HERITAGE HOUSE
NEPA NOISE ASSESSMENT

Napa, California

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INTRODUCTION

The Heritage House project proposes to modify the interior of the existing Sunrise Assisted Living Facility at 3700 Valle Verde Drive in City of Napa, California. This building will house 24 one-bedroom units and 66 single-room occupancy (SRO) units with on-site supportive services. A new three-story multi-family apartment building will be constructed to the north of the existing building and will house 16 two-bedroom and 8 three-bedroom affordable housing units.

The project's potential to result in adverse effects with respect to applicable National Environmental Policy Act (NEPA) guidelines is assessed in this report. The report is divided into two sections. 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. The NEPA Noise Assessment Section evaluates noise effects resulting from the project.

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 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level (L_{dn}* or *DNL)* is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

TABLE 1 Definition of Acoustical Terms Used in this Report

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

Regulatory Background

The U.S. Department of Housing and Urban Development (HUD) environmental noise regulations are set forth in 24CFR Part 51B (Code of Federal Regulations). The following exterior noise standards for new housing construction would be applicable to this project:

- 65 dBA DNL or less – acceptable.

- Exceeding 65 dBA DNL but not exceeding 75 dBA DNL – normally unacceptable (appropriate sound attenuation measures must provide an additional 5 decibels of attenuation over that typically provided by standard construction in the 65 dBA DNL to 70 dBA DNL zone; 10 decibels additional attenuation in the 70 dBA DNL to 75 dBA DNL zone).

- Exceeding 75 dBA DNL – unacceptable.

These noise standards also apply, "… at a location 2 meters from the building housing noise sensitive activities in the direction of the predominant noise source…" and "…at other locations where it is determined that quiet outdoor space is required in an area ancillary to the principal use on the site."

A goal of 45 dBA DNL 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 DNL or less if the exterior level is 65 dBA DNL or less. Where exterior noise levels range from 65 dBA DNL to 70 dBA DNL, the project must provide a minimum of 25 decibels of attenuation, and a minimum of 30 decibels of attenuation is required in the 70 dBA DNL to 75 dBA DNL zone. Where exterior noise levels range from 75 dBA DNL to 80 dBA DNL, the project must provide a minimum of 35 decibels of attenuation to achieve an interior level of 45 dBA DNL or less.

Existing Noise Environment

The project site is located on the east-side of Valle Verde Drive, north of Firefly Lane. The site is currently developed with a vacant assisted living facility. A three-story multi-family development is located to the west, Salvador Channel and single-family residences across the channel to the east, a multi-family development to the south and a City-owned stormwater detention area and trail to the north. Queen of the Valley Medical Center is located west of project site on Firefly Lane. A noise monitoring survey was performed in the vicinity of the project site beginning Wednesday, August 8, 2018 and concluding on Friday, August 10, 2018. The monitoring survey included two long-term noise measurements and one short-term measurement, as shown in Figure 1. Table 4 summarizes the results of the short-term measurement.

Long-term noise measurement LT-1 was made at a distance of about 25 feet from the centerline of Valle Verde Drive on the backside of the existing covered parking lot area associated with the multi-family development to the west of the project site. The primary noise source at this location was vehicular traffic on the adjacent Valle Verde Drive and Firefly Lane. Emergency vehicles and sirens accessing Queen of the Valley Medical Center frequently pass by the site, generating

