from Project Traffic

Increases in traffic noise gradually degrade the environment in areas sensitive to noise. According to CEQA, "a substantial increase" is necessary to cause a significant environmental impact. A substantial increase would occur if: a) the noise level increase is 5 dBA L_{dn} or greater, with a future noise level of less than 60 dBA L_{dn}, or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 to 65 dBA L_{dn}, or c) the noise level increase is 1.5 dBA L_{dn} or greater, with a future noise level of 65 dBA L_{dn} or greater. Vehicular traffic on roadways in the Town would increase as development occurs and the Town's population increases. These projected increases in traffic would, over time, increase noise levels throughout the community.

The results presented in Tables 5 and 6 indicate that project-generated traffic noise levels would not increase substantially due to anticipated traffic volume increases along major roadways in Atherton. The traffic noise levels for the vast majority of roadways in Atherton are expected to increase by 1 dBA L_{dn} or less in the future, which would be below the significance thresholds. Only the segment of Encinal Avenue, east of El Camino Real, is projected to experience a noise level increase of 2 dBA L_{dn}. This increase would occur under cumulative and cumulative plus project conditions and the project's contribution to the 2 dBA L_{dn} future noise level increase would be 0.1 dBA, which is also below the significance thresholds. The traffic noise increases attributable to the implementation of the HEU would not result in a substantial permanent increase noise levels in the community. This is a less-than-significant impact.

TABLE 5 AM Peak Hour Traffic Volumes and Project-Generated Traffic Noise Increases

Roadway	Location	PM Peak Hour Volumes			Cumulative Noise Increase (dBA)		
		Existing	Cumulative	Cumulative Plus Project	Cumulative Versus Existing	Cumulative Plus Project Versus Existing	Project Contribution
Alameda de las Pulgas	North of Atherton Avenue	1211	1298	1311	0.3	0.3	0.0
Alameda de las Pulgas	South of Atherton Avenue	1029	1125	1136	0.4	0.4	0.0
Alejandra Avenue	West of El Camino Real	405	405	434	0.0	0.3	0.3
Atherton Avenue	East of Alameda de las	826	839	847	0.1	0.1	0.0
Atherton Avenue	West of Alameda de las	88	102	102	0.6	0.6	0.0
Bay Road	North of Ringwood	573	621	641	0.3	0.5	0.2
Bay Road	South of Ringwood	762	802	819	0.2	0.3	0.1
El Camino Real	North of Selby Lane	3283	3596	3664	0.4	0.5	0.1
El Camino Real	South of Selby Lane	3526	3909	3981	0.4	0.5	0.1
El Camino Real	North of Fair Oaks Lane	2656	2956	3020	0.5	0.6	0.1
El Camino Real	South of Fair Oaks Lane	2570	2879	2941	0.5	0.6	0.1
El Camino Real	North of Alejandra Avenue	2745	3048	3109	0.5	0.5	0.0
El Camino Real	South of Alejandra Avenue	2666	2969	3031	0.5	0.6	0.1
El Camino Real	North of Encinal Avenue	2659	2841	2900	0.3	0.4	0.1
El Camino Real	South of Encinal Avenue	2564	2592	2651	0.0	0.1	0.1
El Camino Real	North of Valparaiso	2316	2458	2515	0.3	0.4	0.1
El Camino Real	South of Valparaiso	2036	2142	2194	0.2	0.3	0.1
Encinal Avenue	East of El Camino Real	604	774	784	1.1	1.1	0.0
Encinal Avenue	West of El Camino Real	83	83	83	0.0	0.0	0.0
Fair Oaks Lane	East of El Camino Real	459	514	520	0.5	0.5	0.0
Fair Oaks Lane	West of El Camino Real	725	771	779	0.3	0.3	0.0
Glenwood Avenue	East of El Camino Real	562	576	581	0.1	0.1	0.0
Marsh Road	East of Middlefield Road	1433	1592	1609	0.5	0.5	0.0
Middlefield Road	North of Marsh Road	1025	1239	1252	0.8	0.9	0.1
Middlefield Road	South of Marsh Road	1456	1545	1561	0.3	0.3	0.0
Middlefield Road	North of Ravenswood	921	1017	1029	0.4	0.5	0.1

Roadway	Location	PM Peak Hour Volumes			Cumulative Noise Increase (dBA)		
		Existing	Cumulative	Cumulative Plus Project	Cumulative Versus Existing	Cumulative Plus Project Versus Existing	Project Contribution
Middlefield Road	South of Ravenswood	1492	1773	1794	0.7	0.8	0.1
Ravenswood Avenue	West of Middlefield Road	927	1116	1129	0.8	0.9	0.1
Ringwood Avenue	West of Bay Road	1004	1048	1062	0.2	0.2	0.0
Selby Lane	East of El Camino Real	70	70	70	0.0	0.0	0.0
Selby Lane	West of El Camino Real	645	743	755	0.6	0.7	0.1
Sonoma Avenue	East of Bay Road	149	165	166	0.4	0.5	0.1
Valparaiso Avenue	West of El Camino Real	994	1028	1054	0.1	0.3	0.2

TABLE 6 PM Peak Hour Traffic Volumes and Project-Generated Traffic Noise Increases

Roadway	Location	PM Peak Hour Volumes			Cumulative Noise Increase (dBA)		
		Existing	Cumulative	Cumulative Plus Project	Cumulative Versus Existing	Cumulative Plus Project Versus Existing	Project Contribution
Alameda de las Pulgas	North of Atherton Avenue	1178	1314	1327	0.5	0.5	0.0
Alameda de las Pulgas	South of Atherton Avenue	1041	1186	1197	0.6	0.6	0.0
Alejandra Avenue	West of El Camino Real	195	195	228	0.0	0.7	0.7
Atherton Avenue	East of Alameda de las	569	587	593	0.1	0.2	0.1
Atherton Avenue	West of Alameda de las	48	65	65	1.3	1.3	0.0
Bay Road	North of Ringwood	408	473	495	0.6	0.8	0.2
Bay Road	South of Ringwood	508	596	614	0.7	0.8	0.1
El Camino Real	North of Selby Lane	3072	3270	3345	0.3	0.4	0.1
El Camino Real	South of Selby Lane	3368	3584	3661	0.3	0.4	0.1
El Camino Real	North of Fair Oaks Lane	2524	2758	2828	0.4	0.5	0.1
El Camino Real	South of Fair Oaks Lane	2498	2767	2837	0.4	0.6	0.2
El Camino Real	North of Alejandra Avenue	2615	2829	2897	0.3	0.4	0.1
El Camino Real	South of Alejandra Avenue	2598	2812	2879	0.3	0.4	0.1
El Camino Real	North of Encinal Avenue	2686	3007	3076	0.5	0.6	0.1
El Camino Real	South of Encinal Avenue	2658	2689	2757	0.1	0.2	0.1
El Camino Real	North of Valparaiso	2609	2666	2735	0.1	0.2	0.1
El Camino Real	South of Valparaiso	2468	2510	2576	0.1	0.2	0.1
Encinal Avenue	East of El Camino Real	534	886	898	2.2	2.3	0.1
Encinal Avenue	West of El Camino Real	104	104	105	0.0	0.0	0.0
Fair Oaks Lane	East of El Camino Real	334	417	422	1.0	1.0	0.0
Fair Oaks Lane	West of El Camino Real	562	682	689	0.8	0.9	0.1
Glenwood Avenue	East of El Camino Real	480	520	526	0.3	0.4	0.1
Marsh Road	East of Middlefield Road	1634	1676	1692	0.1	0.2	0.1
Middlefield Road	North of Marsh Road	1122	1348	1361	0.8	0.8	0.0
Middlefield Road	South of Marsh Road	1440	1708	1725	0.7	0.8	0.1
Middlefield Road	North of Ravenswood	1052	1230	1244	0.7	0.7	0.0

Roadway	Location	PM Peak Hour Volumes			Cumulative Noise Increase (dBA)		
		Existing	Cumulative	Cumulative Plus Project	Cumulative Versus Existing	Cumulative Plus Project Versus Existing	Project Contribution
Middlefield Road	South of Ravenswood	1644	1977	2002	0.8	0.9	0.1
Ravenswood Avenue	West of Middlefield Road	1044	1189	1204	0.6	0.6	0.0
Ringwood Avenue	West of Bay Road	648	690	700	0.3	0.3	0.0
Selby Lane	East of El Camino Real	96	96	97	0.0	0.0	0.0
Selby Lane	West of El Camino Real	490	560	571	0.6	0.7	0.1
Sonoma Avenue	East of Bay Road	62	77	77	0.9	0.9	0.0
Valparaiso Avenue	West of El Camino Real	897	954	985	0.3	0.4	0.1

Temporary Noise Increases from Project Construction

Background Information on Construction Noise

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas near noise-sensitive land uses, or when construction lasts over extended periods of time.

Typically, construction activities would be carried out in stages. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 7 and 8. Table 7 shows the average noise level ranges, by construction phase, and Table 8 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise falls in the range of 80 to 90 dBA at 50 feet from the source. Construction-generated noise levels drop off/increase at a rate of about 6 dBA per doubling/halving of the distance between the source and receptor. Shielding by buildings or terrain can provide an additional 5 to 10 dBA noise reduction at distant receptors.

TABLE 7 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 8 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
Ballast Equalizer[3]	82	Continuous
Ballast Tamper[3]	83	Continuous
Bar Bender	80	Continuous
Chain Saw	85	Continuous
Compressor (air)	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
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rail Saw[3]	90	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tie Cutter[3]	84	Continuous
Tie Handler[3]	80	Continuous
Tie Inserter[3]	85	Continuous
Tractor	84	Continuous
Truck	84	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

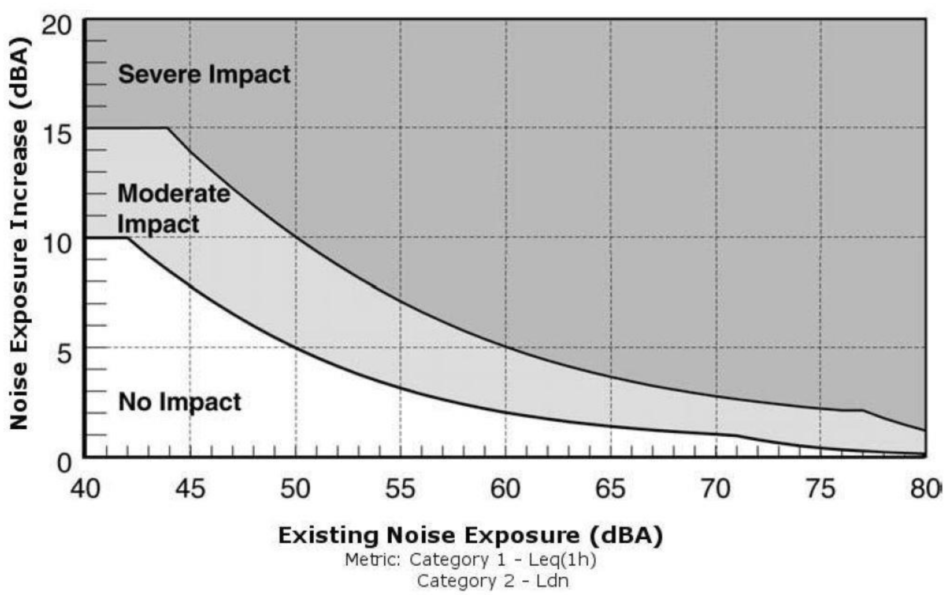
Notes: [1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant. [2]Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation. [3] Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, FTA Report No. 0123, September 2018., [4] Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances, National Cooperative Highway Research Program, 1999.

Construction Noise Criteria

Section 8.16.050 A. of the Town of Atherton Municipal Code states that "construction and delivery are exempt from the basic noise regulation during the times and on the days when construction activities are allowed pursuant to the terms and provisions of Chapter 15.40" Chapter 15.10.120 states that "construction, pickup and delivery shall be prohibited on any property within the town between the hours of 5:00 p.m. in the evening and 8:00 a.m. of the following day," on Saturday and Sunday" Thus, construction noise in the Town of Atherton is exempt from regulation if the above guidelines are adhered to.

Criteria established by the Federal Transit Administration (FTA) specify a comparison of the total noise levels resulting from a project plus the ambient noise levels to the ambient noise levels existing without the project, as shown below in Figure 2. Category 1 receivers are daytime only uses and Category 2 receivers are 24-hour uses such as residences. The "Moderate Impact" zone represents the threshold of measurable annoyance. For temporary construction noise, the upper boundary of the "Moderate Impact" zone is used to define a substantial temporary noise increase above ambient conditions. For example, if the existing noise were measured to be 60 dBA L_{dn}, and the combined noise including the construction of the project would exceed 65 dBA L_{dn}, the increase in the ambient would be considered substantial, resulting in significant impact. A significant noise impact would also be identified if construction occurred outside of allowable hours. In the Town of Atherton, construction projects shall not take place between the hours of 5:00 p.m. and 8:00 a.m. on weekdays, or at any time on Saturday, Sunday, or a legal holiday without the issuance of a special permit. A significant noise impact would be identified if construction required for the development of housing would generate a substantial temporary noise level increase over ambient noise levels at noise sensitive receivers, during allowable construction days and hours.

