APPENDIX D

Noise Report

LOS ALTOS HIGH SCHOOL FIELD LIGHTING PROJECT NOISE AND VIBRATION ASSESSMENT

Los Altos, California

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Prepared for:

Pooja Nagrath
Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

Prepared by:

Steve J. Deines

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

I&R Job No.: 19-159

INTRODUCTION

The Project proposes to add lighting and an upgraded public address (PA) system to the existing track and athletic fields at Los Altos High School, allowing the school to host athletic and other events at night. The PA system would be used for sporting events, marching band, and school activities during daytime hours, along with a select amount of nighttime events. The use of lights and PA systems would be limited to no later than 10:00 p.m. after the conclusion of varsity and junior varsity interscholastic competitions. Typical competitions would end by 8:30 p.m. After installation of the field lighting and upgraded PA system, Los Altos High School expects an average attendance at football games of 1,500, with up to 2,200 attendees expected for rivalry or homecoming games. An approximate attendance of up to 500 people is expected for non-football sporting events, marching band activities, and other special events. In the past, Los Altos High School has played one or two night football games per year at nearby Foothill College.

This report evaluates the project's potential to result in significant environmental noise or vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; and, 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts to a less-than-significant level.

SETTING

Fundamentals of Environmental Noise

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

In addition to the concepts of pitch and loudness, there are several noise measurement scales 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* (*DNL* or L_{dn}) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

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 DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dB 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 dB with open windows. With standard construction and closed windows in good condition, the noise attenuation factor is around 20 dB for an older structure and 25 dB for a newer dwelling. Sleep and speech interference is therefore of concern when exterior noise levels are about 57 to 62 dBA DNL with open windows and 65 to 70 dBA DNL 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.

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

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

TABLE 2 Typical Noise Levels in the Environment

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

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

Fundamentals of Groundborne Vibration

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

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

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

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

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

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

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

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background

The State of California and the City of Los Altos have established regulatory criteria that are applicable in this assessment. 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.

State CEQA Guidelines. The CEQA guidelines are used in this analysis 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; or

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

Checklist items (a) and (b) are applicable to the proposed project. The project is not located within two miles of a public airport or in the vicinity of a private airstrip and would not expose people

residing or working in the project area to excessive aircraft noise levels; therefore, item (c) is not carried further in this analysis.

City of Los Altos General Plan. The City of Los Altos General Plan sets forth noise and land use compatibility standards for proposed land uses (General Plan, Table NEH-1: Land Use Compatibility Standards). The acceptable outdoor noise exposure level for schools is 60 dBA DNL and conditionally acceptable outdoor noise exposure level is 70 dBA DNL. The following policies would be applicable to the project:

Policy 7.4: Consider the potential impact on the general noise level when planning changes and improvements to the circulation system.

Policy 7.5: Require reasonable mitigation measures to reduce noise levels to those determined to be acceptable in the event that significant increase in noise levels will result from an improvement to the circulation system.

Policy 7.9: Minimize stationary noise sources and noise emanating from construction activities.

***City of Los Altos Municipal Code*.** The City of Los Altos Municipal Code, Title 6 'HEALTH AND SAFETY', Chapter 6.16 'Noise Control', establishes noise level limits as follows:

6.16.050 Exterior noise limits.

A. Maximum permissible sound levels by receiving land use.

1. The noise standards for the various categories of land use identified by the noise control office as presented in Table 4 of this section, unless otherwise specifically indicated, shall apply to all such property within a designated zone.

2. No person shall operate, or cause to be operated, any source of sound at any location within the city, or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level, when measured on any other property, either incorporated or unincorporated, to exceed:

    a. The noise standard for that land use as specified in Table 4 for a cumulative period of more than thirty (30) minutes in any hour; or

    b. The noise standard plus five dB for a cumulative period of more than fifteen (15) minutes in any hour; or

    c. The noise standard plus ten (10) dB for a cumulative period of more than five (5) minutes in any hour; or

    d. The noise standard plus fifteen (15) dB for a cumulative period of more than one minute in any hour; or

e. The noise standard plus twenty (20) dB or the maximum measured ambient for any period of time.

3. If the measured ambient level exceeds that permissible within any of the first four noise limit categories above, the allowable noise exposure standard shall be increased in five dB increments in each category as appropriate to encompass or reflect such ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

4. If the noise measurement occurs on a property adjacent to a zone boundary, the noise level limit applicable to the lower noise zone, plus five dB, shall apply.

5. If possible, the ambient noise shall be measured at a consistent location on the property with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, the ambient noise shall be estimated by performing a measurement in the same general source at least ten (10) dB below the ambient in order that only the ambient level be measured. If the difference between the ambient and the noise source is five to ten (10) dB, then the level of the ambient itself can be reasonably determined by subtracting a one decibel correction to account for the contribution of the source.

B. Corrections for character of sound. In the event the alleged offensive noise contains a steady, audible tone, such as a whine, screech, or hum, or contains music or speech conveying informational content, the standard limits set forth in Table 4 shall be reduced by five dB.

TABLE 4: EXTERIOR NOISE LIMITS
(Levels not to be exceeded more than 30 minutes in any hour)

Receiving Land Use Category	Time Period	Noise Level (dBA)
All R1 Zoning Districts	10:00 p.m. -- 7:00 a.m.	45
	7:00 a.m. -- 10:00 p.m.	55
All R3 and PCF Zoning Districts	10:00 p.m. -- 7:00 a.m.	50
	7:00 a.m. -- 10:00 p.m.	55
All OA Zoning Districts	10:00 p.m. -- 7:00 a.m.	55
	7:00 a.m. -- 10:00 p.m.	60
All C Zoning Districts	10:000 p.m. -- 7:00 a.m.	60
	7:00 a.m.--10:00 p.m.	65

Source: City of Los Altos Municipal Code, June 2006

6.16.070 Prohibited acts.

A. Noise disturbances prohibited. No person shall unnecessarily make or continue, or cause to be made or continued, any noise disturbance.

B. Specific prohibitions. The following acts, and the causing or permitting thereof, are declared to be in violation of this chapter:

6. Construction and demolition.

ii. Nonresidential properties. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work on weekdays before 7:00 a.m. and after 7:00 p.m. and Saturdays before 9:00 a.m. or after 6:00 p.m. or any time on Sundays or the city observed holidays of New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day, such that the sound there from creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by special exception. This section shall apply to operations on properties other than residentially zoned property. This section shall not apply to the use of lawn or garden tools as specified in subsection (B) (11) of this section;

a. Where technically and economically feasible, construction activities shall be conducted in such a manner that the maximum noise levels at affected properties will not exceed those listed in the following schedules:

i. Mobile equipment. Maximum noise levels for the nonscheduled, intermittent, short-term operation (less than ten (10) days) of mobile equipment:

TABLE 5: Maximum Noise Levels for the nonscheduled, Intermittent, and Short–Term Operations (Less than ten (10) days)

	All R1 Zoning Districts	**All PCF and R3 Zoning Districts**	**All OA and C Zoning Districts**
Daily, except Sundays and legal holidays 7:00 a.m. & 7:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 7:00 p.m. & 7:00 a.m. and all day Sundays and legal holidays	50 dBA	55 dBA	60 dBA

Source: City of Los Altos Municipal Code, June 2006

Stationary equipment. Maximum noise levels for the respectively scheduled and relatively long-term operation (periods of ten (10) days or more) of stationary equipment:

TABLE 6: Maximum Noise Levels for the Respectively Scheduled and Relatively Long–Term Operations (periods of ten (10) days or more)			
	All R1 Zoning Districts	**All PCF and R3 Zoning Districts**	**All OA and C Zoning Districts**
Daily, except Sundays and legal holidays 7:00 a.m. & 7:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 7:00 p.m. & 7:00 a.m. and all day Sundays and legal holidays	50 dBA	55 dBA	60 dBA

Source: City of Los Altos Municipal Code, June 2006

c. Deliveries, start-up and closing down. The construction times above shall apply to deliveries of materials and equipment, and arrival of workers, start-up and closing down and departure activities on a job site.

12. Air-conditioning or air-handling equipment. Operating or permitting the operation of any air-conditioning or air-handling equipment in such a manner as to exceed any of the following sound levels without a variance:

TABLE 7: Air-Conditioning or Air-Handling Equipment Operational Sound Levels	
Measurement Location	**Residentially zoned properties dB(A)**
Any point on a neighboring property line, five feet above grade level, no closer than three feet from any wall	50
Center of a neighboring patio, five feet above grade level, no closer than three feet from any wall	45
Outside the neighboring living area window nearest the equipment location, not more than three feet from the window opening, but at least three feet from any other surface	45

Source: City of Los Altos Municipal Code, June 2006

(Prior code § 10-5.09)

Mountain View Los Altos Union High School District Board. The Board of Trustees of the Mountain View Los Altos Union High School District has established Board Policy 7325 and Administrative Regulations 7325 to guide the use of stadium lights and public address systems. The policy and regulations are summarized in Table 8:

TABLE 8 Proposed Use of the Field Lights and Public Address System

Proposed Use of Field	Use of Field Lights	Use of Public Address System
Sports Games	A total of up to 25 nights of varsity/junior varsity interscholastic competition per annual season, comprised of the annual seasons for football (five games), boy's and girls' soccer (10 games), and boy's and girls' lacrosse (10 games), concluding by 10:00 PM at the latest[1]	Yes (play-by-play commentary only permitted during football games). All other athletic competitions shall limit the use of the public address systems to announcements, warm-up music or similar uses without running commentary.
Sports Practices	Monday through Friday, concluding by 8:30 PM. Not during weekend nights unless under unusual circumstances approved by the Superintendent or designee	No
Marching Band Practice	Two weeknights per week between August and November; one practice concluding by 8:00 PM and one practice concluding by 6:30 PM.[2]	Yes
Marching Band Performance	Five football competitions, commencement, and up to three special evening events.	Yes
Special Events	Commencement and up to three special evening events per year, concluding by 9:00 PM.	Yes
Holiday Use	The stadium field lights will not be used on school holidays, or in the period of time between commencement ceremonies and the beginning of sports practice for the fall season, as permitted by California Interscholastic Federation (CIF) rules.[4]	Use would be limited by all provisions described in BP 7325 policy and shall require prior approval by the superintendent or designee. Use of public address systems during holidays shall not begin prior to 10:00 AM[3]; shall be limited to necessary and occasional announcements, and occasional music played at volumes low enough not to interfere with ordinary conversation at the school site's boundary lines; and shall end by 2:00 PM.

[1] Football competitions would typically end by 10:00 PM; all other competitions would typically end by 8:30 PM. Adequate lighting (non-competition level) would be maintained after games to allow for safe exiting of the field.
[2] Marching band practices would not occur within 12 hours of each other. Practices could be extended in the event of postseason regional or national competitions, but not beyond December 31, except by permission of the Superintendent or designee. Marching band practice may be held during morning, afternoon and Saturday hours without stadium lights with no restriction.
[3] The one exception being Thanksgiving morning (Turkey Trot event, where sound equipment would be in use starting at 8:00 AM)
[4] CIF schedule shows the first day of practice as August 9, 2020 for fall sports.

Existing Noise Environment

The Los Altos High School campus is located west of North Gordon Way and south of Jardin Drive at 201 Almond Avenue in Los Altos. The school is in a residential area. Single-family residences are located on all sides of the campus. The noise measurement surveys completed near Los Altos High School are described below and summarized in Table 9 and Table 10.

Illingworth & Rodkin, Inc. performed a noise monitoring survey on Friday, October 5, 2018 to characterize the ambient noise levels at the site and in the project vicinity. This survey consisted of two attended short-term measurements (LA-1 and LA-2). An additional noise monitoring survey was performed on Thursday, September 26, 2019 to characterize the ambient noise levels at the site and in the project vicinity and to measure noise during Saturday football games. The survey consisted of five long-term measurements (LT-1 through LT-5). The ambient noise environment in the area results primarily from vehicular traffic on the local street network. Distant jet aircraft and activities at the school also contribute to the ambient noise environment. Noise monitoring locations are depicted in Figure 1.

Short-term noise measurements LA-1 and LA-2 were conducted on Friday, October 5, 2018 in several ten-minute intervals starting at 11:50 a.m. and concluding at 12:40 p.m. LA-1 was near the residence located at 201 Alicia Way, approximately 50 feet north of the centerline of Almond Avenue. This location was selected to characterize daytime ambient noise levels in the residential areas located in the proximity of the school along Almond Avenue. The 10-minute average noise level measured at this location beginning at 11:50 a.m. was 60 dBA L_{eq}, and the 10-minute average noise level measured at this location beginning at 12:00 p.m. was 61 dBA L_{eq}. During the measurements, automobiles generated maximum noise levels ranging from 63 to 73 dBA L_{max} and noise from construction in the neighborhood ranged from 55 to 58 dBA L_{max}. LA-2 was located between the residences at 335 and 345 Alicia Way at the edge of the pavement. This location was selected to characterize daytime ambient noise levels in the residential areas located along neighborhood streets in the vicinity. The 10-minute average noise level measured at this location beginning at 12:20 p.m. was 56 dBA L_{eq}, and the 10-minute average noise level measured at this location beginning at 12:30 p.m. was 59 dBA L_{eq}. During the measurements, vehicles generated maximum noise levels ranging from 59 to 76 dBA $L_{max,}$ distant jet aircraft produced a maximum noise levels of 47 to 53 dBA L_{max}, voices from the school were audible but did not affect measured sound levels. Vehicles traveling at a higher than normal speeds resulted in the elevated noise levels.

Long-term measurements LT-1 through LT-5 measured noise levels between Thursday, September 26, 2019 and Monday, September 30, 2019. Two football games were played at the school's field on Saturday, September 28, 2019 between the hours of 11:00 a.m. and 4:00 p.m. The junior varsity game began at 11:00 a.m. The varsity game began at 1:30 p.m. LT-1 was made near the northeast corner of the site, near athletic fields and tennis courts. This location was selected to characterize ambient noise levels at residences to the northeast. LT-2 was made behind the bleachers at the west side of the football field. This location was selected to characterize ambient noise levels at the football field and at the nearest residences to the west. LT-3 was made near the southeast corner of the site, across the street and in front of 154 Almond Avenue. This location was selected to characterize ambient noise levels at the nearest residences to the south. LT-4 was made west of the site along Valencia Drive near 351 Richelieu Court. This location was

selected to characterize ambient noise levels at residences northwest of the football field. LT-5 was made north of the site at the corner of Jardin Drive and Los Ninos Way. This location was selected to characterize ambient noise levels at residences north of the site. Results of long-term measurements are summarized in Table 10.

FIGURE 1 Los Altos High School Measurement Locations

Source: Google Earth

TABLE 9 Summary of Short-Term Noise Measurement Data (dBA)

Location and Date	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
LA-1A: 201 Alicia Way (10/5/2018, 11:50 a.m. - 12:00 p.m.)	68	67	64	57	47	60
LA-1B: 201 Alicia Way (10/5/2018, 12:00 p.m. - 12:10 p.m.)	73	70	64	59	50	61
LA-2A: 335/345 Alicia Way (10/5/2018, 12:20 p.m. - 12:30 p.m.)	73	69	59	44	39	56
LA-2B: 335/345 Alicia Way (10/5/2018, 12:30 p.m. - 12:40 p.m.)	76	74	59	43	38	59

TABLE 10 Summary of Long-Term Noise Measurement Data (dBA)

Location and Date	Hourly-Average Noise Level, L_{eq}			DNL
	Daytime	Nighttime	Football Game	
LT-1: Northwest corner of Los Altos High School (Thursday, 9/26/2019 through Monday, 9/30/2019)	45 to 69	33 to 48	55 to 61	52 to 59
LT-2: West of Los Altos High School football field (Thursday, 9/26/2019 through Monday, 9/30/2019)	45 to 67	34 to 47	63 to 67	53 to 60
LT-3: South of Los Altos High School at 154 Almond Avenue (Thursday, 9/26/2019 through Monday, 9/30/2019)	59 to 68	42 to 65	65 to 66	64 to 67
LT-4: West of Los Altos High School along Valencia Drive (Thursday, 9/26/2019 through Monday, 9/30/2019)	51 to 67	35 to 54	56 to 61	54 to 59
LT-5: North of Los Altos High School along Jardin Drive (Thursday, 9/26/2019 through Monday, 9/30/2019)	51 to 67	34 to 52	57 to 59	52 to 60

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 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 Los Altos General Plan or Municipal Code, as follows:

    - Temporary Noise Increase. A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA L_{eq} at the property lines shared with residential land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase at adjacent residential land uses.