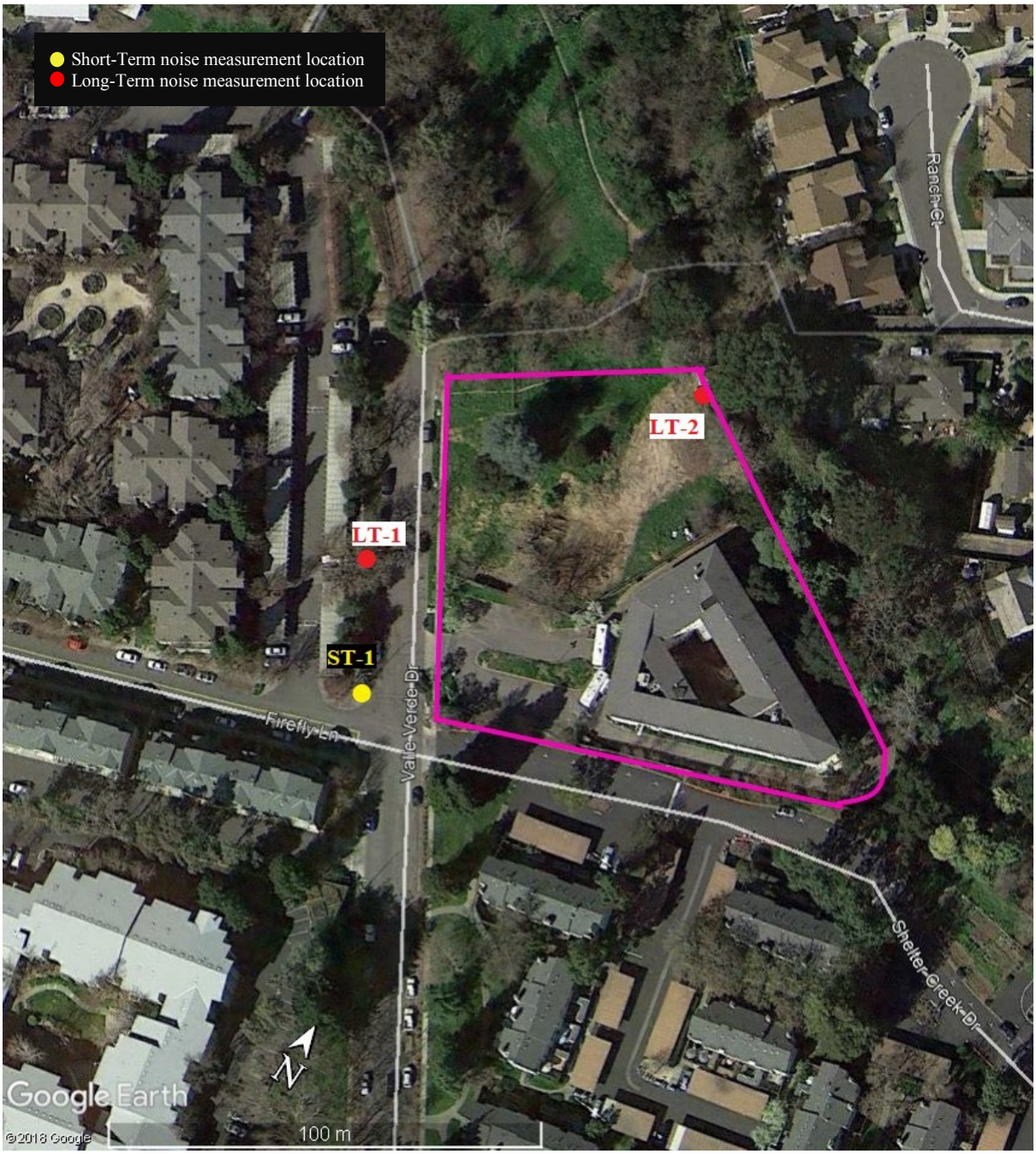
maximum instantaneous noise levels of 75 to 85 dBA L_{max}. Hourly average noise levels ranged from 46 to 61 dBA L_{eq} at this location during daytime hours and from 37 to 58 dBA L_{eq} at night, with higher hourly average noise levels occurring during periods with emergency vehicle sirens. The day-night average noise level on Thursday, August 9, 2018 was 58 dBA DNL, with inclusion of emergency vehicle sirens and was calculated to be 53 dBA DNL, with emergency vehicle sirens removed from the data set.