FIGURE 2 Increase in Cumulative Noise Levels Allowed by Criteria



Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018.

Construction Noise Impact Assessment

Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming the two loudest pieces of equipment would operate simultaneously, as recommend by the FTA for construction noise evaluations. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power.

For the purposes of analyzing a credible worst-case scenario, the construction equipment and phasing information of an example multi-family project was used to calculate construction noise levels on an hourly basis (Hourly L_{eq}) and on an average basis throughout an approximate 20-month construction period (Average L_{dn}). The construction noise levels would represent the majority of residential construction projects anticipated under the HEU, although the duration of the project would vary depending on the size of the project. Equipment expected to be used in each construction phase are summarized in Table 9, along with the quantity of each type of equipment, the reference noise level at 50 feet assuming the operation of the two loudest pieces of construction equipment, and the estimated noise levels at the nearest property lines projected from the center of the construction activity by phase. Construction noise levels were calculated at distances of 100, 200, 400, and 500 feet.

Table 10 summarizes the minimum distances between construction sites and receptors in various ambient noise environments. In relatively quiet noise environments (i.e., 55 dBA L_{dn}), construction noise can increase ambient noise levels by up to 7 dBA L_{dn} before a substantial temporary noise increase would occur. Construction activities occurring within 315 feet of sensitive receptors (as measured from the acoustic center of the construction site) would result in a substantial temporary noise increase above ambient conditions. Conversely, in relatively noisy environments (i.e., 75 dBA L_{dn}), construction noise can increase ambient noise levels by up to 2 dBA L_{dn} before a substantial temporary noise increase would occur. Construction activities occurring within 80 feet of sensitive receptors (as measured from the acoustic center of the construction site) would result in a substantial temporary noise increase above ambient conditions.

TABLE 9 Construction Noise Levels

Phase	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq} and L_{dn} (dBA) From Operation of Two Loudest Pieces of Construction Equipment				
		Noise Level at 50 feet	Noise Level at 100 feet	Noise Level at 200 feet	Noise Level at 400 feet	Noise Level at 500 feet
Demolition	Concrete/Industrial Saw (1)* Excavator (2) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)*	85	79	73	67	65
Site Preparation	Grader (2)* Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)	84	78	72	66	64
Grading/ Excavation	Excavator (4) Grader (2) Rubber Tired Dozer (1) Concrete/Industrial Saw (2)* Tractor/Loader/Backhoe (2)	86	80	74	68	66
Trenching/ Foundation	Excavator (2)* Tractor/Loader/Backhoe (2)*	82	76	70	64	62
Building Exterior	Crane (3) Forklift (2) Generator Set (1)* Tractor/Loader/Backhoe (2)* Welders (2)	82	76	70	64	62
Building Interior/ Architectural Coating	Aerial Lift (2) Air Compressor (10)*	77	71	65	59	57
Paving	Cement and Mortar Mixer (4) Paver (4) Paving Equipment (4) Roller (4) Tractor/Loader/Backhoe (4)*	83	77	71	65	63
Average Construction Noise L_{dn}		**77**	**71**	**65**	**59**	**57**

*Denotes two loudest pieces of construction equipment per phase

TABLE 10 Noise Levels and Distances Defining Noise Impacts Due to Construction

Existing Ambient Noise Level (L_{dn})	Maximum Allowable Construction Noise Level (L_{dn})	Overall Noise Level (L_{dn})	Increase Above Ambient (L_{dn})	Minimum Distance to Avoid Substantial Temporary Noise Increase (feet)
55	61	62	7	315
60	63	65	5	250
65	66	69	4	175
70	69	73	3	125
75	73	77	2	80

Mitigation Measure 1:

Construction noise in the Town of Atherton is exempt from regulation if the activities occur between eight 8:00 a.m. and 5:00 p.m. Monday through Friday. Construction is prohibited between 5:00 p.m. and 8:00 a.m. and on weekends and holidays. However, the FTA has established criteria to reduce the impacts of construction noise at nearby noise sensitive receptors. To reduce construction noise impacts, construction best management practices are recommended.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction materials, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Construction equipment shall be well-maintained and used judiciously to be as quiet as possible. The following best management practices will be implemented to reduce noise from construction activities near sensitive receptors:

- Pursuant to the Municipal Code, restrict noise-generating activities at the construction site or in areas adjacent to the construction site to the hours between 8:00 a.m. and 5:00 p.m., Monday through Friday and prohibit construction activities on Saturday and Sunday, and State, Federal or Local Holidays;
- Consider temporary noise barriers during construction phases involving earth moving equipment (e.g., grading operations) where they would be effective in reducing the construction noise impact, when directly adjoining sensitive receptors. An eight-foot plywood noise barrier could reduce noise levels by at least 5 dBA;
- Utilize ‘quiet’ models of air compressors and other stationary noise sources where technology exists;
- Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment;

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

- Acoustically shield stationary equipment located near adjacent receptors with temporary noise barriers;

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

- Prohibit all unnecessary idling of internal combustion engines;

- Route all construction traffic to and from the project site via designated truck routes and prohibit construction related heavy truck traffic in residential areas where feasible;

- Control noise from construction workers' radios to the point where they are not audible at existing residences that border the project site;

- Notify all adjacent receptors of the construction schedule in writing;

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

- 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.

Implementation of mitigation would limit construction hours and reduce construction noise levels at noise sensitive locations. The highest noise levels would occur during site grading and during periods where construction is located directly adjacent to noise sensitive locations. With the implementation of Mitigation Measure 1, construction noise levels at each project site will be reduced to the extent feasible, resulting in a less-than-significant impact.

Impact 2: **Exposure to Excessive Groundborne Vibration during Construction.** Construction activities occurring as part of the project could expose sensitive land uses to excessive groundborne vibration. With proper mitigation and adherence to the applicable guidelines, this is a **less-than-significant** impact.

The California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV to avoid damage to buildings that are structurally sound and designed to modern engineering standards, a vibration limit of 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a vibration limit of 0.25 in/sec PPV for historic and some old buildings.

Construction equipment such as pile drivers are known to generate substantial vibration levels that if used in the vicinity of sensitive land uses may expose persons to excessive vibration levels as well as have the potential to damage buildings. Other construction equipment such as bulldozers and vibratory rollers do not create the vibration levels of pile drivers; however, these types of equipment are more likely to operate continuously and closer to sensitive receptors, and they may expose persons to excessive vibration levels. Foundation construction techniques involving impact or vibratory pile driving equipment, which can cause excessive vibration, are not expected with the proposed HEU.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 11 presents typical vibration levels that could be expected from construction equipment at a distances of 25 feet to 100 feet. Vibration levels would be higher at distances less than 25 feet and lower at distances greater than 100 feet. Vibration levels would also vary depending on soil conditions, construction methods, and equipment used. Vibration levels are highest close to the source, and then attenuate with increasing distance at the rate $(D_{ref}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet.

TABLE 11 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	PPV at 50 ft. (in/sec)	PPV at 100 ft. (in/sec)
Clam shovel drop		0.202	0.094	0.044
Hydromill (slurry wall)	in soil	0.008	0.004	0.002
	in rock	0.017	0.008	0.004
Vibratory Roller		0.210	0.098	0.046
Hoe Ram		0.089	0.042	0.019
Large bulldozer		0.089	0.042	0.019
Caisson drilling		0.089	0.042	0.019
Loaded trucks		0.076	0.035	0.017
Jackhammer		0.035	0.016	0.008
Small bulldozer		0.003	0.001	0.001

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., January 2024.

Table 12 summarizes the minimum safe setback distances to maintain in order to achieve the 0.25 in/sec PPV threshold for historical buildings and the 0.3 in/sec and 0.5 in/sec PPV thresholds for modern buildings.

TABLE 12 Vibration Source Levels for Construction Equipment and Minimum Safe Setbacks

Equipment		Minimum Safe Setback (feet) 0.25 in/sec PPV	Minimum Safe Setback (feet) 0.30 in/sec PPV	Minimum Safe Setback (feet) 0.50 in/sec PPV
Clam shovel drop		21	18	11
Hydromill (slurry wall)	in soil	<1	<1	<1
	in rock	3	2	2
Vibratory Roller		22	19	12
Hoe Ram		10	9	6
Large bulldozer		10	9	6
Caisson drilling		10	9	6
Loaded trucks		9	8	5
Jackhammer		5	4	3
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., January 2024.

A review of the National Register of Historic Places Website[1] shows that the following four properties are located within the Atherton HEU area:

- 210 Oak Grove Avenue, Menlo Park (1,000-, 1,050-, and 1,100-feet west of 175, 185, and 197 Ravenswood Avenue, respectively)
- 555 Ravenswood Avenue, Menlo Park (1,450-feet southwest of 175 Ravenswood Avenue)
- 1100 Merrill Street, Menlo Park (2,120-feet southwest of 175 Ravenswood Avenue, and 2,120-feet east of Menlo School)
- 98 Alejandra Avenue, Atherton (950-feet north of Sacred Heart School, 1,250-feet northeast of the Circus Club, 1,600-feet west of Menlo School, and 1,700-feet southwest of Menlo College,)

All HEU sites would be 950 feet or further from existing historic resources identified by the National Register of Historic Places. Since specific future projects within the Town are unknown at this time, it is conservatively assumed that the construction areas associated with these future projects could be located within the minimum safe setback distances identified in Table 12. For projects that produce vibration levels exceeding the thresholds, construction vibration would be expected to cause both human annoyance and the possibility of cosmetic damage, resulting in a significant impact.

[1] National Register of Historic Places Map, Cultural Resources GIS Facility, January 4, 2024. https://www. https://www.nps.gov/maps/full.html?mapId=7ad17cc9-b808-4ff8-a2f9-a99909164466

Mitigation Measure 2:

Groundborne vibration studies shall be prepared by qualified professionals in accordance with industry-accepted methodology where heavy construction activities involving significant site grading, underground, or foundation work will occur within 25 feet of residential or other vibration sensitive uses. The industry-accepted methodologies include the recommended vibration assessment procedure and thresholds provided by public agencies such as Caltrans or the Federal Highway Administration. The studies should identify necessary construction vibration controls to reduce both human annoyance and the possibility of cosmetic damage. Controls shall include, but not be limited to, the following measures:

- 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 Town 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.

- Use smaller equipment to minimize vibration levels below the limits.

- Avoid using vibratory rollers and tampers near sensitive areas.
- Select demolition methods not involving impact tools.

- Modify/design or identify alternative construction methods to reduce vibration levels below the limits.

- Avoid dropping heavy objects or materials.

With the implementation of mitigation, short-term construction activities would not expose persons to excessive vibration levels, resulting in a less-than-significant impact.

Impact 3: **Excessive Aircraft Noise.** Proposed housing opportunity sites would not be within the vicinity of a private airstrip, an airport land use plan, or within two miles of a public airport or public use airport and exposed to excessive noise levels. This is a **less-than-significant** impact.

The Palo Alto Airport is a general aviation field located northeast of US 101 and southwest of the San Francisco Bay, approximately 2.8 miles east of the Atherton town limits. Figure 5 of the Palo Alto Airport's 2022 Annual Airport Noise Report shows Palo Alto Airport noise contours as of 2022[2]. No housing sites would be located within two miles of the Palo Alto Airport, and would be well outside of the 55 dBA CNEL noise contour. Based on a review of Figure 5 of the Palo Alto

[2] Palo Alto Airport 2022 Annual Airplane Noise Report, June 2022. https://www.cityofpaloalto.org/files/assets/public/v/1/public-works/palo-alto-airport/airplane-noise/2022-pao-annual-noise-report.pdf

Airport's 2022 Annual Airport Noise Report, aircraft operations would not expose persons to excessive aircraft noise exceeding 65 dBA CNEL.