    - Operational Noise in Excess of Standards. A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

    - Permanent Noise Increase. A significant impact would be identified if traffic or school activity 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 DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL 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 0.3 in/sec PPV would be considered excessive as such levels would have the potential to result in cosmetic damage to buildings.

Impact 1: **Temporary or Permanent Noise Increases in Excess of Established Standards.** Project construction and traffic would not generate noise levels that exceed the applicable noise thresholds or result in a substantial temporary or permanent noise level increase at existing noise-sensitive land uses in the project vicinity. **This is a less-than-significant impact.**

A significant noise impact would occur if construction, traffic, or activities generated by the project would substantially increase noise levels at sensitive receptors in the project vicinity.

Temporary Noise Increases from Project Construction

Section 6.16.070 of the Los Altos Municipal Code defines prohibited acts for construction and demolition. The Code prohibits operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work on weekdays before 7:00 a.m. and after 7:00 p.m. and Saturdays before 9:00 a.m. or after 6:00 p.m. or any time on Sundays or the city observed holidays of New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day, such that the sound there from creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by special exception. The Code also states that where technically and economically feasible, construction activities, including mobile and stationary equipment, shall be limited to 75 dBA L_{max} in residential districts between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and Saturdays and to 50 dBA L_{max} in residential districts at all other times and days.

This analysis assumes that construction activities will occur only during the allowable hours or modified hours as permitted by the code. Furthermore, the analysis assumes that the noise limits will be met where it is technically and economically feasible. Project construction will be consistent with the code and the impact is less-than-significant.

Construction activities associated with the Project would occur over a period of two months. Installation of the proposed lighting and audio system would require minor excavation of the field to construct the pole foundations, trenching and boring for electrical conduit installation, installation via hydraulic crane of the lighting poles, mounting of the luminaires, and restoration of disturbed surfaces including pavement and landscaping that was removed during excavation and trenching. Construction equipment to be used would include an excavator, boring machine, concrete truck and pump, crane, and semi-trucks for materials delivery.

Typical noise levels for different construction equipment at a distance of 50 feet are shown in Table 11. Table 11 levels are consistent with construction noise levels calculated for the project in the Federal Highway Administration (FHWA) Roadway Construction Noise Model, including the anticipated equipment that would be used for each phase of the project. As indicated in Table 10, excavators, cranes, boring jack power units, trucks, and concrete pumps would be anticipated to generate noise level of 80 to 85 dBA L_{max} at a distance of 50 feet. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain can provide an additional 5 to 10 dBA noise reduction at distant receptors.

TABLE 11 Construction Equipment, 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes: [1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

[2] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

[3] Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

Typically, small construction projects do not generate significant noise impacts when standard construction best management practices are enforced at the project site and when the duration of

the noise generating construction period is limited to 12 months or less. Construction noises associated with projects of this type are disturbances that are necessary for the construction or repair of buildings and structures in urban areas. However, as construction noise at the nearest residences to the west may occasionally exceed the 75 dBA L_{max} criterion outlined section 6.16.070 of the Los Altos Municipal Code, the following best practices should be followed:

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Unnecessary idling of internal combustion engines should be strictly prohibited.

- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors. If they must be located near receptors, adequate muffling (with barriers or enclosures where feasible and appropriate) shall be used to reduce noise levels at the adjacent sensitive receptors.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

With implementation of the above best practices and given that construction is proposed only during allowable hours, this is a **less-than-significant** impact.

Permanent Noise Increases from Project Traffic

A significant permanent noise increase would occur if traffic generated by the project would substantially increase noise levels at sensitive receptors in the project vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

Based on the transportation impact analysis conducted by Hexagon Transportation Consultants, Inc.[1], p.m. peak hour traffic noise increases as a result of the project were calculated at five intersections near the site. The additional traffic contributed by the project would result in noise increases of 0 to 2 dB along all affected roadway segments. As this increase is only anticipated for a select few evening hours on nights of events with the highest attendance, the overall traffic noise level increase as a result of the project would be less than 1 dBA DNL. Traffic noise increases resulting from the proposed project would not result in noise increases of 3 dBA DNL or more on the surrounding roadway network. This is a **less-than-significant** impact.

1 Los Altos High School Field Lighting Project, Hexagon Transportation Consultants, February 2020

Permanent Noise Increases from On-Site Operational Noise

With the addition of permanent lights, a limited number of currently occurring sports games and practices, marching band performances and practices, and special events may shift from daytime to evening hours. Sports games would typically conclude by 8:30 p.m. with football games concluding by 10:00 p.m. at the latest. Attendance for sporting events is anticipated to increase after the installation of permanent field lighting. The most attendees the high school expects to attract is 2,200 people, up from 1,500 people, at the Homecoming football game. An average crowd for future football games is expected to be about 1,500 people, up from 1,000 people, and a minimum crowd for other sporting events would be up to 500 people, up from 200 people. Mountain View Los Altos Union High School District Board Policy and Regulation 7325 guide the allowed uses for stadium lighting and PA systems and are summarized in Table 8.

Football Games

Home football games would be expected to generate the highest noise levels at residential land uses in the site vicinity, primarily because of the number of participants and spectators. The nearest noise sensitive receptors include residences bordering the site to the west (represented by LT-2 and LT-4), residences to the south across Almond Avenue (represented by LT-3), residences to the north across Jardin Drive (represented by LT-5), and residences to the northeast (represented by LT-1).

Based on the noise monitoring survey, during the 2:00 p.m. hour on Saturday, September 28, 2019, the varsity football game generated a worst-hour average noise level of 67 dBA L_{eq} at the nearest residences to the west, with maximum noise levels in the range of 70 to 85 dBA L_{max}. The nearest residences to the south of the field were exposed to a worst-hour average noise level of 65 dBA L_{eq}, with maximum noise levels in the range of 73 to 76 dBA L_{max}. Noise levels to the south during the football game were consistent with levels measured on prior and following days during which there were no football games, and are characteristic of continuous traffic noise along Almond Avenue. The nearest residences to the north of the field were exposed to a worst-hour average noise level of 59 dBA L_{eq}, with maximum noise levels in the range of 65 to 74 dBA L_{max}. The nearest residences to the northeast of the field were exposed to a worst-hour average noise level of 56 dBA L_{eq}, with maximum noise levels in the range of 59 to 73 dBA L_{max}. Attendance of the game is estimated to be around 1,000 people.

Based on measurements made at various high school football games in the Bay Area[2,3,4], the variation in spectator noise primarily depends upon the attendance and level of excitement generated by the game. Otherwise, noise levels generated by the PA or the referees' whistles would be about the same regardless of the number of people in attendance. Table 12 summarizes hourly

2 Santa Teresa High School Stadium Lighting Project, Environmental Noise Assessment, Illingworth & Rodkin, Inc., September 12, 2013.

3 Lynbrook High School Field Improvements and Lighting Project Environmental Noise Assessment, Illingworth & Rodkin, Inc., June 3, 2010.

4 Silver Creek High School Sports Lighting Project Environmental Noise Assessment, Prepared by Illingworth & Rodkin, Inc., September 9, 2013.

average noise levels calculated at the nearest receivers, based on the number of spectators anticipated for future games and the results of the noise monitoring survey.

TABLE 12 Worst Hour Noise Levels for Future Football Events (L_{eq}, dBA)

Number of Spectators	Backyards of Residences to West	Residences to South	Residences to North	Residences to Northeast
1,500 (Typical)	69	67	61	58
2,200 (Homecoming)	70	68	62	59

Future football games may be played during evening hours and would conclude by 10:00 p.m. at the latest. Ambient hourly average noise levels between 7:00 p.m. and 10:00 p.m. currently range from 44 to 51 dBA L_{eq} at backyards of residences to the west, 56 to 65 dBA L_{eq} at residences to the south along Almond Avenue, 48 to 57 dBA L_{eq} at residences to the north, and 44 to 52 dBA at residences to the northeast. As shown in Table 12, homecoming football games would be anticipated to generate worst-hour noise levels of about 70 dBA L_{eq} at the nearest residences to the west, 68 dBA L_{eq} at the nearest residences to the south, 62 dBA L_{eq} at the nearest residences to the north, and 59 dBA L_{eq} at the nearest residences to the northeast. The closest residences to the west could be exposed to noise levels during typical football games that would exceed ambient noise levels during the later evening hours by as much as 26 dBA L_{eq}. Residences to the south would experience noise levels up to 12 dBA L_{eq} higher than ambient levels in the evening. Residences to the north would experience noise levels up to 14 dBA L_{eq} above ambient levels in the evening. Residences to the northeast would experience noise levels up to 15 dBA L_{eq} above evening ambient levels. During typical attendance games, worst-hour noise levels at the closest residences to the west would exceed the ambient by up to 25 dBA L_{eq}, by up to 11 dBA L_{eq} at the closest residences to the south, by up to 13 dBA at the closest residences to the north, and by up to 14 dBA at the closest residences to the northeast.

Table 13 shows the calculated DNL noise levels during typical and homecoming attendance football games at surrounding residences. DNL levels in Table 13 were calculated based on the worst hour noise levels in Table 12. Long-term measurements at location LT-2 indicated that junior varsity football games resulted in noise levels 2 dB lower than the varsity football games that followed them. The levels in Table 13 assume three sustained hours of junior varsity play at levels 2 dB below those in Table 12, followed by three hours of sustained varsity play at levels equal to those in Table 12.

TABLE 13 DNL Resulting from Football Events between 4:00 p.m. and 10:00 p.m. (dBA)

Number of Spectators	Backyards of Residences to West	Residences to South	Residences to North	Residences to Northeast
1,500 (Typical)	62	60	54	51
2,200 (Homecoming)	63	61	55	52

As shown in Table 13, noise levels resulting from football games occurring continuously between the hours of 4:00 p.m. and 10:00 p.m. would exceed 55 dBA DNL at the closest residences to the west and south of the field of the field.

Los Altos High School currently plays all of its football games, outside of one or two per year currently hosted at Foothill College, at the school and during daytime hours. After installation of permanent field lighting, football games would shift from daytime to evening hours. No games are to continue past 10:00 p.m. The increase in noise levels as a result of installation of field lighting will primarily result from the increase in attendance. Due to the shift of football games to evening hours, attendance at average attendance games is expected to increase from 1,000 to 1,500, and at homecoming games from 1,500 to 2,200. This would result in increases of 2 dBA during both typical and homecoming games. These increases are reflected in the calculated noise levels shown in Table 13. The additional one or two games that were previously played at Foothill College which would be relocated to Mountain View High School will not have a substantial impact on the overall noise level throughout the season. As football games are already being played at the site and attendance increases will not result in substantial noise increases (3 dBA or greater) at nearby sensitive receptors, evening football games would not result in a significant noise impact.

Other Sports Games, Practices, and Events

Noise levels generated by field hockey, track meets, soccer, and lacrosse games are generally limited to whistles and some cheering. These noise levels would not be as prominent as the noise levels generated by football games. Based on noise monitoring of soccer games at other high schools,[5,6] whistles and cheering would be anticipated to generate maximum noise levels of about 58 to 63 dBA L_{max} at residences adjoining the field. Hourly average noise levels during field hockey, soccer, and lacrosse events would be anticipated to be about 53 dBA L_{eq} at the closest residences to the west, located about 225 feet from the center of the field. Evening field hockey, track meets, soccer, and lacrosse events would not substantially increase noise levels at nearby sensitive receptors (increase would be less than 1 dBA DNL).

The proposed field lighting would allow marching band practices to occur during evening hours. As outlined in Table 8, marching band practices would occur on two weeknights per week between August and November. One practice would conclude by 8:00 p.m. and the other practice would

[5] Silver Creek High School Sports Lighting Project Environmental Noise Assessment, Prepared by Illingworth & Rodkin, Inc., September 9, 2013.

[6] Santa Teresa High School Sports Lighting Project Environmental Noise Assessment, Prepared by Illingworth & Rodkin, Inc., September 12, 2013.

conclude by 6:30 p.m. In 2012, Illingworth & Rodkin, Inc. measured marching band practice noise levels at Santa Teresa High School in San José, California[6]. At a distance of approximately 570 feet, the hourly average noise level measured was 61 dBA L_{eq}, and the average maximum noise level measured throughout the practice was 74 dBA L_{max}. This corresponds to an hourly average noise level of 69 dBA L_{eq} and maximum noise level of 82 dBA L_{max} at the nearest residence to the west. The resulting DNL from one hour and fifteen minutes of marching band practice would be 56 dBA DNL. This would not substantially increase day-night average noise levels at nearby sensitive receptors.

Field lights would be used for commencement and up to three special evening events per year, concluding by 9:00 p.m. Attendance for these events would vary by event, with the largest attendance anticipated for commencement. Noise levels resulting from events would depend on the nature of the event and their attendance. With attendance levels similar to a typical football game, but a duration shorter than that of the combined varsity and junior varsity games used for calculations in Table 13, commencement would result in noise levels approximately 2 dBA below those of a typical football game. Following the attendance increases proposed for a typical football game, increased commencement attendance would result in a noise level increase of 2 dBA DNL. With increased attendance, other special events would be similar in noise level to non-football sporting events such as soccer and field hockey and would not substantially increase noise levels at nearby sensitive receptors (increase would be less than 1 dBA DNL).

In addition to field lighting, the project also includes an audio upgrade for the field. The PA system would include a distributed speaker system, with multiple speakers that would be angled down towards the field. The PA system proposed by the project is the standard type used at high school sports fields that are similar in size to the proposed project and would be used during games and other events, such as commencement. Normally, a distributed sound system is equivalent or superior to a single- or dual-speaker system when considering potential community noise impacts. PA announcements would be similar to levels generated during existing football games with maximum instantaneous noise levels ranging from about 65 to 75 dBA L_{max} at the nearest residences. The PA systems would be used less frequently and not be allowed for running commentary during events such as lacrosse, soccer, field hockey, and track meets. Typically, PA announcements at such events are limited to announcements, warm-ups, and to announce halftime and the end of the game. The intermittent announcements are taken into account in the calculations provided in Tables 12 and 13. The new PA systems would be designed to reduce spillover into the adjacent residential areas, and to conform to exterior noise limits set in the City of Los Altos Municipal Code and General Plan, which prohibit noise levels from operation of stationary noise sources from exceeding 55 dBA at the nearest residential land use. This is a **less-than-significant** impact.

Mitigation Measure 1: None required.

Impact 2: **Generation of Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels would not exceed 0.3 in/sec PPV at the nearest structures. **This is a less-than-significant impact.**

Installation of the proposed lighting and audio system would require minor excavation of the field to construct pole foundations, trenching and boring for electrical conduit installation, installation

via hydraulic crane of the lighting poles, mounting of the luminaires, and restoration of disturbed surfaces including pavement and landscaping that was removed during excavation and trenching. Construction equipment to be used would include an excavator, boring machine, concrete truck and pump, crane, and semi-trucks for materials delivery. The closes structures to the project site are residences located about 25 feet to the west, and residences located about 85 feet to the south. Based on vibration levels presented in the Federal Transit Administration Manual for typical construction equipment[7], equipment associated with project construction would be anticipated to generate vibration levels of 0.003 to 0.08 in/sec PPV at a distance of 25 feet. Vibration levels at a distance of 85 feet were calculated to be 0.001 to 0.03 in/sec PPV. Construction vibration could, at times, be perceptible to occupants, but would not be anticipated to cause cosmetic or structural damage to the nearest buildings and would not be considered excessive. As construction moves away from the western and southern property lines, vibration levels would be even lower. This is a **less-than-significant** impact.

