Noise and Vibration Existing Conditions Report

FINAL DRAFT

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INTRODUCTION

The City of Davis is updating their 2001 General Plan. The City's basemap (Figure 1) shows the City limits, transportation noise sources (including highways, major and minor roads, and railway lines), and parks and other public outdoor spaces located within the City and surrounding areas. Figure 2 shows the Planning Area and Sphere of Influence for the General Plan Update, which expands beyond the existing City Limits.

This chapter discusses the results of the noise and vibration opportunities and constraints analysis. The report includes two sections: 1) the Setting section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses the existing noise environment; and 2) the Opportunities and Constraints Analysis section identifies constraints for potential noise-sensitive uses and provides guidance towards the design and planning effort to attain noise and land use compatibility.

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.

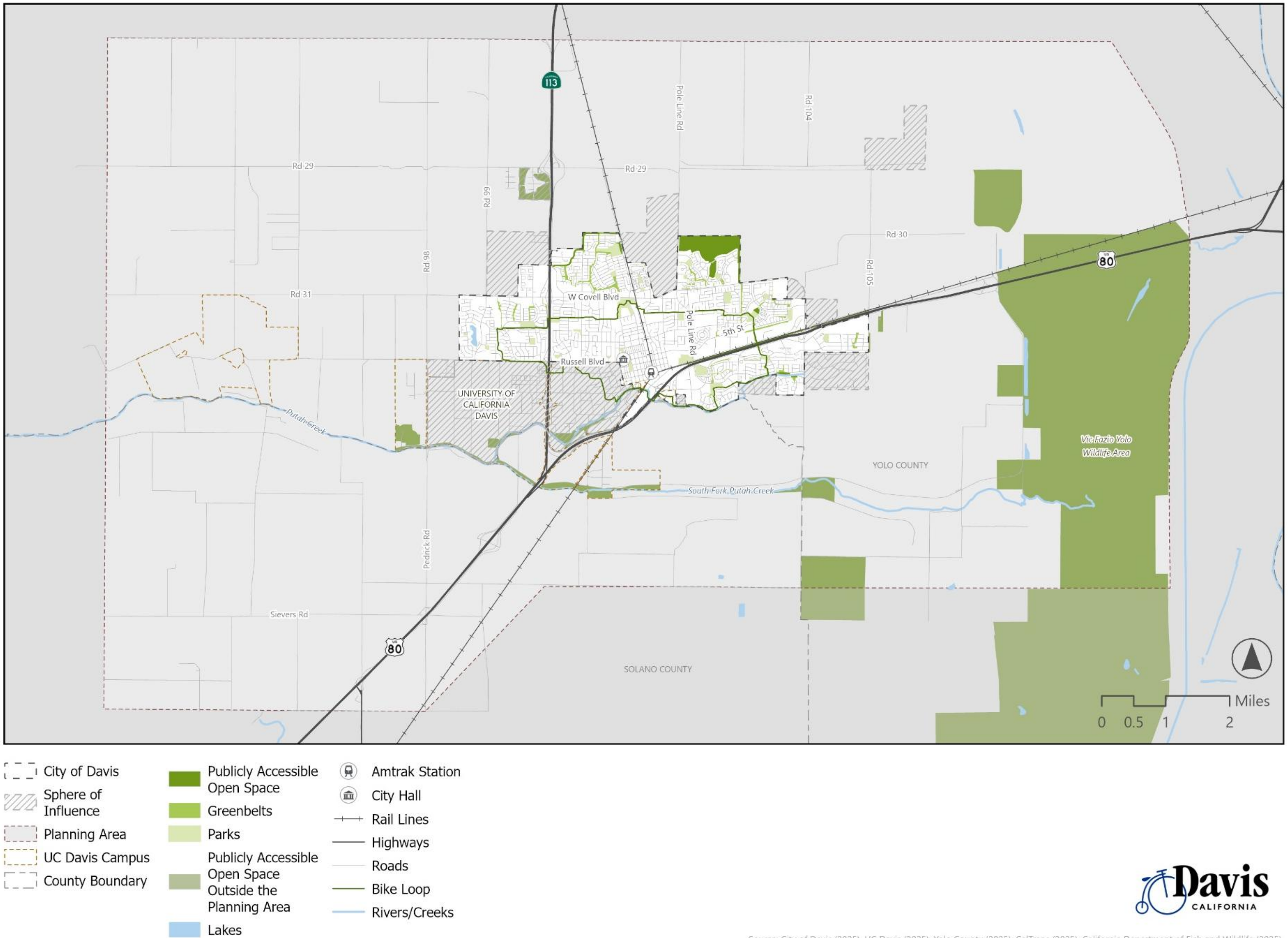
In addition to the concepts of pitch and loudness, there are several noise measurement scales used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that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

Figure 1. City Limits

Davis CALIFORNIA

Source: City of Davis (2025), UC Davis (2025), Yolo County (2025), CalTrans (2025), California Department of Fish and Wildlife (2025).

Figure 2. Planning Area and Sphere of Influence



Source: City of Davis (2025), UC Davis (2025), Yolo County (2025), CalTrans (2025), California Department of Fish and Wildlife (2025).

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 Leve, dBA	The sound pressure level in decibels measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m. to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.

Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Sources: 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	

Sources: Technical Noise Supplement (TeNS), California Department of Transportation, September 2018.

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 (DNL or Ldn)* 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 at about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling.[1] Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

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

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

to aircraft noise. When the L_{dn} is 60 dBA, approximately 30 to 35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.[2]

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the Peak Particle Velocity (PPV) and another is the Root Mean Square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous vibration levels produce. The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying.

Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, that are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

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

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

Table 3. Typical Levels of Groundborne Vibration

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

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

Construction Vibration

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

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels such as people in an urban environment may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

Table 4 displays continuous vibration impacts on human annoyance and on buildings. As discussed previously, annoyance is a subjective measure and vibrations may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying.

Table 4. Reactions of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect.
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure.
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected.

0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings.
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures.
0.5	Severe – vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures.

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

Vibration from Heavy Trucks and Buses

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

Regulatory Background

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

Federal Government

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

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

FEDERAL HIGHWAY ADMINISTRATION (FHWA)

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

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

FEDERAL TRANSIT ADMINISTRATION (FTA)

The FTA has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[4] which limit daytime construction noise to 80 dBA L_{eq} at residential land uses, 85 dBA L_{eq} at commercial and office land uses, and to 90 dBA L_{eq} at industrial land uses. The FTA also provides damage criteria during construction vibration exposure. The criteria is summarized in Table 5.

Table 5. FTA Construction Vibration Damage Criteria

Building/Structural Category	PPV, in/sec	Approximate, L_v[a]
Reinforced-concrete, steel or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90
Notes: [a] RMS velocity in decibels, VdB re 1 micro-in/sec		

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

The FTA has identified vibration impact criteria for sensitive buildings, residences, and institutional land uses near rail transit and railroads (Table 6). The thresholds for residences and buildings where people normally sleep (e.g., nearby residences) are 72 VdB for frequent events (more than 70 events of the same source per day), 75 VdB for occasional events (30 to 70 vibration events of the same source per day), and 80 VdB for infrequent events (less than 30 vibration events of the same source per day).

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

Table 6. FTA Groundborne Vibration Impact Criteria

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

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

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

State of California

CEQA GUIDELINES

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

1. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
2. Generation of excessive groundborne vibration or groundborne noise levels;
3. For a project located within the vicinity of a private airstrip or an airport land use plan or where such a plan has not been adopted within two miles of a public airport or

public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

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}/DNL/CNEL in any habitable room.

2022 CALIFORNIA BUILDING CAL GREEN CODE

The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2022 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). The sections that pertain to this project are as follows:

- 5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
- 5.507.4.2 Performance method. For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\,(1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

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

DIVISION OF AERONAUTIC NOISE STANDARDS

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

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

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)

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

Local

CITY OF DAVIS GENERAL PLAN

The Community Safety Section in the City of Davis General Plan includes a chapter on noise, which sets forth goals, policies, and actions with the aim of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of Davis. With the goal of maintaining community noise levels and allowing a high quality of life, the City has defined “normally acceptable” exterior noise thresholds for new developments within the City. These thresholds are summarized in Table 19. Additionally, Table 20 summarizes the target interior noise levels. Acoustical studies shall be required for new developments where the noise environments exceed these thresholds. The study shall demonstrate how implementation of appropriate noise control methods would adequately reduce noise levels to meet the thresholds in Tables 19 and 20.

The City’s General Plan discourages the use of sounds walls and encourages the use of alternative mitigation measures whenever feasible; however, the City shall facilitate the construction of sound walls where desired by the neighborhood and where no other noise-reduction methods would reduce noise levels to the acceptable exterior levels in Table 19. Where sound walls are built, dense landscaping shall in installed along them to mitigate visual impact and adequate openings and visibility from surrounding areas to increase safety and access. Openings shall be designed to maintain necessary noise attenuation.

Table 19
STANDARDS FOR EXTERIOR NOISE EXPOSURE

USE	COMMUNITY NOISE EXPOSURE L_{dn} or CNEL, dBA			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential	Under 60	60-70*	70-75	Above 75
Transient Lodging - Motels, Hotels	Under 60	60-75	75-80	Above 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	Under 60	60-70	70-80	Above 80
Auditoriums, Concert Halls, Amphitheaters	Under 50	50-70	NA	Above 70
Sports Arenas, Outdoor Spectator Sports	NA	Under 75	NA	Above 75
Playgrounds, Neighborhood Parks	Under 70	NA	70-75	Above 75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Under 70	NA	70-80	Above 80
Office Buildings, Business Commercial and Professional	Under 65	65-75	Above 75	NA
Industrial, Manufacturing, Utilities, Agriculture	Under 65	70-80	Above 80	NA

NORMALLY ACCEPTABLE: Specified land use is satisfactory assuming all buildings involved are of conventional construction, without special noise insulation requirements.

CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is conducted, and needed noise attenuation features are included in the construction or development.

NORMALLY UNACCEPTABLE: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be conducted and needed noise attenuation features shall be included in the construction or development.

CLEARLY UNACCEPTABLE: New construction or development shall not be undertaken.

NA: Not applicable.

* The City Council shall have discretion within the "conditionally acceptable" range for residential use to allow noise levels in outdoor spaces to go up to 65 dBA if cost effective or aesthetically acceptable measures are not available to reduce noise levels in outdoor use spaces to the "normally acceptable" levels. Outdoor spaces which are designed for visual use only (for example, streetside landscaping in an apartment project), rather than outdoor use space, may be considered acceptable up to 70 dBA.

Table 20
STANDARDS FOR INTERIOR NOISE LEVELS

USE	NOISE LEVEL (dBA)
Residences, schools through grade 12, hospitals and churches	45
Offices	55

Acoustical studies shall be required for all proposed projects that would cause noise exposures that may exceed the City's Noise Ordinance standards for construction activities or result in impacts after development that would be greater than normally acceptable levels. Other mitigation measures, such as lowering speed limits or installing traffic calming measures, shall be considered where traffic noise adjacent to all residences, schools, hospitals, and libraries exceeds acceptable noise levels.

The project proponent shall employ noise-reducing construction practices and incorporate the following measures into contract specifications to reduce the impact of construction noise:

1. All equipment shall have sound-control devices no less effective than those provided on the original equipment. No equipment shall have an unmuffled exhaust.
2. As directed by the City, the contractor shall implement appropriate additional noise mitigation measures including, but not limited to, changing the location of stationary construction equipment, shutting off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, or installing acoustic barriers around stationary construction noise sources.

CITY OF DAVIS MUNICIPAL CODE

Chapter 24 of the City's Municipal Code includes Noise Regulations that would apply to future projects in Davis. Section 24.02.020 provides maximum noise limits during specified daytime and nighttime hours. Table 1 below summarizes the maximum noise limits for each receiving land use type. Note, the high noise traffic corridors include Highway 113 and I-80.

Table No. 1		
Land Use	**Time Period**	**Maximum Noise Level (dBA)**
Residential	9 p.m.—7 a.m.	50
	7 a.m.—9 p.m.	55
Commercial/industrial/core commercial	10 p.m.—7 a.m.	55
	7 a.m.—10 p.m.	60
High noise traffic corridor	Anytime	65

Section 24.02.030 defines an absolute maximum noise level limit of 20 dBA over the limits in Table 1 or greater than 80 dBA, as measured at the property plane.

Section 24.03.040 defines construction allowable hours between 7:00 a.m. and 7:00 p.m. on weekdays and between 8:00 a.m. and 8:00 p.m. on weekends. Further, construction noise level thresholds are established. Authorized construction in the City shall be allowed if one of the following noise level criteria are met:

1. No individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 feet. If the device is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close to 20 feet from the equipment as possible.
2. The noise level at any point outside of the property plane of the project shall not exceed 86 dBA.
3. The provisions of subdivisions (1) and (2) of this subsection shall not be applicable to impact tools and equipment; provided, that such impact tools and equipment shall have intake and exhaust mufflers recommended by manufacturers thereof and approved by the director of public works as best accomplishing maximum noise attenuation, and that pavement breakers and jack-hammers shall also be equipped with acoustically attenuating shields or shrouds recommended by the manufacturers thereof and approved by the director of public works as best accomplishing maximum noise attenuation. In the absence of manufacturer's recommendations, the director of public works may prescribe such means of accomplishing maximum noise attenuation as he or she may determine to be in the public interest.

   Construction projects located more than 200 feet from existing homes may request a special use permit to begin work at 6:00 a.m. on weekdays from June 15th until September 1st. No percussion type tools (such as ramsets or jackhammers) can be used before 7:00 a.m. The permit shall be revoked if any noise complaint is received by the police department.
4. No individual powered blower shall produce a noise level exceeding 70 dBA measured at a distance of 50 feet.
5. No powered blower shall be operated within 100 feet radius of another powered blower simultaneously.

Air conditioners and similar equipment, work required for public health and safety, safety devices, and emergencies are exempt from this chapter.

Existing Noise Environment

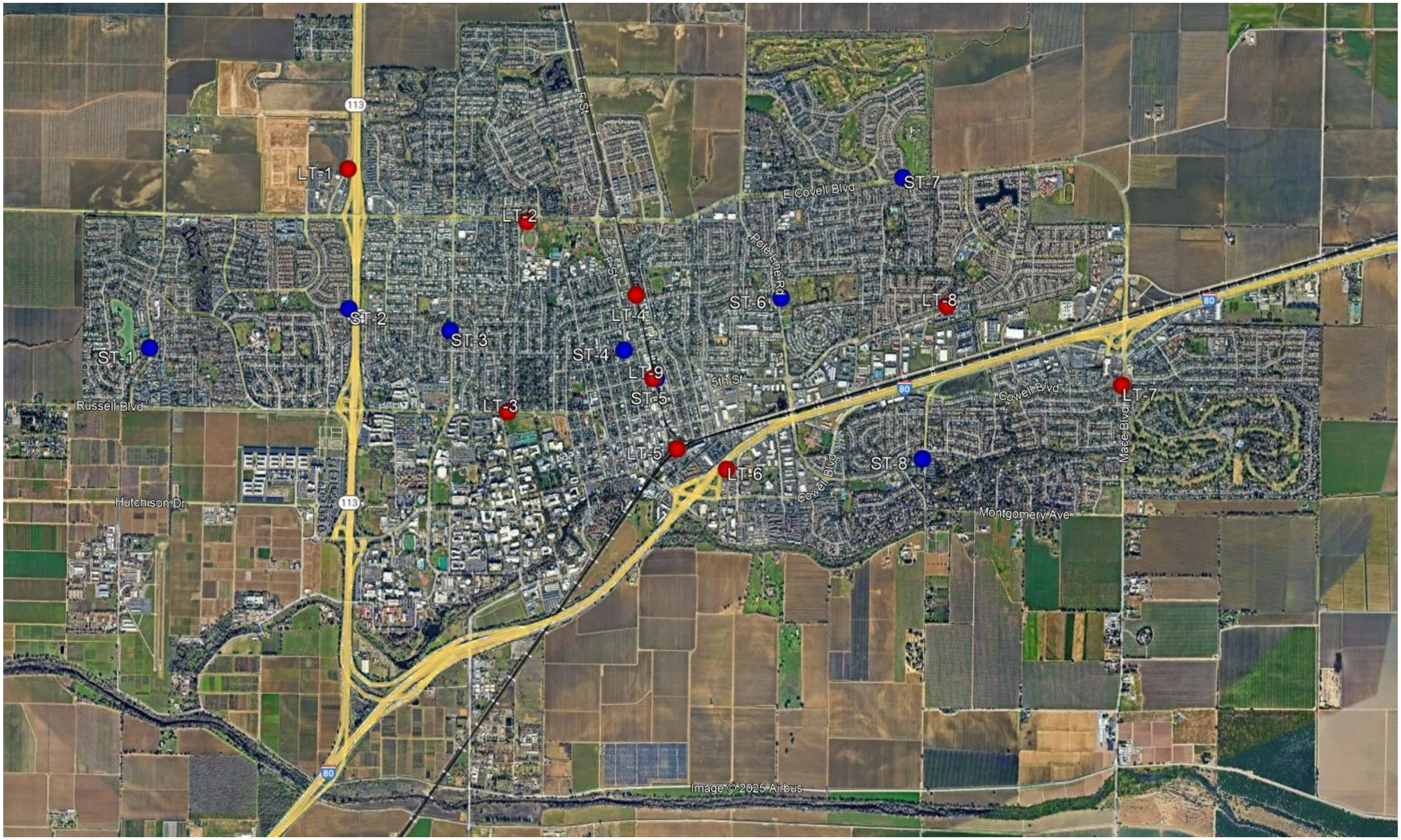
A noise measurement survey was completed to establish existing noise levels from substantial sources in the City of Davis. There were several purposes for the noise measurements. Long-term (LT) measurements made hour-by-hour over a period of 24 hours or more provide information on how noise levels vary throughout the day and night and how noise levels may vary from day to day. A series of attended short-term (ST) measurements were also made, which are useful for several purposes. The person attending the measurements can identify the noise sources that occur during the measurement and note the level of noise associated with identifiable events. This assists in quantitatively and qualitatively characterizing the noise environments along the major roadways and also in the quieter areas. The day-night average noise level (L_{dn}) is the metric used in the City of Davis to characterize the 24-hour average noise exposure level. It is also important to know how noise levels vary within each hour of the day and night. For this purpose, standard acoustical descriptors L_{eq}, L_{max}, L_1, L_{10}, L_{50}, L_{90}, and L_{min} were also measured and reported.

Noise from transportation activity is the primary component of the noise environment in the City of Davis. Transportation corridors that traverse the City, such as Interstate 80 (I-80) and California Highway 113 (Highway 113); major arterial roadways, such as Russell Boulevard and Covell Boulevard; and train activity along the Union Pacific Railroad (UPRR) and California Northern Railroad (CFNR) corridors, are the predominant sources of environmental noise. Aircraft associated with the University Airport and Yolo County Airport would make minimal to no contribution to the noise environment within the City of Davis. Aircraft associated with the Sacramento International Airport would intermittently contribute to the noise environment, but due to the distance and location of the airport, the contribution would be minimal. Portions of the City include industrial land uses that contribute to the noise environment in localized areas.

The noise monitoring survey was completed between Tuesday, April 8, 2025, and Friday, April 18, 2025. Nine long-term noise measurements (LT-1 through LT-9) and eight short-term (10-minute duration) noise measurements (ST-1 through ST-8) were made within the City of Davis. The measurement locations are shown in Figure 3.

Long-term noise measurement LT-1 was made along John Jones Road, north of West Covell Boulevard. LT-1 was set back approximately 25 feet from the centerline of John Jones Road and approximately 175 feet from the centerline of the nearest through lane of Highway 113 southbound. The dominant noise source at LT-1 was traffic noise along Highway 113. Measurements at LT-1 were made from Monday, April 14, 2025, to Friday, April 18, 2025. Hourly average noise levels typically ranged from 63 to 72 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 59 to 70 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise levels on Tuesday, April 15, 2025, Wednesday, April 16, 2025, and Thursday, April 17, 2025, ranged from 71 to 72 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures A1 through A5 in Appendix A.

Figure 3. Aerial Image Showing the Project Area, Vicinity, and Noise Measurement Locations



Sources: Google Earth, 2025.

LT-2 was made from Tuesday, April 8, 2025, through Friday, April 11, 2025, along West Covell Boulevard, just north of Davis Senior High School Football Field. LT-2 was set back approximately 70 feet from the centerline of West Covell Boulevard, which was the dominant noise source at LT-2. Hourly average noise levels typically ranged from 61 to 70 dBA L_{eq} during daytime hours and from 50 to 62 dBA L_{eq} during nighttime hours. The day-night average noise level measured on Wednesday, April 9, 2025, and Thursday, April 10, 2025, was 66 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figures A6 through A9 in Appendix A.

LT-3 was made from Tuesday, April 8, 2025, through Friday, April 11, 2025, approximately 45 feet north of the centerline of Russell Boulevard, north of Russell Field. Traffic noise along Russell Boulevard was the dominant noise source at LT-3. Hourly average noise levels typically ranged from 66 to 72 dBA L_{eq} during daytime hours and from 54 to 68 dBA L_{eq} during nighttime hours. The day-night average noise level measured on Wednesday, April 9, 2025, and Thursday, April 10, 2025, was 71 dBA DNL. The daily trend in noise levels at LT-3 is shown in Figures A10 through A13 in Appendix A.

LT-4 was made from Tuesday, April 8, 2025, through Friday, April 11, 2025, approximately 50 feet east of the centerline of CFNR tracks, near a parking lot just north of Alice Street. Train noise along CFNR tracks was the dominant noise source at LT-4. Hourly average noise levels typically ranged from 43 to 74 dBA L_{eq} during daytime hours and from 38 to 59 dBA L_{eq} during nighttime hours. The day-night average noise level measured on Wednesday, April 9, 2025, and Thursday, April 10, 2025, ranged from 57 to 59 dBA DNL. The daily trend in noise levels at LT-4 is shown in Figures A14 through A17 in Appendix A.