LT-2 was measured at the northeast corner of the project site, approximately 250 feet from Valle Verde Drive. The primary noise sources at this location were distant vehicular traffic and emergency vehicle sirens from Firefly Lane. Hourly average noise levels at this location ranged from 39 to 46 dBA L_{eq} during the day and from 36 to 43 dBA L_{eq} at night. The day-night average noise level on Thursday, August 9, 2018 was 49 dBA DNL. The results of the long-term noise measurements at LT-1 and, LT-2 are shown in Figures 2 and 3, respectively.

TABLE 4 Summary of Short-Term Noise Measurement Data, August 10, 2018

ID	Location (Start Time)	Measured Noise Levels, dBA				Primary noise source
		L_{10}	L_{50}	L_{90}	L_{eq}	
ST-1	At intersection of Valle Verde Drive and Firefly Lane (12:40 pm to 12:50 pm)	72	51	41	58	Traffic on Firefly Lane

FIGURE 1 Noise Measurement Locations



Source: Google Earth, 2018.

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Significance Criteria

An adverse effect would result if noise levels at the project site would exceed HUD Guidelines for acceptability. Exterior noise levels exceeding 65 dBA DNL or interior noise levels exceeding 45 dBA DNL would exceed HUD's noise compatibility criteria. Although the HUD guidelines are only specified to apply to new construction (Valle Verde Building), this analysis applies the same criteria to all residences onsite, including the former Sunrise Assisted Living Building (Heritage House Building).

Future Exterior Noise Environment

The primary noise source for the project site is vehicular traffic along Valle Verde Drive and Firefly Lane. Pursuant to the HUD Guidelines, the noise exposure at least 10 years in the future must be considered in addition to the existing noise exposure. Based on the traffic volumes provided[1], future traffic noise levels along Valle Verde Drive and Firefly Lane are not anticipated to measurably increase from existing levels (increase would be less than 1 dBA) under future conditions due to increases in traffic volumes along these roadways.

Exterior use areas of Heritage House would include the outdoor patio located in the central courtyard which would be exposed to 49 dBA DNL. Exterior use areas of Valle Verde Apartments would include a courtyard patio and BBQ area, play area, shade garden half basketball court, and picnic area, which would be exposed to 49 dBA DNL. Outdoor areas would be shielded by existing and proposed buildings. The private balconies of Valle Verde Apartments would be exposed to ambient noise levels up to 54 dBA DNL in balconies facing Valle Verde Drive, not including occasional emergency sirens, which would vary on a day-to-day basis and would not be anticipated to affect the usability of outdoor spaces. Exterior noise levels at all outdoor use areas would be considered "acceptable" by HUD.

Future Interior Noise Environment

Based on floor plans and elevations[2] prepared by *MWA Architects* (dated August 10, 2018), residential units are located on Levels 1 to 3 in Valle Verde and Heritage House Buildings. Façades of new south facing residential units in Valle Verde Building would be exposed to 54 dBA DNL and south and west facing façades of Heritage House would be exposed to future exterior noise levels of up to 59 and 56 dBA DNL, respectively. The predicted exterior noise level would not exceed 65 dBA DNL and would be considered "normally acceptable" under HUD standards. Under HUD standards, it is assumed that with standard construction any building will provide sufficient attenuation to achieve an interior level of 45 dBA DNL or less if the exterior level is 65 dBA DNL or less. Therefore, residential units in Valle Verde Building and Heritage House Building do not require any additional noise mitigation measure to comply with HUD criteria.

[1] Traffic volume data provided in file *3700-3200 Valle Verde Drive Volumes.xlsx* on September 20, 2018.