Mitigation Measure 2: **None required.**

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

LOS ALTOS HIGH SCHOOL FIELD LIGHTING PROJECT NOISE APPENDIX

Los Altos, California

March 9, 2020

Prepared for:

Pooja Nagrath
Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

Prepared by:

Steve J. Deines

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

I&R Job No.: 19-159

FIGURE A1 Noise Levels at Measurement Site LT-1 on Thursday, September 26, 2019

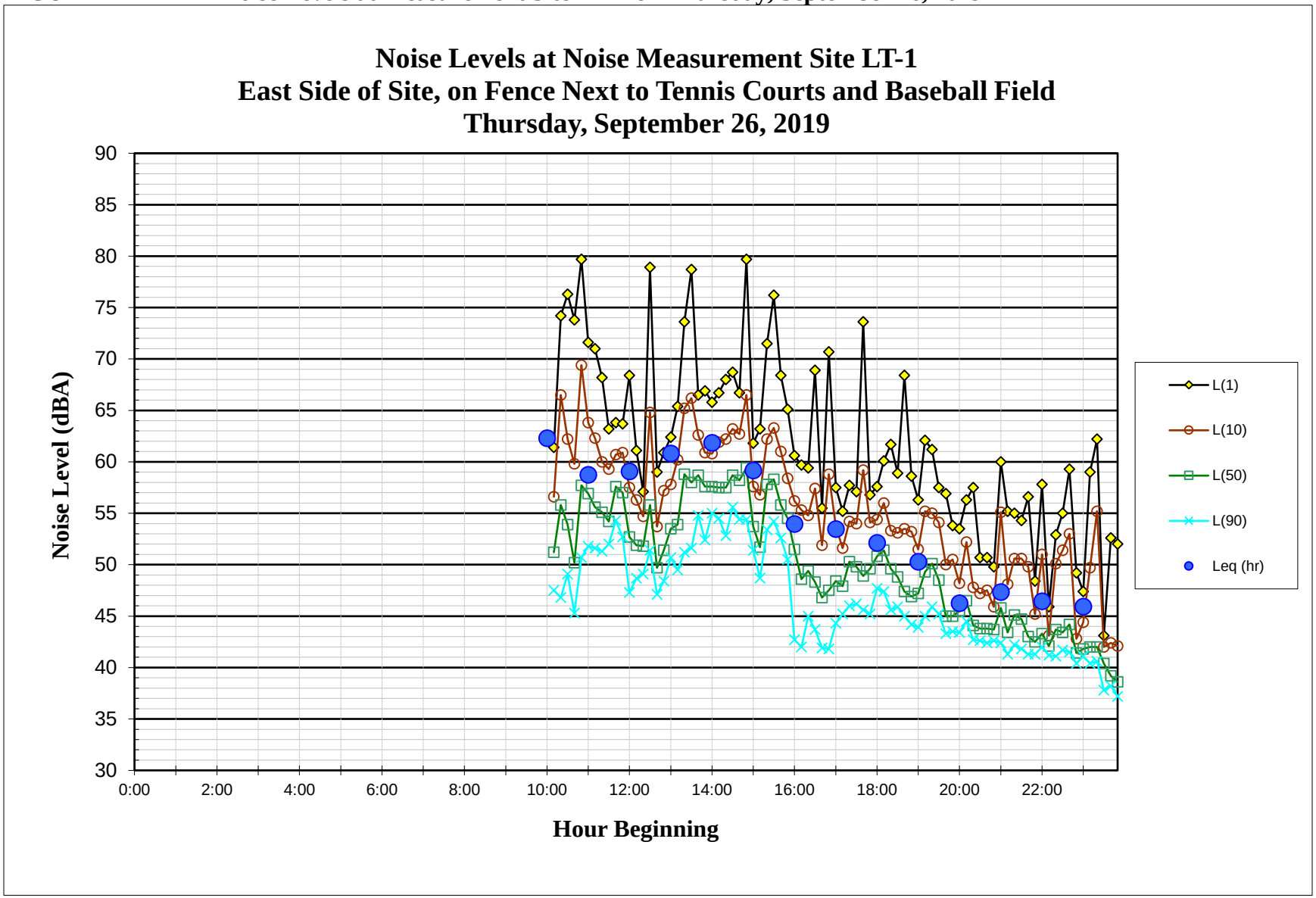

FIGURE A2 Noise Levels at Measurement Site LT-1 on Friday, September 27, 2019