LT-5 was made from Tuesday, April 8, 2025, through Friday, April 11, 2025, near the Davis Amtrak Station, approximately 25 feet north of the centerline of UPRR tracks. Train noise along UPRR tracks was the dominant noise source at LT-5. Hourly average noise levels typically ranged from 51 to 81 dBA L_{eq} during daytime hours and from 43 to 81 dBA L_{eq} during nighttime hours. The day-night average noise level measured on Wednesday, April 9, 2025, and Thursday, April 10, 2025, ranged from 77 to 81 dBA DNL. The daily trend in noise levels at LT-5 is shown in Figures A18 through A21 in Appendix A.

LT-6 was made from Tuesday, April 8, 2025, through Friday, April 11, 2025, from the parking lot of the La Quinta Inn & Suites Hotel, approximately 130 feet south of the centerline of the nearest through lane of I-80 eastbound. Traffic noise along I-80 was the dominant noise source at LT-6. Hourly average noise levels typically ranged from 65 to 76 dBA L_{eq} during daytime hours and from 64 to 71 dBA L_{eq} during nighttime hours. The day-night average noise level measured on Wednesday, April 9, 2025, and Thursday, April 10, 2025, was 75 dBA DNL. The daily trend in noise levels at LT-6 is shown in Figures A22 through A25 in Appendix A.

LT-7 was made from Tuesday, April 8, 2025, through Friday, April 11, 2025, near the Cowell Boulevard/Mace Boulevard intersection. LT-7 was set back approximately 55 feet west of the centerline of Mace Boulevard and approximately 170 feet south of the centerline of Cowell Boulevard. The dominant noise source at LT-7 was traffic noise along these roadways. Hourly average noise levels typically ranged from 56 to 75 dBA L_{eq} during daytime hours and from 45 to 61 dBA L_{eq} during nighttime hours. The day-night average noise level measured on Wednesday, April 9, 2025, and Thursday, April 10, 2025, ranged from 64 to 65 dBA DNL. The daily trend in noise levels at LT-7 is shown in Figures A26 through A29 in Appendix A.

LT-8 was made from Wednesday, April 9, 2025, through Friday, April 11, 2025, approximately 35 feet north of the 5th Street centerline, east of San Sebastian Street. The dominant noise source at LT-8 was traffic noise along 5th Street. Hourly average noise levels typically ranged from 57 to 66 dBA L_{eq} during daytime hours and from 52 to 59 dBA L_{eq} during nighttime hours. The day-night average noise level measured on Thursday, April 10, 2025 was 65 dBA DNL. The daily trend in noise levels at LT-8 is shown in Figures A30 through A32 in Appendix A.

LT-9 was made along the CFNR tracks in downtown Davis at 6th Street. The dominant noise source at LT-9 was train noise along CFNR tracks. Measurements at LT-9 were made from Monday, April 14, 2025, to Friday, April 18, 2025. Hourly average noise levels typically ranged from 48 to 74 dBA L_{eq} during daytime hours and from 45 to 64 dBA L_{eq} during nighttime hours. The day-night average noise level on Tuesday, April 15, 2025, Wednesday, April 16, 2025, and Thursday, April 17, 2025, was 64 dBA DNL. The daily trend in noise levels at LT-9 is shown in Figures A33 through A37 in Appendix A.

Short-term noise measurements were made on Wednesday, April 9, 2025, between 9:50 a.m. and 12:40 p.m. in 10-minute intervals. Results of the measurements are summarized in Table 7.

Short-term noise measurement ST-1 was made just south of the Stonegate Country Club, approximately 55 feet west of the centerline of Lake Boulevard. Traffic along Lake Boulevard consisted of 27 passenger vehicles, which produced noise levels ranging from 52 to 73 dBA. Other noise sources observed at ST-1 included a jet (56 dBA) and a leaf blower (45 to 48 dBA). The 10-minute L_{eq} measured at ST-1 was 58 dBA.

ST-2 was made along a walking trail between the residential streets Hampton Drive and Colusa Avenue. The noise environment at ST-2 was dominated by traffic noise along Highway 113. ST-2 was set back approximately 115 feet west of the centerline of the nearest through lane of Highway 113 southbound and was located behind a seven-foot-tall sound wall running along the highway. Traffic noise levels from Highway 113 typically ranged from 58 to 65 dBA at ST-2. Local traffic was not audible over traffic noise from Highway 113, but in the absence of Highway 113 traffic noise, three passenger vehicles measured along Crystal Grove Lane produced noise levels of 55 to 69 dBA. The 10-minute L_{eq} measured at ST-2 was 61 dBA.

ST-3 was made along Anderson Road south of Redwood Park and opposite from Amherst Drive. ST-3 was set back approximately 35 feet west of the centerline of Anderson Road, which was the dominant noise source at ST-3. Traffic along Anderson Road consisted of 68 passenger vehicles (59 to 70 dBA), two buses (68 to 74 dBA), and one motorcycle (85 dBA). Pickleball occurring on courts approximately 345 feet north of ST-3 was also measured, with noise levels ranging from 45 to 50 dBA. The 10-minute L_{eq} measured at ST-3 was 65 dBA.

ST-4 was made along F Street, about halfway between 7th Street and East 8th Street. ST-4 was set back approximately 40 feet from the centerline of F Street, which was the dominant noise source at this location. Ninety-five passenger cars measured on F Street generated noise levels of 55 to 70 dBA. This was the only observed noise source at ST-4. The 10-minute L_{eq} measured at ST-4 was 61 dBA

Table 7. Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location	Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: near Stonegate Country Club	9:50-10:00	73	69	61	49	44	58
ST-2: walking trail between Hampton Drive and Colusa Avenue	10:10-10:20	69	66	63	61	57	61
ST-3: near Redwood Park	10:30-10:40	85	74	66	59	48	65
ST-4: ~40 feet west of the F Street centerline	10:50-11:00	70	69	66	57	49	61
ST-5: ~40 feet east of the CFNR tracks centerline	11:10-11:20	56	54	51	48	46	49
ST-6: at the Davis Cemetery District and Arboretum	11:30-11:40	71	70	66	59	51	62
ST-7: walking trail connecting East Covell Boulevard and Caravaggio Drive	11:50-12:00	71	68	63	58	47	60
ST-8: ~60 feet west of the Drummond Avenue centerline	12:20-12:30	59	54	50	48	46	49

Sources: Illingworth & Rodkin, Inc., 2025.

ST-5 was made across the CFNR tracks from LT-9 and set back approximately 40 feet from the centerline of the tracks. Traffic noise from local roadways and nearby arterial roadways dominated the noise environment at ST-5 during the 10-minute measurement. Twenty-four passenger vehicles were observed along nearby G Street, which produced noise levels of 45 to 56 dBA at ST-5. Background traffic noise ranged from 45 to 51 dBA, and a car in the nearby parking lot produced noise levels up to 56 dBA. Additionally, a distant lawnmower generated noise levels of 45 to 50 dBA. The 10-minute L_{eq} measured at ST-5 was 49 dBA.

ST-6 was made at the Davis Cemetery District and Arboretum, approximately 50 feet from the centerline of Pole Line Road. Traffic noise along Pole Line Road was the dominant noise source at ST-6 and consisted of a heavy truck (70 dBA), 135 passenger cars (56 to 70 dBA), and a bus (60 dBA). A nearby tree trimmer was also observed at ST-6, producing noise levels of 50 to 55 dBA. The 10-minute L_{eq} measured at ST-6 was 62 dBA.

ST-7 was made along the walking trail connecting East Covell Boulevard and Caravaggio Drive. ST-7 was made approximately 75 feet north of the East Covell Boulevard centerline and was dominated by traffic noise along this roadway. Traffic along East Covell Boulevard consisted of two heavy trucks (63 to 71 dBA), 139 passenger vehicles (53 to 66 dBA), and two buses (66 to 69 dBA). Noisy birds, producing noise levels of 53 dBA, were also measured at ST-7. The 10-minute L_{eq} measured at ST-7 was 60 dBA.

ST-8 was made approximately 60 feet west of the Drummond Avenue centerline, near the Drummond Avenue/Lillard Drive intersection. Traffic noise from I-80 and local roadways dominated the noise environment. Background noise from I-80 produced noise levels of 47 to 51 dBA. Traffic along Lillard Drive consisted of 15 passenger vehicles (47 to 49 dBA) and two buses (54 dBA), while two passenger vehicles were observed along Drummond Avenue (53 to 59 dBA). The 10-minute L_{eq} measured at ST-8 was 49 dBA

OPPORTUNITIES AND CONSTRAINTS ANALYSIS

The main noise sources impacting the existing and future noise environment in the City of Davis consists of vehicular traffic noise from Interstate 80 (I-80), Highway 113, and arterial roadways; and railroad noise from the Union Pacific Railroad (UPRR) and California Northern Railroad (CFNR). Occasional noise from aircraft associated with the Sacramento International Airport and the University of California Davis Airport (University Airport) and stationary sources from industrial and agricultural land uses would affect sensitive receptors in the vicinity. The most sensitive land uses within the City include residences, hotels, churches/temples, schools hospitals, nursing homes, libraries, and auditoriums/concert halls/amphitheaters.

Vehicular Traffic Noise

I-80 is a six-lane interstate that runs mostly in the east-west direction in the southern portion of the City, generating noise levels up to 77 dBA DNL at 100 feet from the centerline of the I-80 eastbound lanes. Highway 113 runs in north-south direction with four lanes of traffic located in the western portion of the City, generating noise levels up to 76 dBA DNL at 100 feet from the centerline of the southbound lanes. With existing noise levels ranging from 76 to 77 dBA DNL at 100 feet, the future noise environment at sensitive receptors in the vicinity of these major highways would exceed normally acceptable levels for sensitive uses. Design measures, such as shielding by intervening buildings or barriers, or increasing the distance from the roadway to the outdoor use areas, would be required to reduce noise levels to meet the normally acceptable thresholds. For outdoor use areas at less sensitive uses, such as industrial, commercial, office uses, etc., the normally acceptable thresholds would be met with the incorporation of noise features, such as sound walls, when the outdoor use areas are located within 100 feet of the centerline of the near travel lanes of I-80 and Highway 113. These should be evaluated on a case-by-case basis.

Major arterial roadways, such as Covell Boulevard, Russell Boulevard, 5th Street, Pole Line Road, Alhambra Drive, Lake Boulevard, La Rue Road, 2nd Street, Cowell Boulevard, Mace Boulevard, Drummond Avenue, and Montgomery Avenue, would also impact the sensitive receptors located along these roadways. With existing noise levels at these major arterials ranging from 62 to 69 dBA DNL at 75 feet, the future noise environment at sensitive receptors in the vicinity of these major arterials would exceed normally acceptable levels. Design measures, such as shielding by intervening buildings or barriers, or increasing the distance from the roadway to the outdoor use areas, would be required to reduce noise levels to meet the normally acceptable thresholds.

Railroad Noise and Vibration

UPRR and CFNR trains pass through Davis. Amtrak offers three types of train services at the Davis station: the "Capitol Corridor" service includes trains about every hour east to Sacramento and west to Oakland/San José; the Long Distance service with one departure daily Coast Starlight (north to Portland/Seattle and south to Los Angeles), and the California Zephyr (east to Reno/Salt Lake City/Denver/Omaha/Chicago). Hours of operation are from 4:15 a.m. to 11:33 p.m., which indicates up to 16 Amtrack trains per day. Typically, 24 individual trains pass through Davis in a 24-hour period, generating noise levels of 57 to 76 dBA DNL at 75 feet from the center of the tracks, with maximum instantaneous noise levels up to 109 dBA L_{max} due to horns. Freight trains are unscheduled, but pass through the City on a daily basis.

Additionally, trains are considered to be a source of perceptible groundborne vibration within approximately 100 feet of the tracks. Groundborne vibration occurs in areas adjacent to fixed rail lines when railroad trains pass through Davis. Ground vibration levels along the railroad corridors are proportional to the speed and weight of the trains, as well as the condition of the tracks and train engine and car wheels. Since vibration levels are dependent on ground conditions, vibration levels would vary throughout the City of Davis. Train vibration would, therefore, need to be assessed on a case-by-case basis.

Aircraft Noise

The University Airport is used for flight training. Operations are infrequent and short in duration. The airport does not include an Airport Land Use Compatibility (ALUC) with noise contours; therefore, due to the location of the airport more than 1 mile southwest of the City of Davis, the infrequent aircraft activity, and the size of aircraft that access the airport, aircraft noise associated with the University Airport would have no impact on the City of Davis.

The Yolo County Airport is more than 5.5 miles west of the City of Davis and has no impact on the noise environment in the City of Davis. Occasional aircraft associated with the Sacramento International Airport would be observed at receptors located within the City of Davis; however, the airport is more than 9.7 miles northeast of the City, and the general flight pattern avoids the City. Aircraft noise due to Sacramento International Airport operations has a less-than-significant impact on the noise environment of sensitive receptors within the City.

Stationary Noise Sources

Commercial, office, and industrial uses would include new noise sources such as mechanical equipment, parking lot/garage noise, truck loading/unloading, etc., which would make a significant local contribution to community noise levels within the City. Equipment such as fans, blowers, chillers, compressors, boilers, pumps, and air conditioning systems can potentially generate continuous noise due to the regular operation. Other intermittent sources of noise include emergency generators, horns, buzzers, and loading activities. The possibility of some of these operational noise sources encroaching on existing sensitive development could result in some land use conflicts, requiring careful consideration during the planning process.

Construction Noise and Vibration

Construction noise associated with projects facilitated by the General Plan Update would substantially increase ambient noise levels temporarily during the construction period. Residences with direct line-of-sight to construction activities would be most affected by construction noise, particularly during phases with heavy equipment used for groundwork and foundations. Once construction activities move indoors, the buildings would provide shielding, breaking the line-of-sight, and construction noise levels would reduce at the receptors. The implementation of standard construction best management practices would be required throughout the duration of construction and would help reduce construction noise levels at the receptors. Additional measures, such as temporary noise barriers, may be required during the noisiest construction phases when noise-sensitive receptors adjoin the project sites. These measures would reduce construction noise as much as possible.

For nonhistorical buildings, the use of standard construction equipment (i.e., not pile driving equipment) more than 20 feet from buildings on adjoining sites would not produce vibration levels exceeding the conservative 0.3 in/sec PPV threshold. Construction activities occurring more than 25 feet from historical buildings would meet the Caltrans threshold of 0.25 in/sec PPV, assuming no pile driving equipment would be required. Pile driving equipment generates high vibration levels, which could potentially impact receptors within about 200 feet at conventional and historical buildings, and this foundation construction technique should be avoided to the extent feasible.