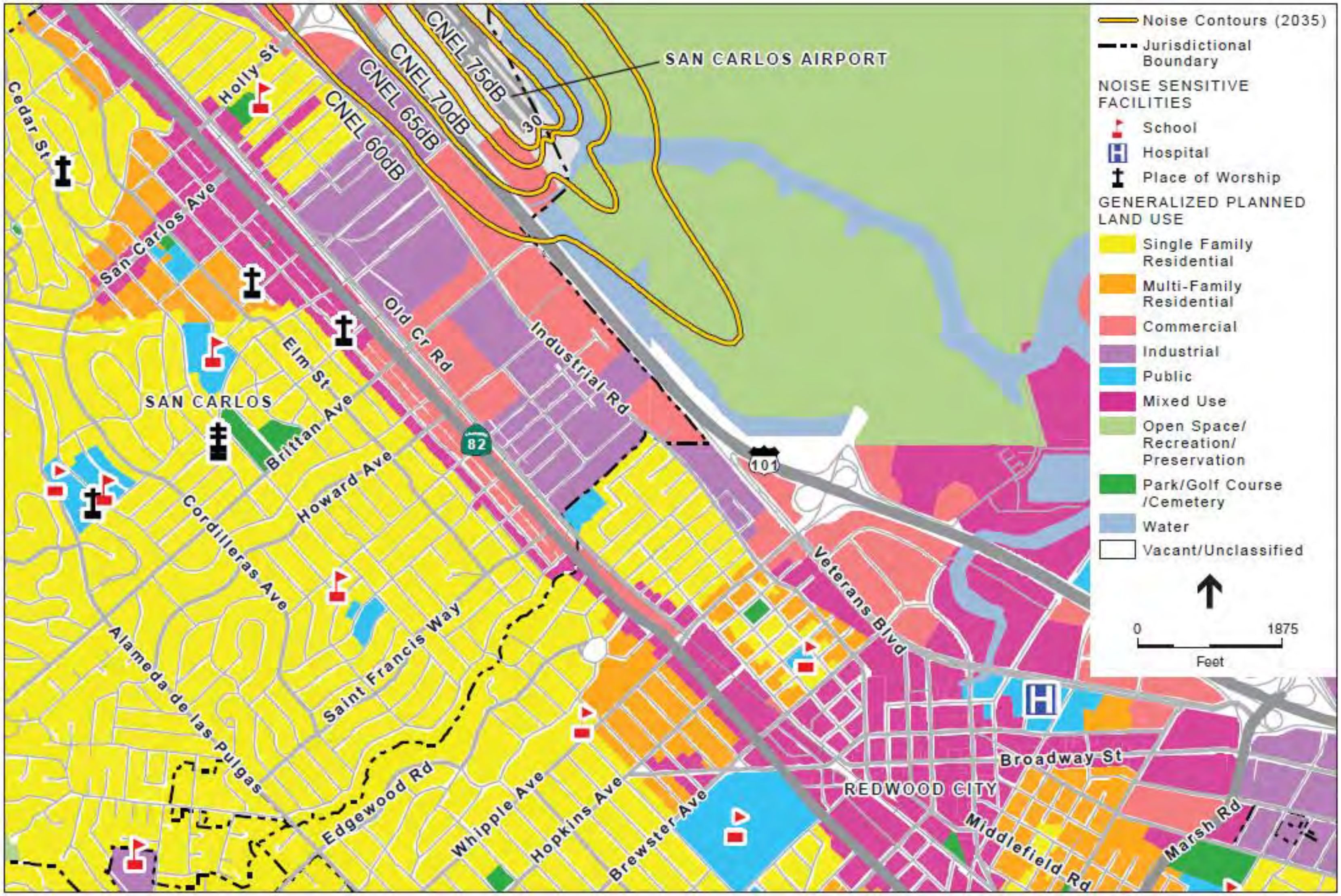
The San Carlos Airport is a community airport located northeast of US 101 and southwest of the San Francisco Bay, approximately 3.4 miles north of the Atherton town limits. Exhibit E-2 of the Comprehensive Airport Land Use Compatibility Plan For the Environs of San Carlos Airport (ALUCP) shows future (2023) San Carlos Airport noise contours[3]. No housing sites would be located within two miles of the San Carlos Airport, and would be well outside of the 60 dBA CNEL noise contour. Based on a review of Exhibit E-2 of the ALUCP, aircraft operations would not expose persons to excessive aircraft noise exceeding 65 dBA CNEL.

All proposed housing sites are located outside of the 55 and 60 dB CNEL noise contours for both the Palo Alto Airport and San Carlos Airport. All other airports are located further away from the Town of Atherton. Thus, the project would have a less-than-significant impact as aircraft noise exposure would be considered compatible with proposed housing sites.

Mitigation Measure 3: None required.

[3] Comprehensive Airport Land Use Compatibility Plan For the Environs of San Carlos Airport, October 2015. https://ccag.ca.gov/wp-content/uploads/2015/11/SQL_FinalALUCP_Oct15_read.pdf

2022 Forecasted Palo Alto Airport Noise Contour Map



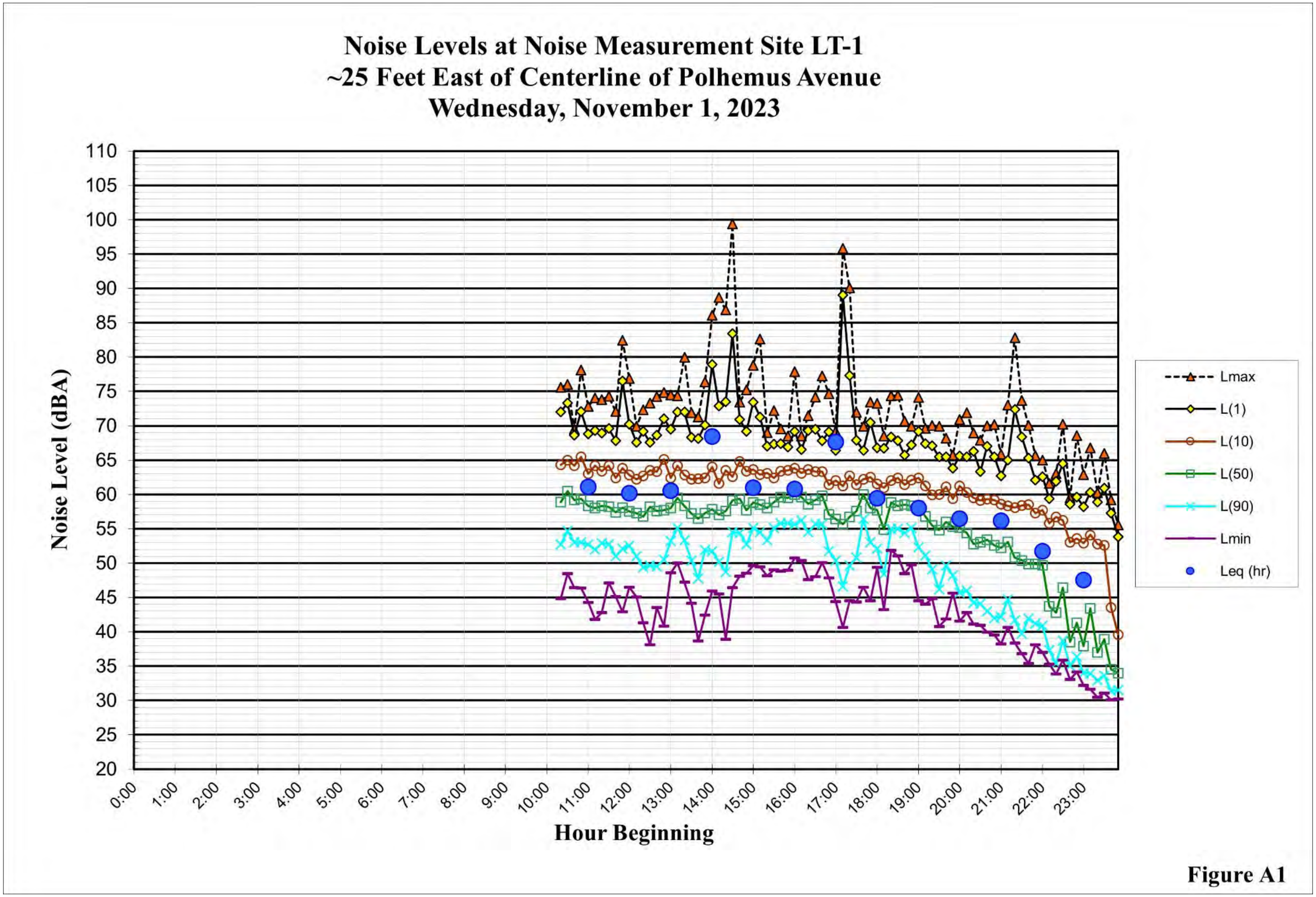
SOURCE: Belmont, 1982; San Mateo County, 1986; Foster City, 1993; Menlo Park, 1994; San Carlos, 2009; City of San Mateo, 2010; Redwood City, 2010; ESRI, 2014; ESA Airports, 2014

San Carlos Airport ALUCP . 130753

Exhibit E-2

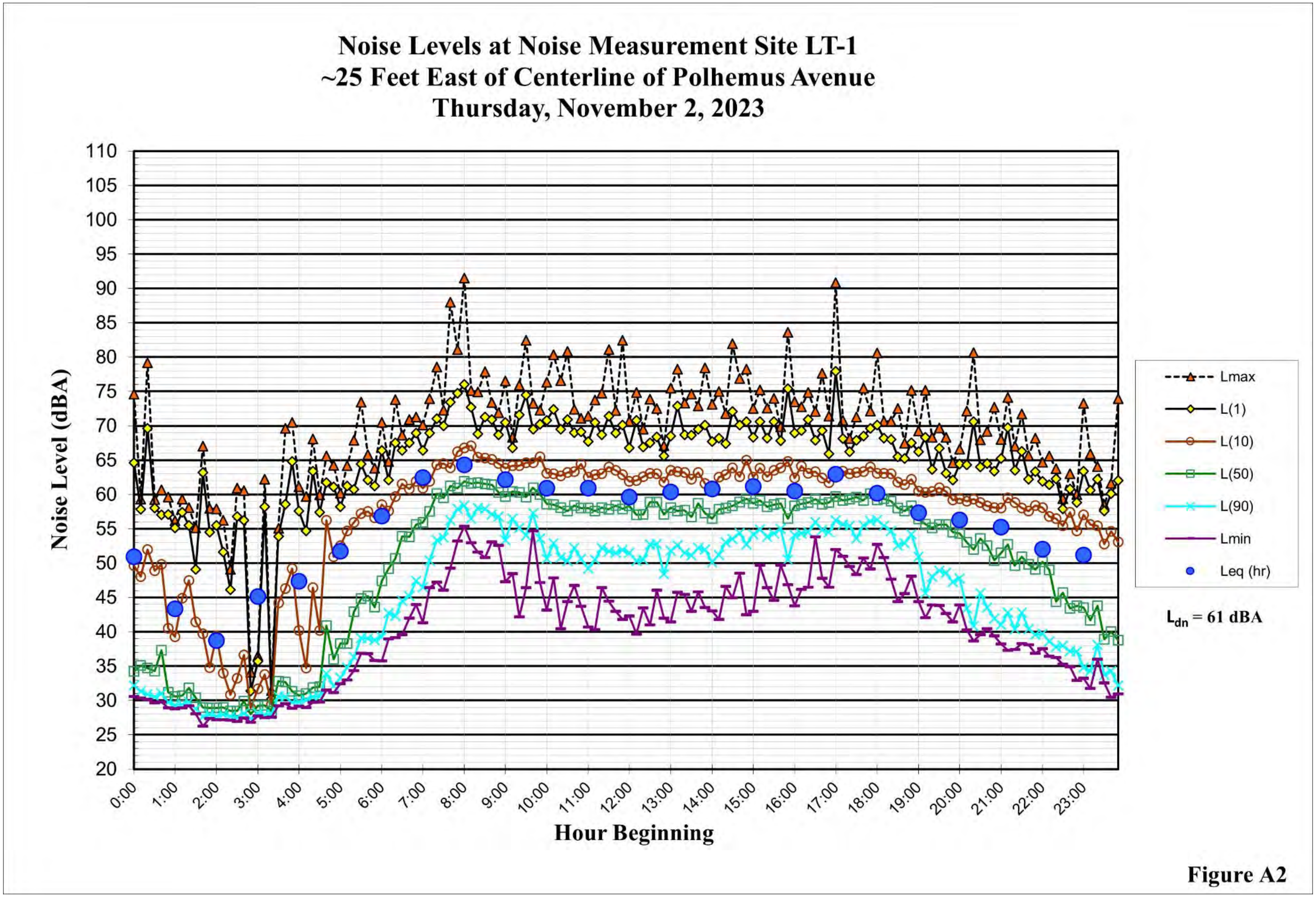
Future (2035) Noise Contours – South

Appendix A – Long-Term Noise Data



Noise Levels at Noise Measurement Site LT-1
~25 Feet East of Centerline of Polhemus Avenue
Wednesday, November 1, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A1



Noise Levels at Noise Measurement Site LT-1
~25 Feet East of Centerline of Polhemus Avenue
Thursday, November 2, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
L_{dn} = 61 dBA