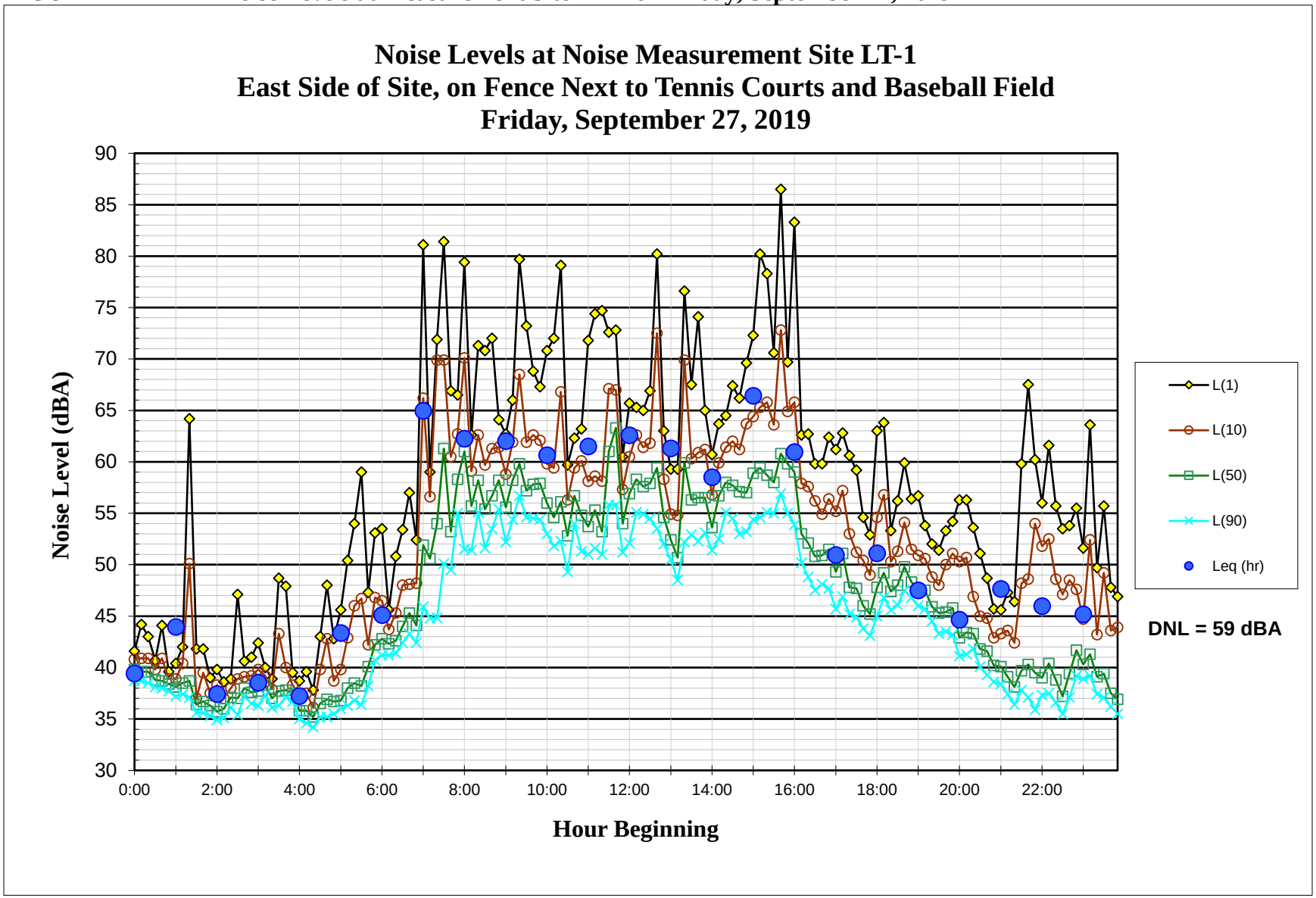

FIGURE A3 Noise Levels at Measurement Site LT-1 on Saturday, September 28, 2019

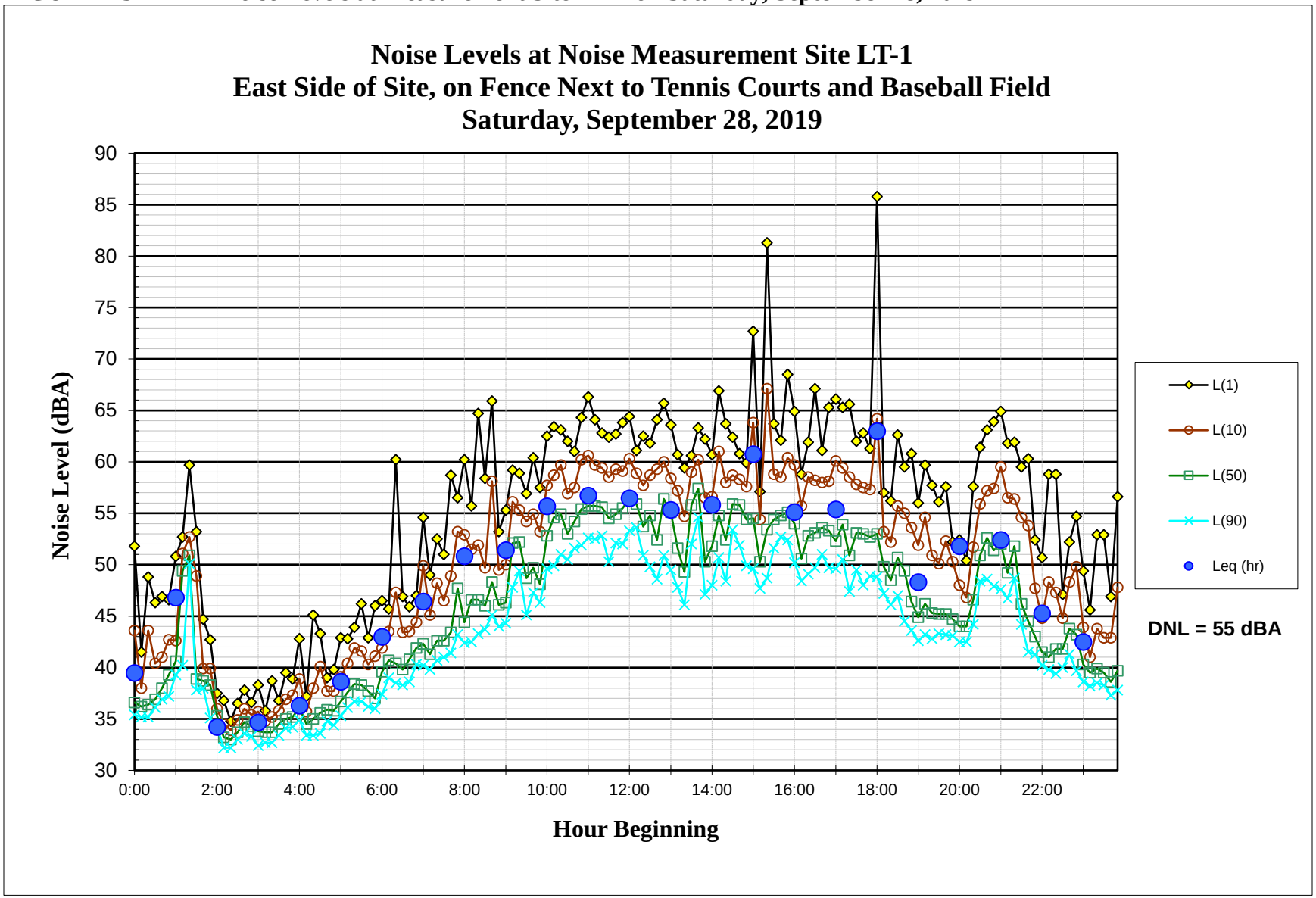

FIGURE A4 Noise Levels at Measurement Site LT-1 on Sunday, September 29, 2019

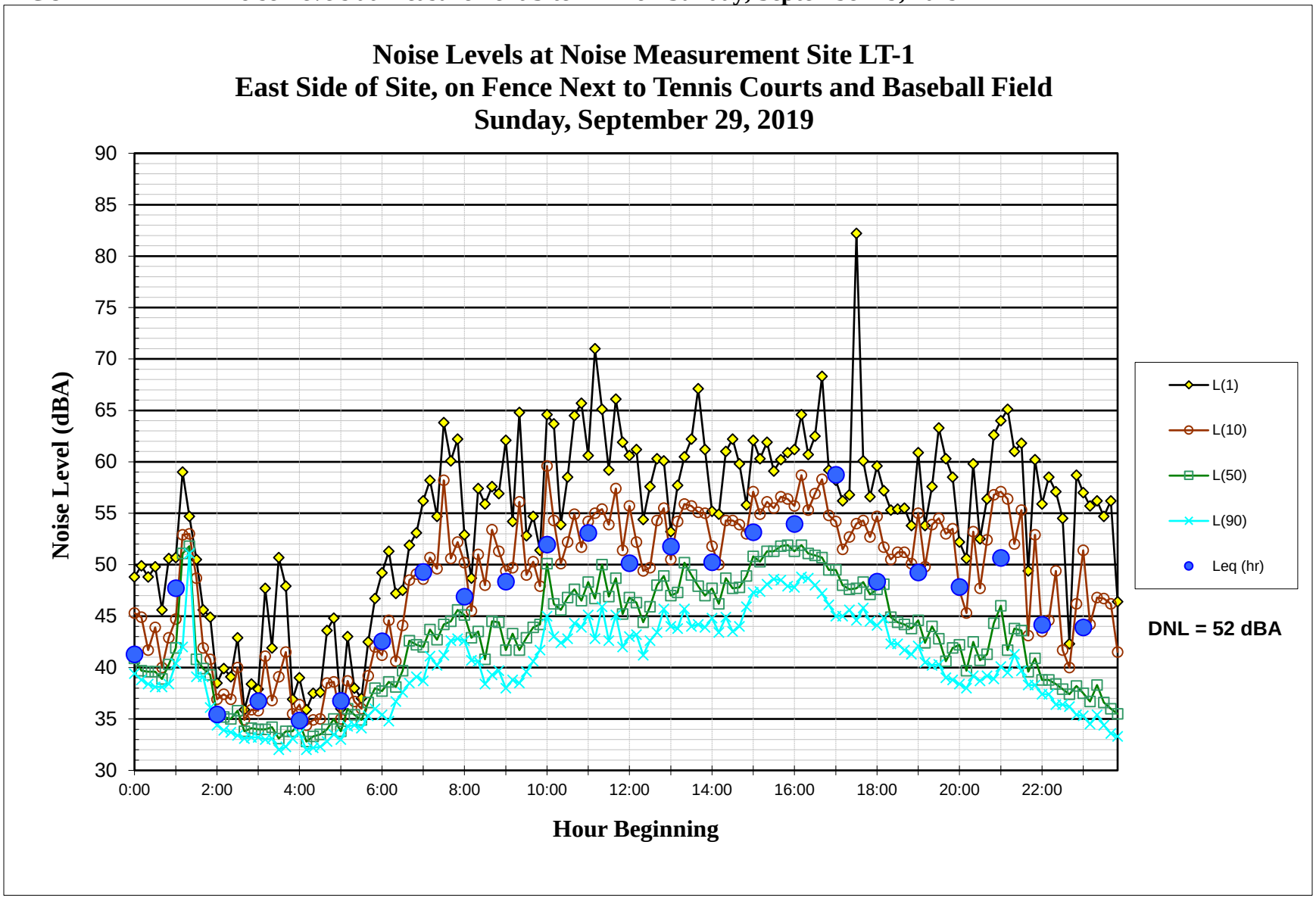

FIGURE A5 Noise Levels at Measurement Site LT-1 on Monday, September 30, 2019

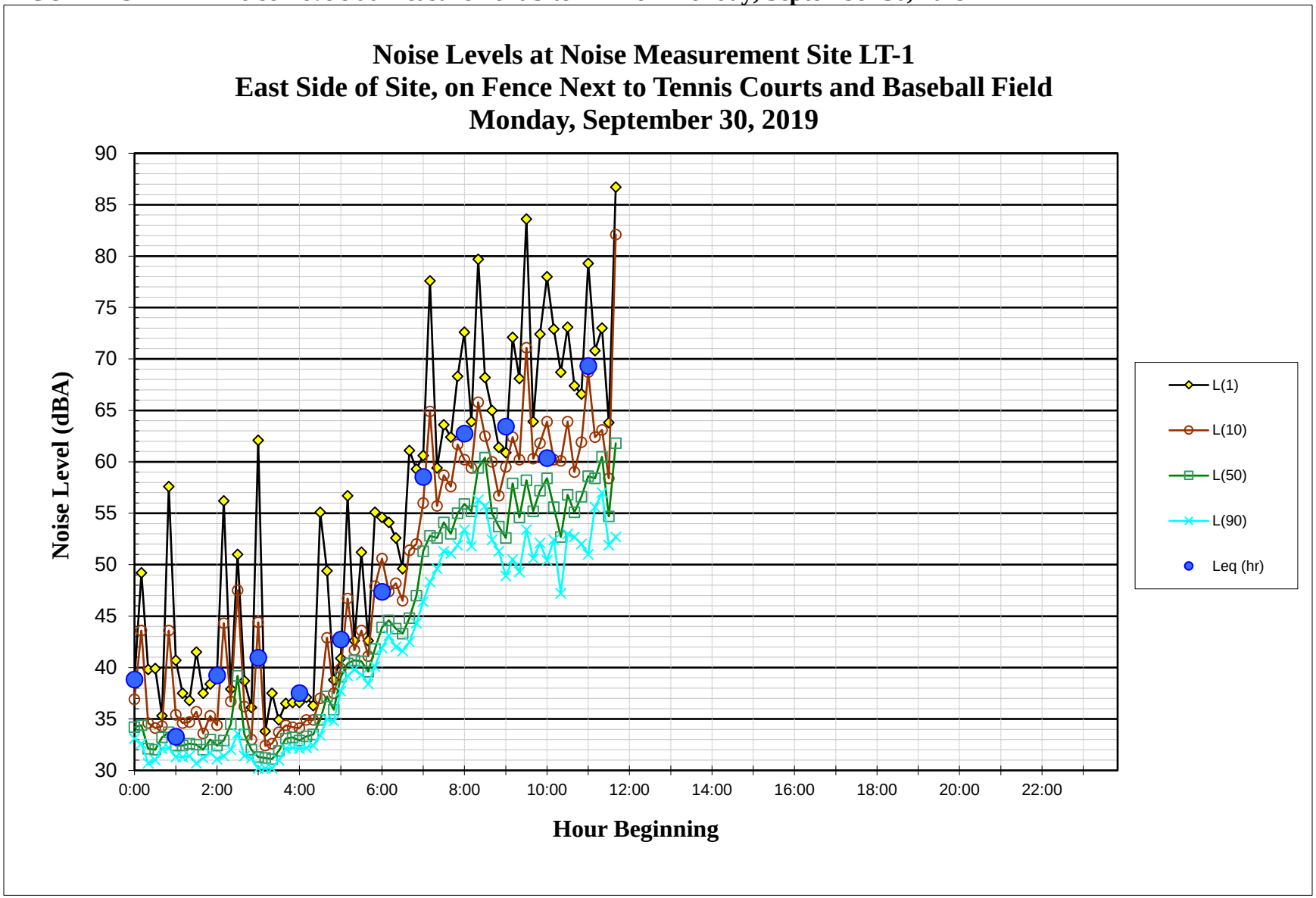

FIGURE A6 Noise Levels at Measurement Site LT-2 on Thursday, September 26, 2019

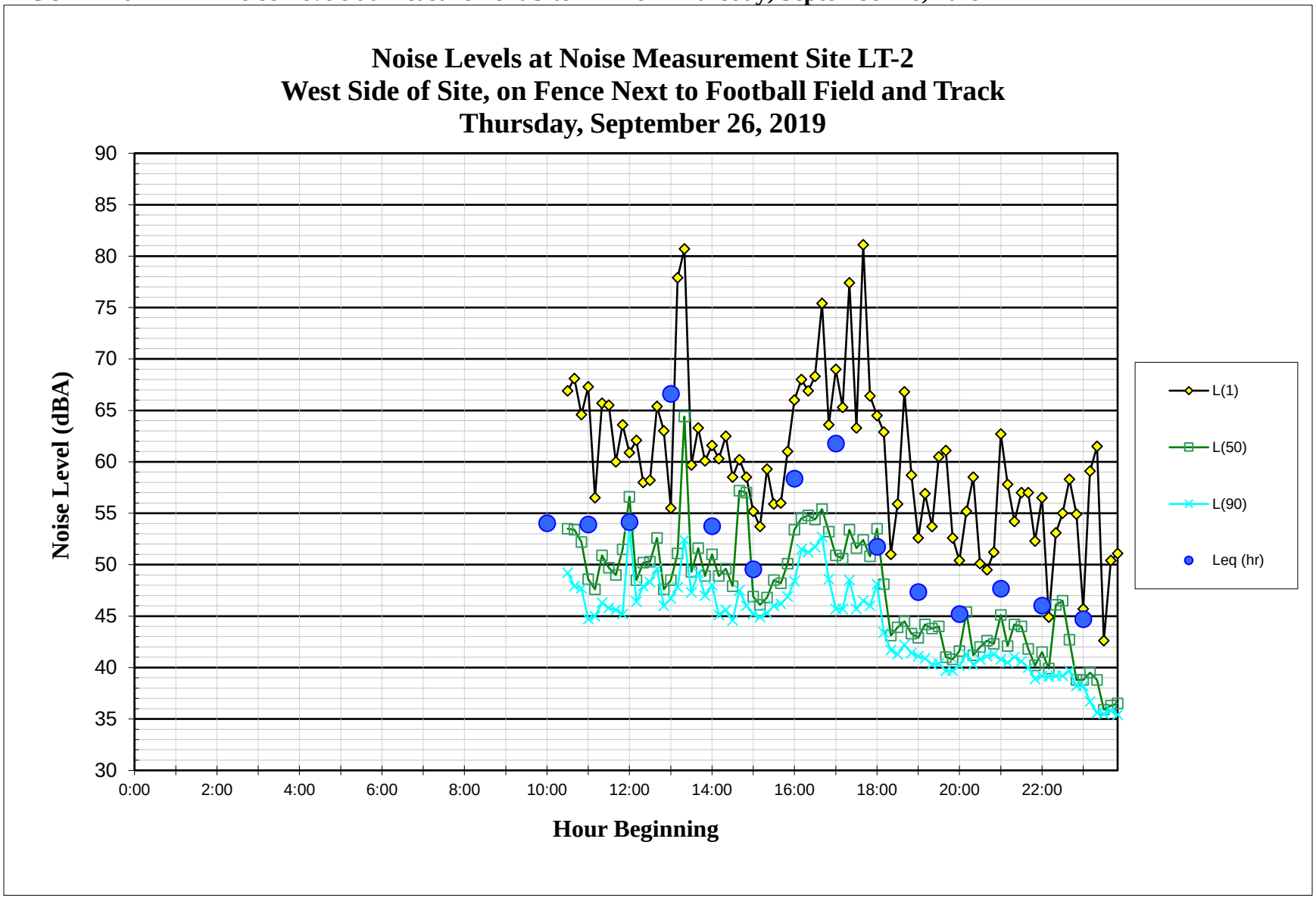