APPENDIX A

Figure A1. Daily trend in Noise Levels at LT-1, Monday, April 14, 2025

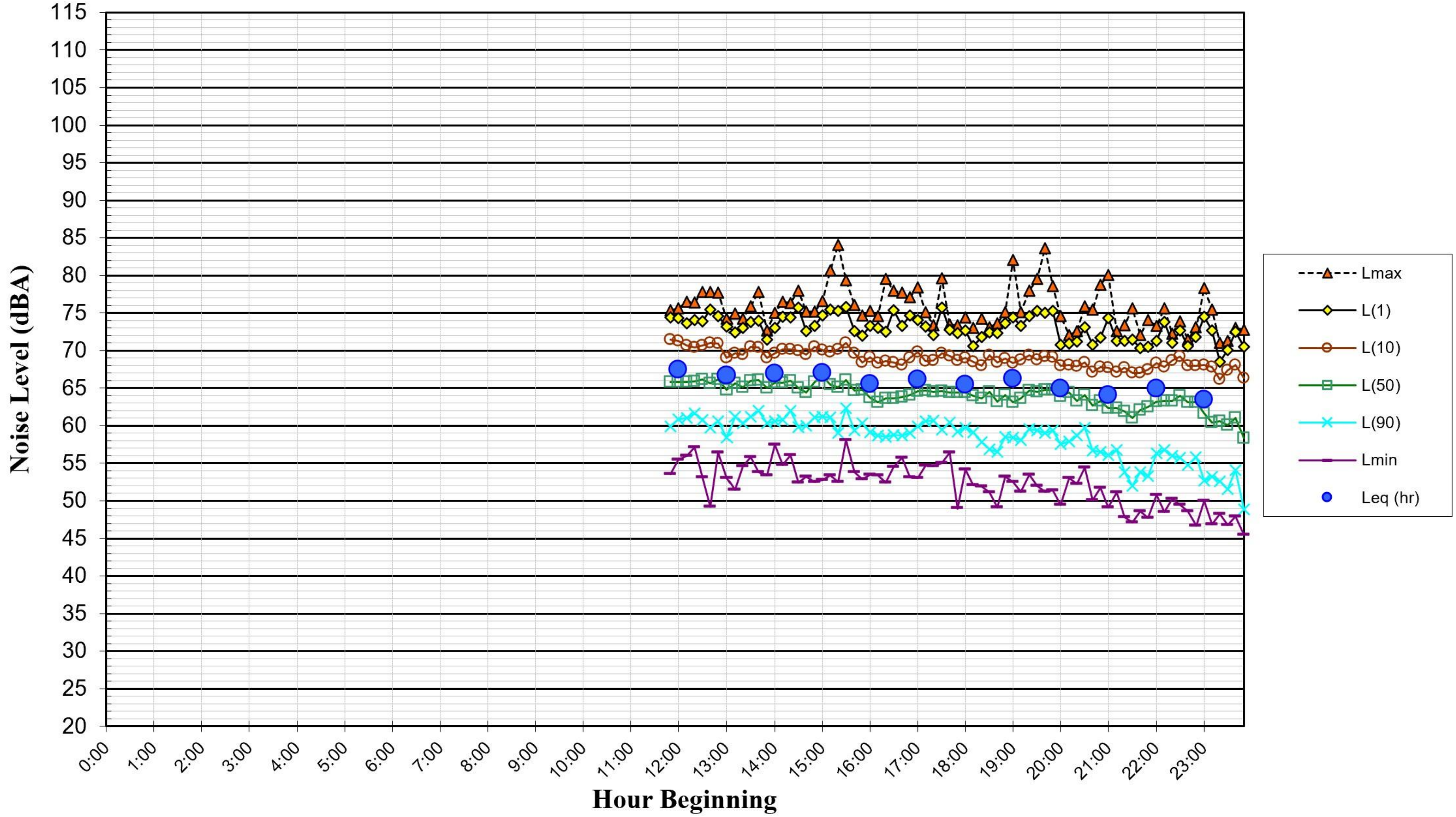


Figure A2. Daily trend in Noise Levels at LT-1, Tuesday, April 15, 2025

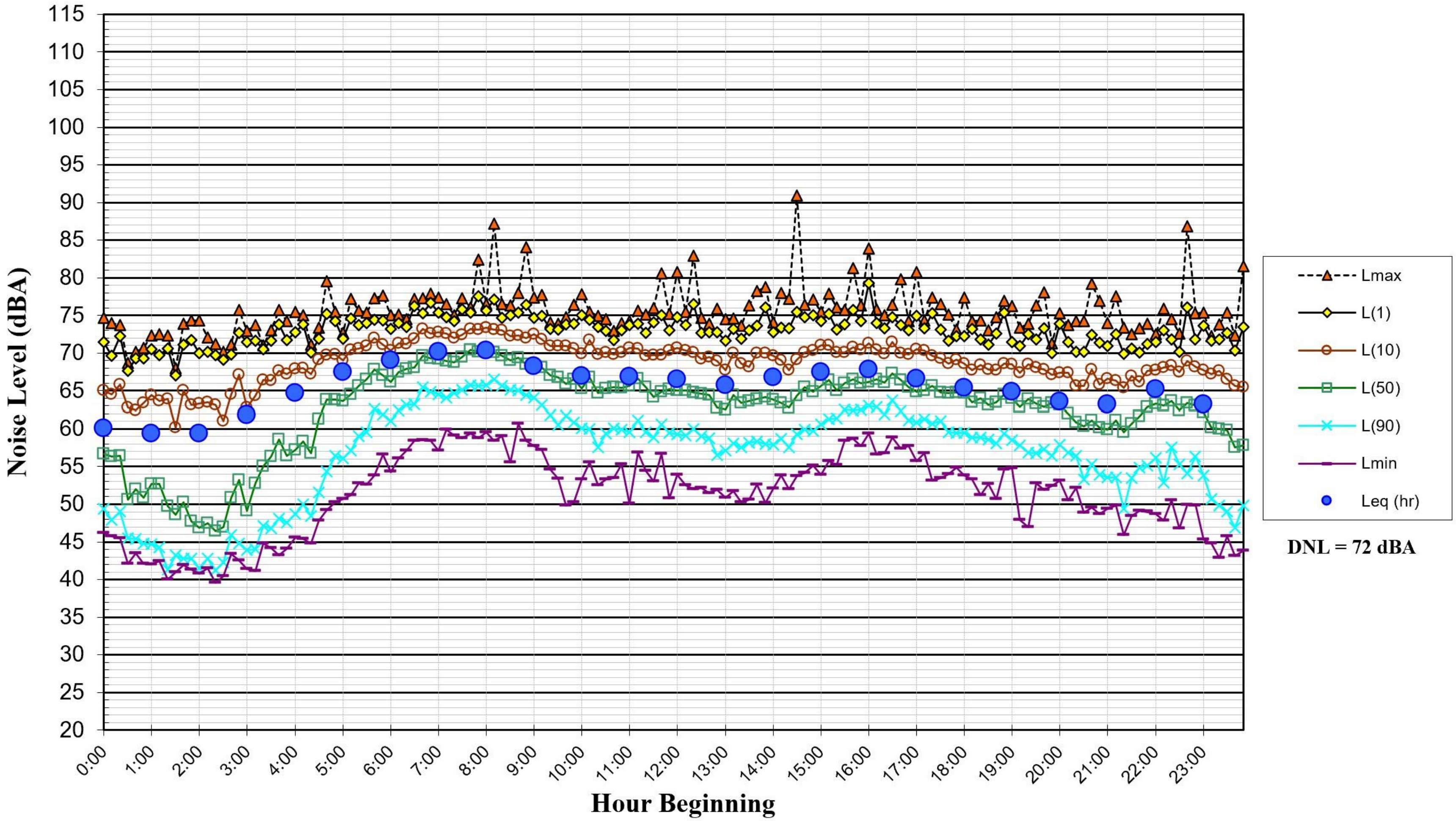


Figure A3. Daily trend in Noise Levels at LT-1, Wednesday, April 16, 2025

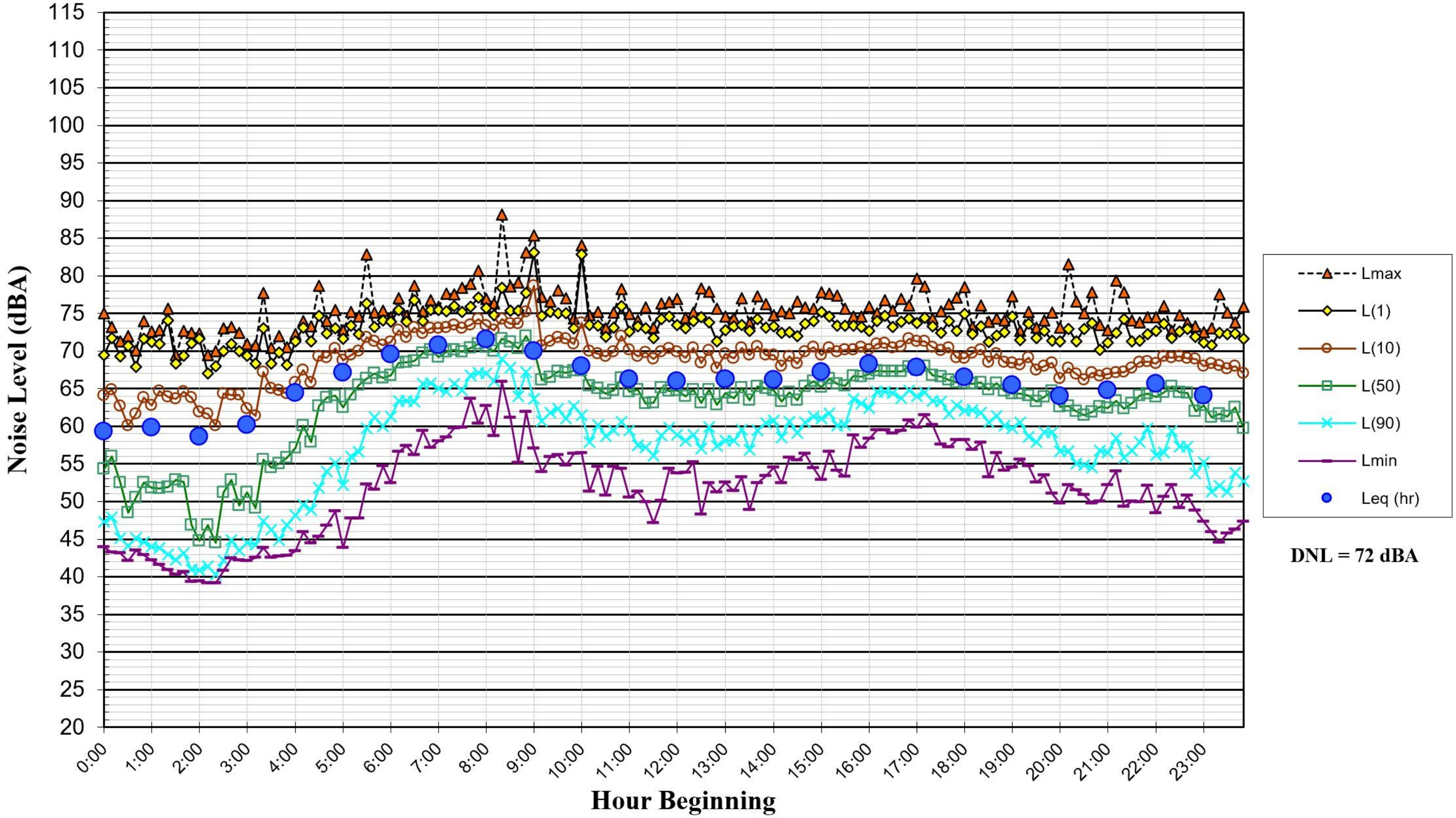


Figure A4. Daily trend in Noise Levels at LT-1, Thursday, April 17, 2025

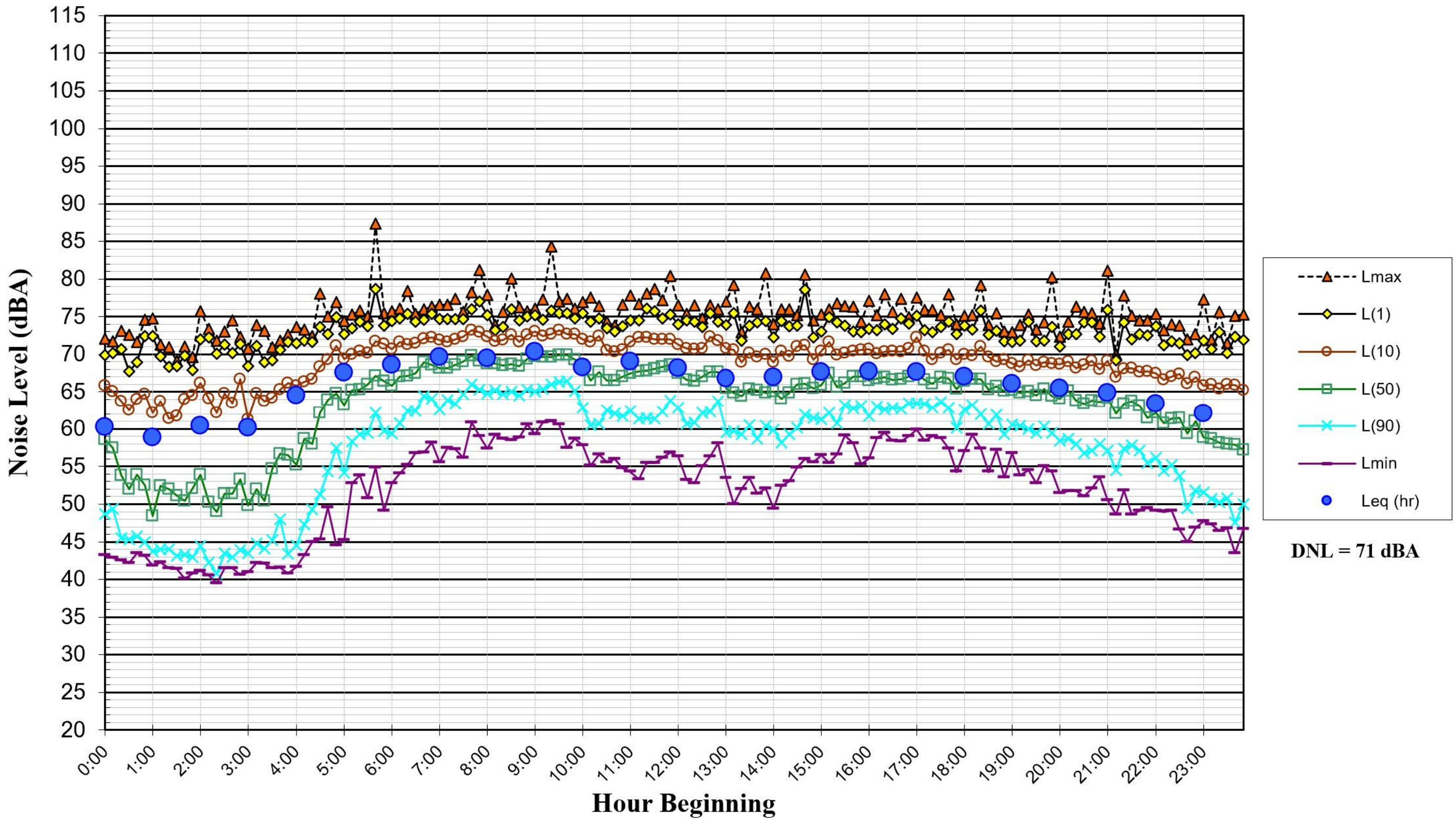


Figure A5. Daily trend in Noise Levels at LT-1, Friday, April 18, 2025

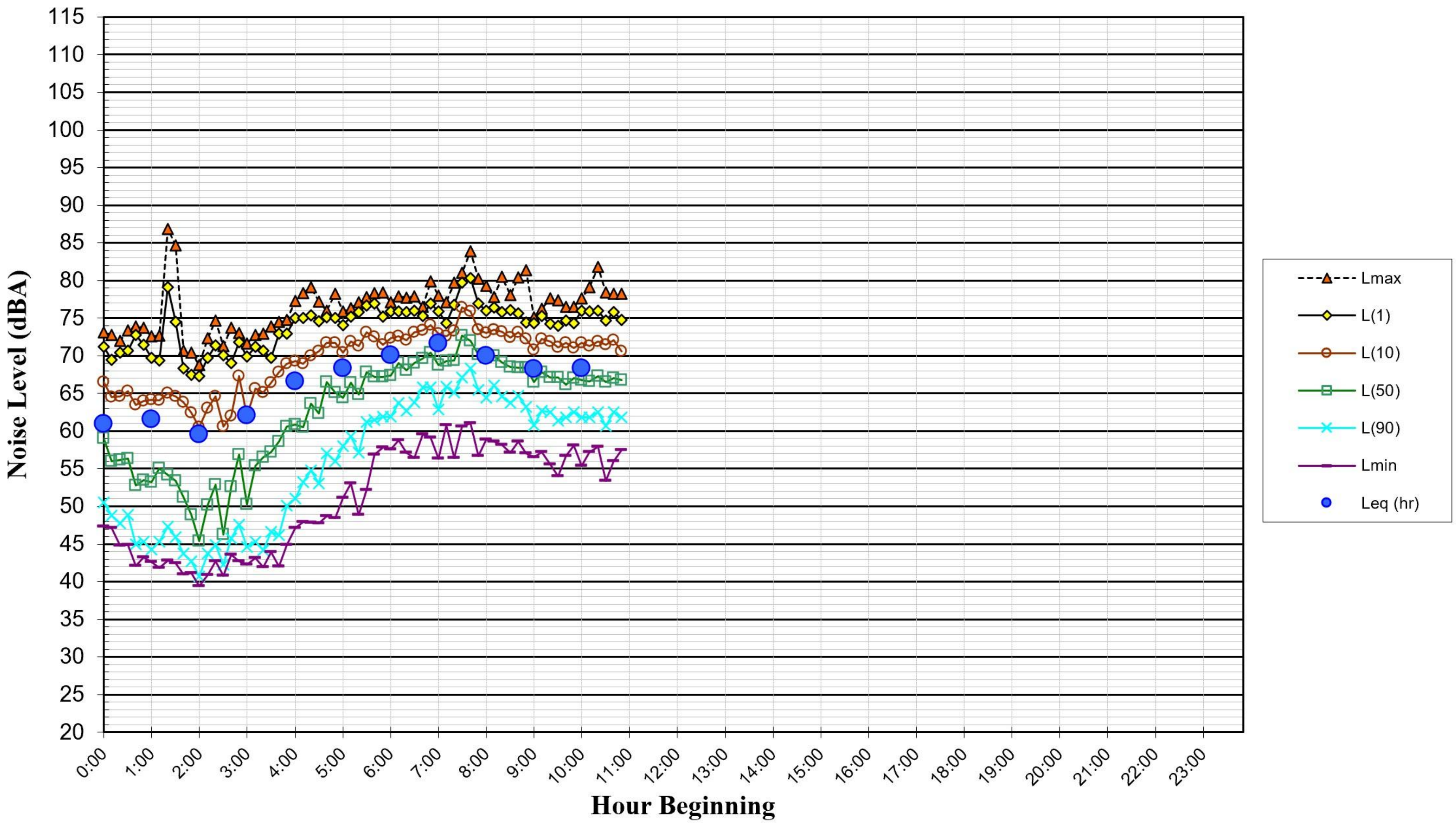


Figure A6. Daily trend in Noise Levels at LT-2, Tuesday, April 8, 2025

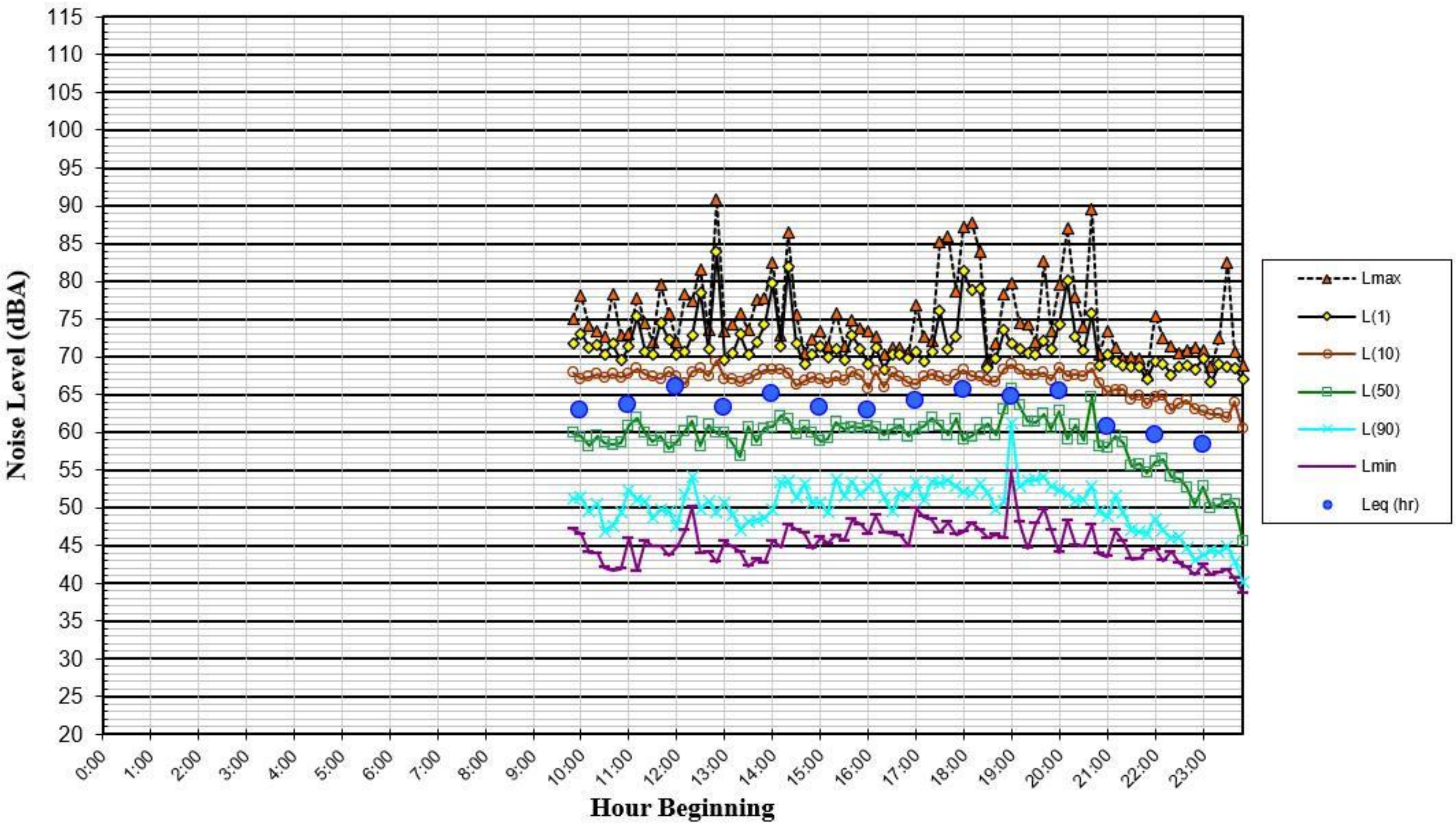