Figure A2

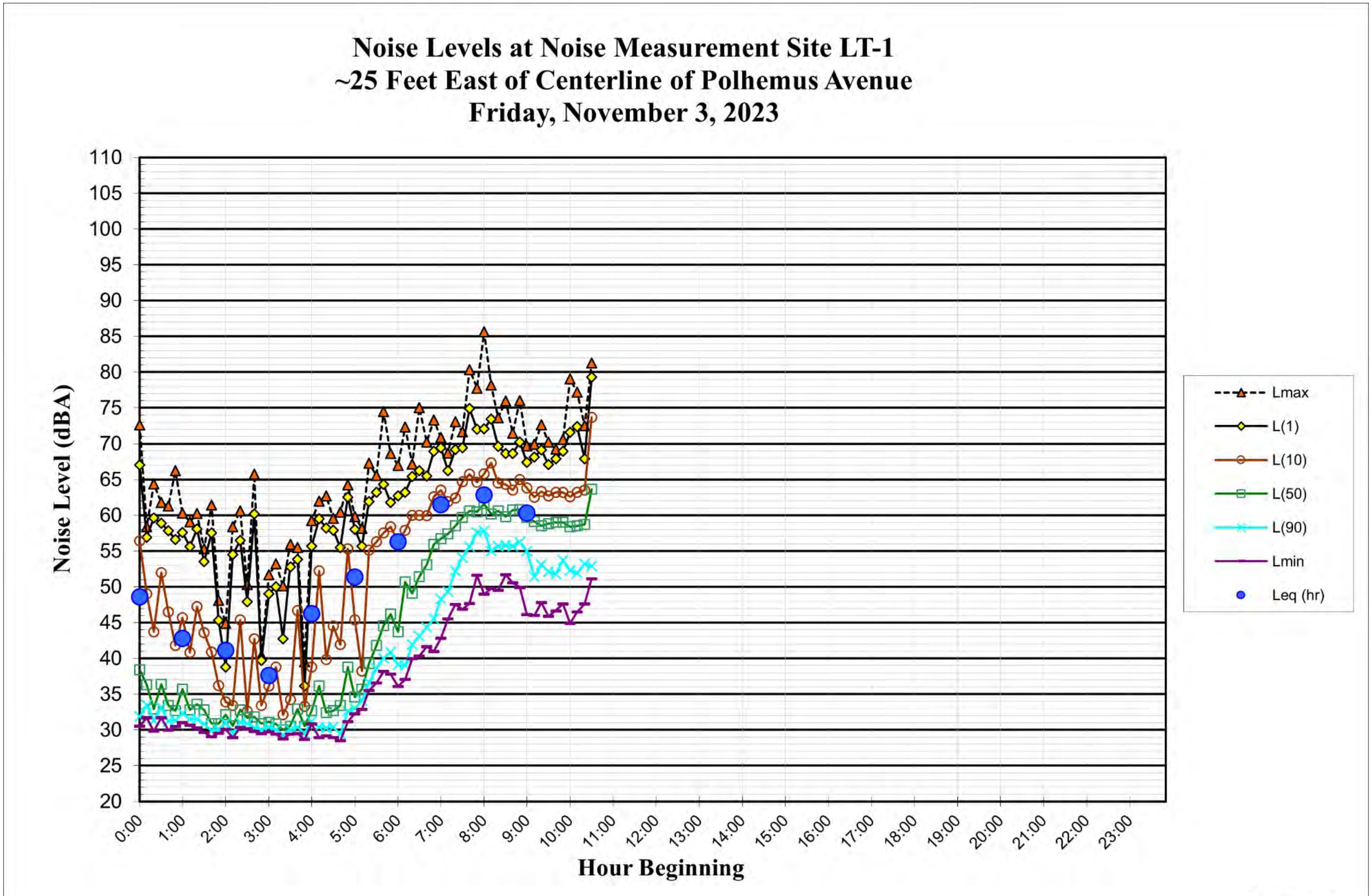

Noise Levels at Noise Measurement Site LT-1
~25 Feet East of Centerline of Polhemus Avenue
Friday, November 3, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A3

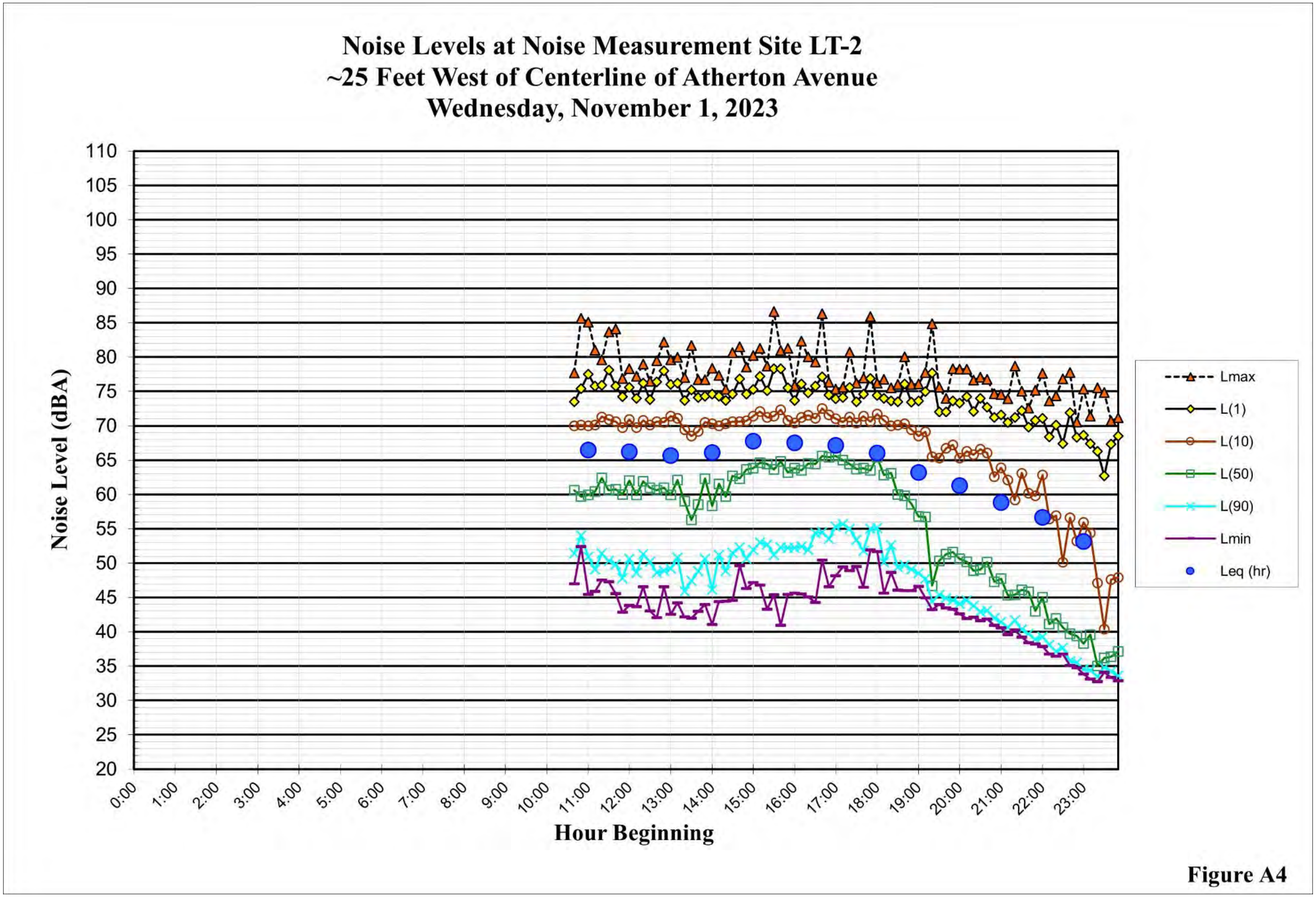
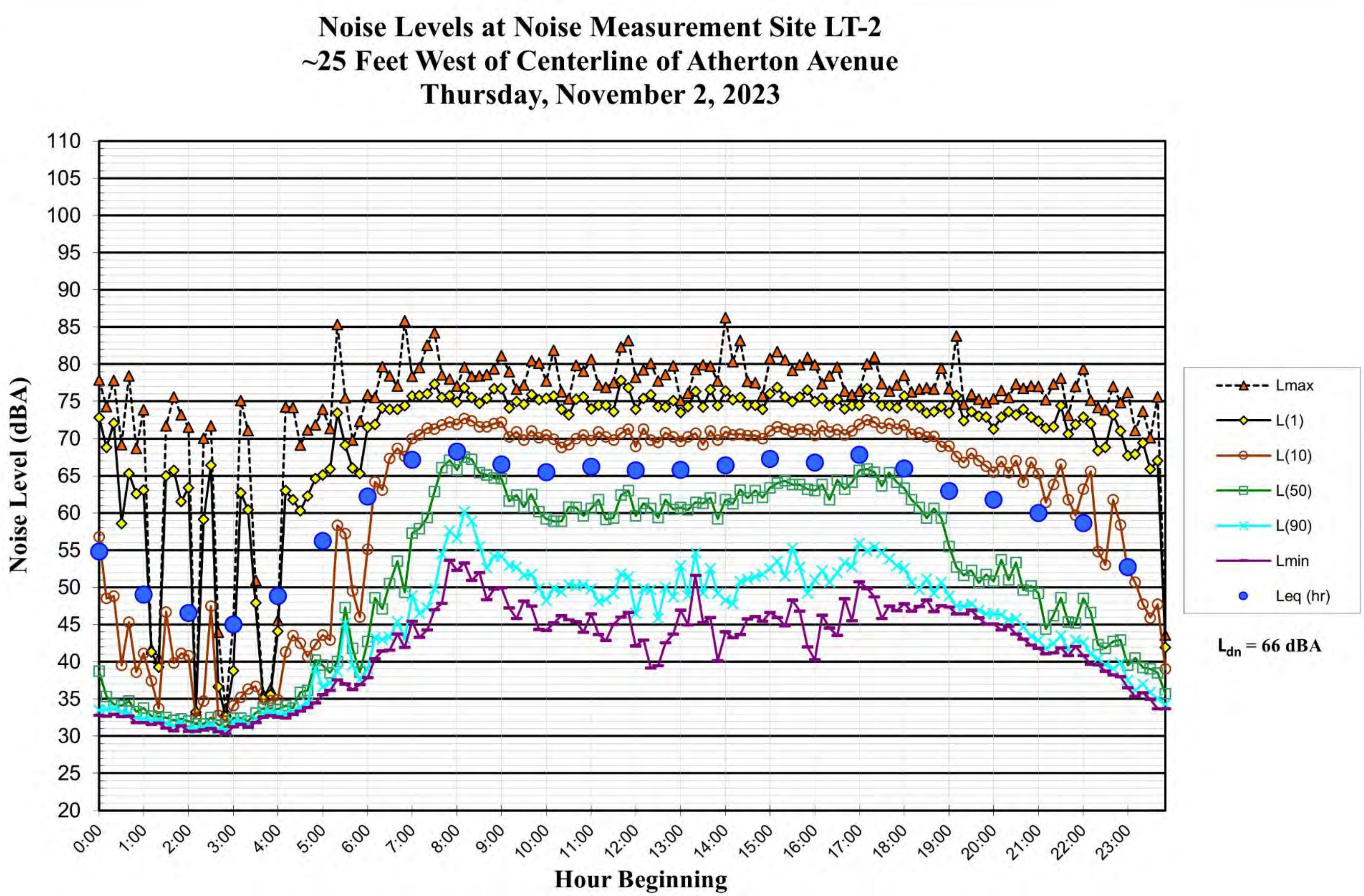

Noise Levels at Noise Measurement Site LT-2
~25 Feet West of Centerline of Atherton Avenue
Wednesday, November 1, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A4