FIGURE A7 Noise Levels at Measurement Site LT-2 on Friday, September 27, 2019

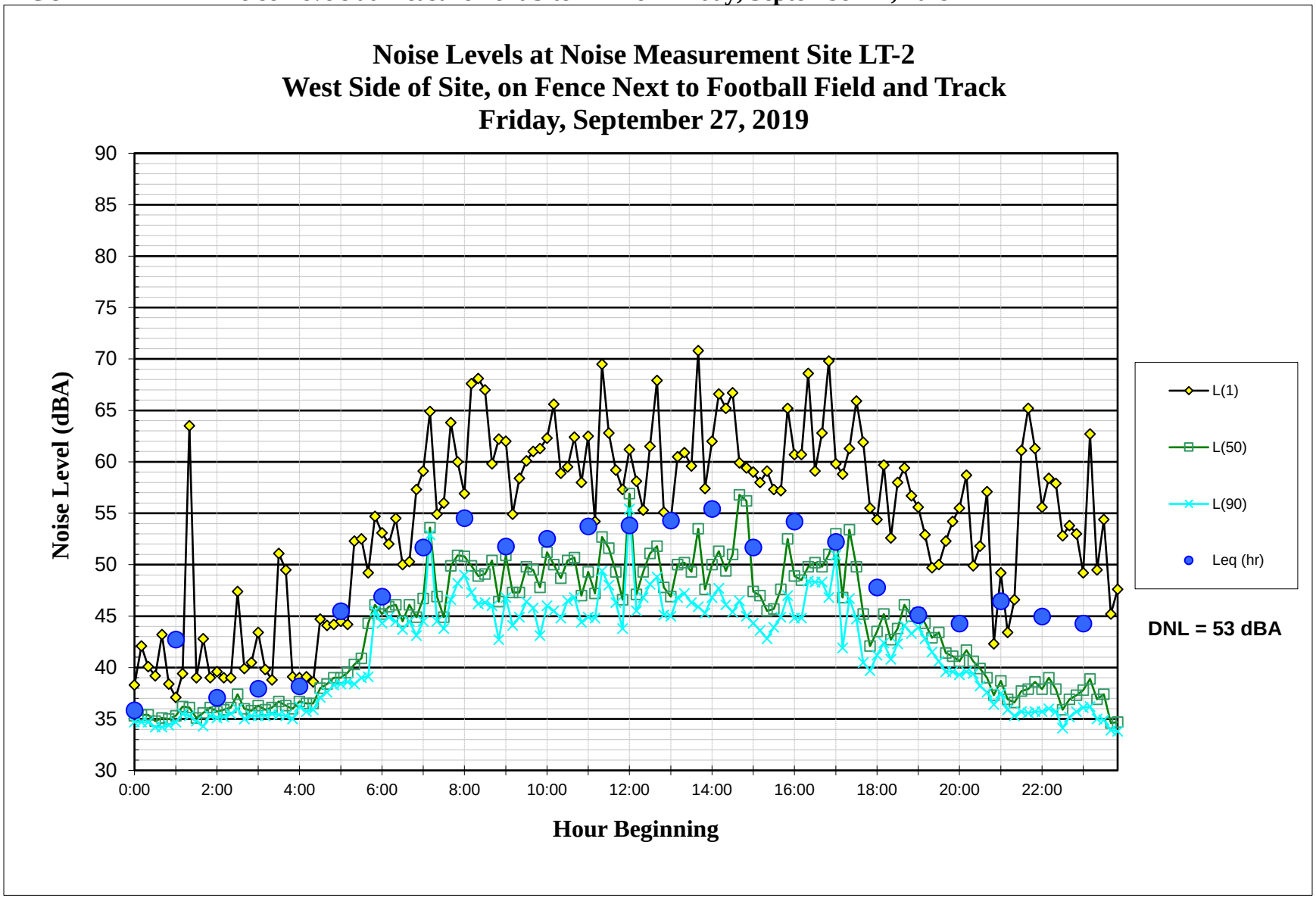

FIGURE A8 Noise Levels at Measurement Site LT-2 on Saturday, September 28, 2019

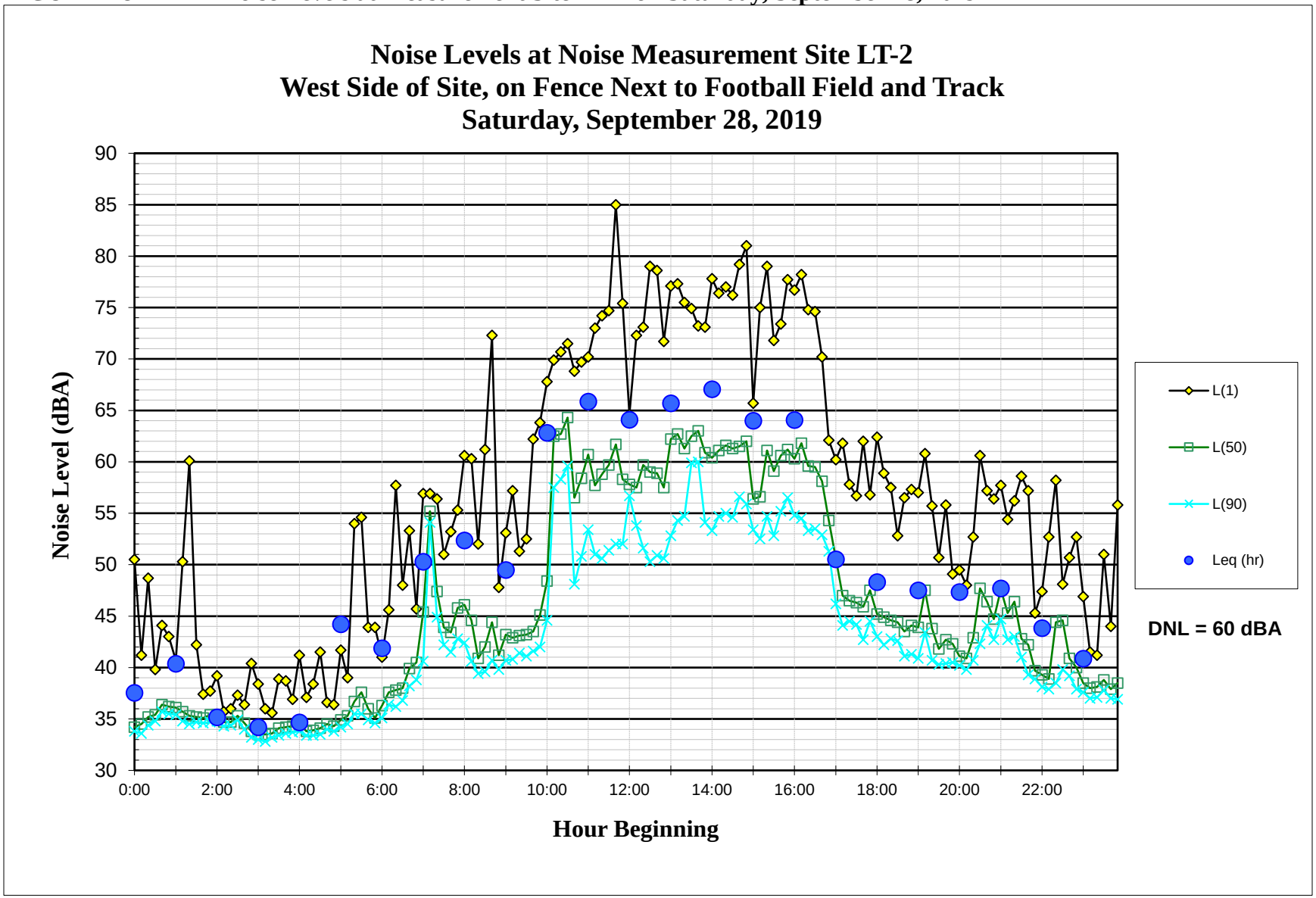

FIGURE A9 Noise Levels at Measurement Site LT-2 on Sunday, September 29, 2019

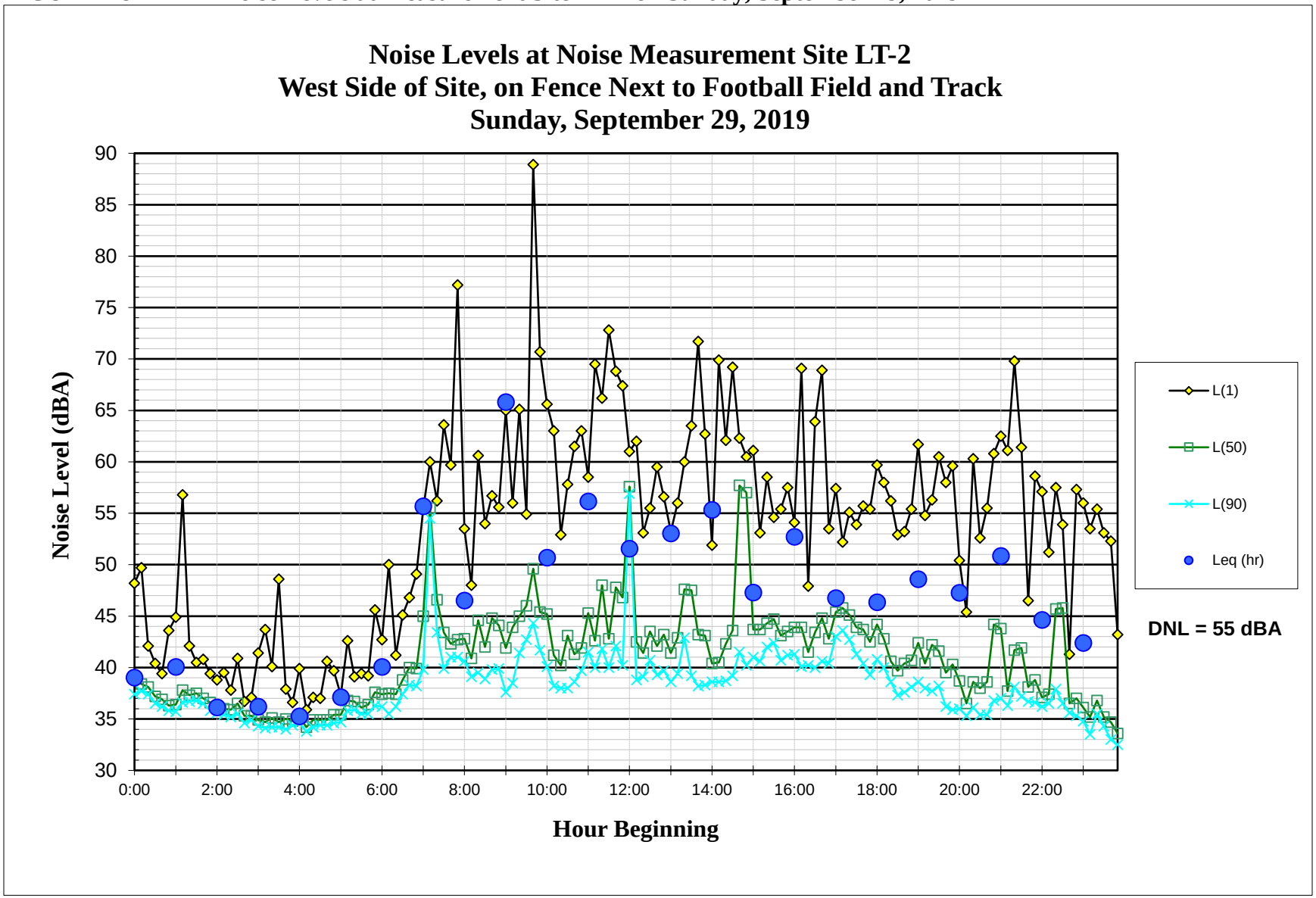

FIGURE A10 Noise Levels at Measurement Site LT-2 on Monday, September 30, 2019

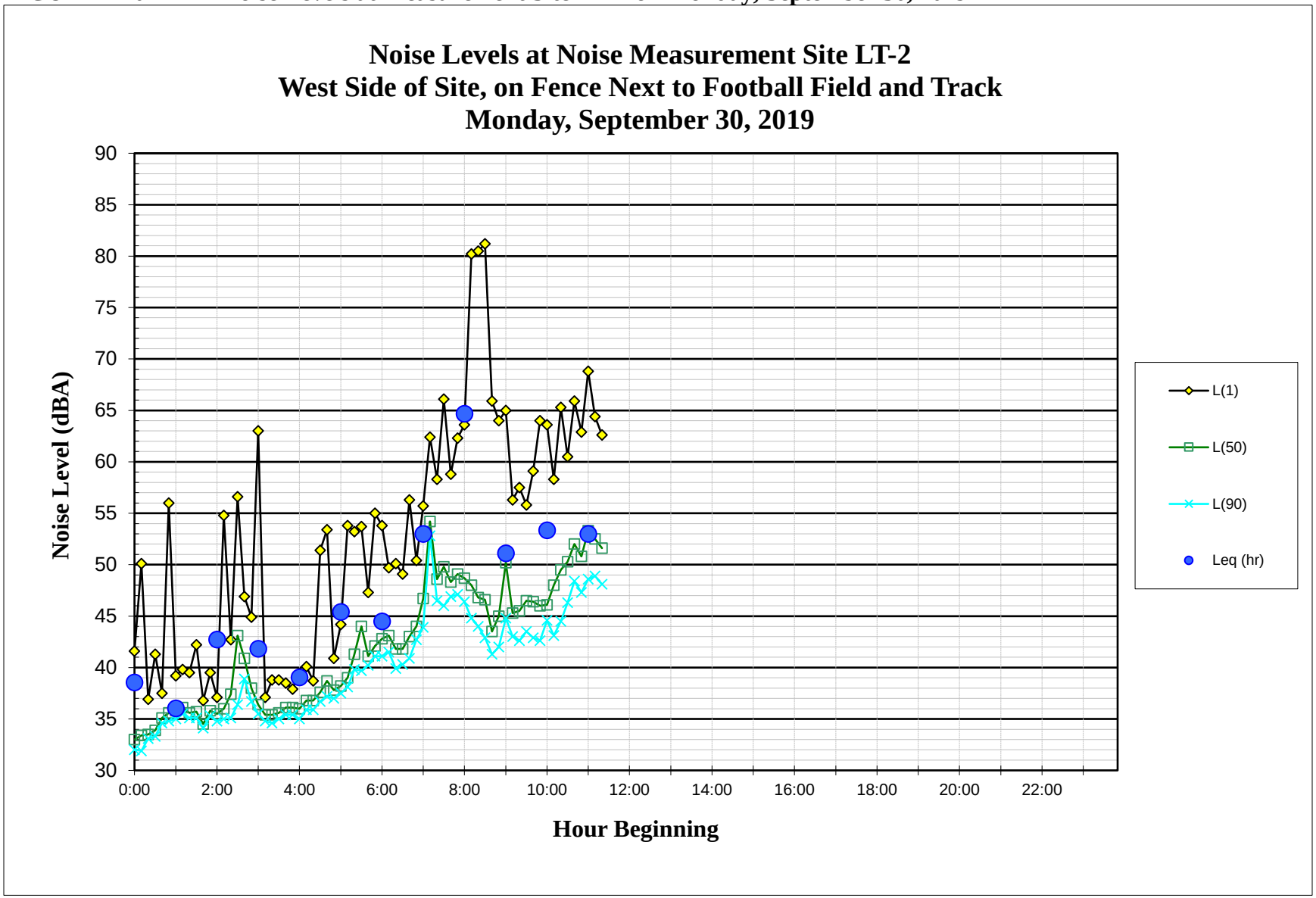

FIGURE A11 Noise Levels at Measurement Site LT-3 on Thursday, September 26, 2019