Figure A7. Daily trend in Noise Levels at LT-2, Wednesday, April 9, 2025

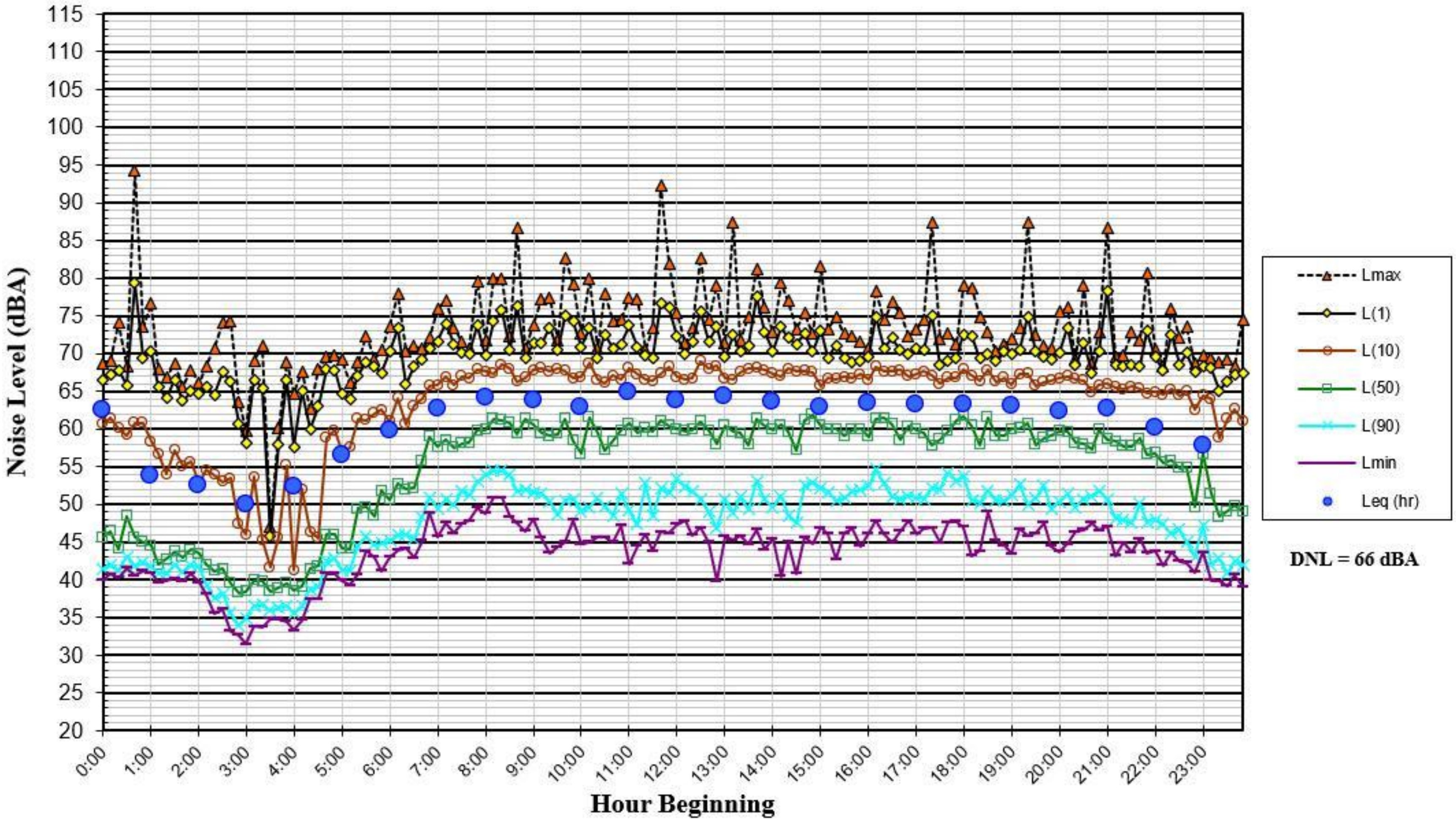


Figure A8. Daily trend in Noise Levels at LT-2, Thursday, April 10, 2025

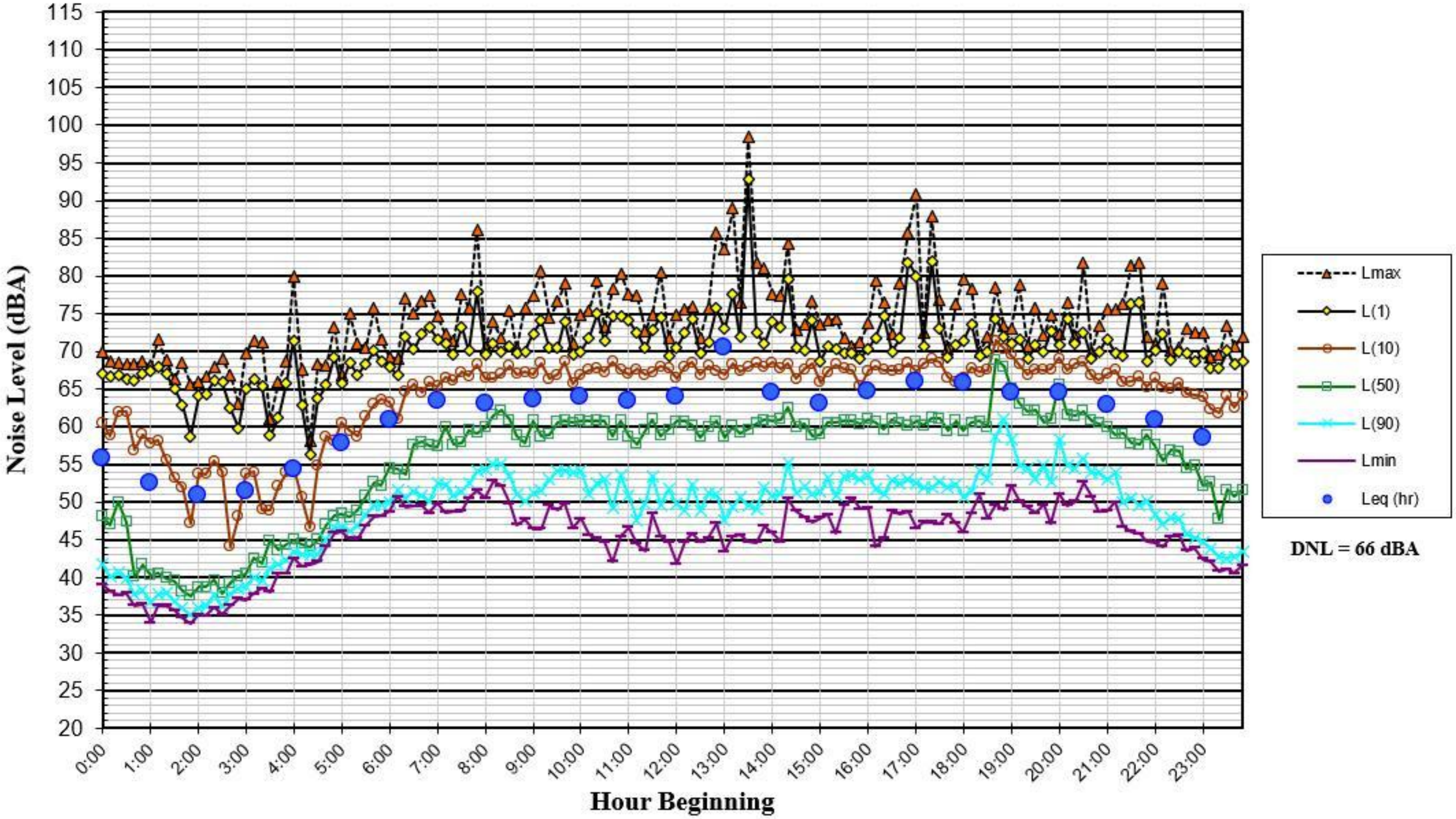


Figure A9. Daily trend in Noise Levels at LT-2, Friday, April 11, 2025

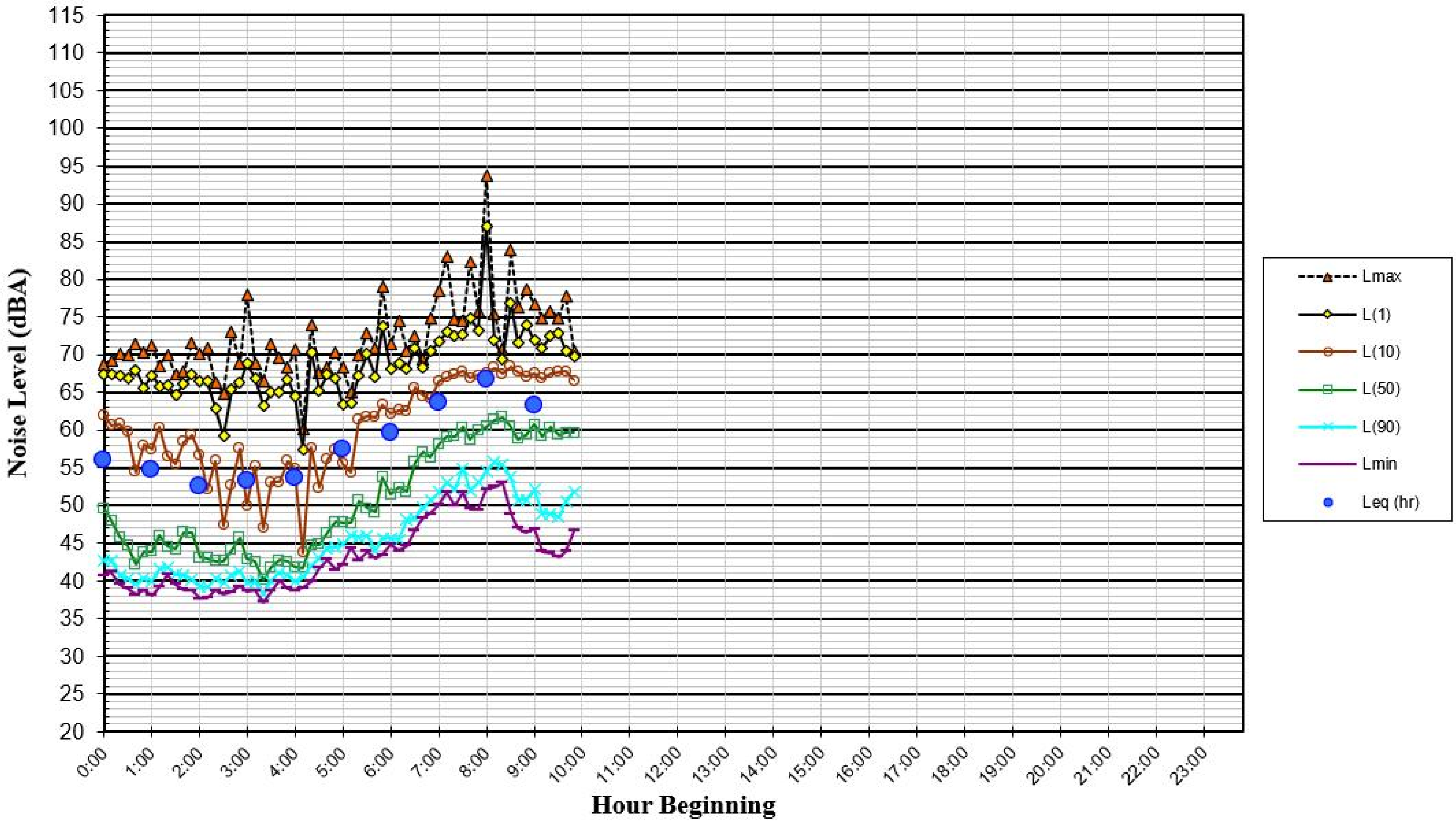


Figure A10. Daily trend in Noise Levels at LT-3, Tuesday, April 8, 2025

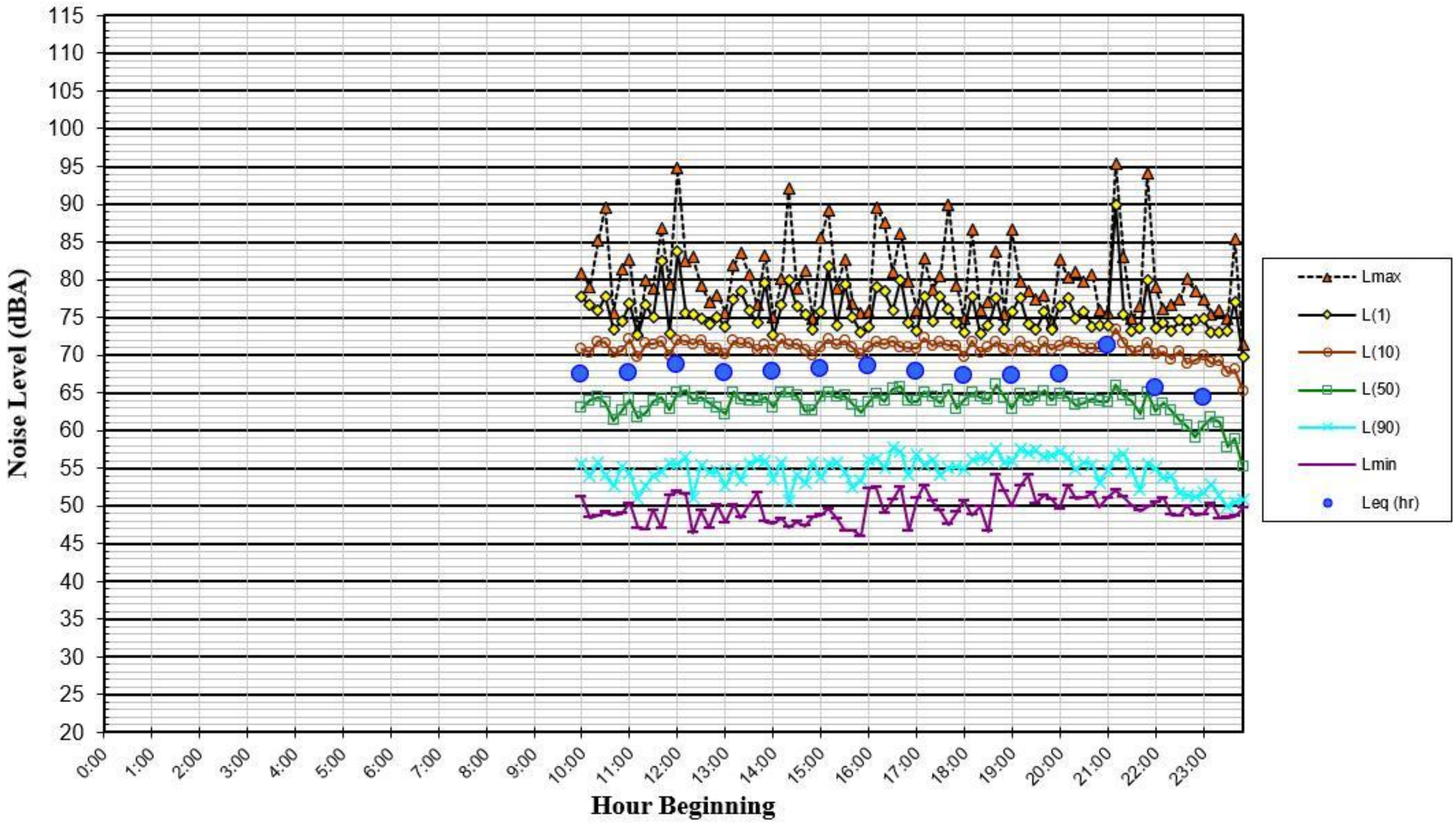


Figure A11. Daily trend in Noise Levels at LT-3, Wednesday, April 9, 2025

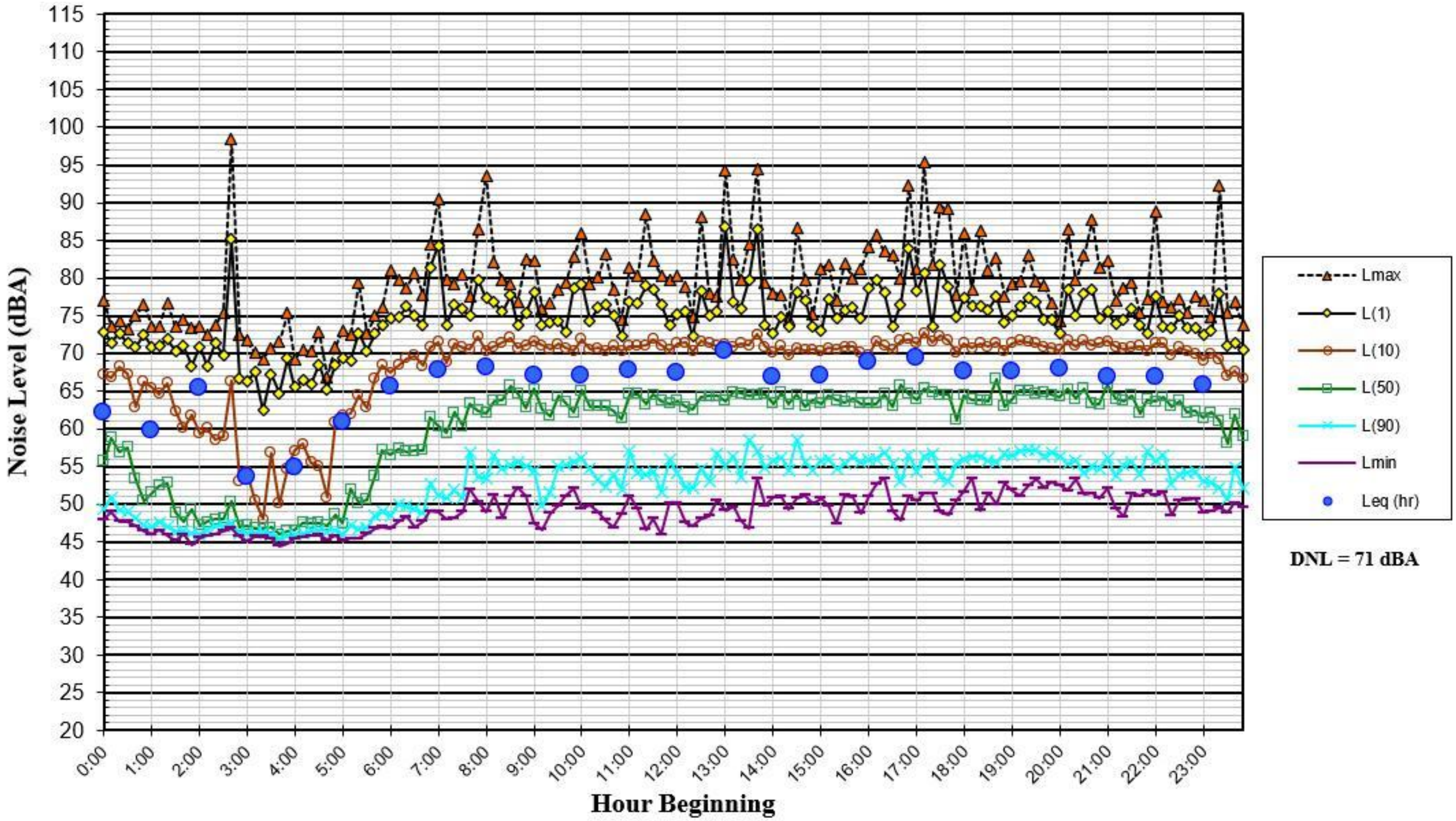


Figure A12. Daily trend in Noise Levels at LT-3, Thursday, April 10, 2025

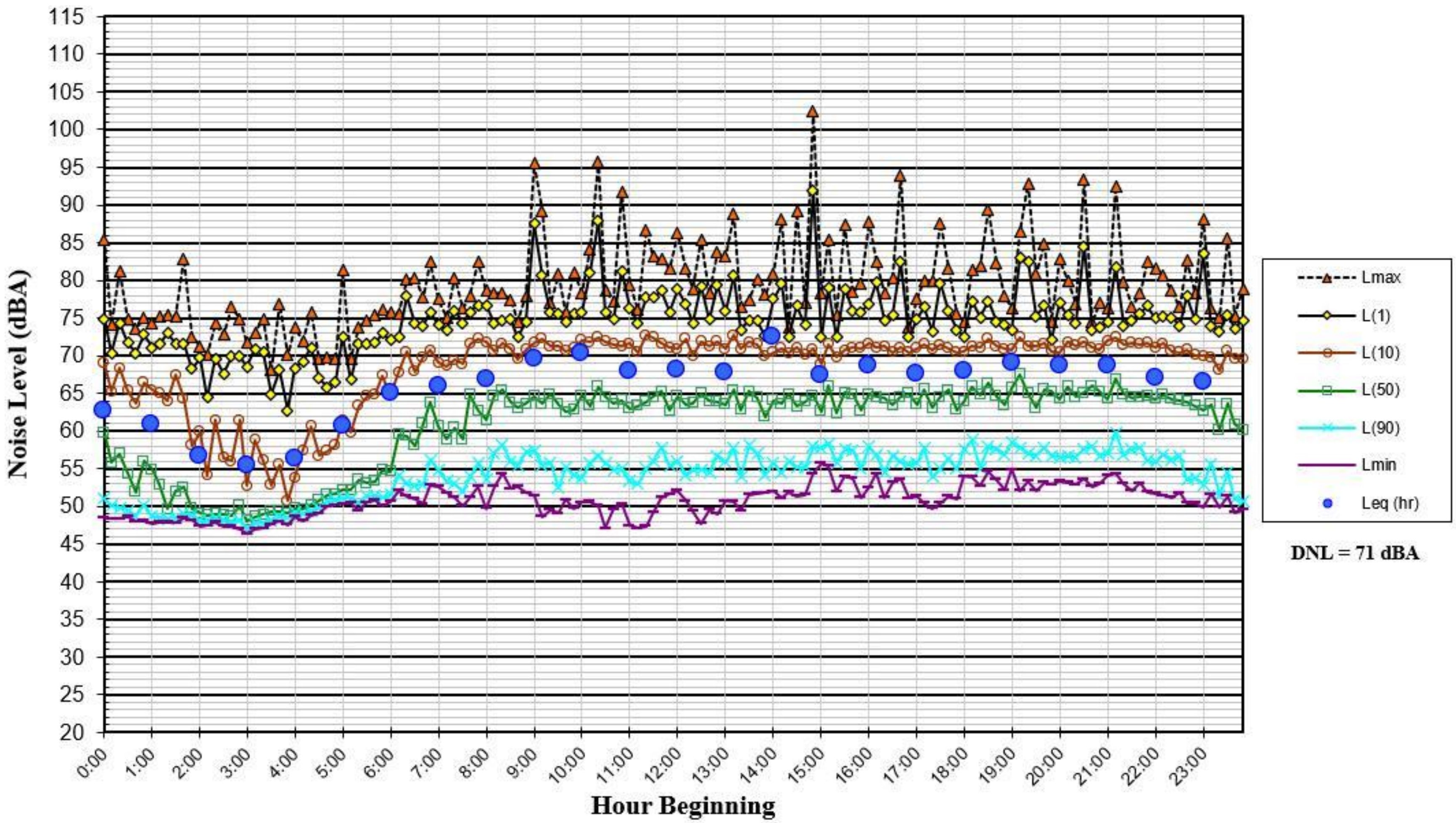