Noise Levels at Noise Measurement Site LT-2
~25 Feet West of Centerline of Atherton Avenue
Thursday, November 2, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
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6:00
7:00
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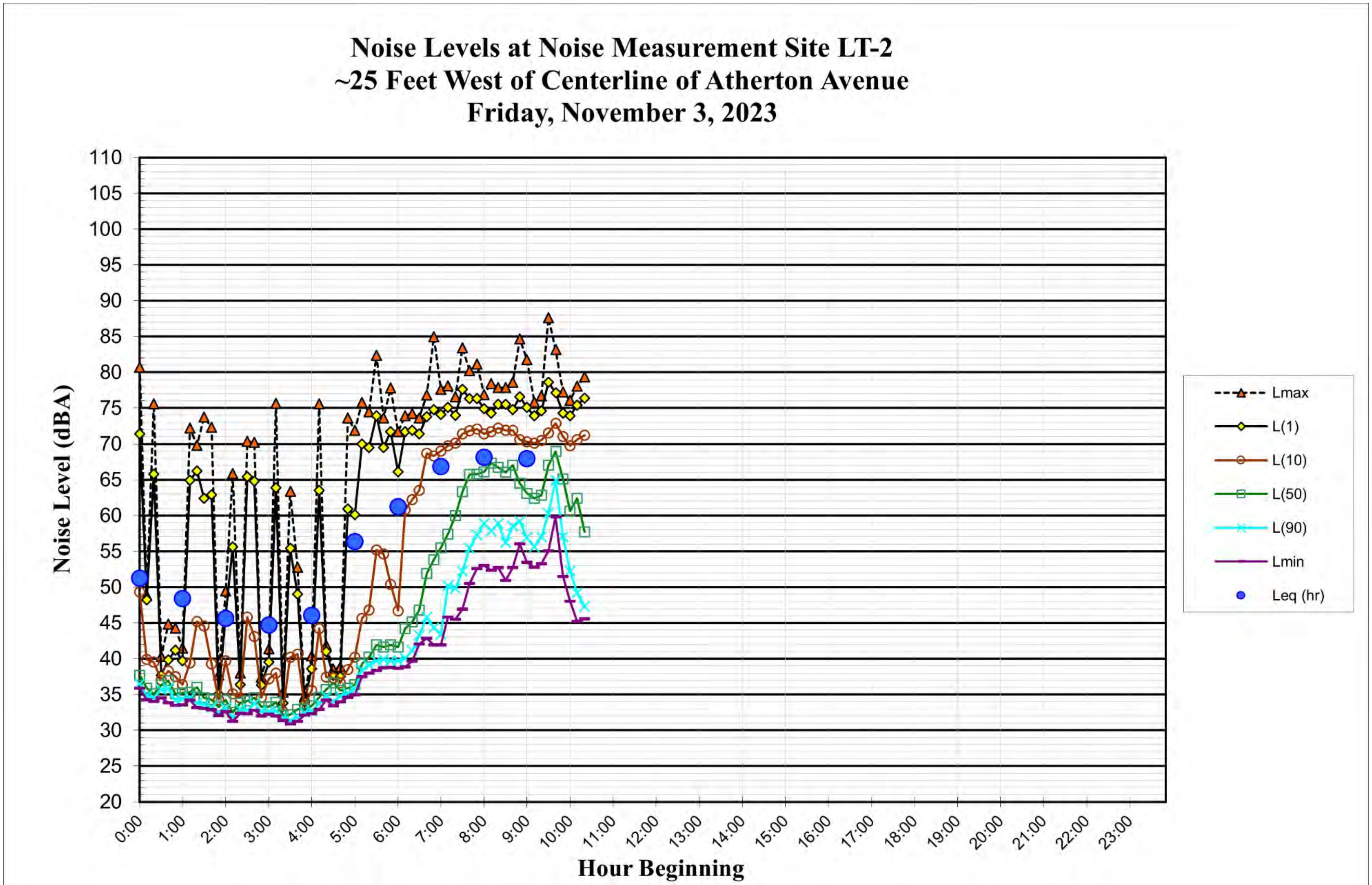
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
L_{dn} = 66 dBA

Figure A5



Noise Levels at Noise Measurement Site LT-2
~25 Feet West of Centerline of Atherton Avenue
Friday, November 3, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
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16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A6

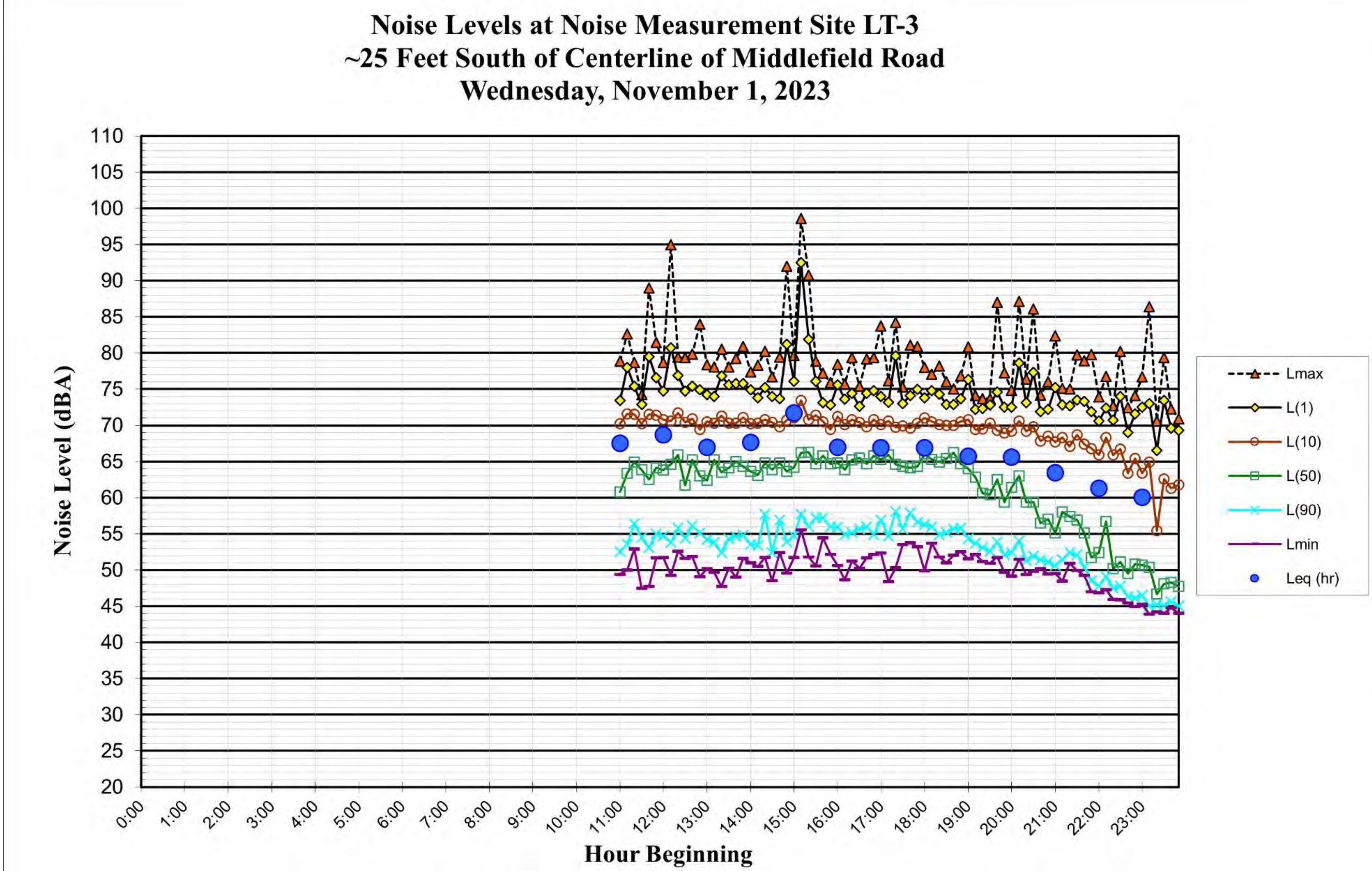
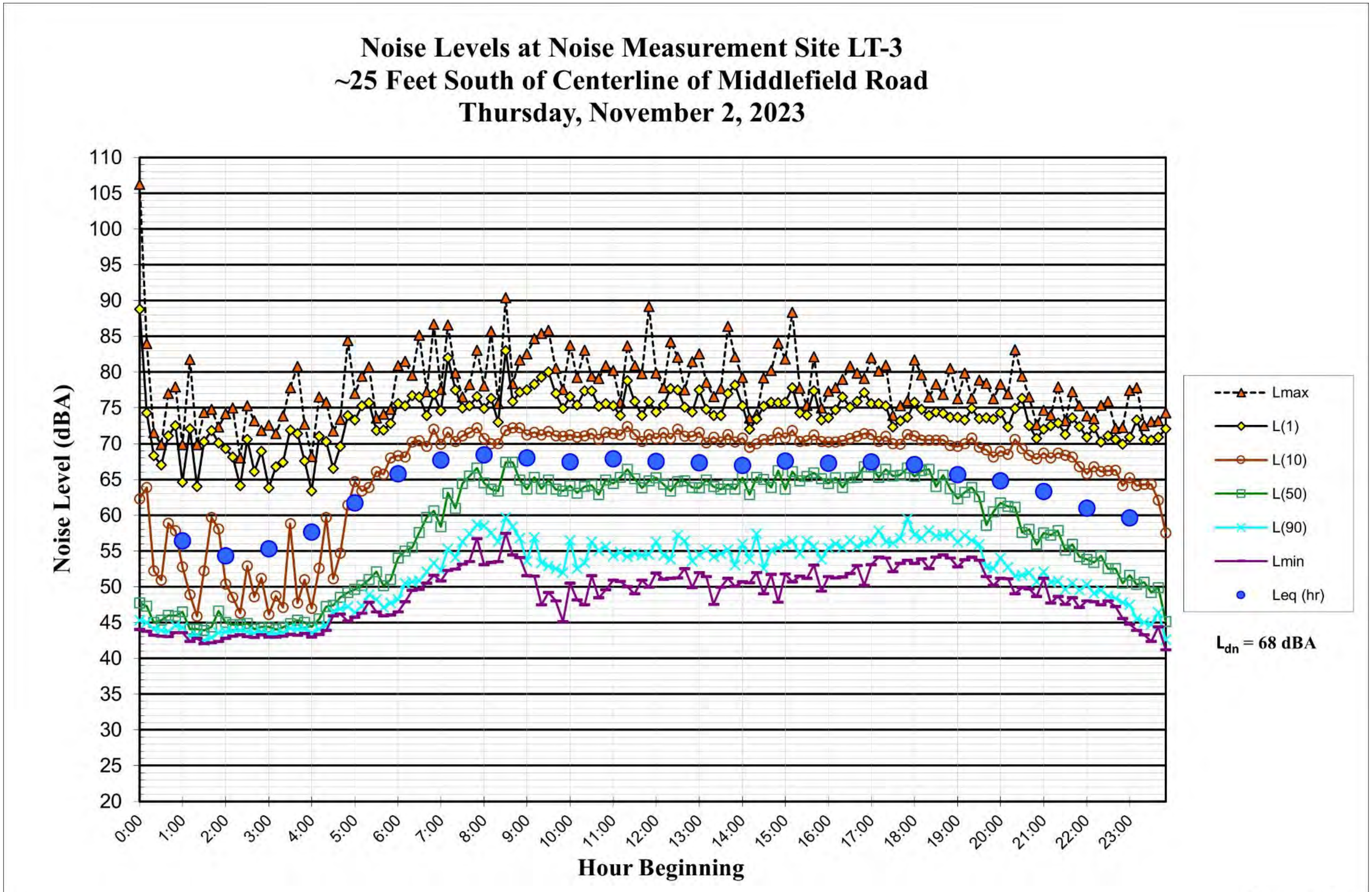

Noise Levels at Noise Measurement Site LT-3
~25 Feet South of Centerline of Middlefield Road
Wednesday, November 1, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A7