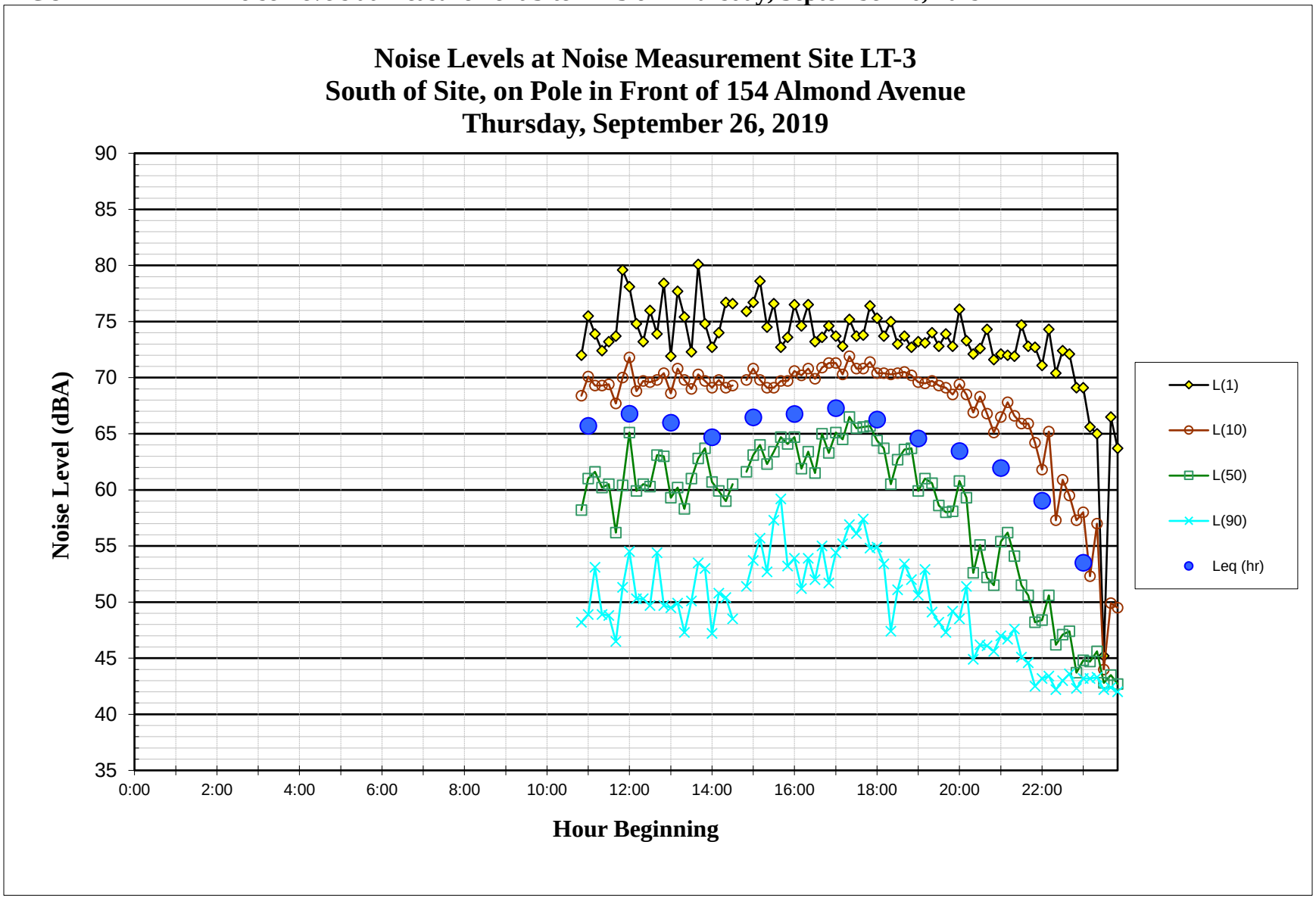

FIGURE A12 Noise Levels at Measurement Site LT-3 on Friday, September 27, 2019

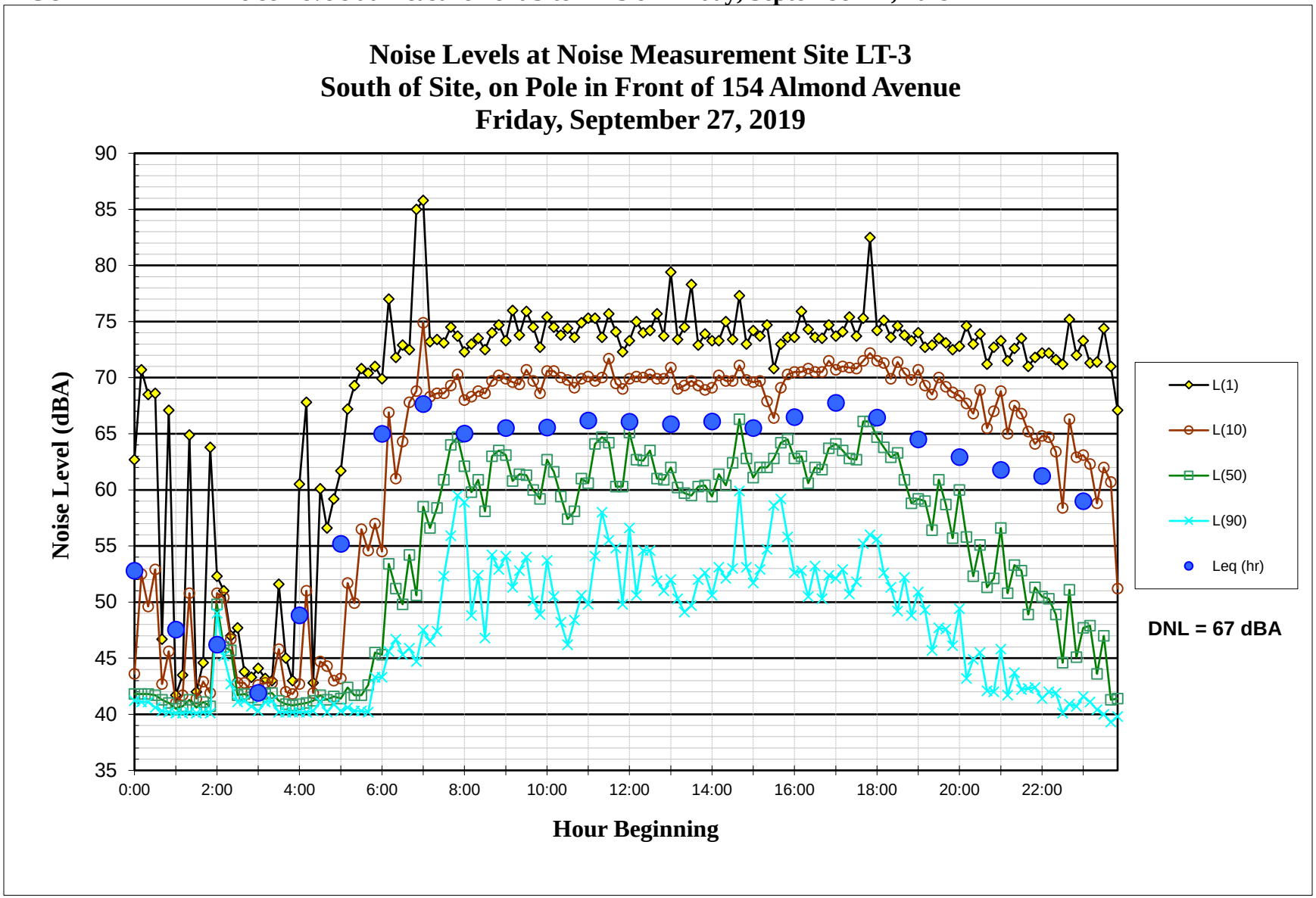

FIGURE A13 Noise Levels at Measurement Site LT-3 on Saturday, September 28, 2019

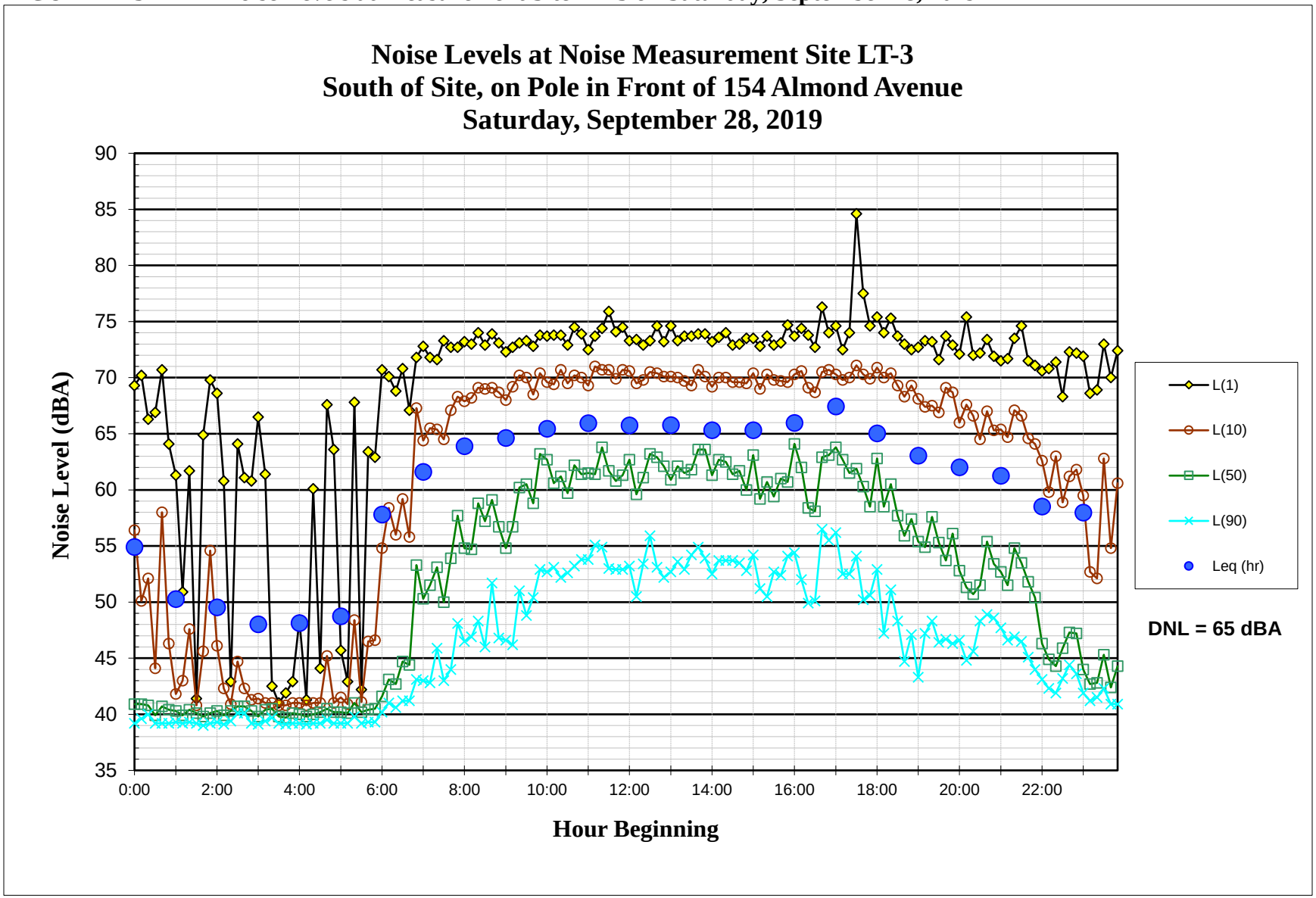

FIGURE A14 Noise Levels at Measurement Site LT-3 on Sunday, September 29, 2019

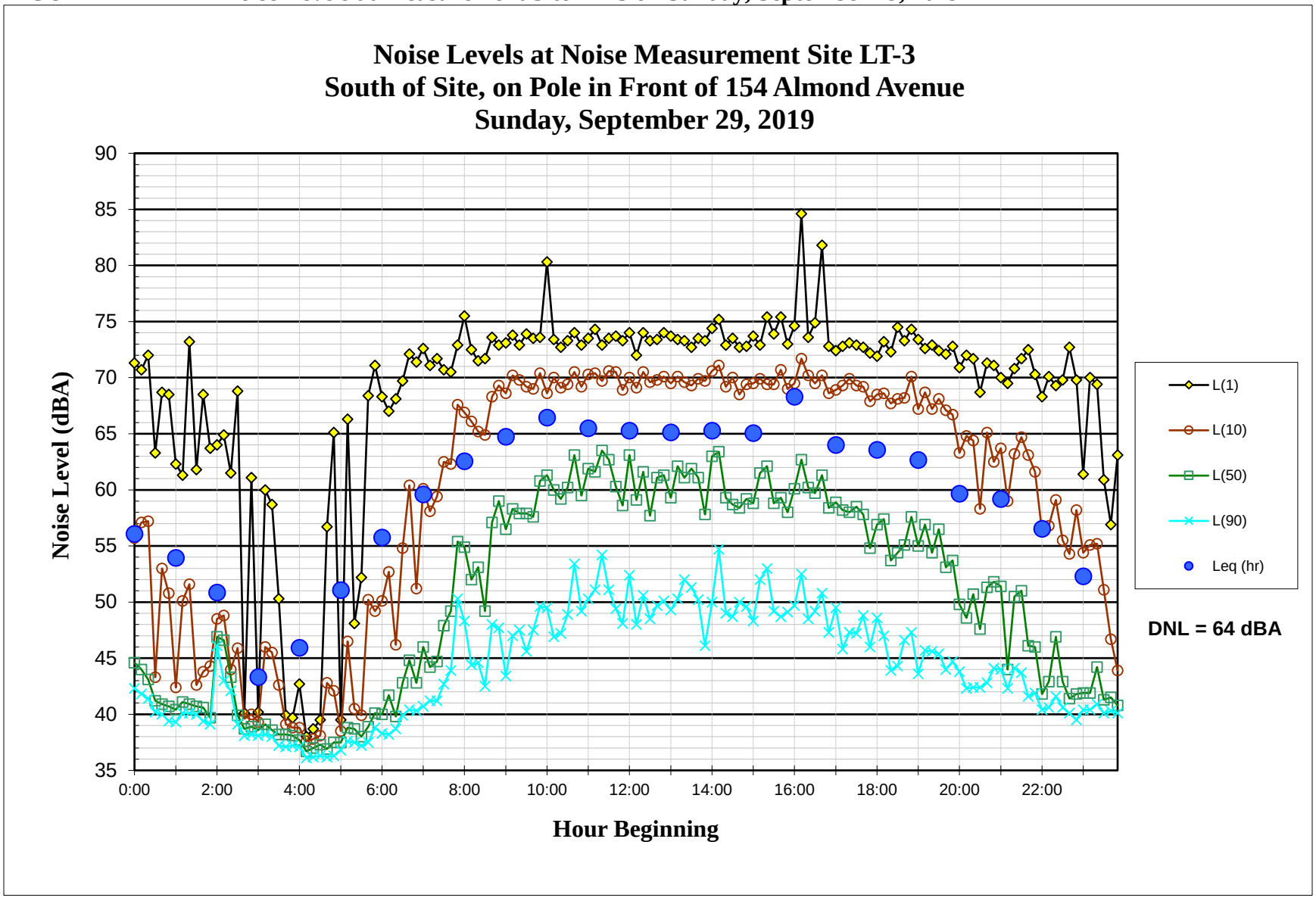

FIGURE A15 Noise Levels at Measurement Site LT-3 on Monday, September 30, 2019

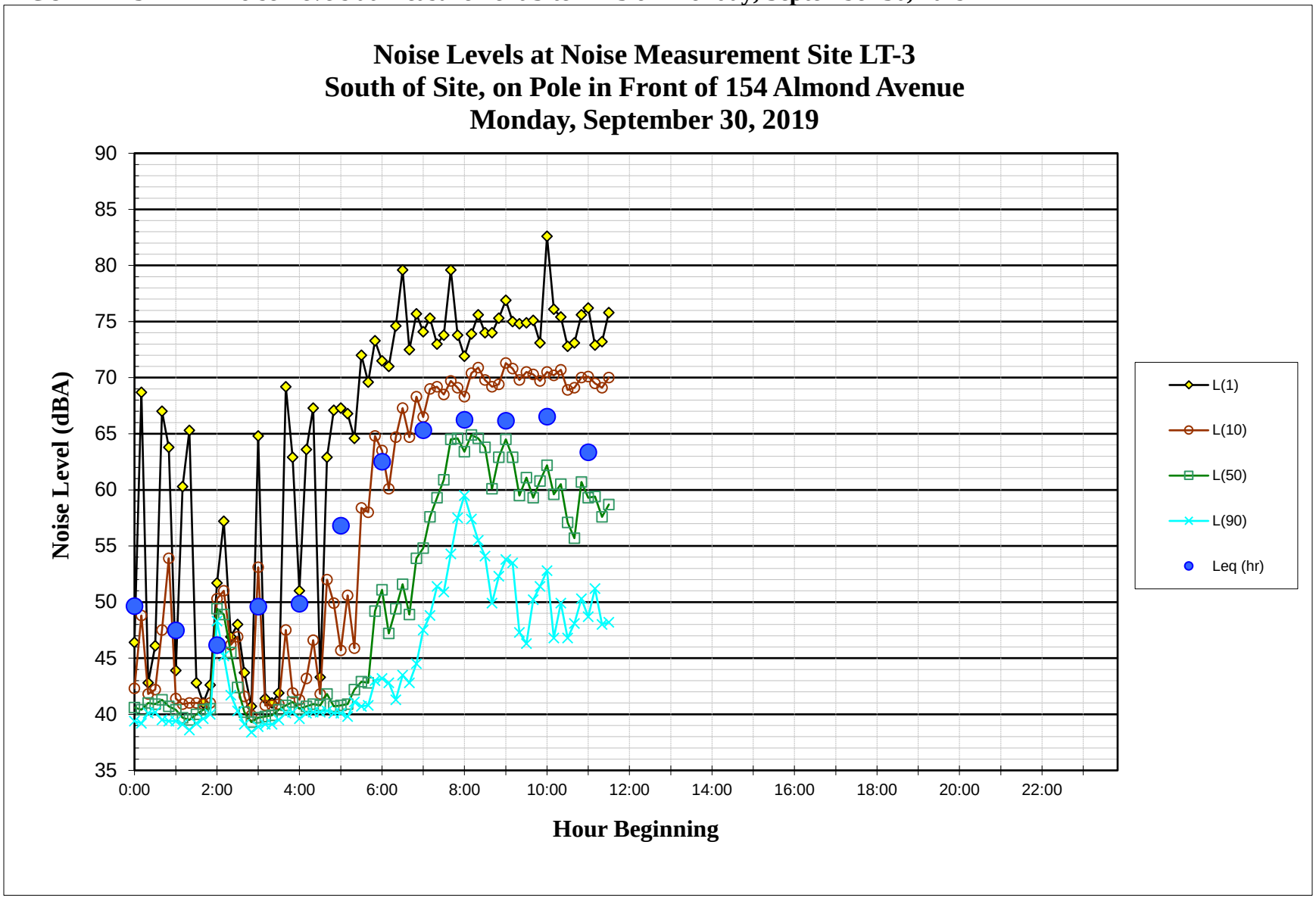

FIGURE A16 Noise Levels at Measurement Site LT-4 on Thursday, September 26, 2019