Figure A13. Daily trend in Noise Levels at LT-3, Friday, April 11, 2025

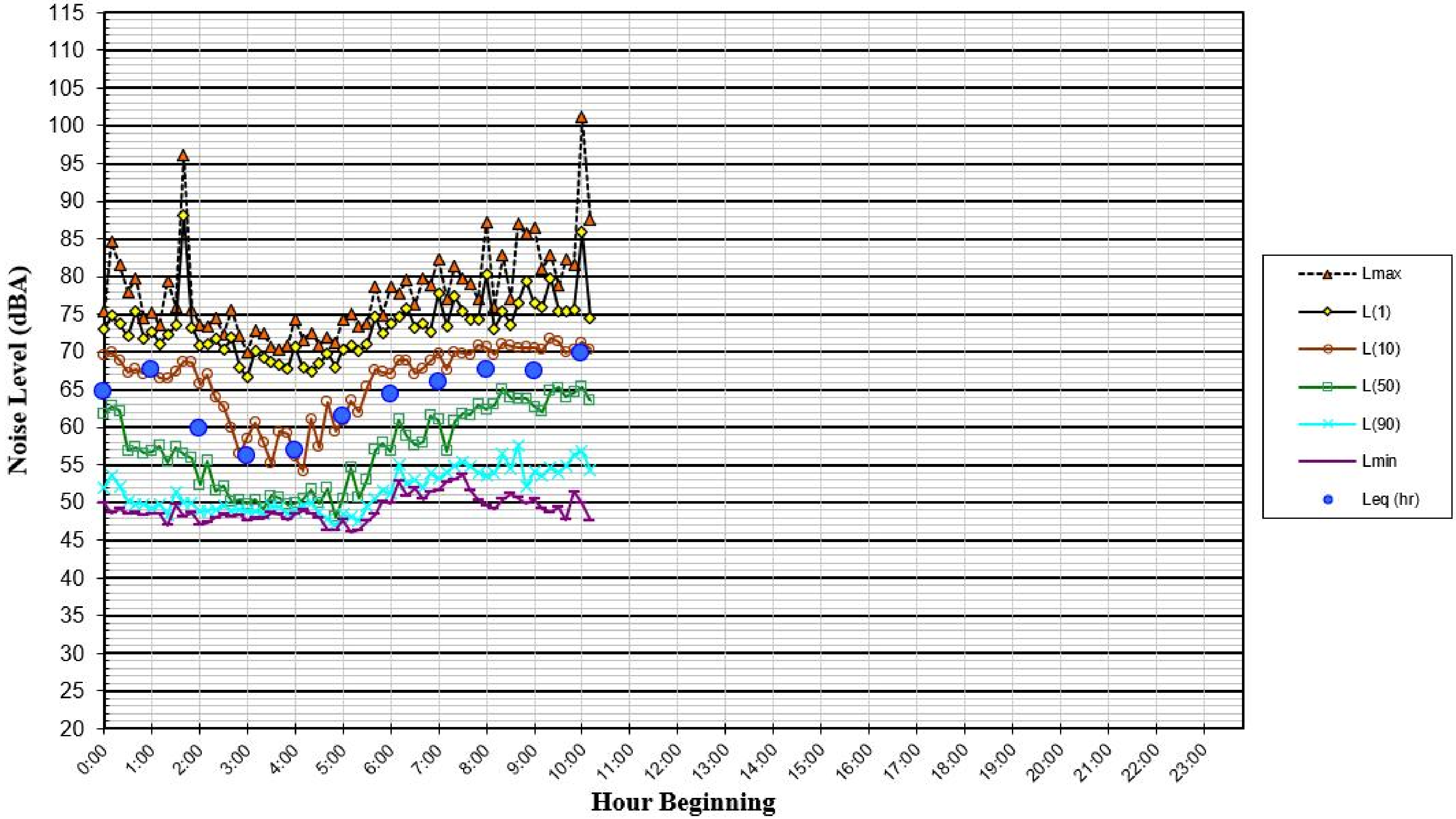


Figure A14. Daily trend in Noise Levels at LT-4, Tuesday, April 8, 2025

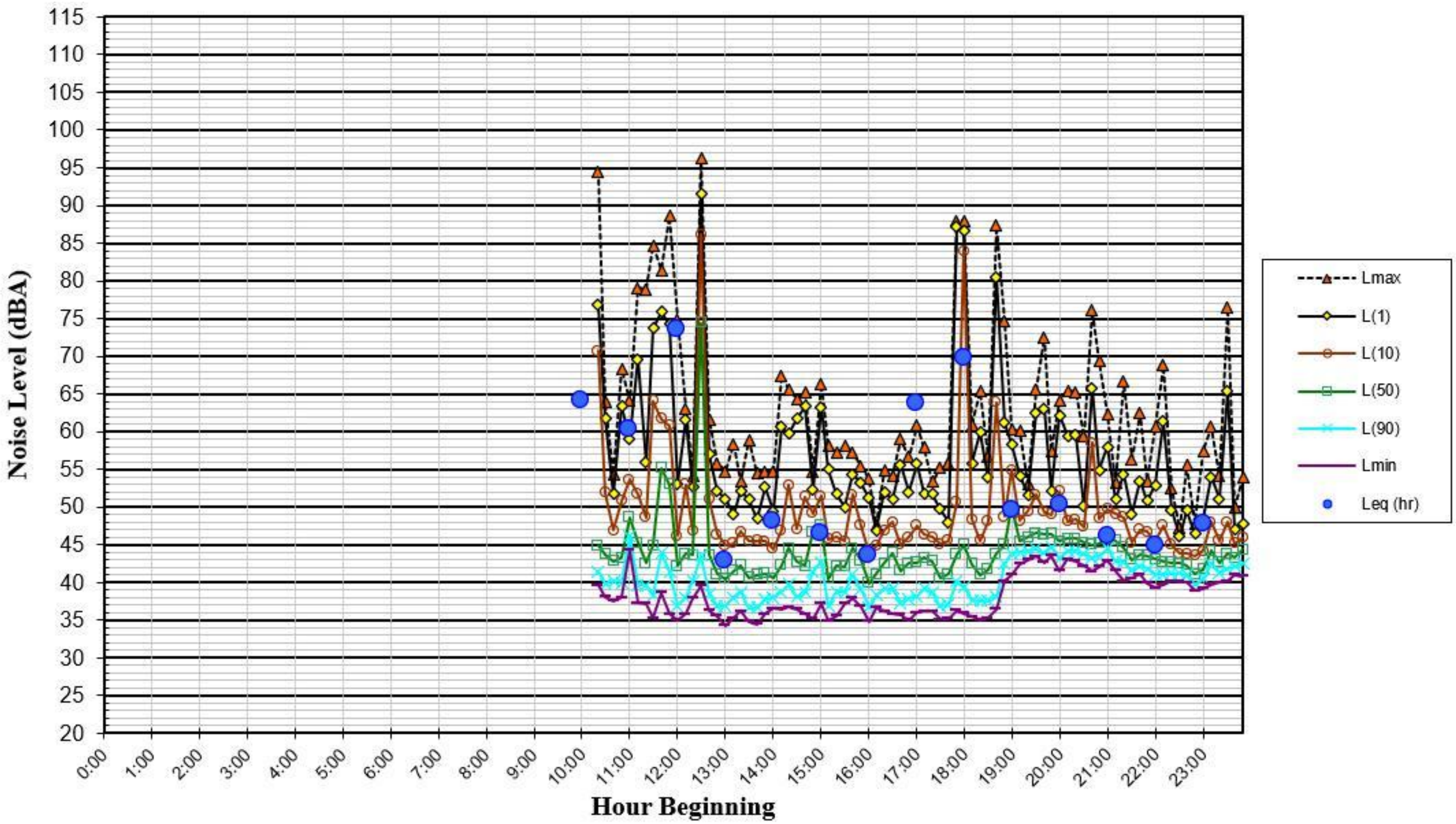


Figure A15. Daily trend in Noise Levels at LT-4, Wednesday, April 9, 2025

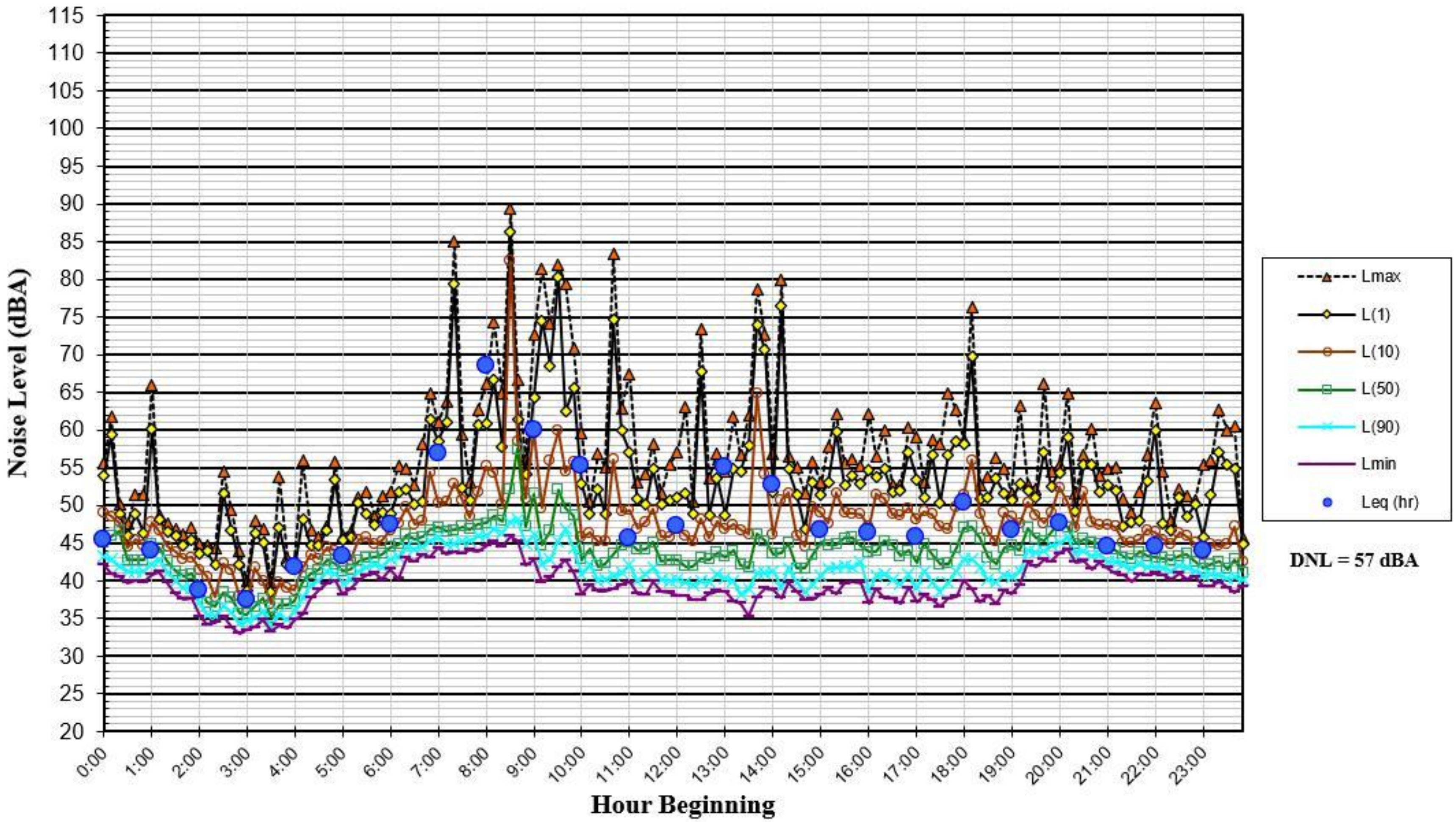


Figure A16. Daily trend in Noise Levels at LT-4, Thursday, April 10, 2025

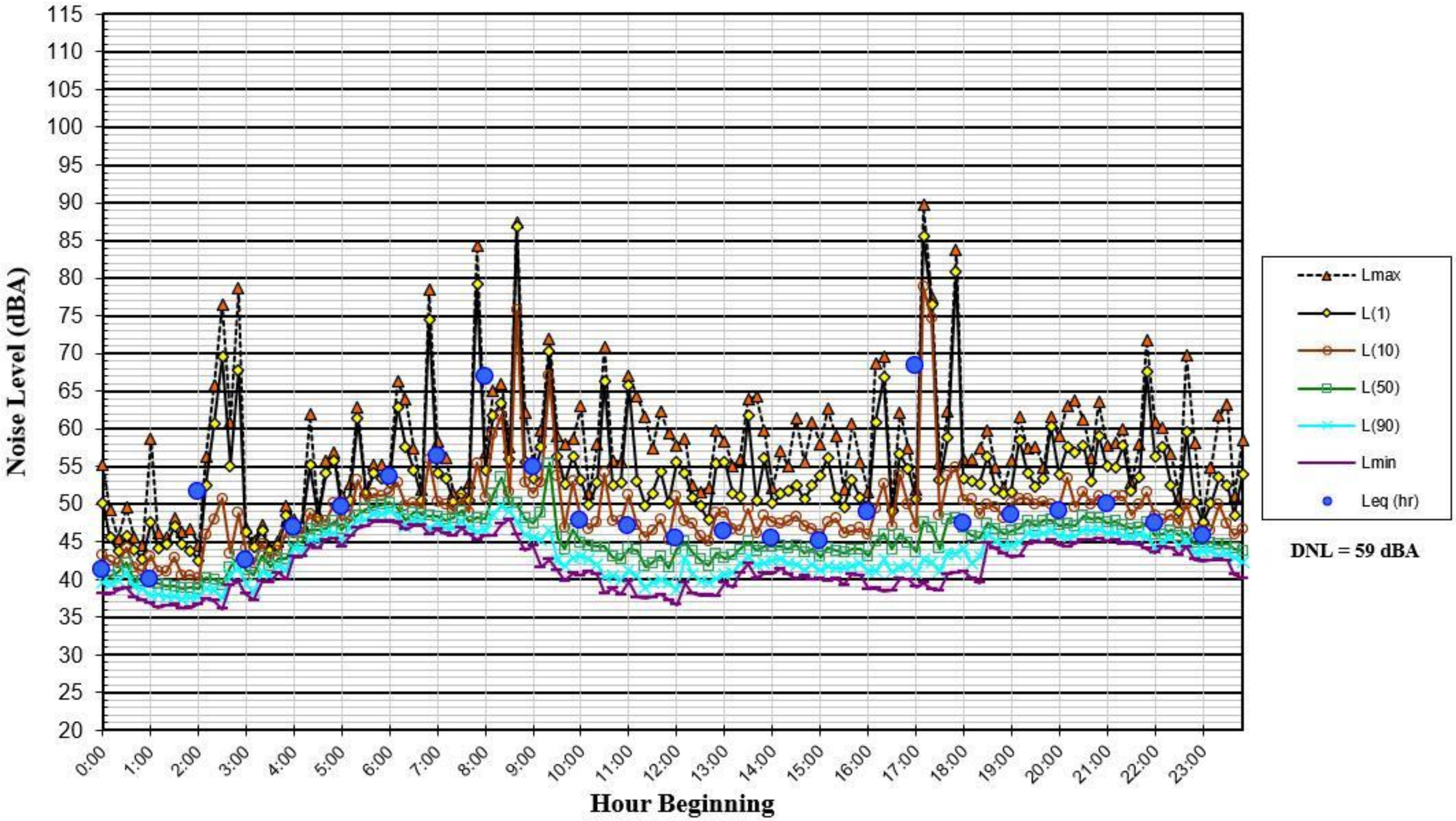


Figure A17. Daily trend in Noise Levels at LT-4, Friday, April 11, 2025

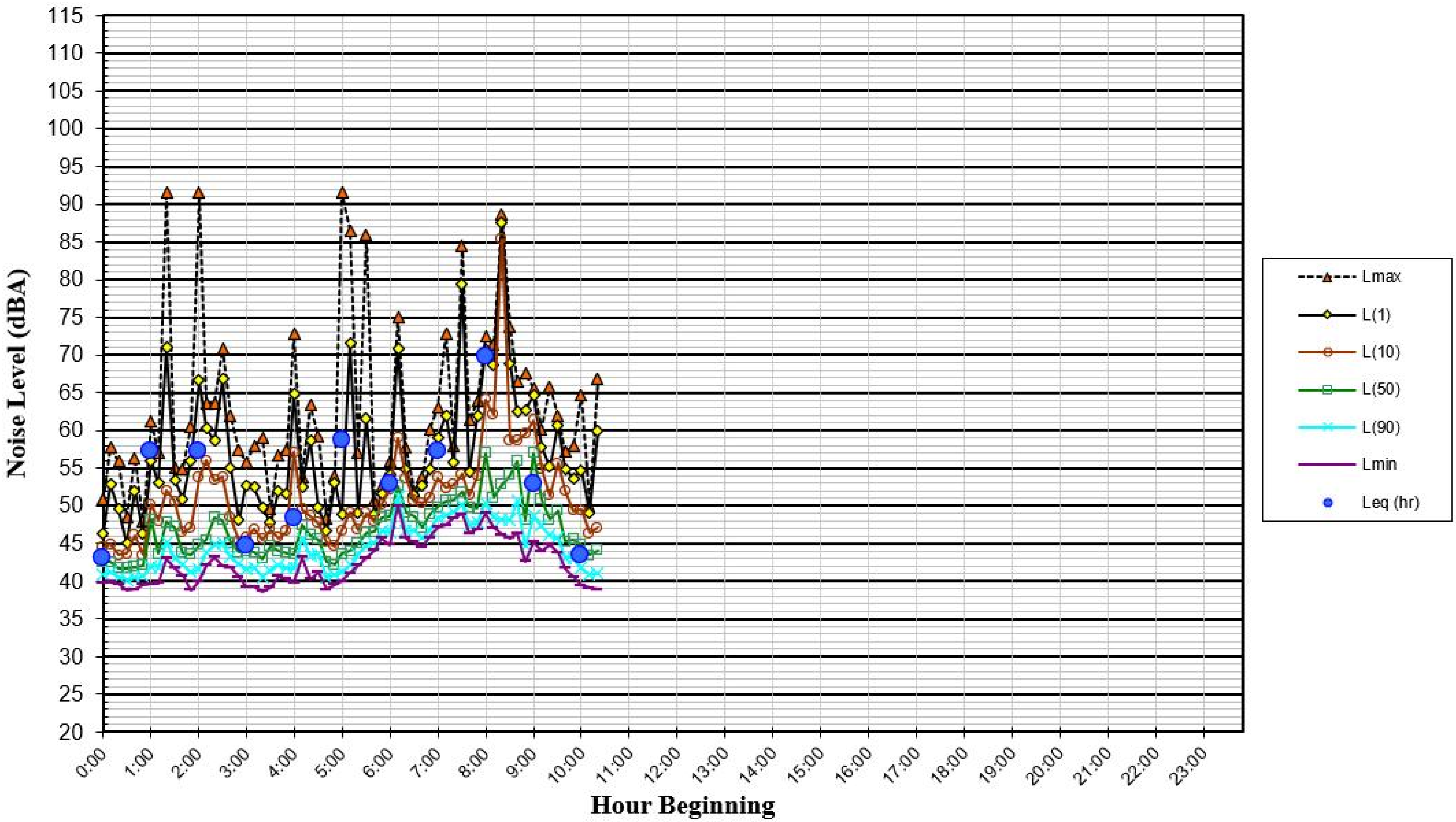


Figure A18. Daily trend in Noise Levels at LT-5, Tuesday, April 8, 2025

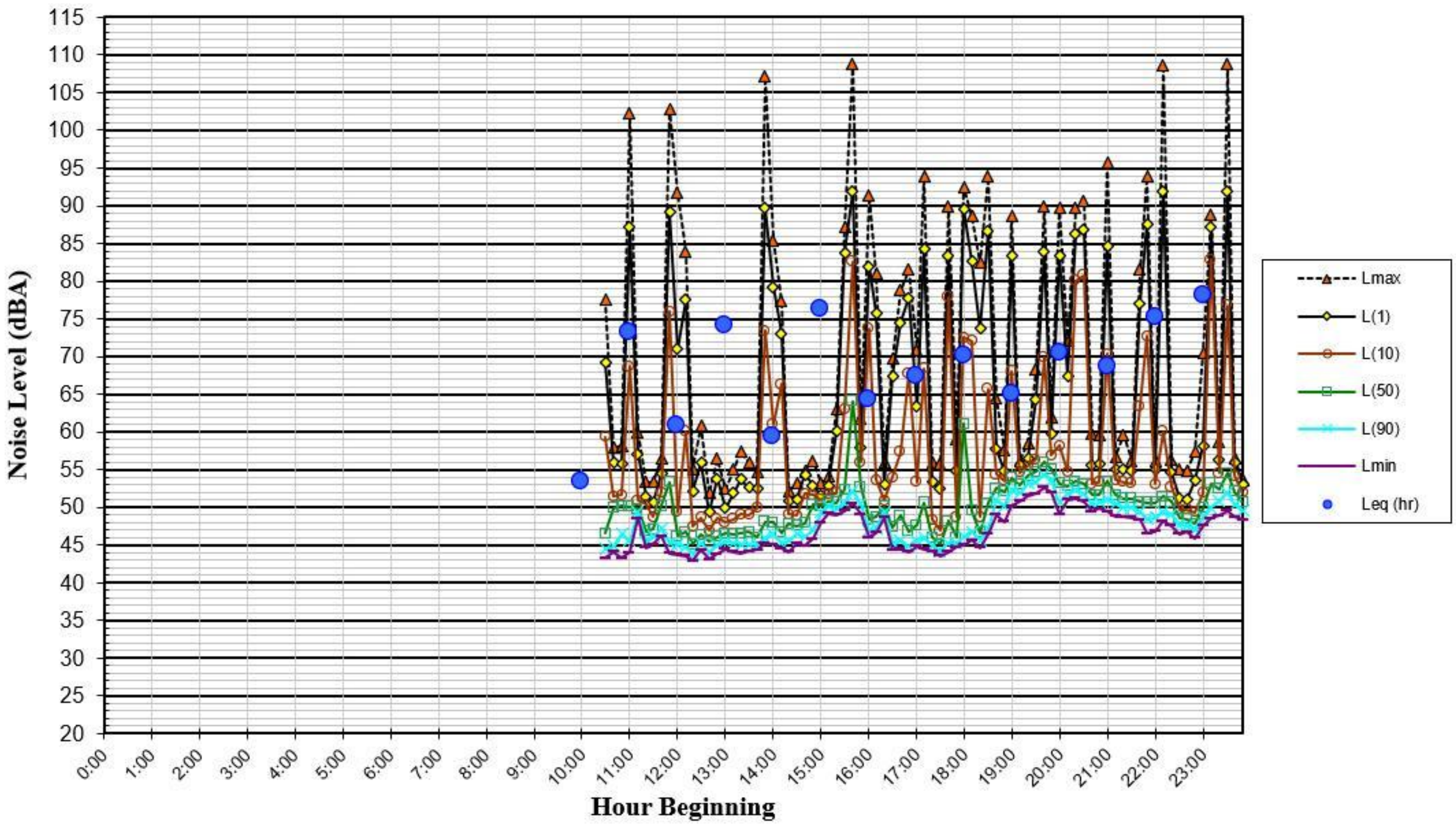