Noise Levels at Noise Measurement Site LT-3
~25 Feet South of Centerline of Middlefield Road
Thursday, November 2, 2023
Noise Level (dBA)
Hour Beginning
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
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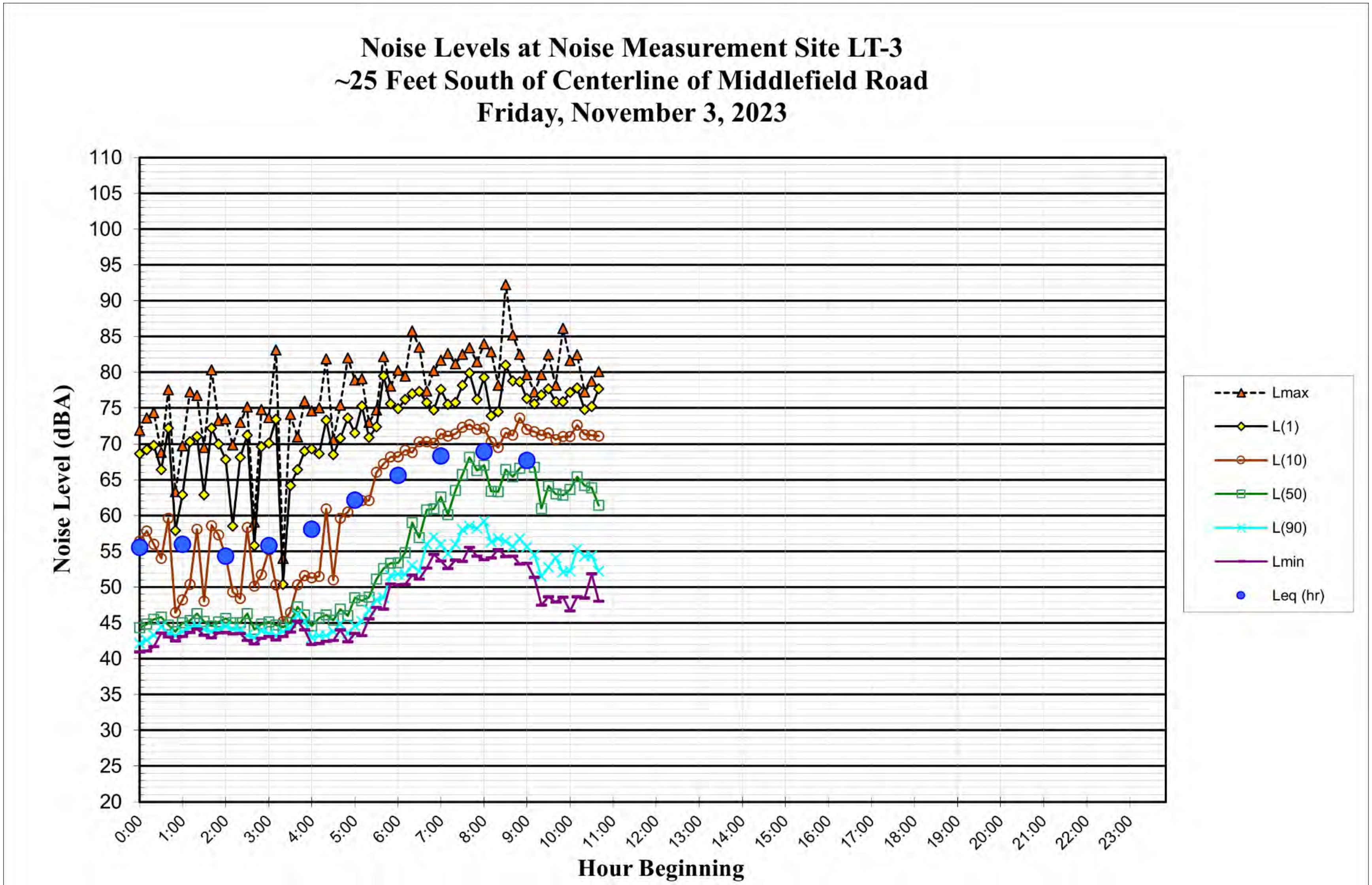
19:00
20:00
21:00
22:00
23:00
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
L_{dn} = 68 dBA

Figure A8



Noise Levels at Noise Measurement Site LT-3
~25 Feet South of Centerline of Middlefield Road
Friday, November 3, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A9

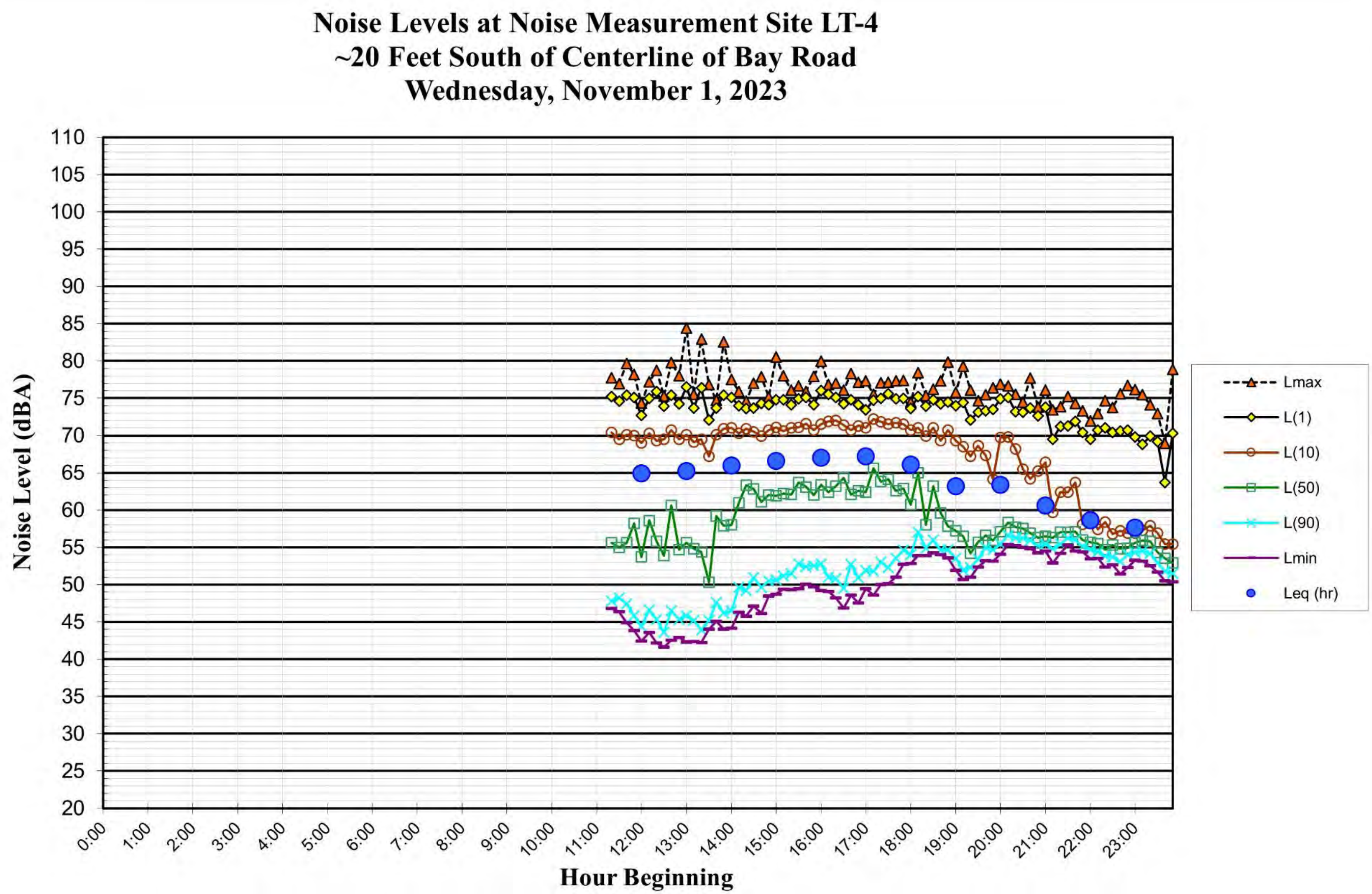
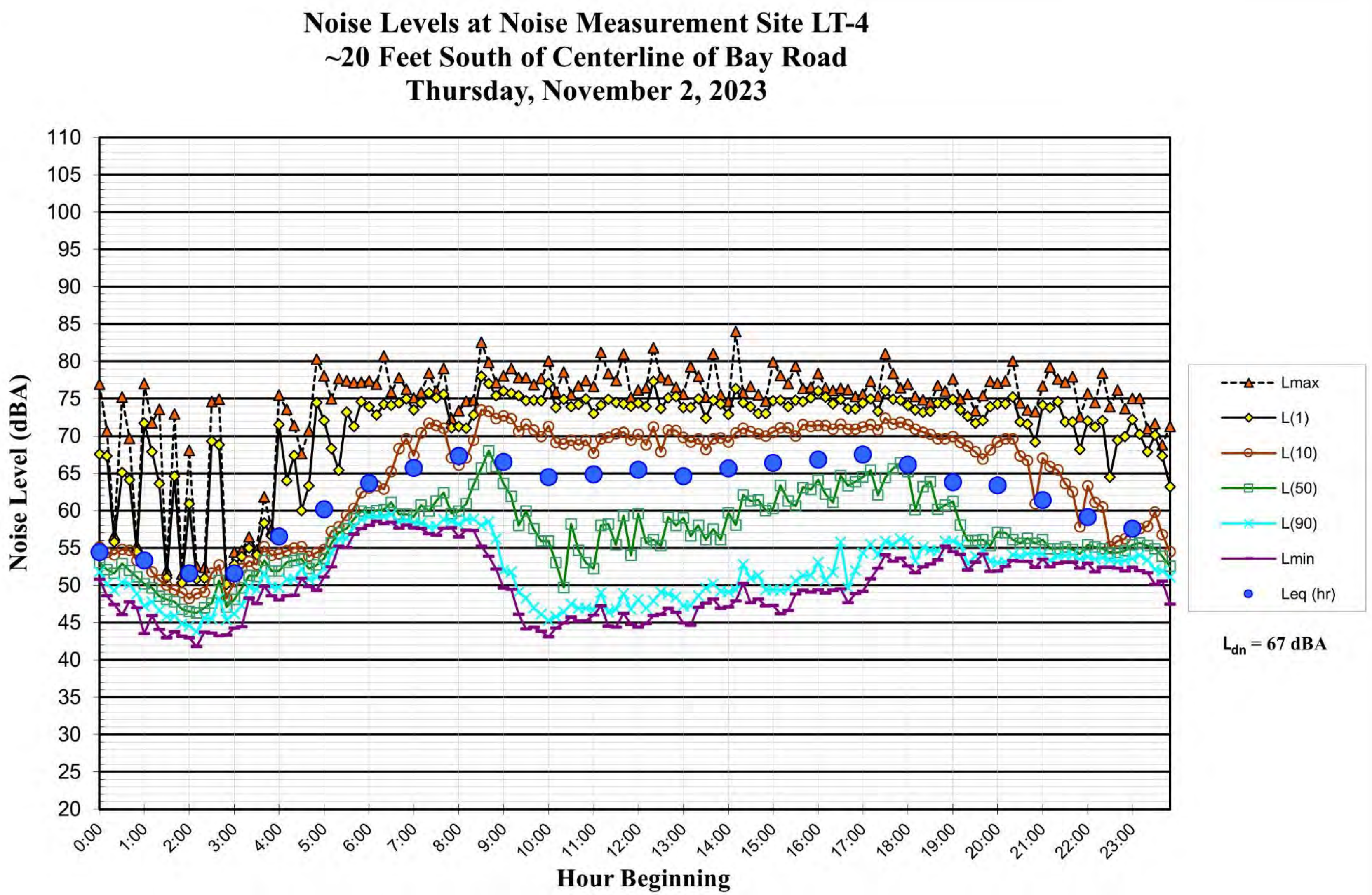

Noise Levels at Noise Measurement Site LT-4
~20 Feet South of Centerline of Bay Road
Wednesday, November 1, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A10



Noise Levels at Noise Measurement Site LT-4
~20 Feet South of Centerline of Bay Road
Thursday, November 2, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
L_{dn} = 67 dBA

Figure A11

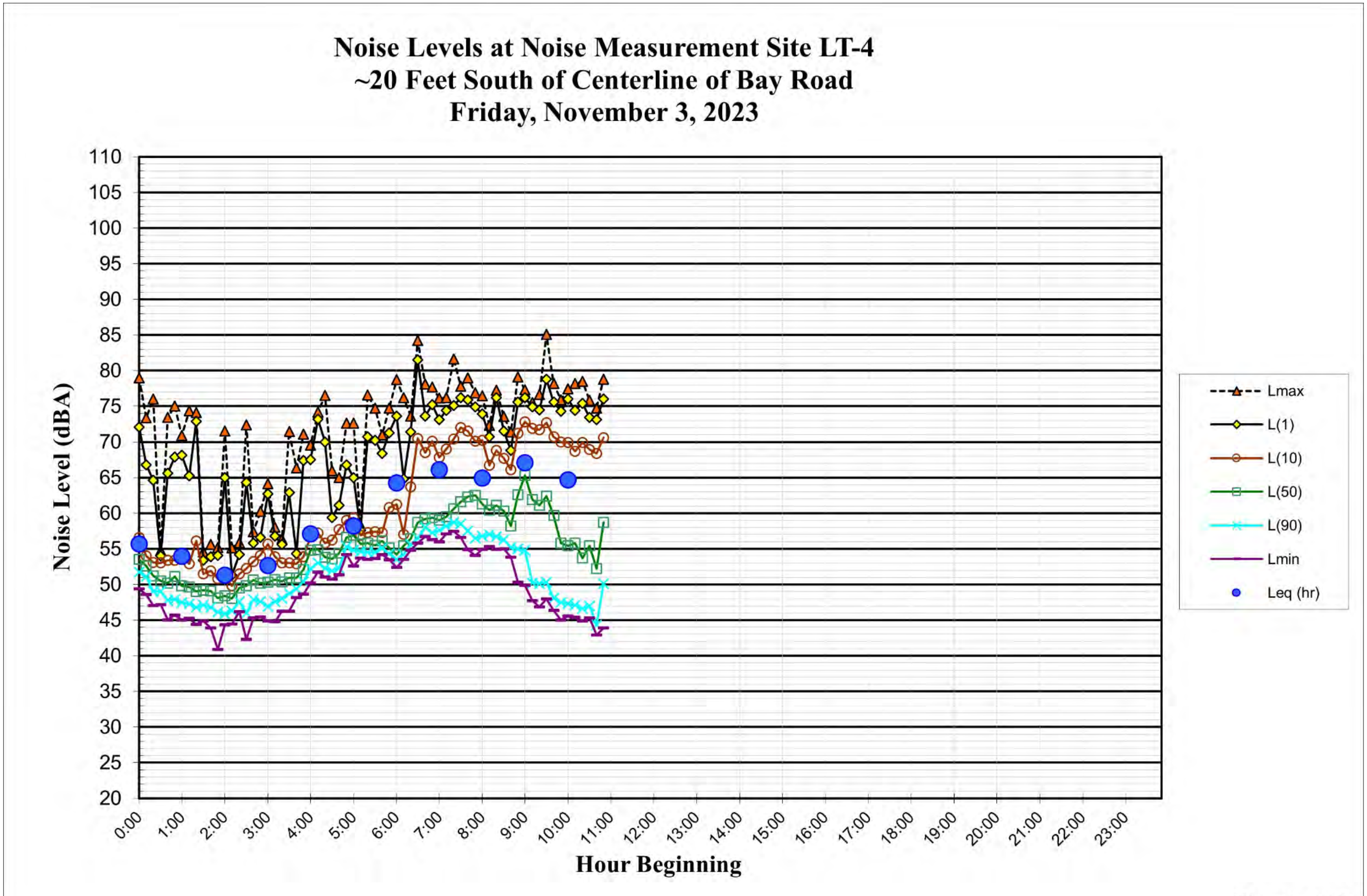

Noise Levels at Noise Measurement Site LT-4
~20 Feet South of Centerline of Bay Road
Friday, November 3, 2023
Noise Level (dBA)
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A12