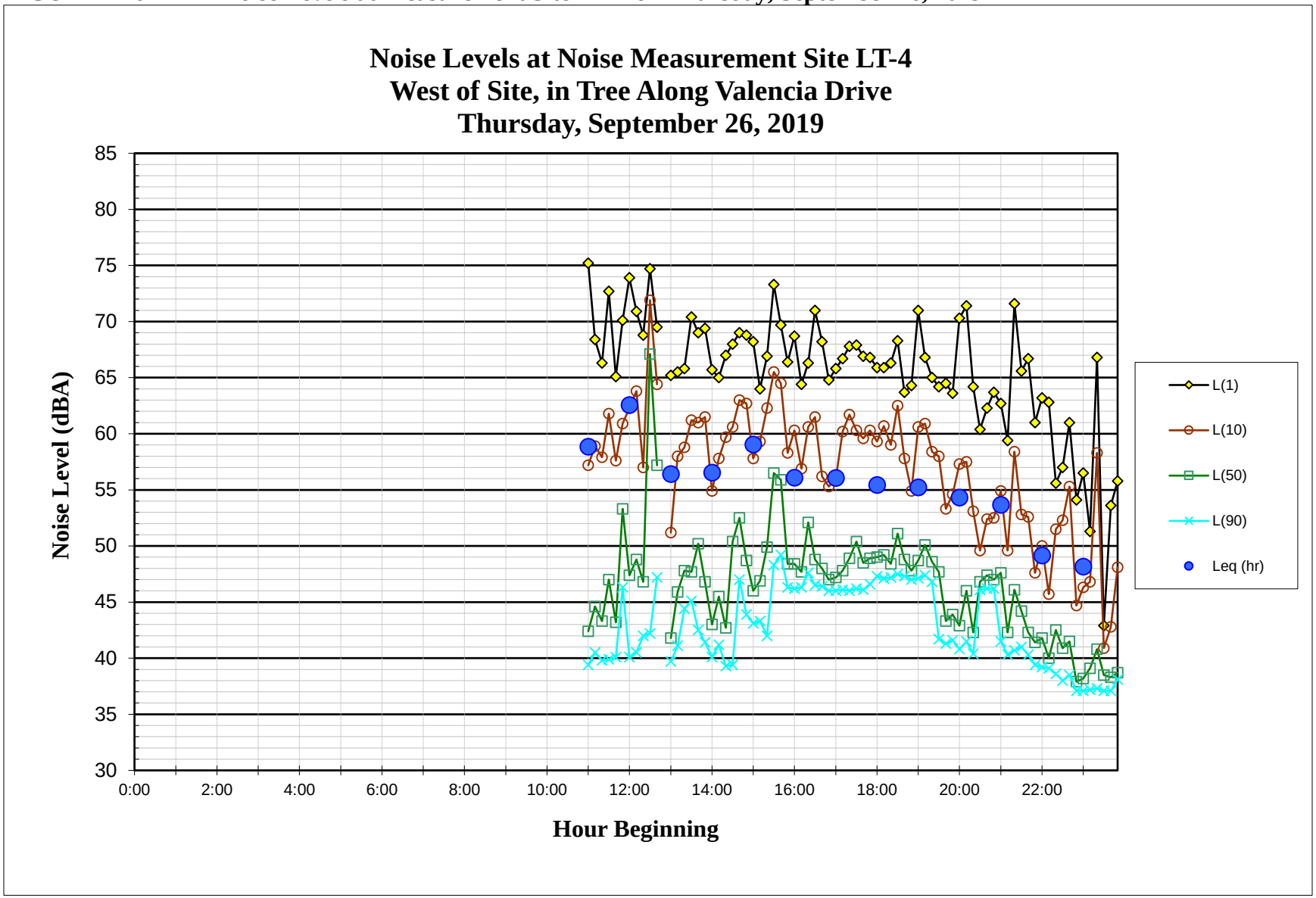

FIGURE A17 Noise Levels at Measurement Site LT-4 on Friday, September 27, 2019

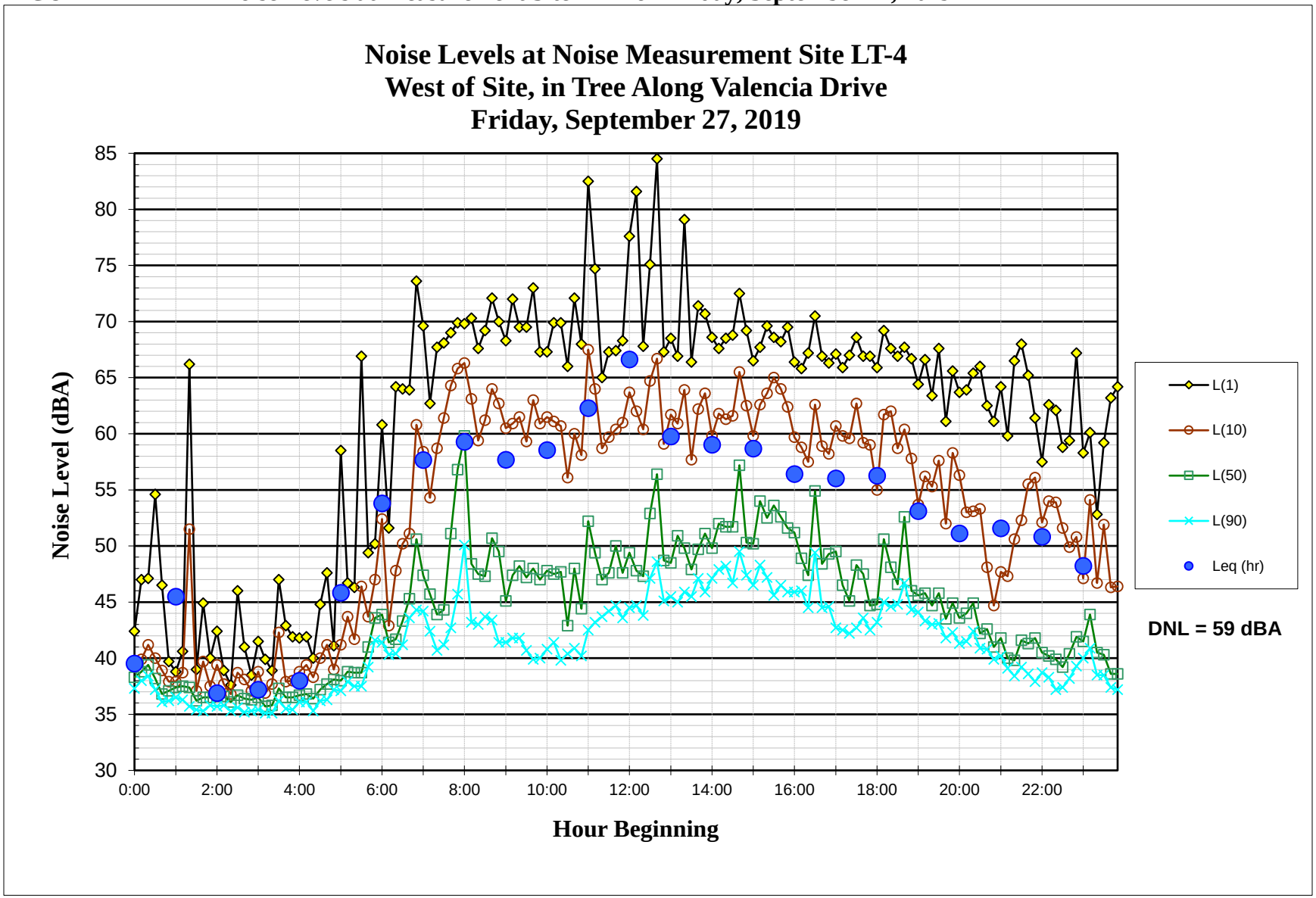

FIGURE A18 Noise Levels at Measurement Site LT-4 on Saturday, September 28, 2019

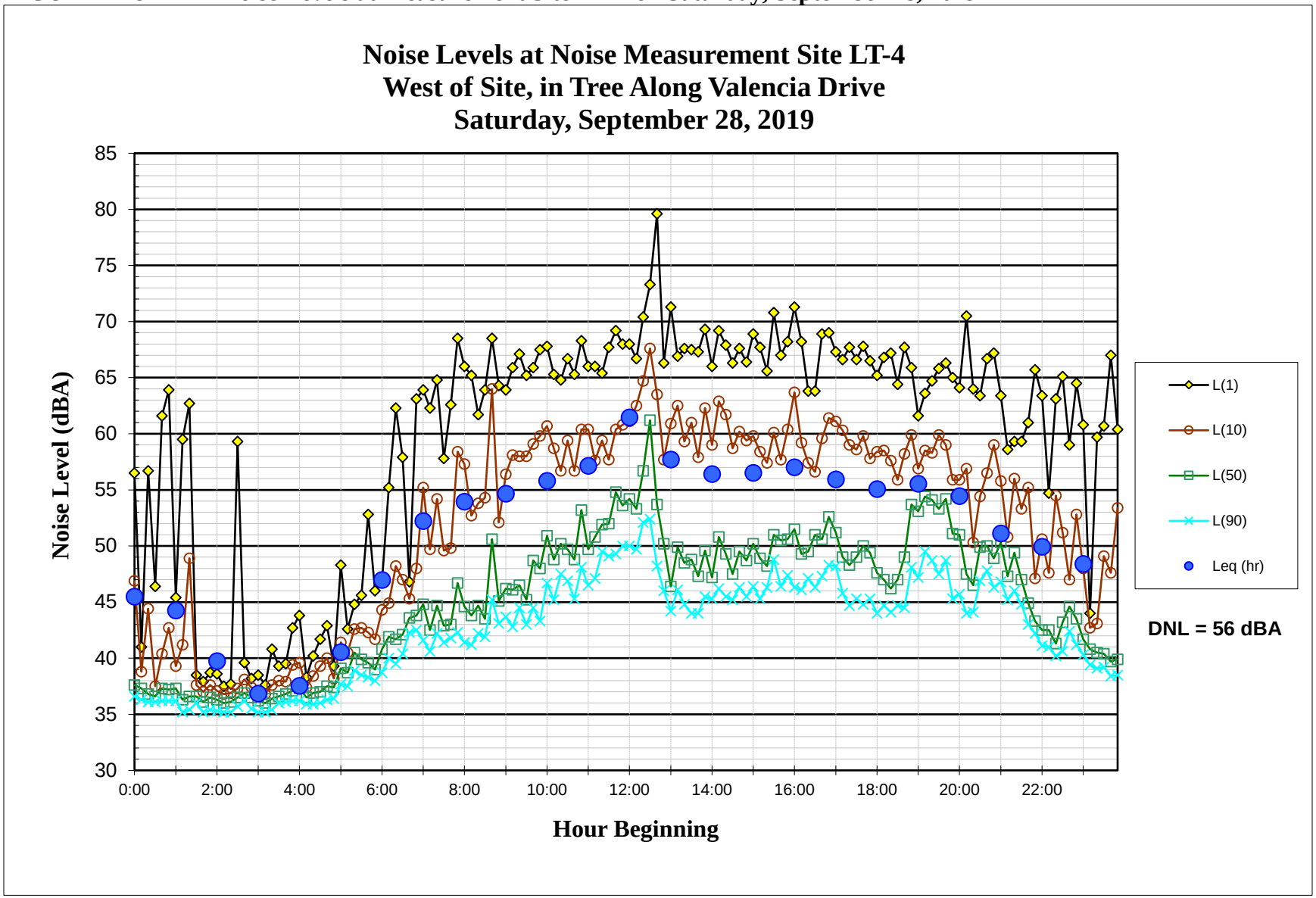

FIGURE A19 Noise Levels at Measurement Site LT-4 on Sunday, September 29, 2019

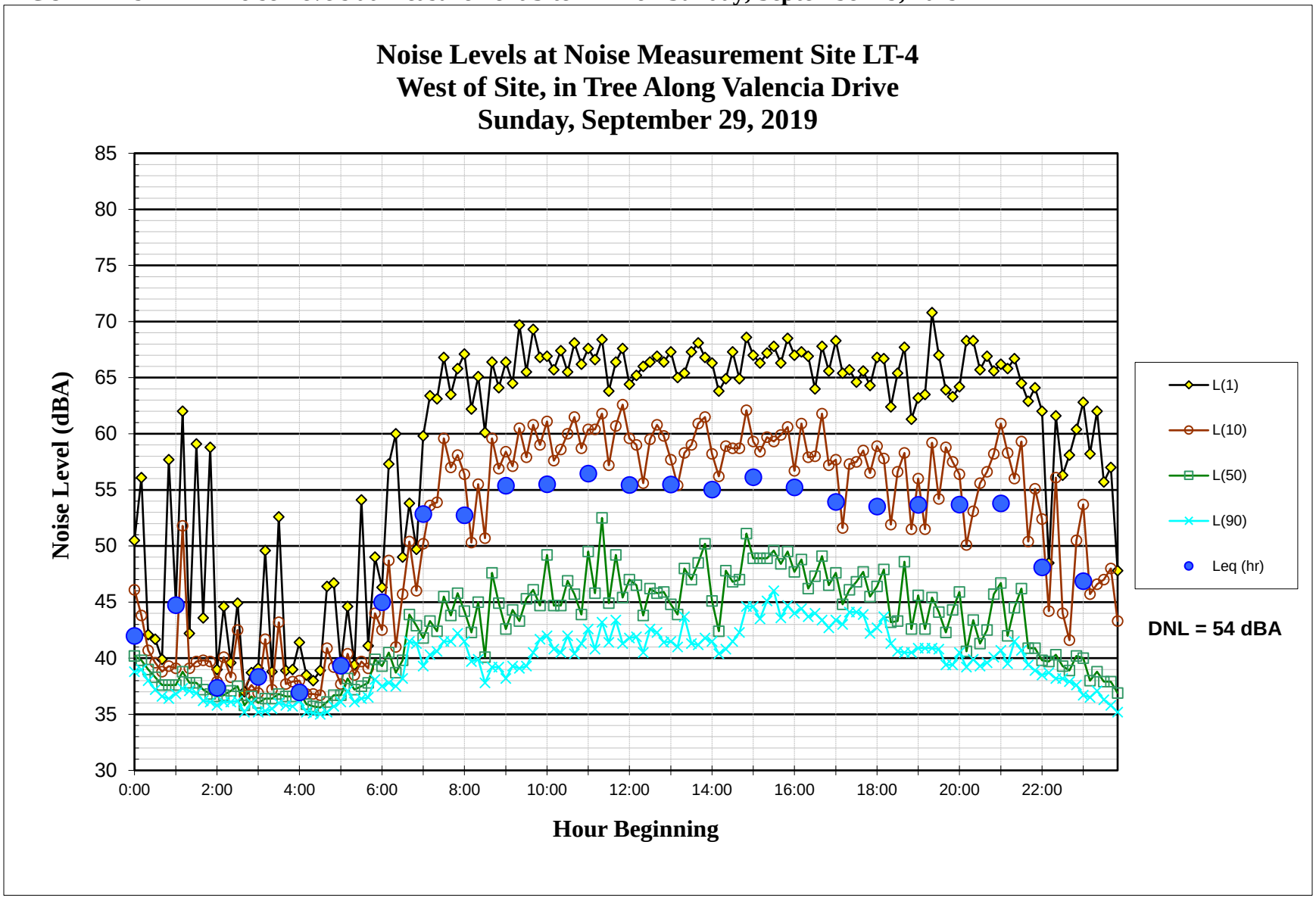

FIGURE A20 Noise Levels at Measurement Site LT-4 on Monday, September 30, 2019

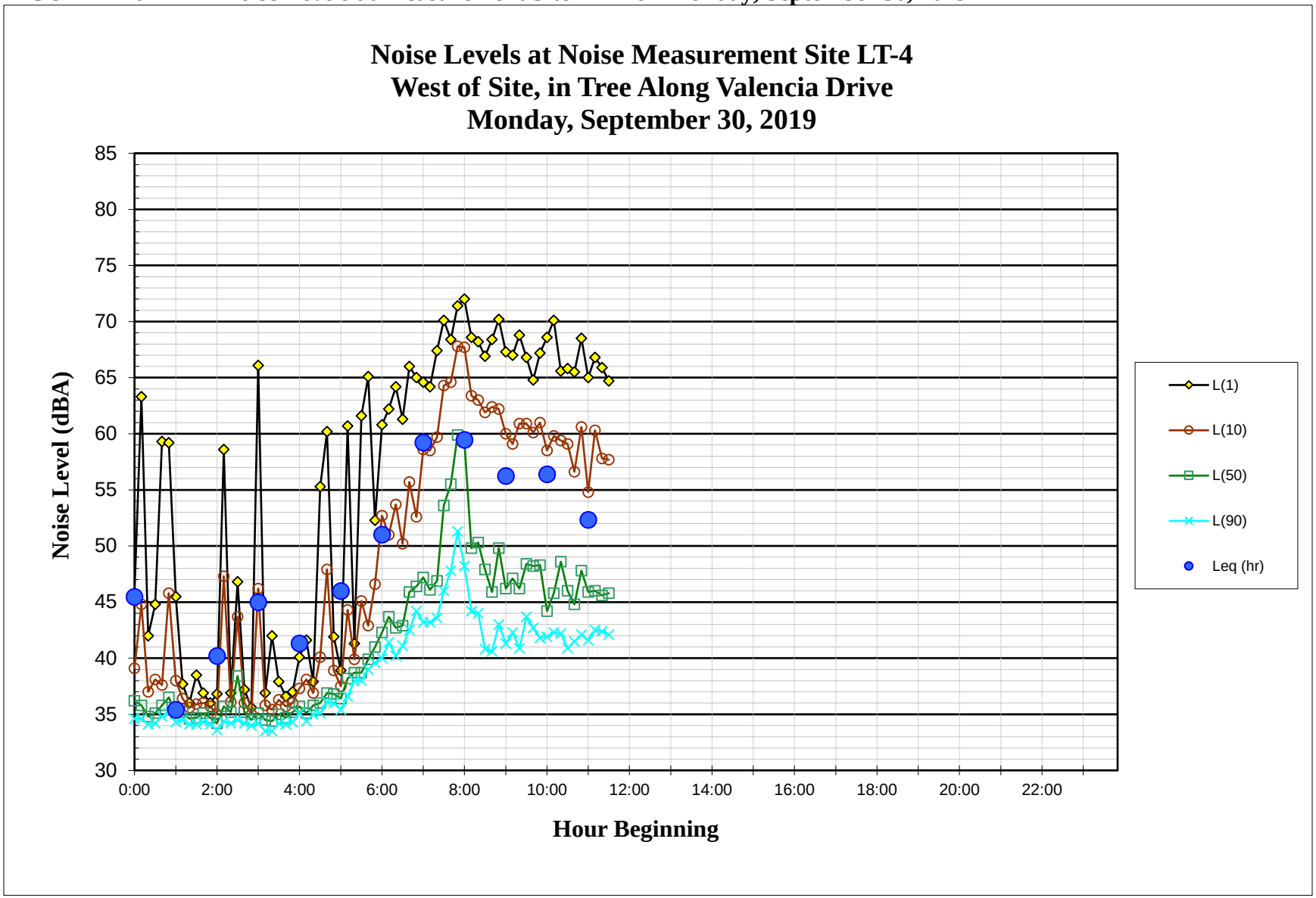