Figure A19. Daily trend in Noise Levels at LT-5, Wednesday, April 9, 2025

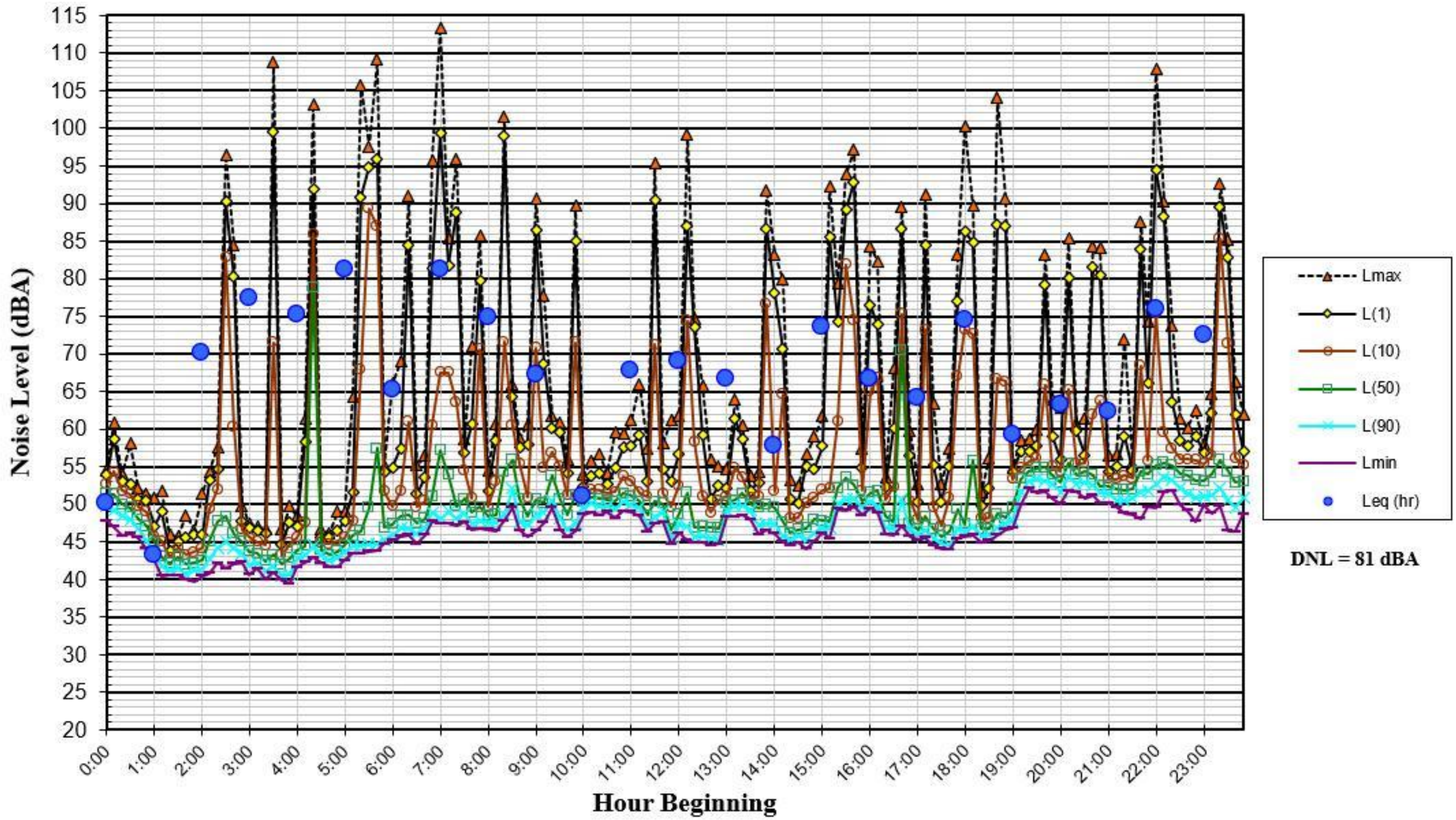


Figure A20. Daily trend in Noise Levels at LT-5, Thursday, April 10, 2025

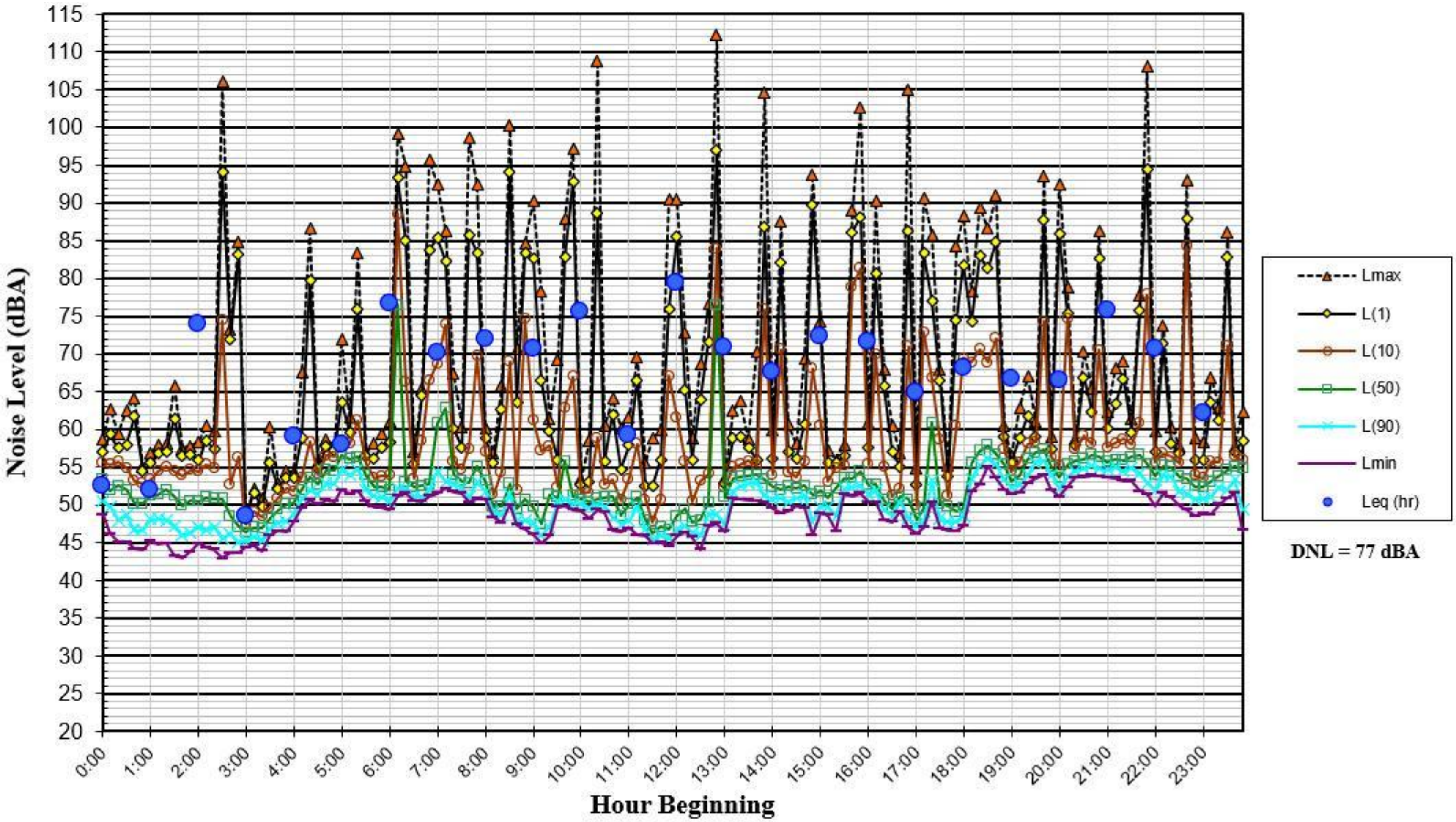


Figure A21. Daily trend in Noise Levels at LT-5, Friday, April 11, 2025

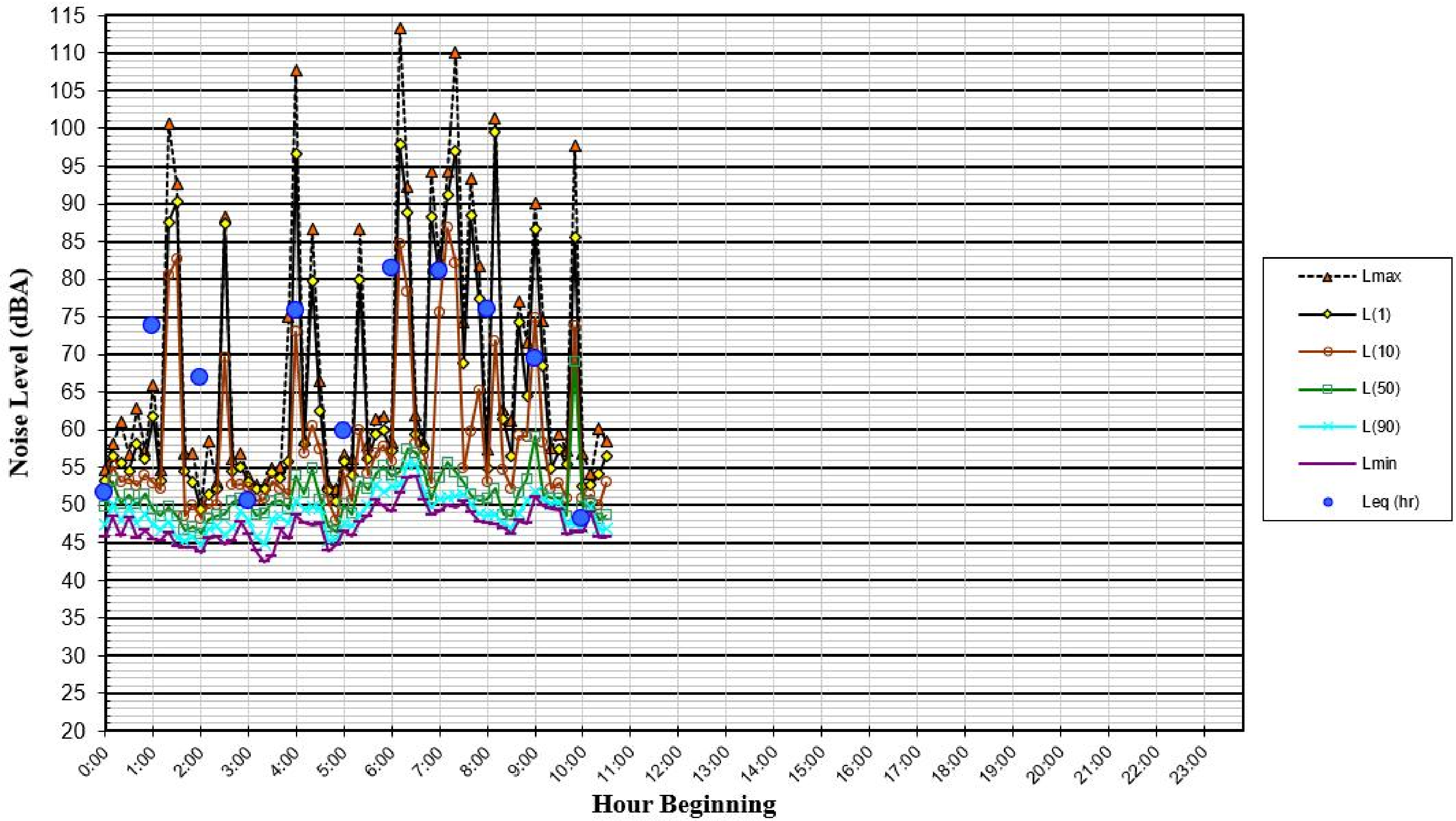


Figure A22. Daily trend in Noise Levels at LT-6, Tuesday, April 8, 2025

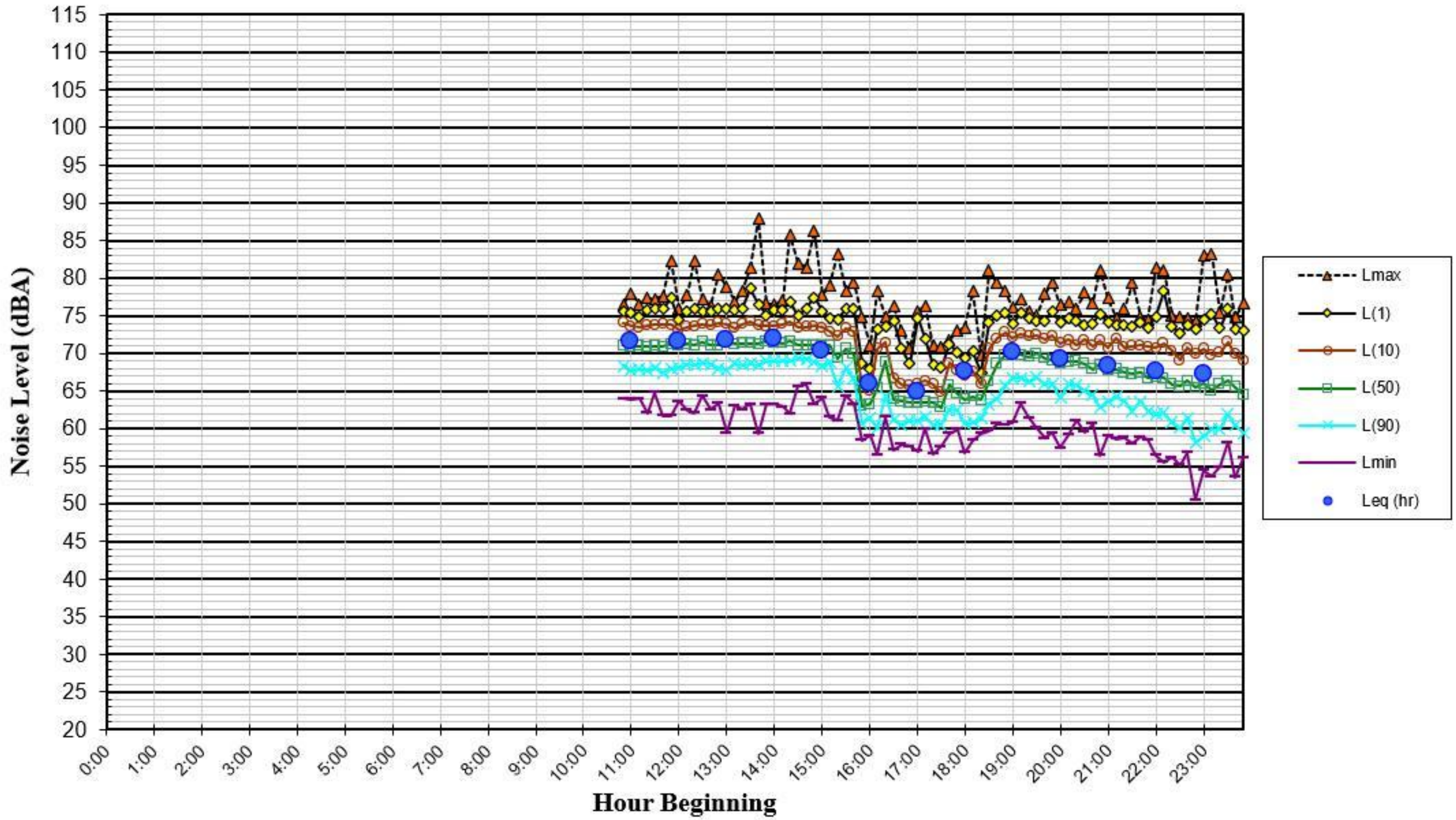


Figure A23. Daily trend in Noise Levels at LT-6, Wednesday, April 9, 2025

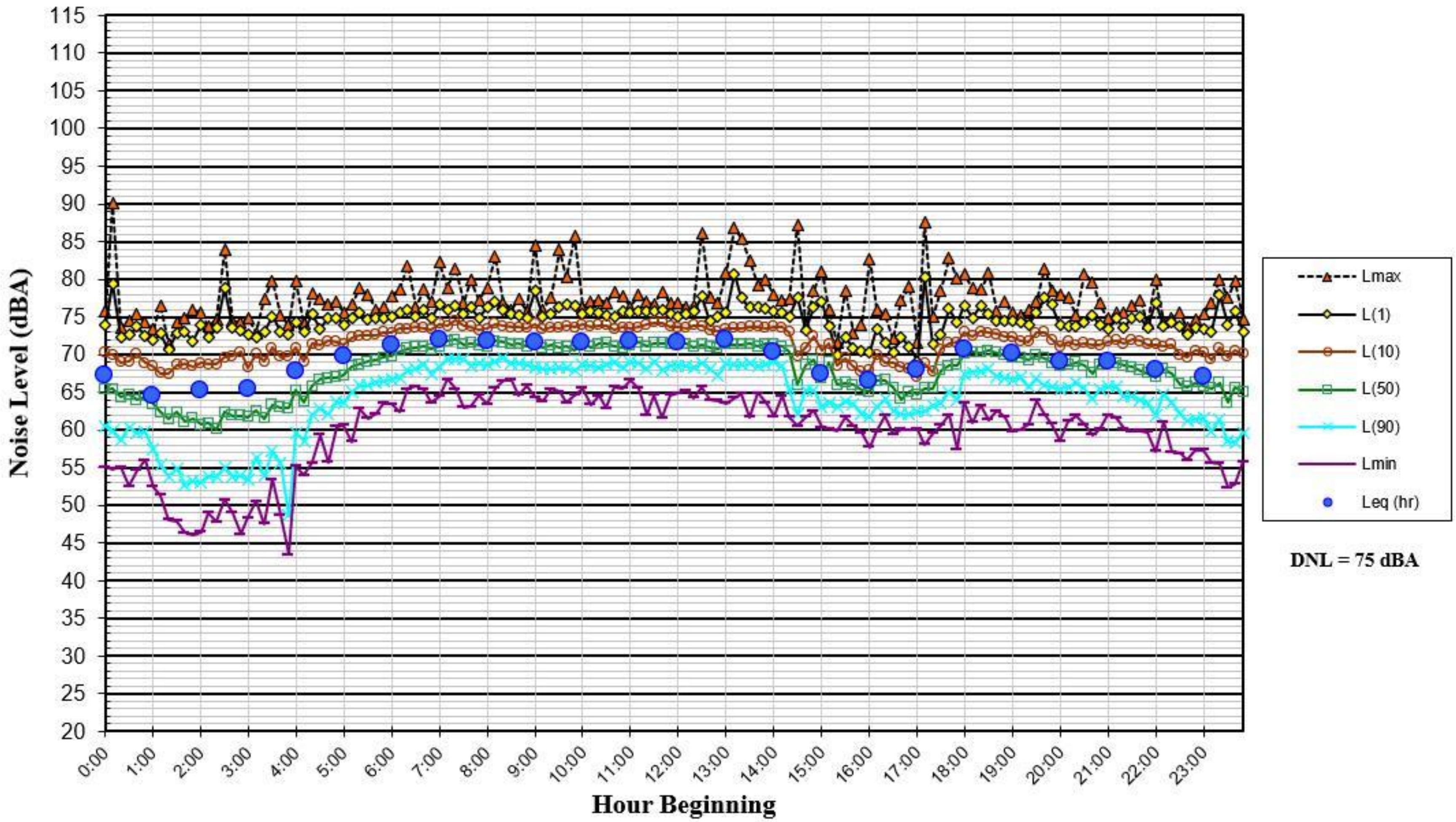


Figure A24. Daily trend in Noise Levels at LT-6, Thursday, April 10, 2025

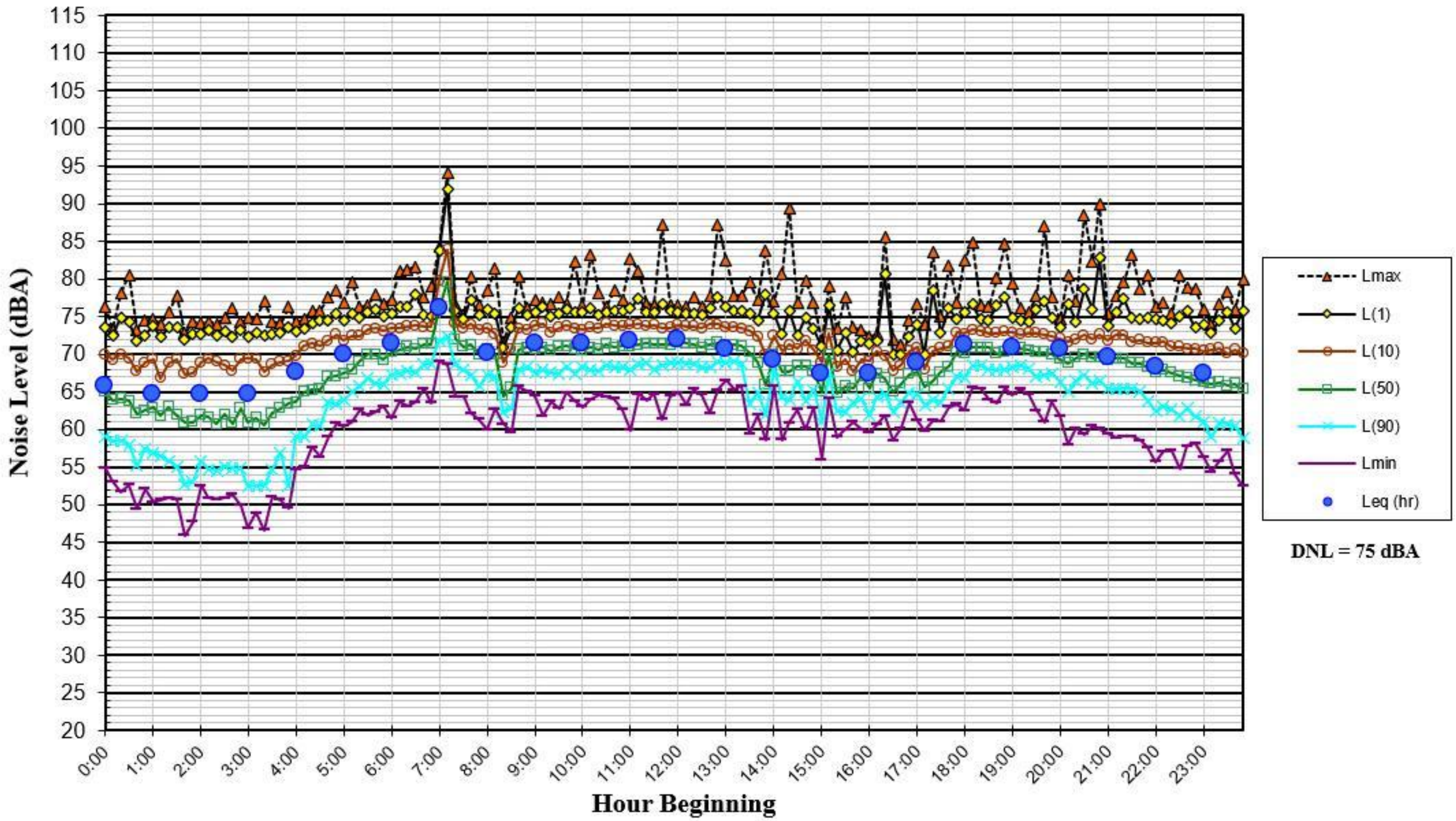


Figure A25. Daily trend in Noise Levels at LT-6, Friday, April 11, 2025