Noise Levels at Noise Measurement Site LT-5
~95 Feet South of Centerline of El Camino Real
Monday, December 11, 2023

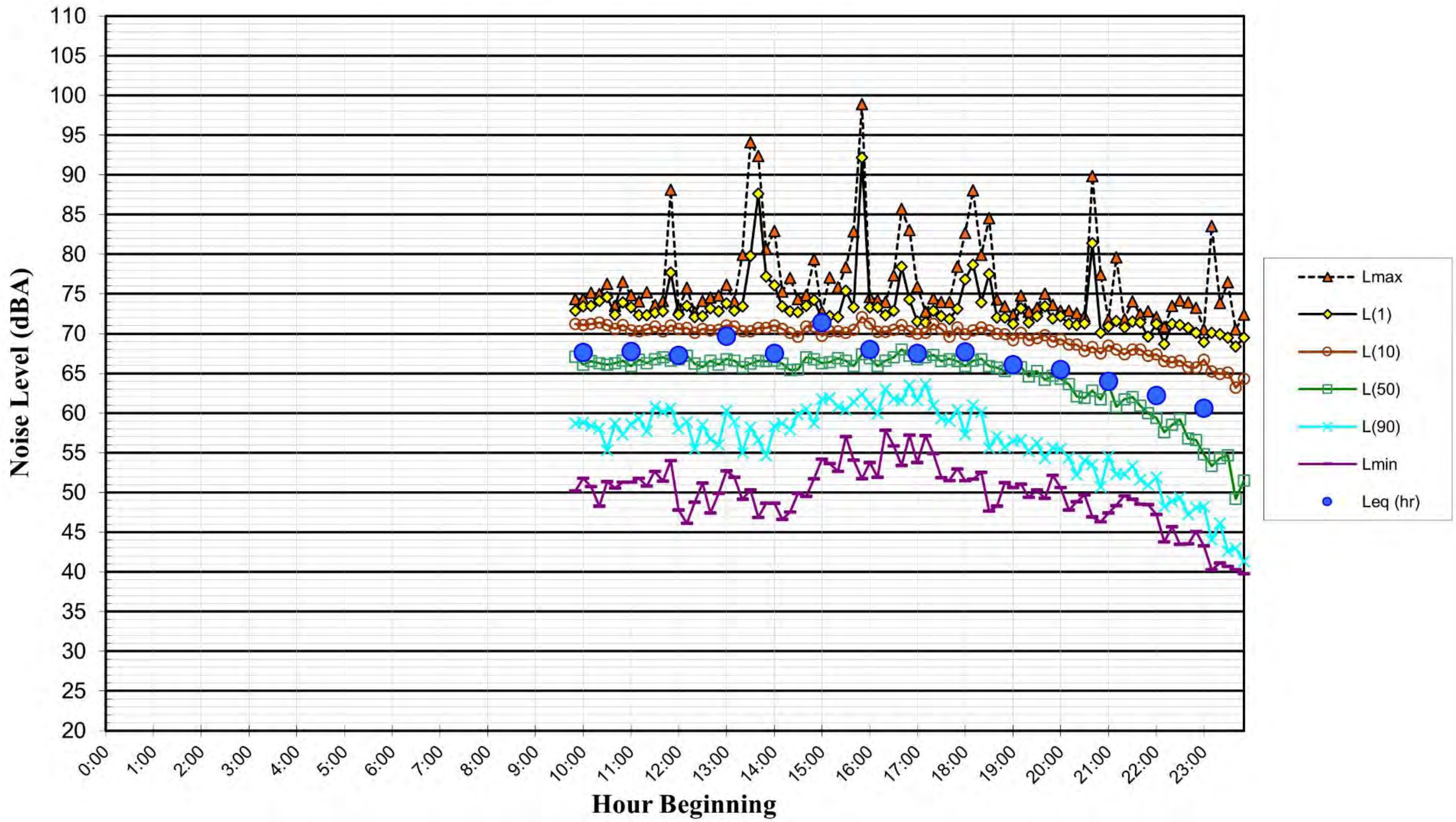
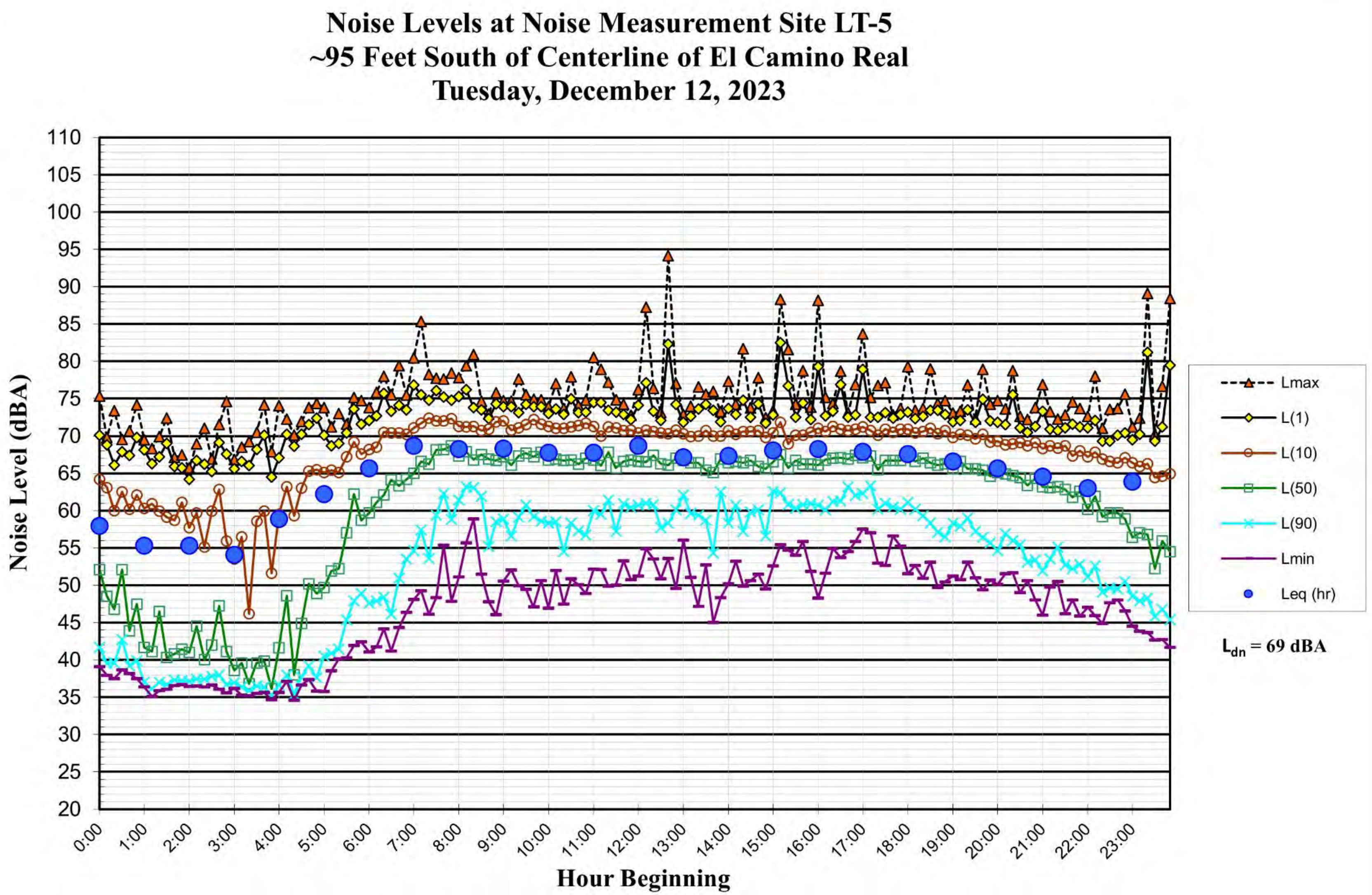


Figure A13



Noise Levels at Noise Measurement Site LT-5
~95 Feet South of Centerline of El Camino Real
Tuesday, December 12, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
L_{dn} = 69 dBA

Figure A14

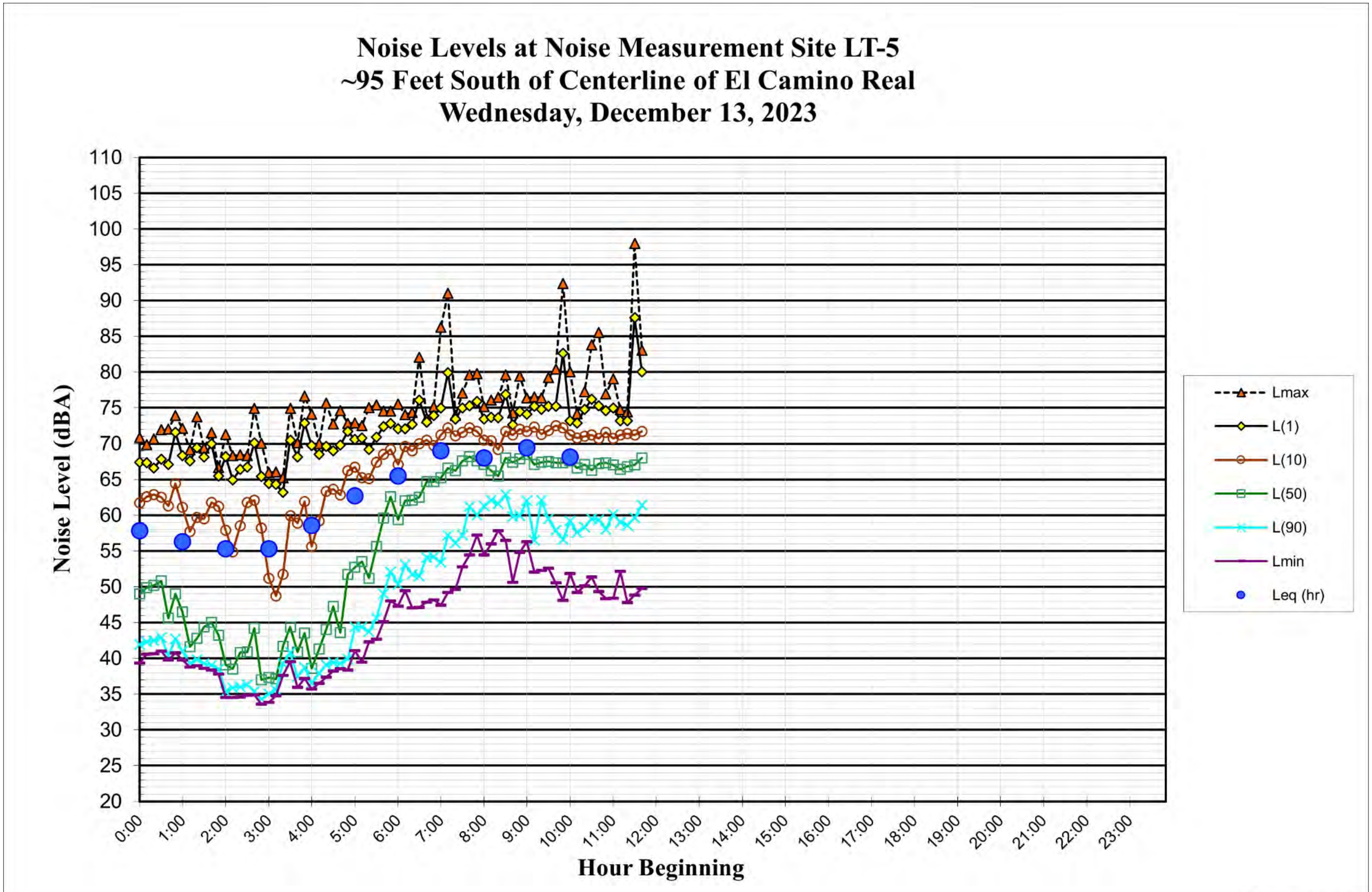

Noise Levels at Noise Measurement Site LT-5
~95 Feet South of Centerline of El Camino Real
Wednesday, December 13, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A15