FIGURE A21 Noise Levels at Measurement Site LT-5 on Thursday, September 26, 2019

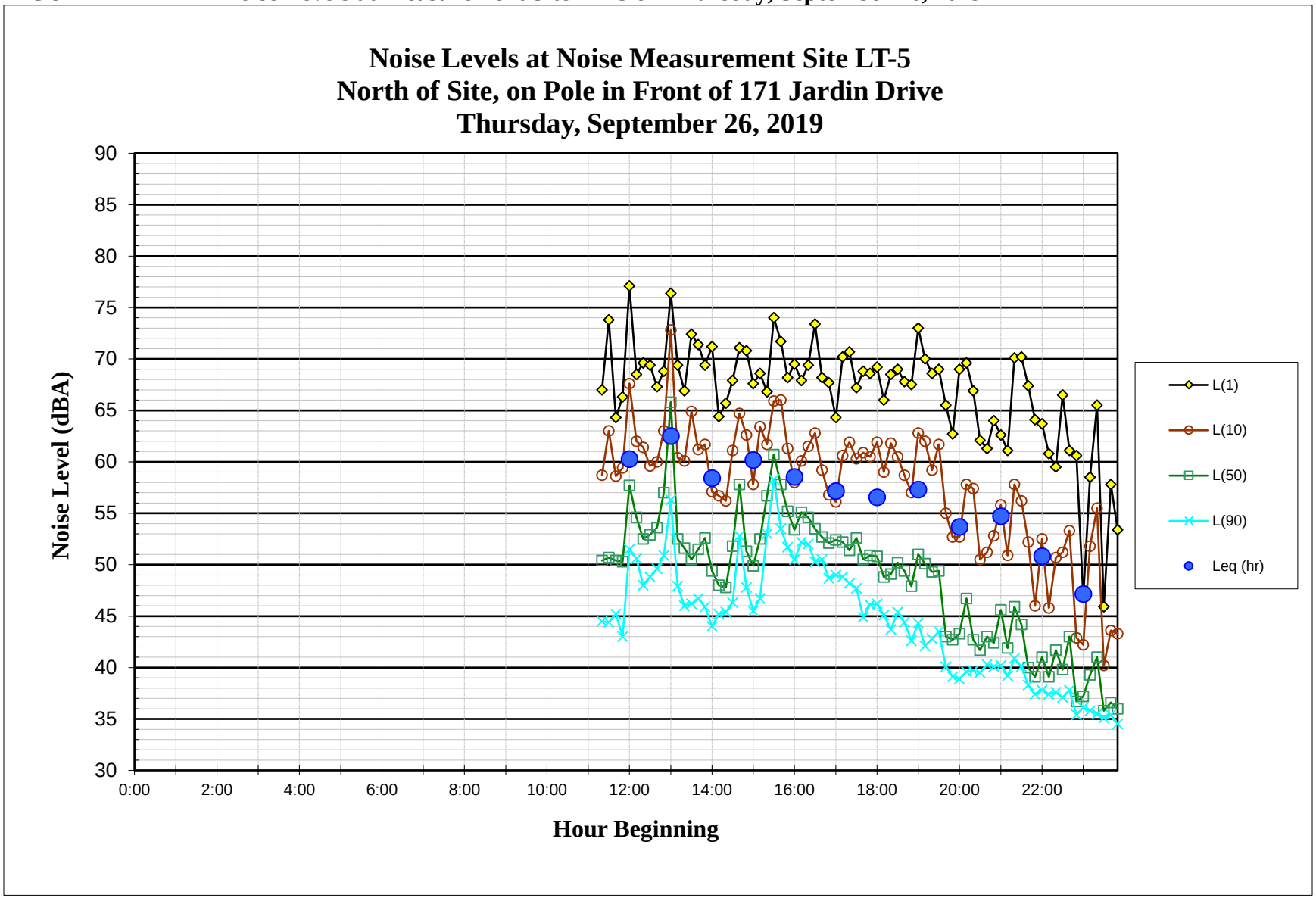

FIGURE A22 Noise Levels at Measurement Site LT-5 on Friday, September 27, 2019

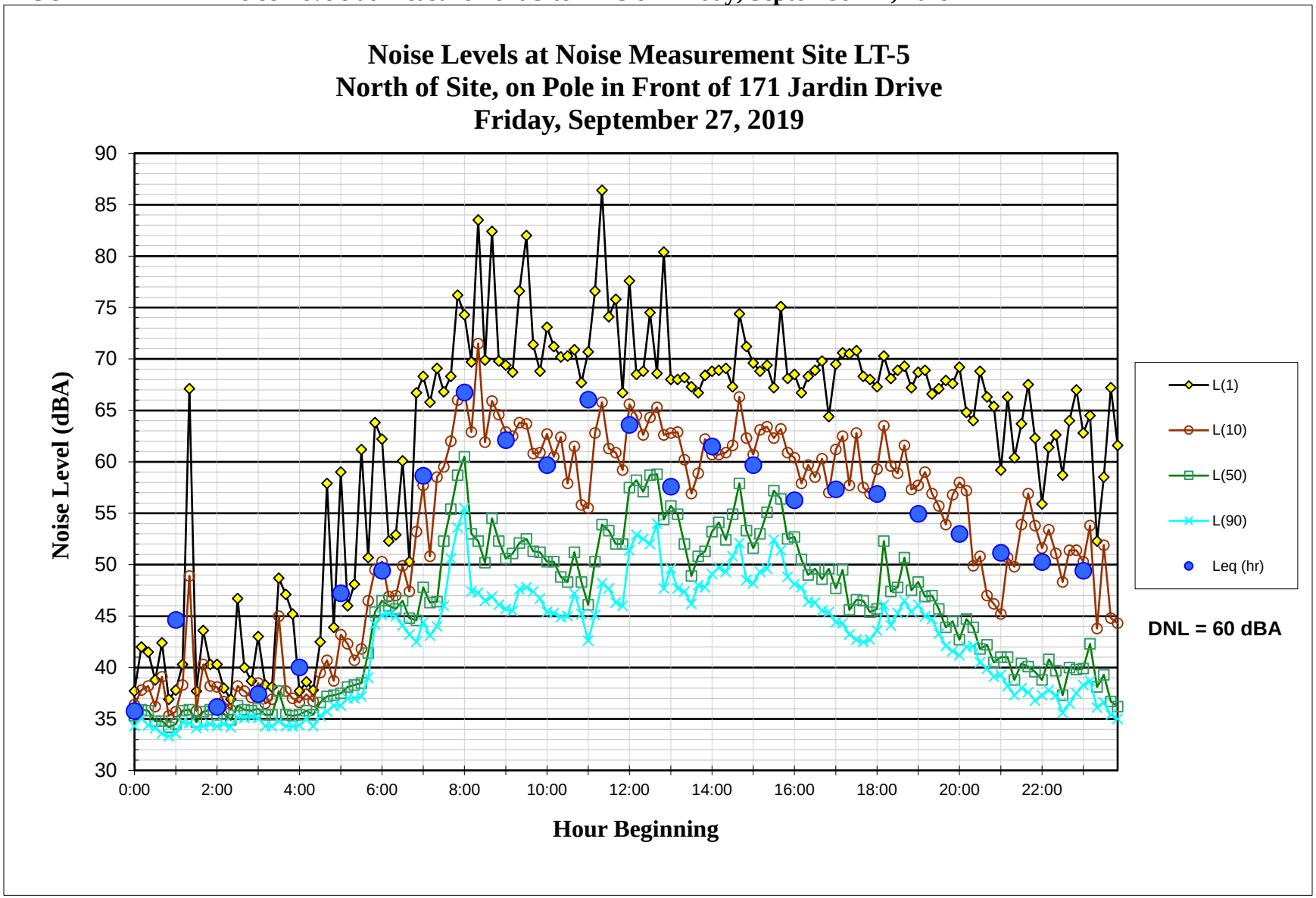

FIGURE A23 Noise Levels at Measurement Site LT-5 on Saturday, September 28, 2019

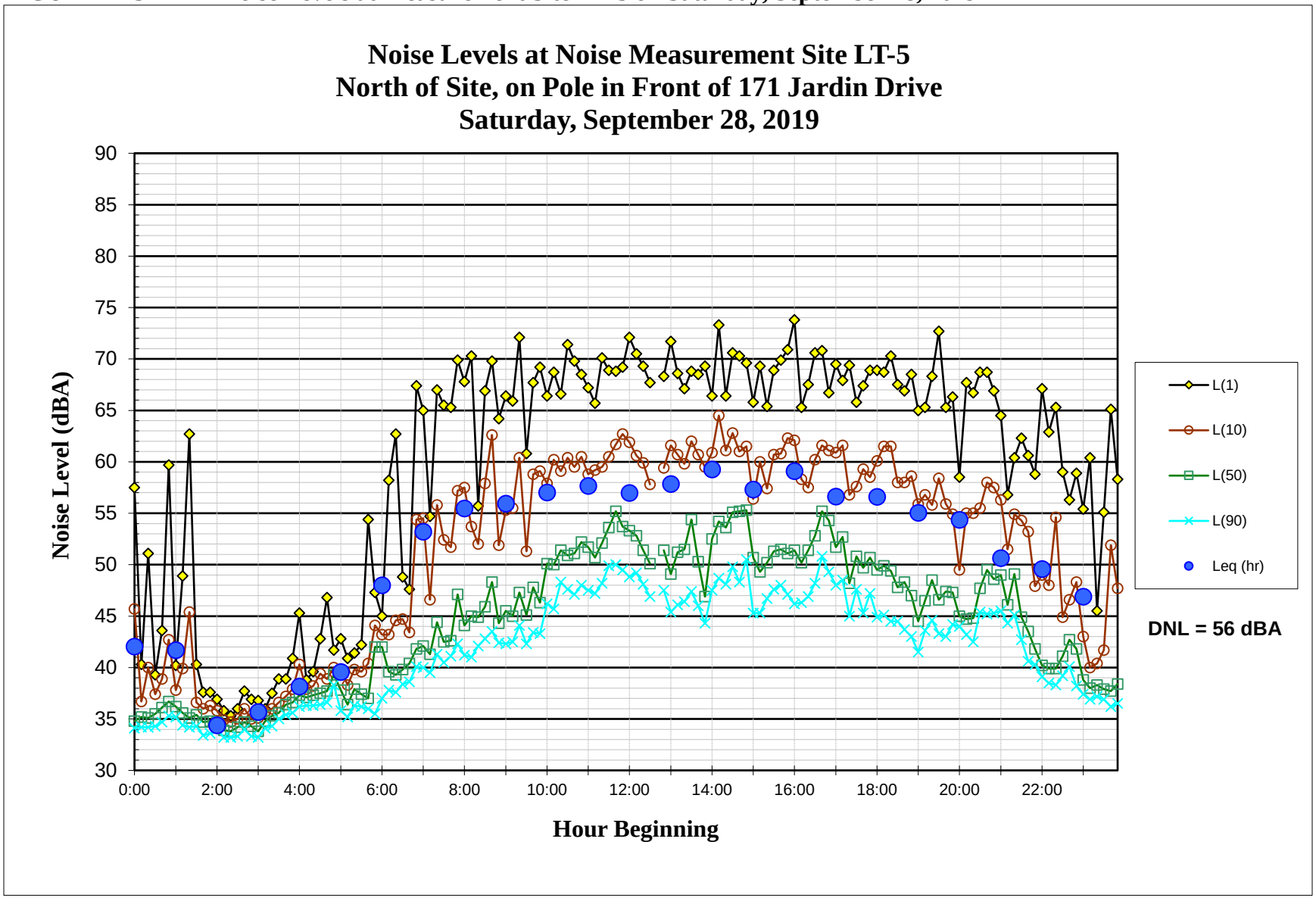

FIGURE A24 Noise Levels at Measurement Site LT-5 on Sunday, September 29, 2019

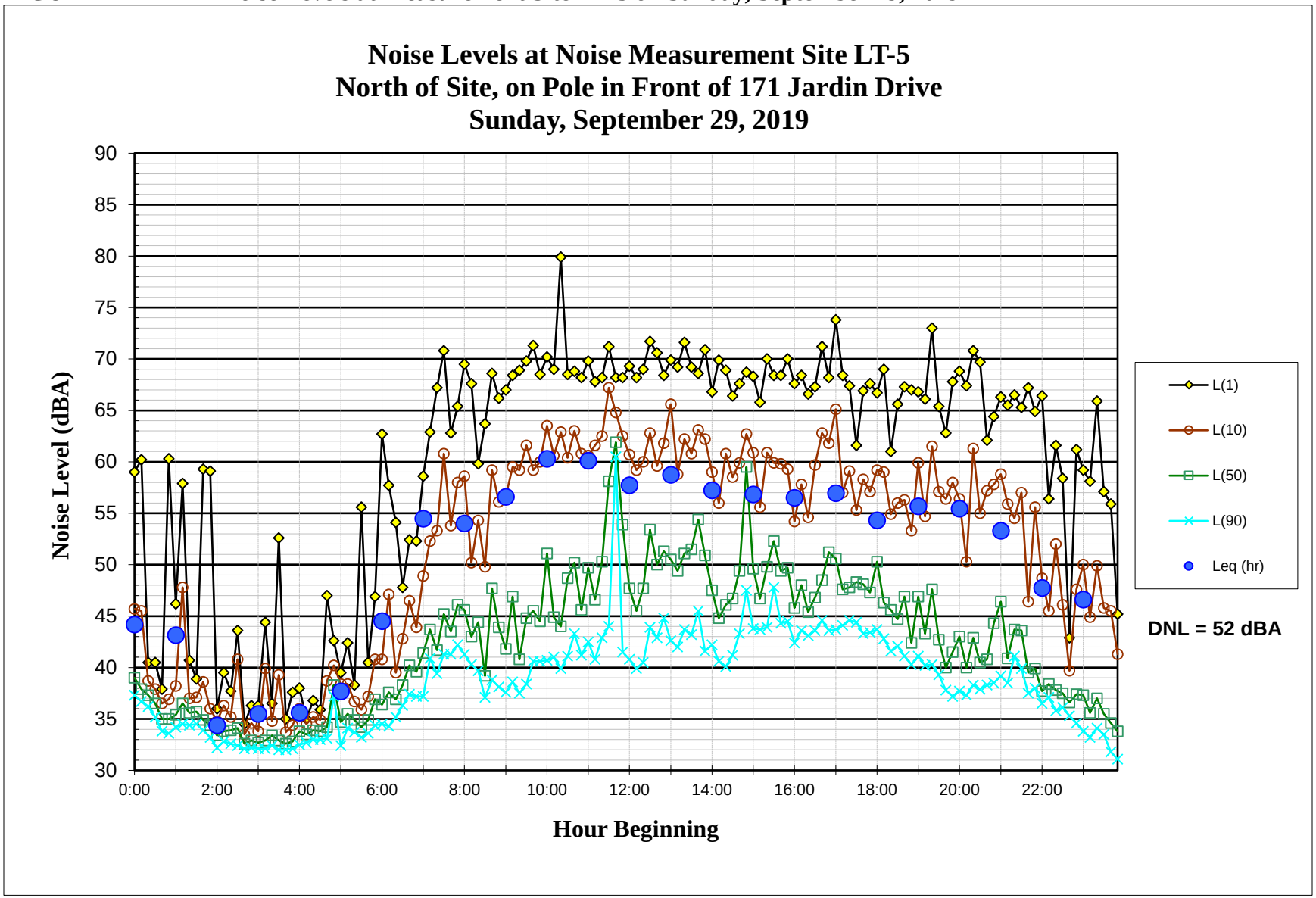

FIGURE A25 Noise Levels at Measurement Site LT-5 on Monday, September 30, 2019