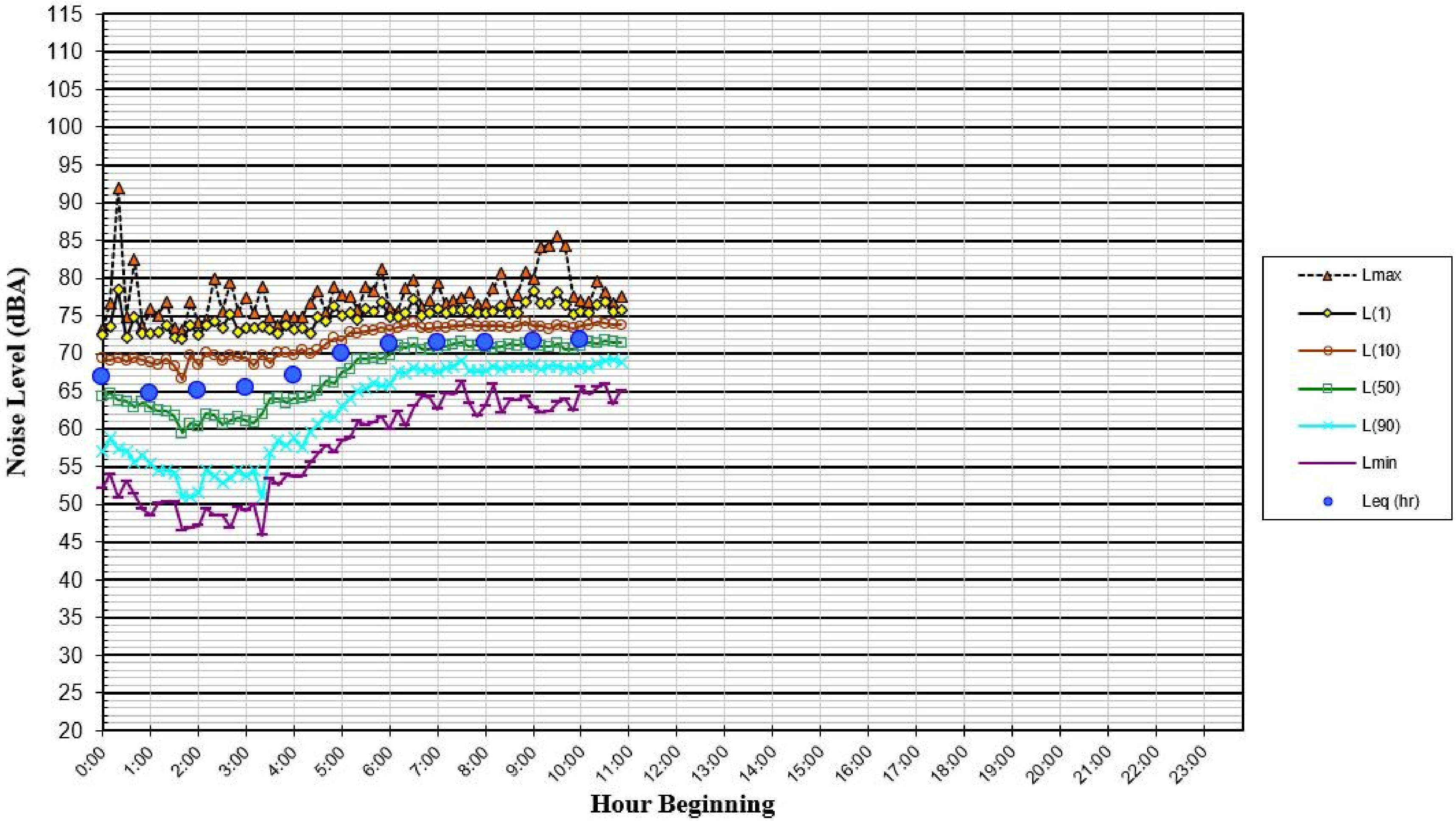


Figure A26. Daily trend in Noise Levels at LT-7, Tuesday, April 8, 2025

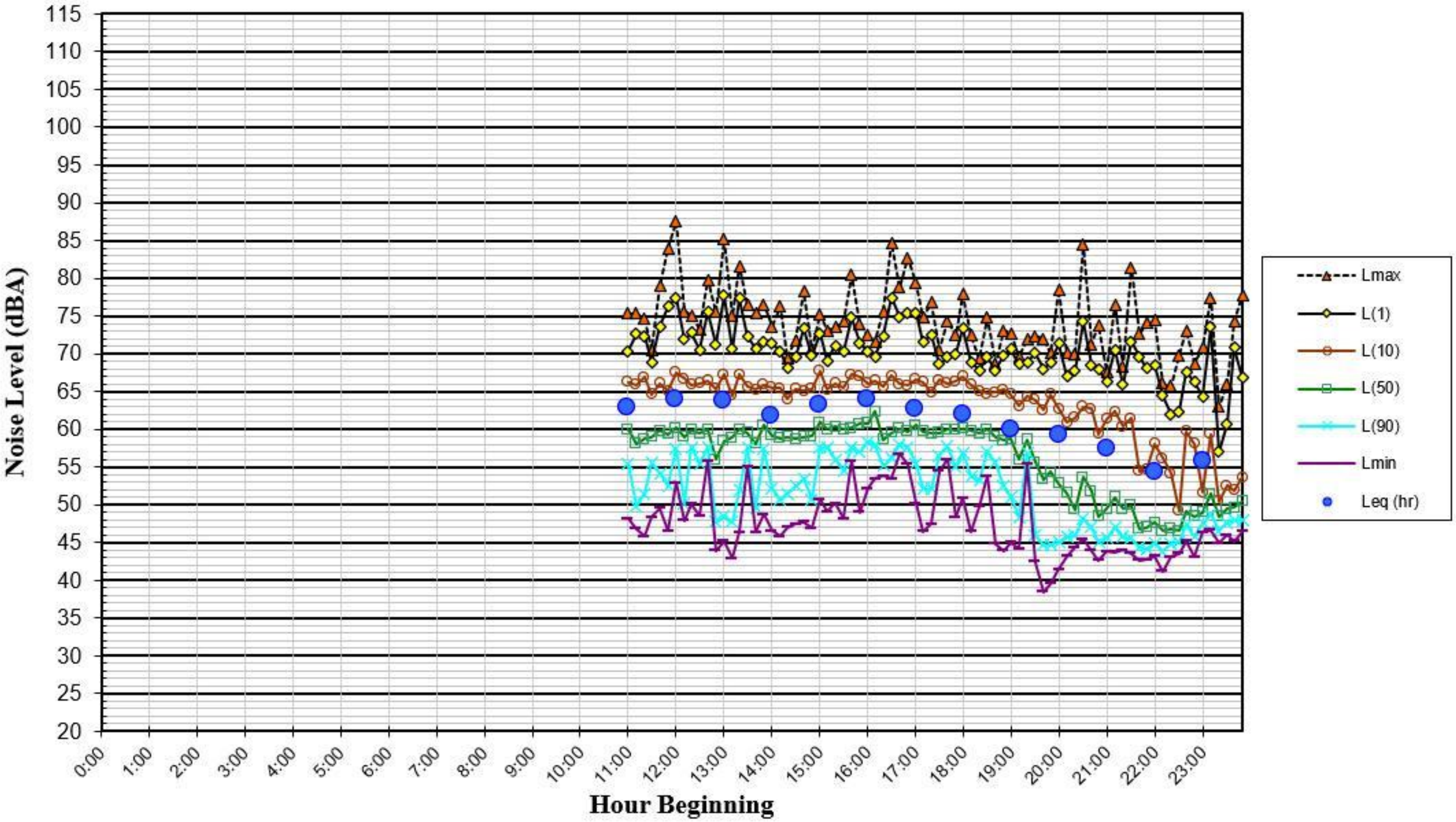


Figure A27. Daily trend in Noise Levels at LT-7, Wednesday, April 9, 2025

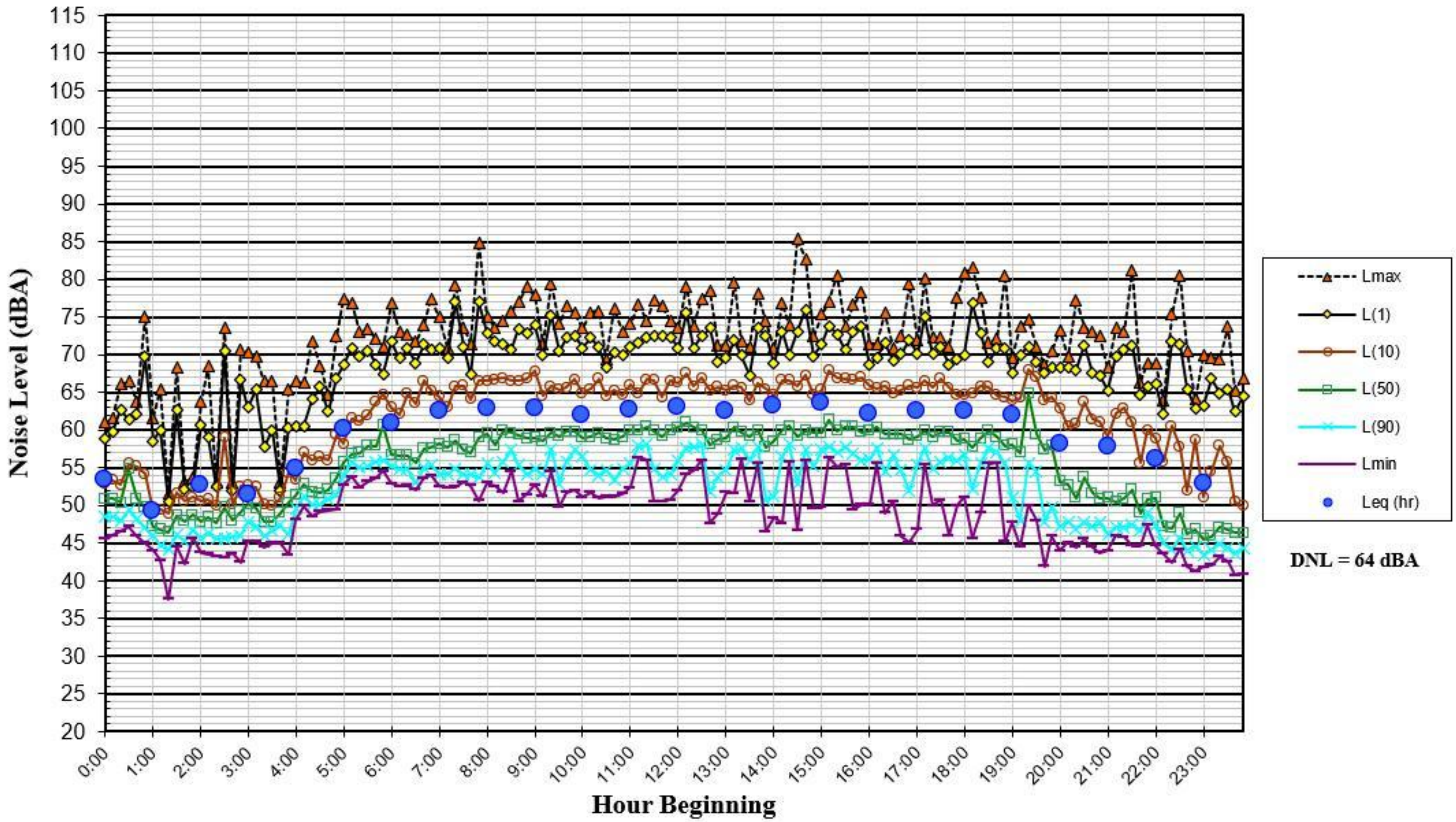


Figure A28. Daily trend in Noise Levels at LT-7, Thursday, April 10, 2025

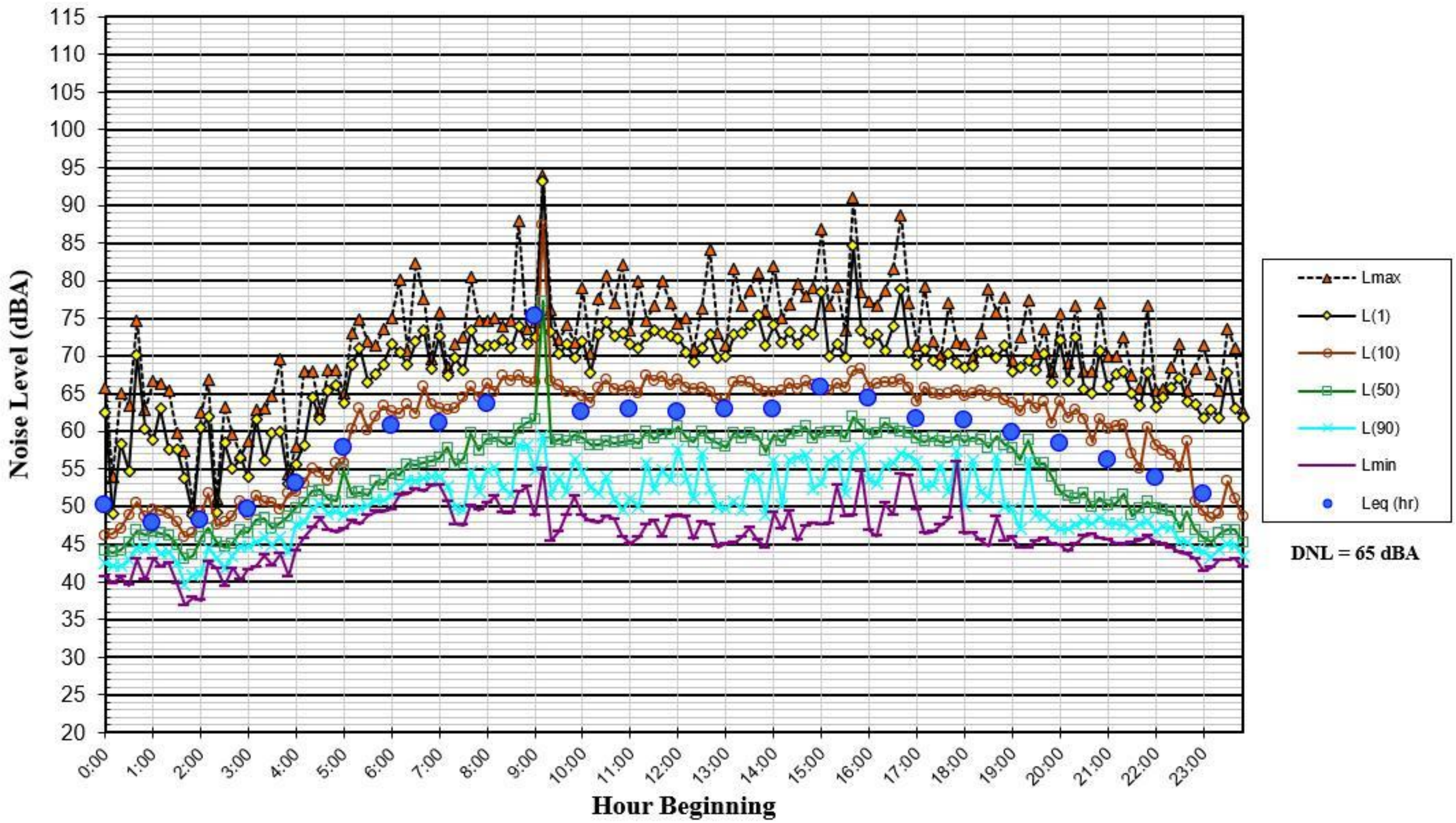


Figure A29. Daily trend in Noise Levels at LT-7, Friday, April 11, 2025

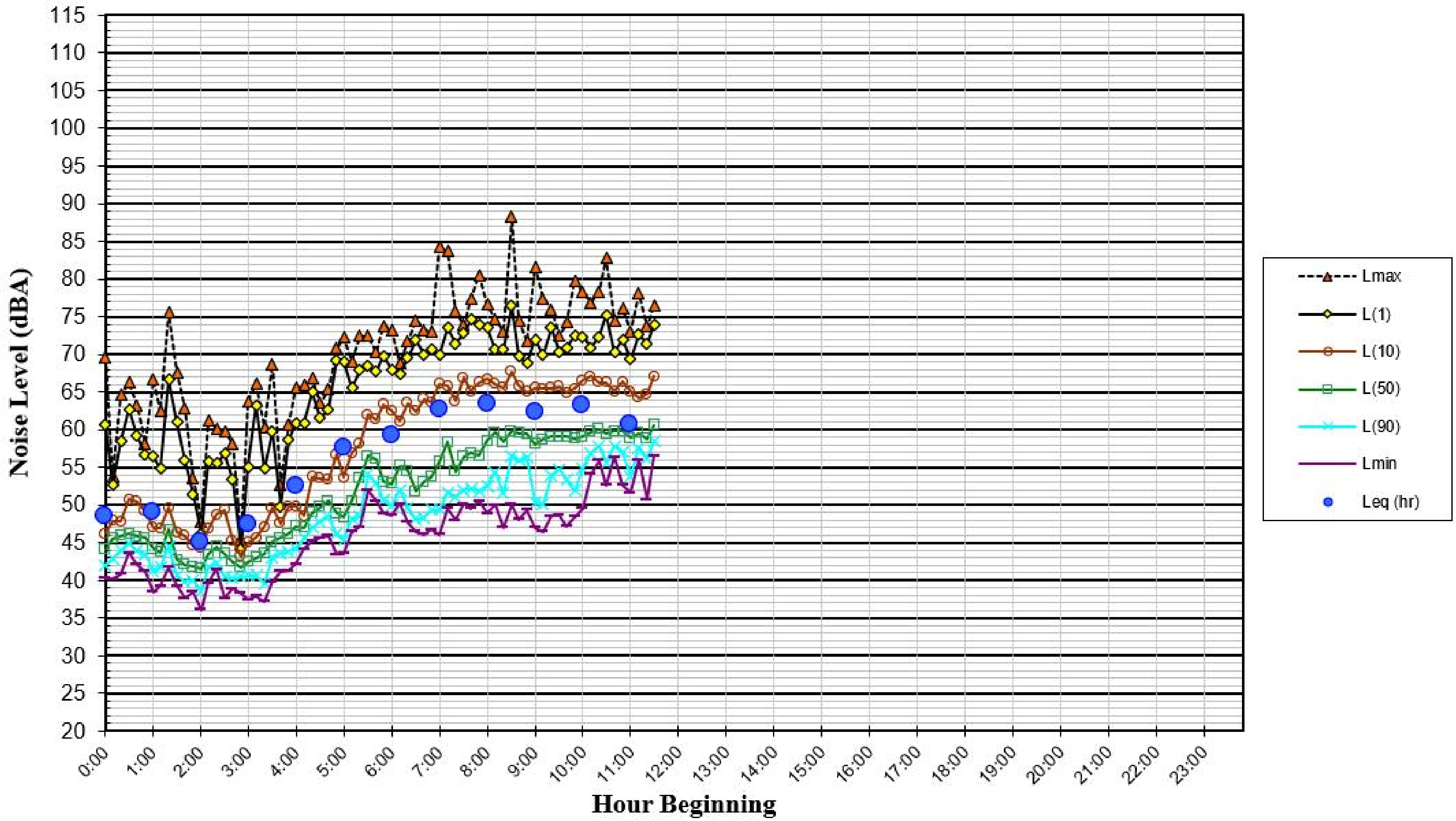


Figure A30. Daily trend in Noise Levels at LT-8, Wednesday, April 9, 2025

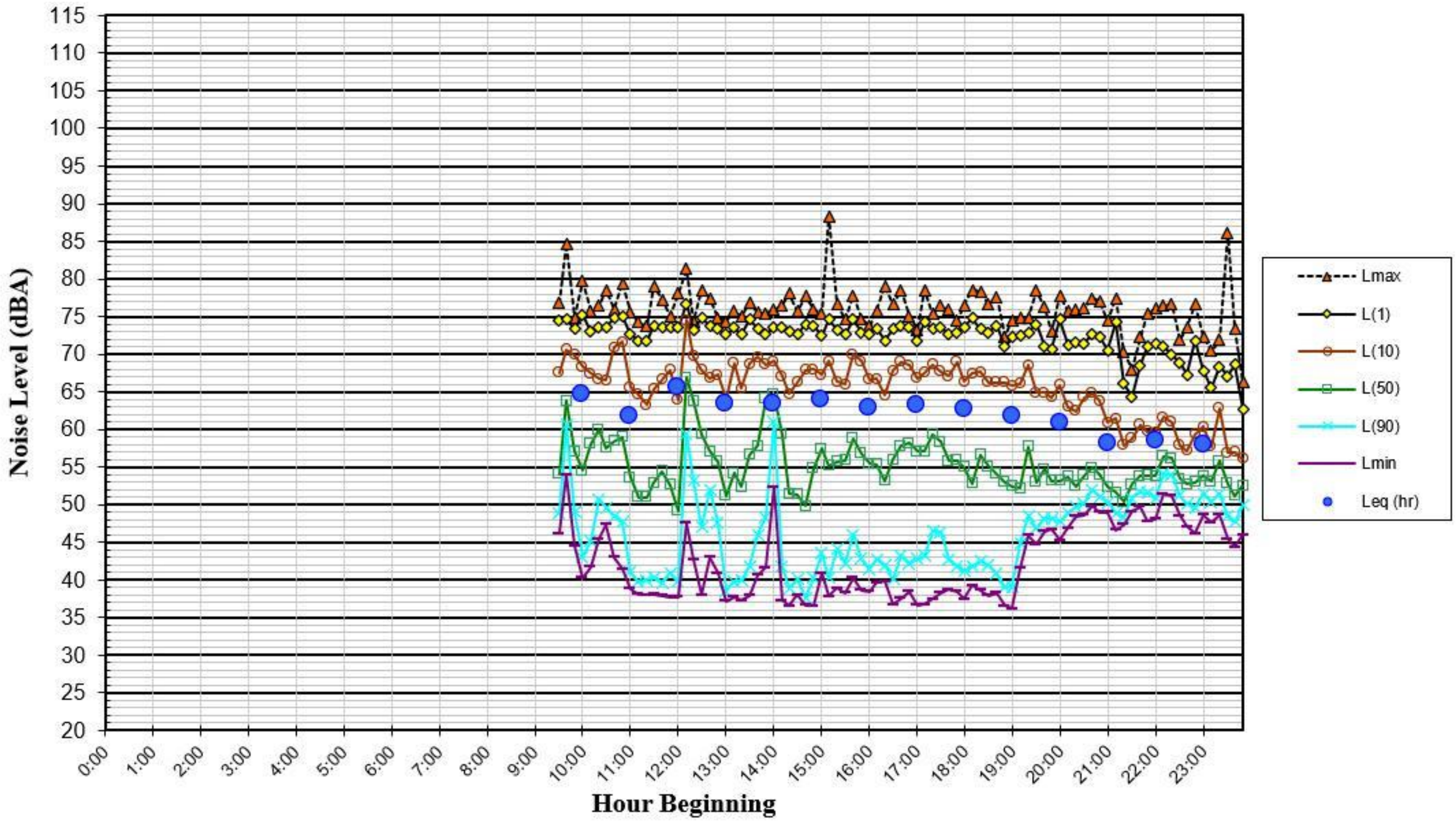


Figure A31. Daily trend in Noise Levels at LT-8, Thursday, April 10, 2025