[2] Heritage House & Valle Verde : Planning & EIR Submittal – Resubmittal, MWA Architects, August 10, 2018

FIGURE 2 Daily Trend in Noise Levels at LT-1

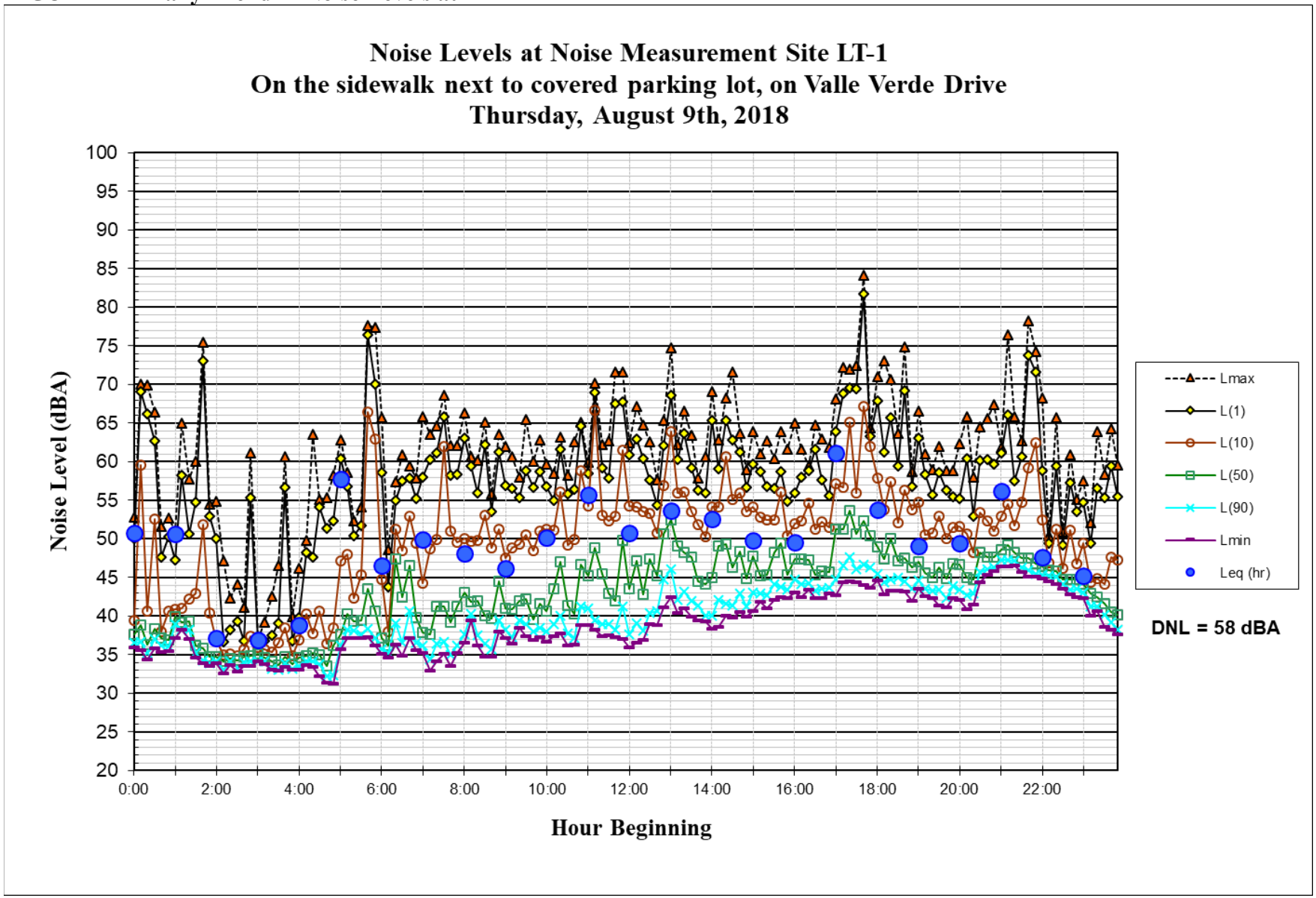

FIGURE 3 Daily Trend in Noise Levels at LT-2