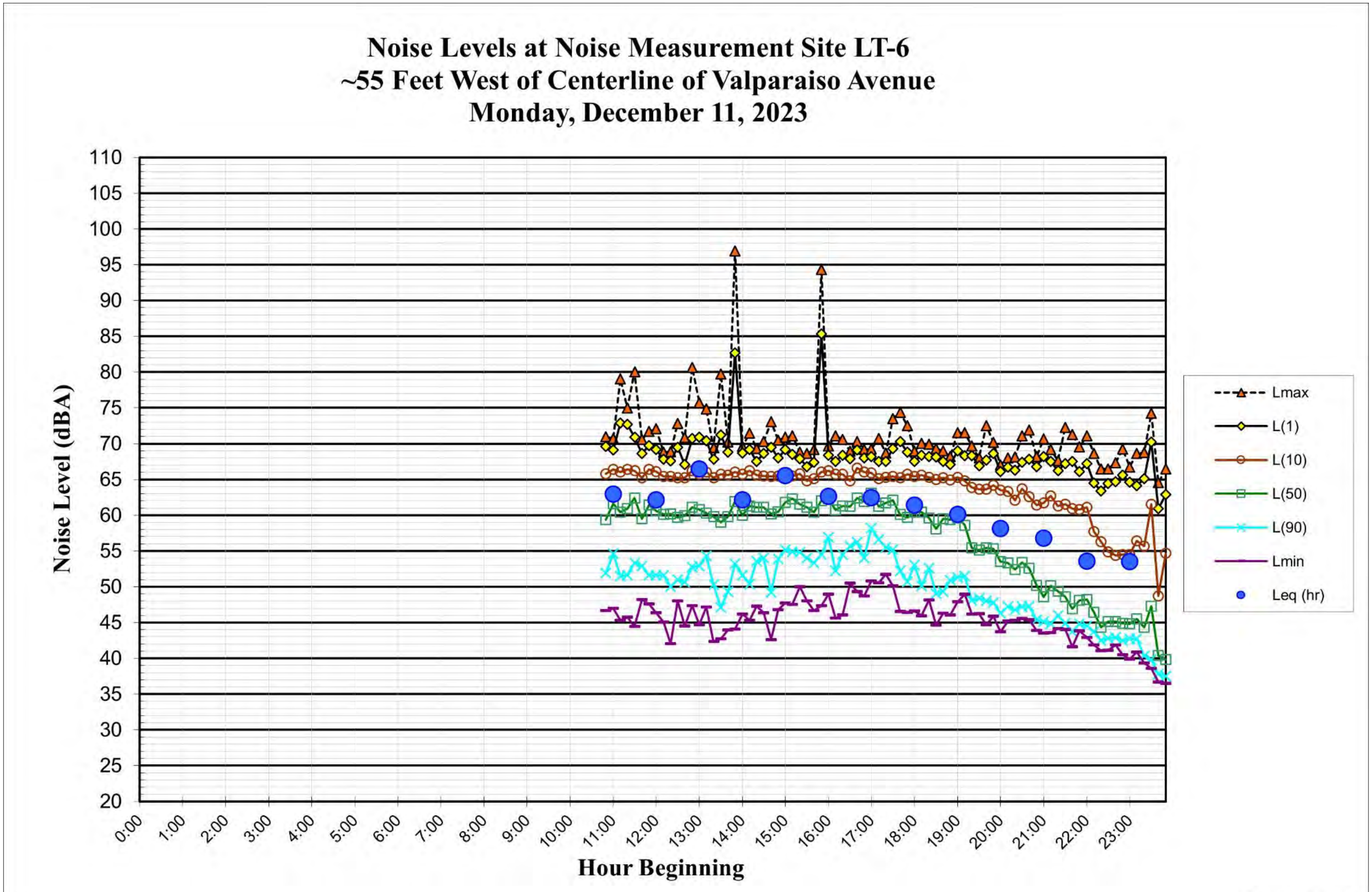
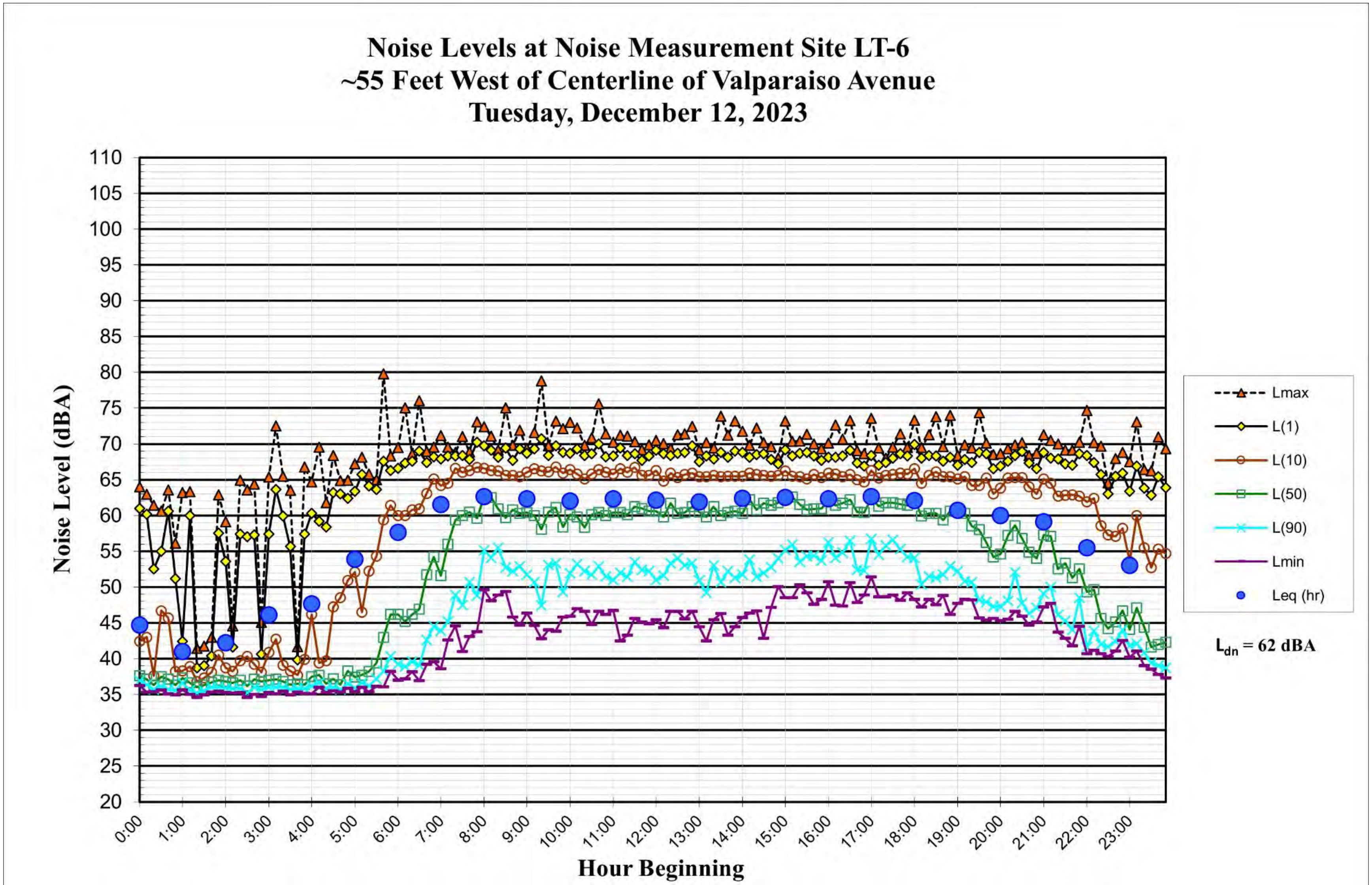
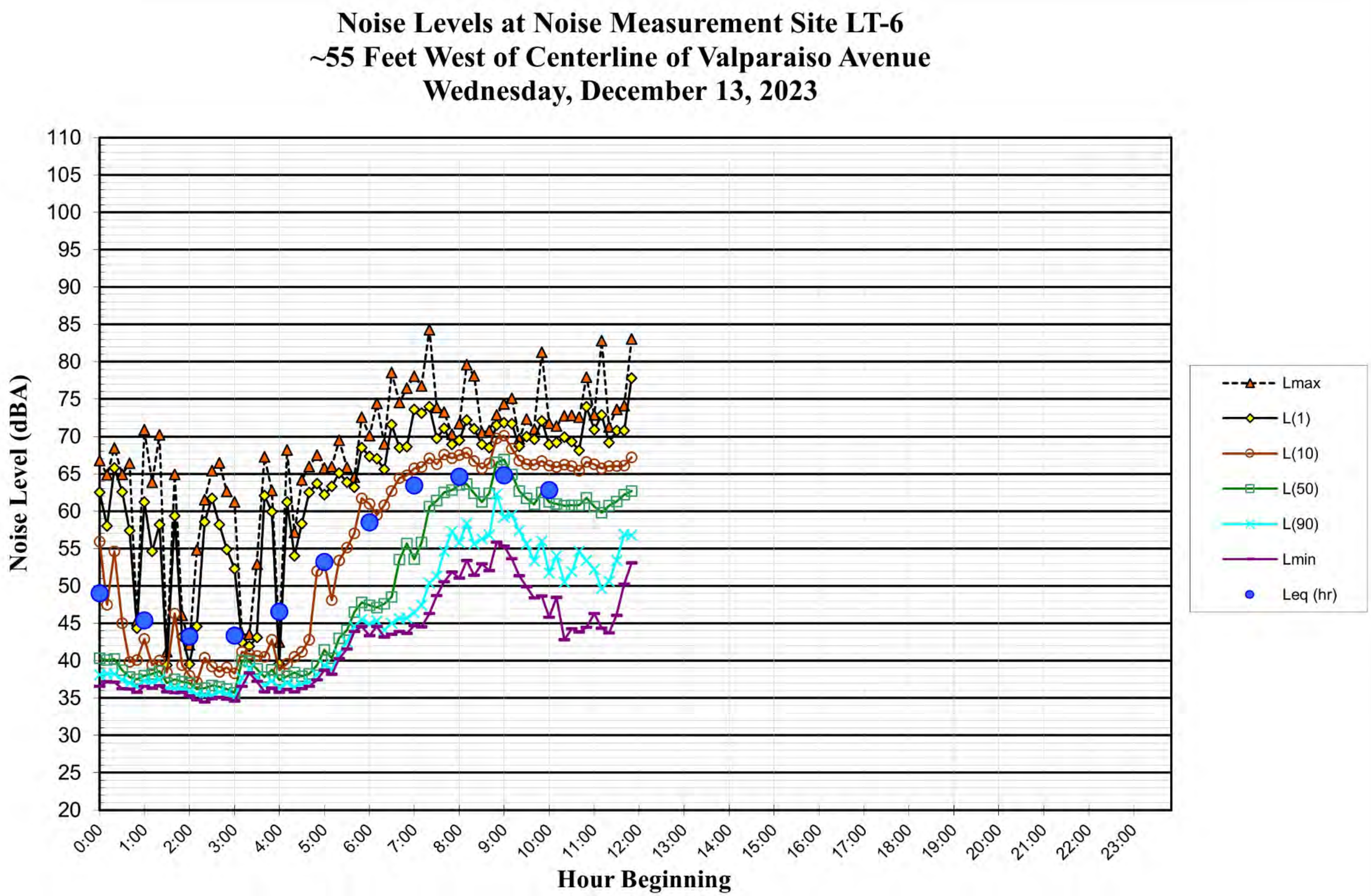

Noise Levels at Noise Measurement Site LT-6
~55 Feet West of Centerline of Valparaiso Avenue
Monday, December 11, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A16



Noise Levels at Noise Measurement Site LT-6
~55 Feet West of Centerline of Valparaiso Avenue
Tuesday, December 12, 2023
Noise Level (dBA)
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
L_{dn} = 62 dBA

Figure A17



Noise Levels at Noise Measurement Site LT-6
~55 Feet West of Centerline of Valparaiso Avenue
Wednesday, December 13, 2023
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A18