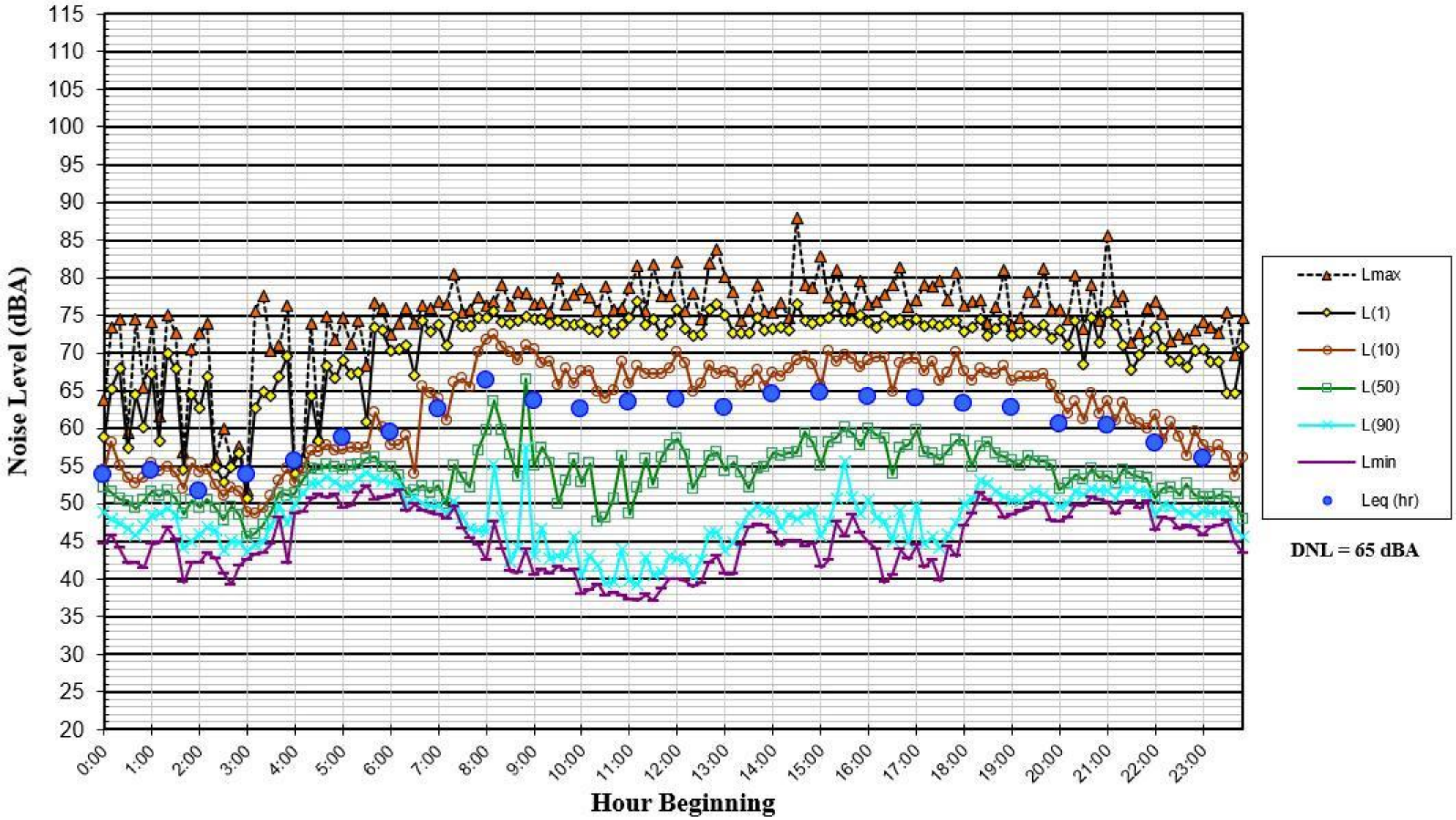


Figure A32. Daily trend in Noise Levels at LT-8, Friday, April 11, 2025

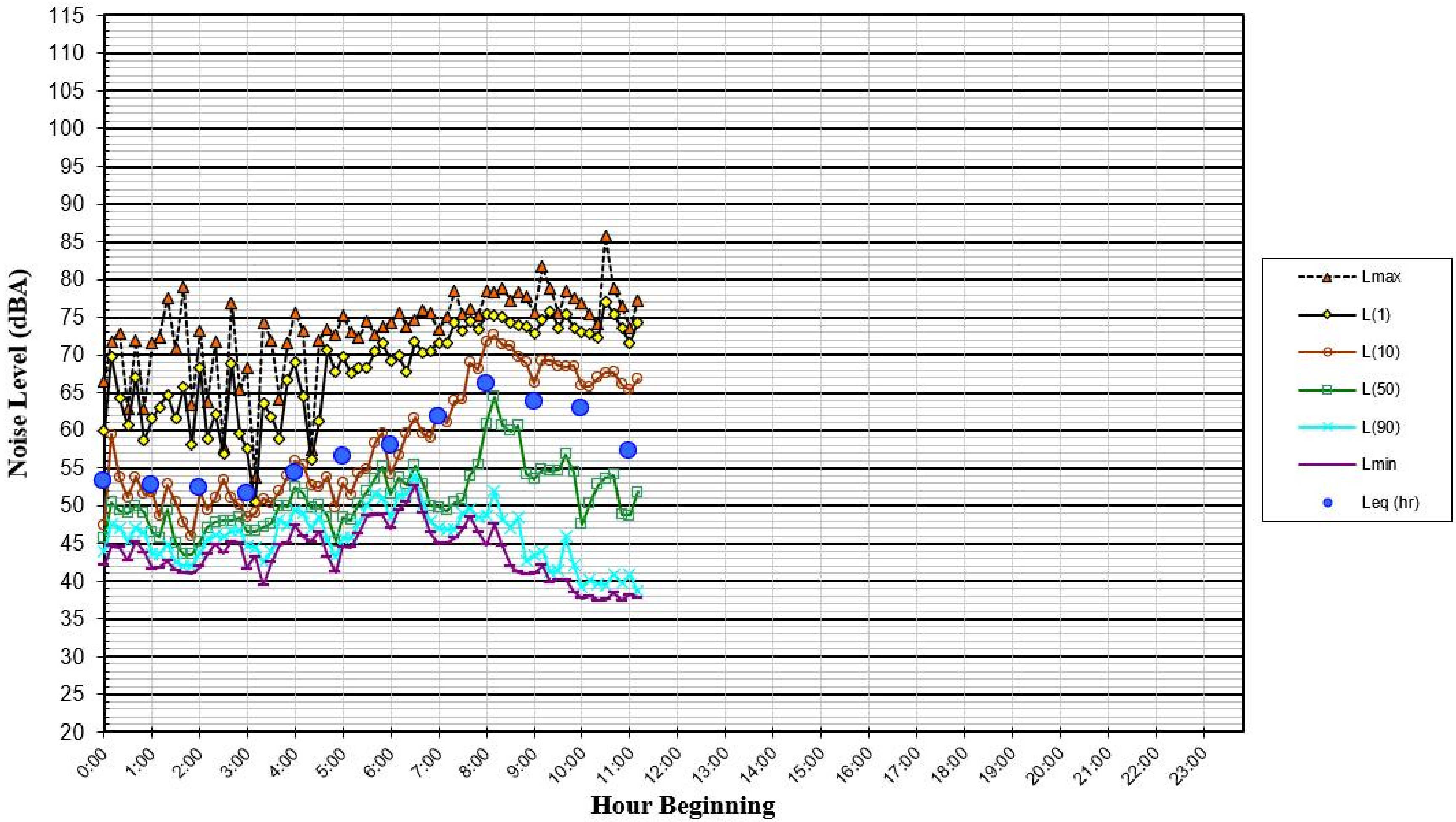


Figure A33. Daily trend in Noise Levels at LT-9, Monday, April 14, 2025

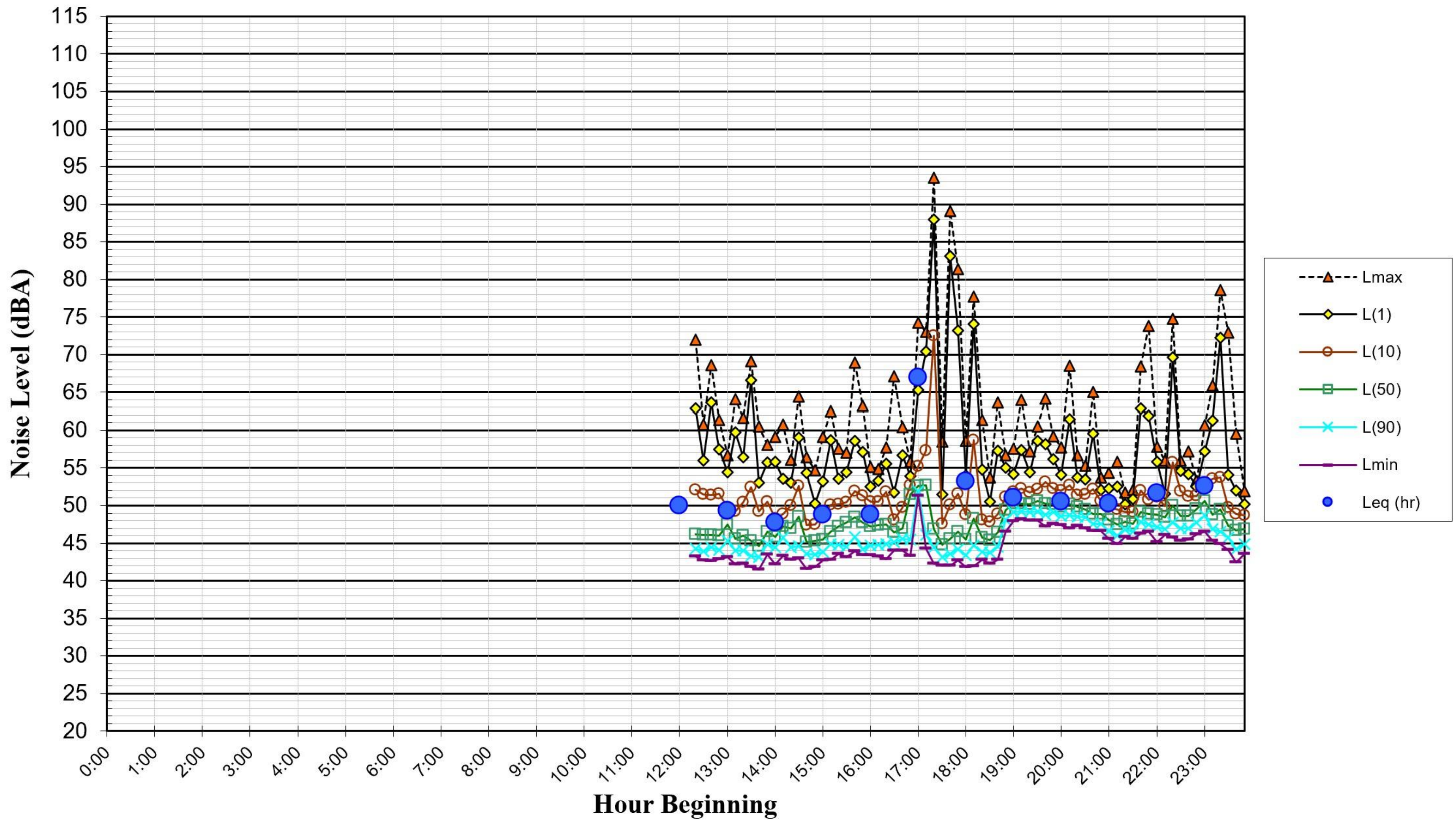


Figure A34. Daily trend in Noise Levels at LT-9, Tuesday, April 15, 2025

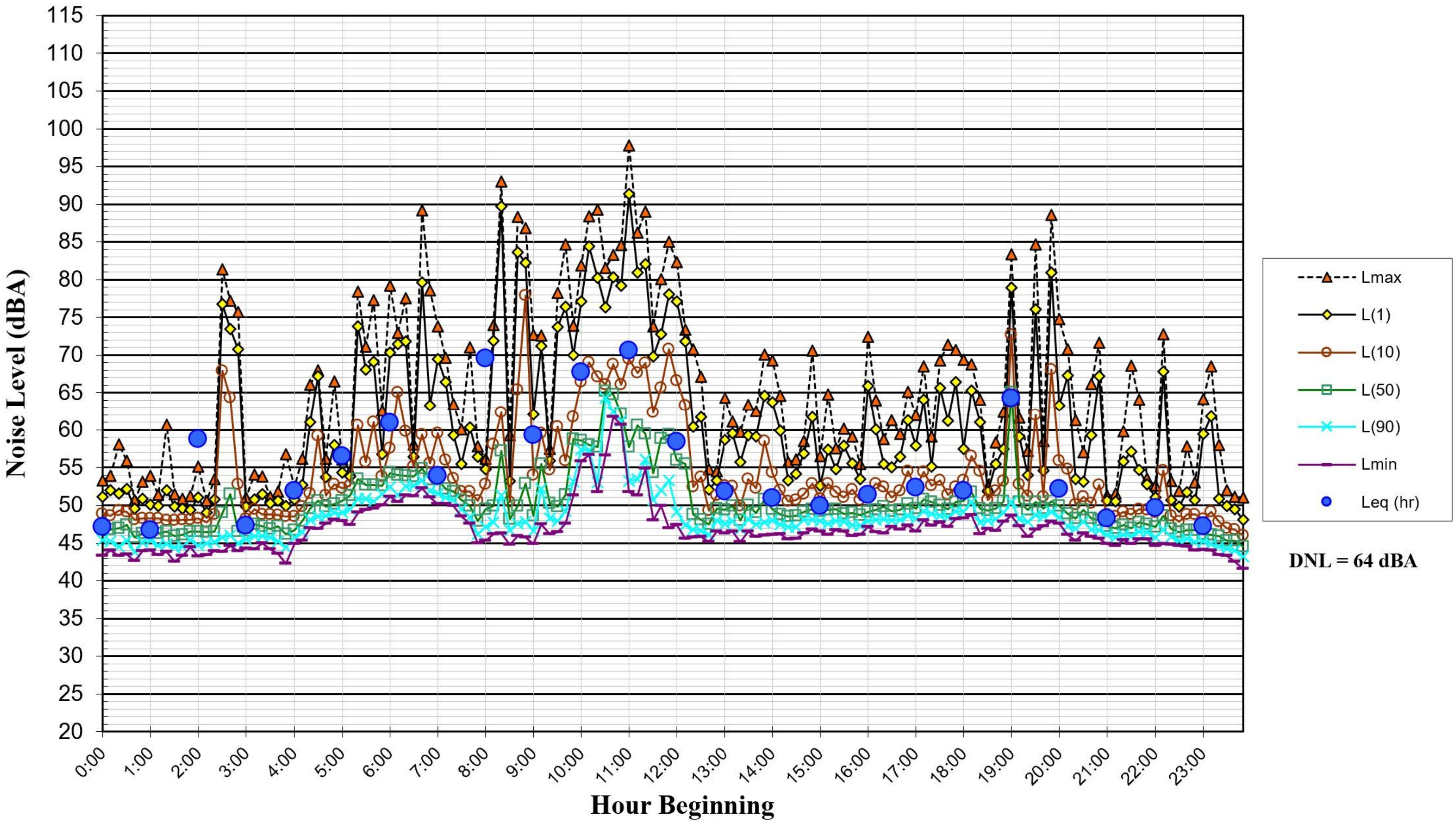


Figure A35. Daily trend in Noise Levels at LT-9, Wednesday, April 16, 2025

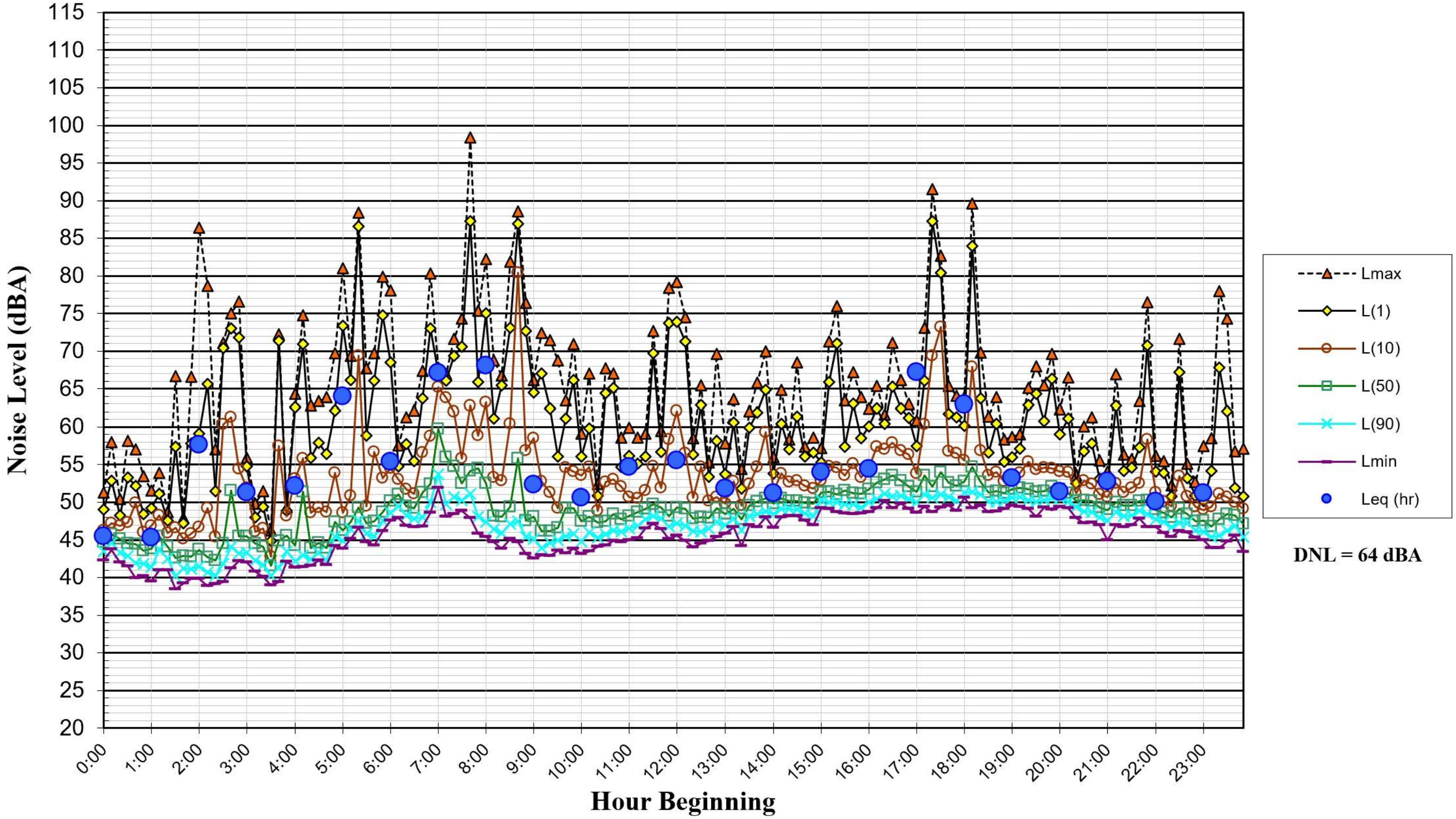


Figure A36. Daily trend in Noise Levels at LT-9, Thursday, April 17, 2025

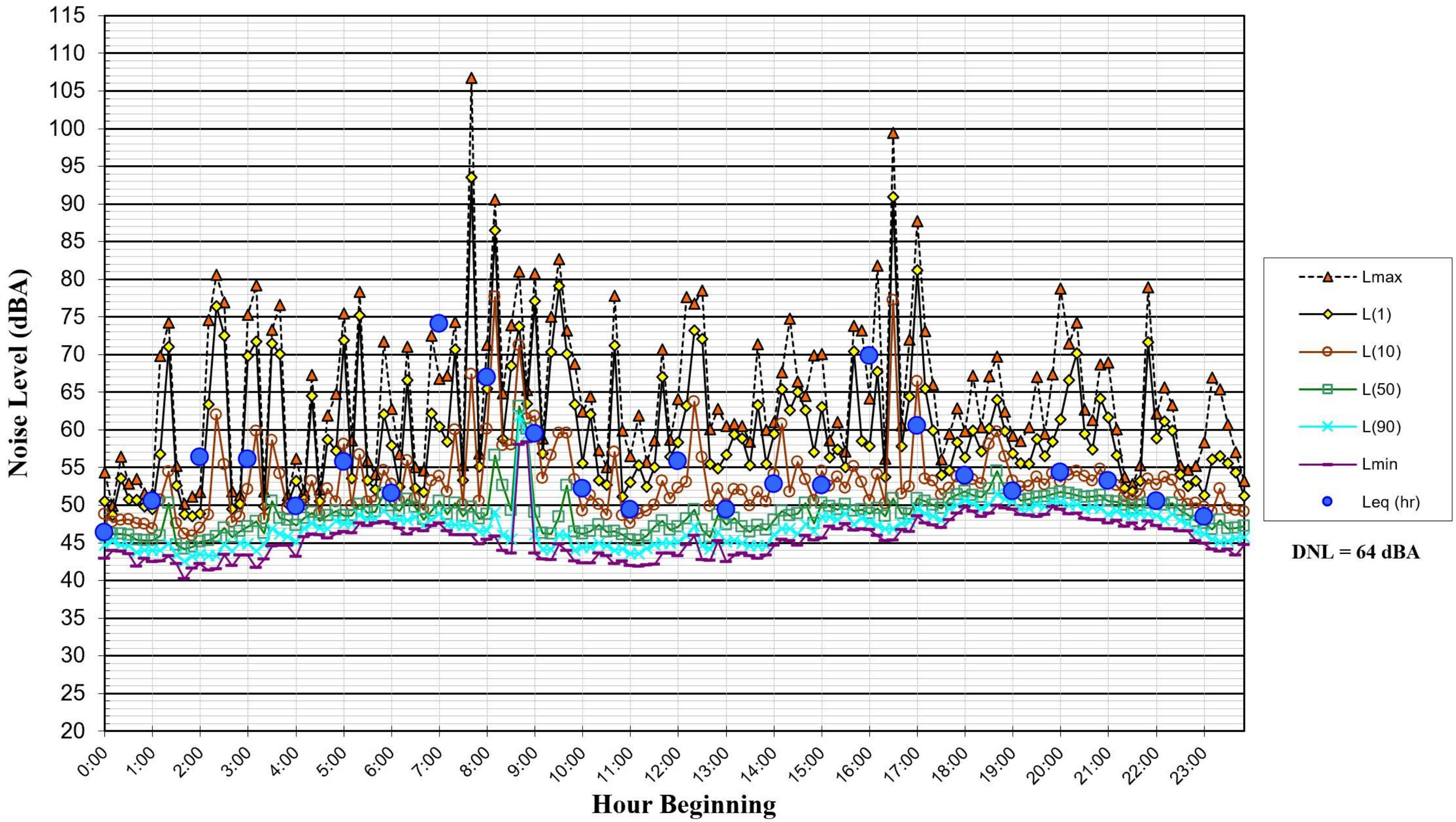


Figure A37. Daily trend in Noise Levels at LT-9, Friday, April 18, 2025