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M E M O

Date: October 8, 2024

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From: Carrie J. Janello
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SUBJECT: Palo Alto Commons Project, 4075 El Camino Way, Palo Alto, CA – Noise and Vibration Assessment

The Palo Alto Commons Project would expand the existing 121-unit assisted living facility (83,511 square feet) located at 4075 El Camino Way in Palo Alto, California. The expansion would include the addition of 18 new units totaling 6,816 square feet, primarily located on the second and third floors.1 The project requests an amendment to the existing Planned Community Permit for the site to allow for the proposed expansion. No increase in parking or modifications to the circulation of the site are proposed.

This memo evaluates construction noise and vibration levels and operational noise levels resulting from the proposed expansion. The construction noise and vibration levels are assessed relative to thresholds established by the City of Palo Alto and the State of California, and where necessary, controls are recommended as part of a construction management plan. Operational noise levels are also assessed, and where necessary, mitigation measures are recommended to reduce project impacts to a less-than-significant level.

Regulatory Background

California Department of Transportation. Caltrans identifies a vibration threshold of 0.5 in/sec

1 The plans have been updated since this analysis to include fewer residential units, greater square footage, and one additional rooftop heat pump. These project modifications would not change the project's impacts, as discussed further in this report.

PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.25 in/sec PPV for historic and some old buildings.

City of Palo Alto 2030 Comprehensive Plan. Chapter 4 of the 2030 Comprehensive Plan (Natural Environment) discusses noise. The following goals and policies apply to the proposed project:

Goal N-6: An environment that minimizes the adverse impacts of noise.

Policy N-6.3 Protect the overall community and especially sensitive noise receptors, including schools, hospitals, convalescent homes, senior and child care facilities and public conservation land from unacceptable noise levels from both existing and future noise sources, including construction noise.

Policy N-6.5 Protect residential and residentially-zoned properties from excessive and unnecessary noise from any sources on adjacent commercial or industrial properties.

Policy N-6.6 Apply site planning and architectural design techniques that reduce overall noise pollution and reduce noise impacts on proposed and existing projects within Palo Alto and surrounding communities.

Policy N-6.7 While a proposed project is in the development review process, the noise impact of the project on existing residential land uses, public open spaces and public conservation land should be evaluated in terms of the increase in existing noise levels for the potential for adverse community impact, regardless of existing background noise levels. If an area is below the applicable maximum noise guideline, an increase in noise up to the maximum should not necessarily be allowed.

Policy N-6.8 The City may require measures to reduce noise impacts of new development on adjacent properties through appropriate means including, but not limited to, the following:

- Orient buildings to shield noise sensitive outdoor spaces from sources of noise.
- Construct noise walls when other methods to reduce noise are not practical and when these walls will not shift similar noise impacts to another adjacent property.
- Screen and control noise sources such as parking lots, outdoor activities and mechanical equipment, including HVAC equipment.
- Increase setbacks to serve as a buffer between noise sources and adjacent dwellings.
- Whenever possible, retain fences, walls or landscaping that serve as noise buffers while considering design, safety and other impacts.
- Use soundproofing materials, noise reduction construction techniques, and/or acoustically-rated windows/doors.
- Include auxiliary power sources at loading docks to minimize truck engine idling.
- Control hours of operation, including deliveries and trash pickup, to minimize noise impacts.

Policy N-6.9 Continue to require applicants for new projects or new mechanical equipment in the Multifamily, Commercial, Manufacturing or Planned Community districts to submit an acoustical analysis demonstrating compliance with the Noise Ordinance prior to receiving a building permit.

Policy N-6.11 Continue to prioritize construction noise limits around sensitive receptors, including through limiting construction hours and individual and cumulative noise from construction equipment.
Policy N-6.13 Minimize noise spillover from rail related activities into adjacent residential or noise-sensitive areas.

City of Palo Alto Municipal Code. The noise ordinance of the City of Palo Alto limits noise levels caused by stationary noise sources and construction on adjacent residential properties. The applicable portions of the noise code are as follows:

9.10.030 Residential property noise limits.

(a) No person shall produce, suffer or allow to be produced by any machine, animal, or device, or any combination of same, on residential property, a noise level more than six (6) dB above the local ambient at any point outside the property plane.

9.10.060 Special Provisions. The special exceptions listed in this section shall apply, notwithstanding the provisions of Sections 9.10.030 through 9.10.050. Said exceptions shall apply only to the extent and during the hours specified in each of the following enumerated exceptions.

(a) General Daytime Exception. Any noise source which does not produce a noise level exceeding seventy (70) dBA at a distance of twenty-five feet under its most noisy condition of use shall be exempt from the provisions of Sections 9.10.030(a), 9.10.040 and 9.10.050(a) between the hours of eight a.m. and eight p.m. Monday through Friday, nine a.m. and eight p.m. on Saturday, except Sundays and holidays, when the exemption herein shall apply between ten a.m. and six p.m.

(b) Construction. Except for construction on residential property, construction, alteration and repair activities which are authorized by valid city building permit shall be prohibited on Sundays and holidays and shall be prohibited except between the hours of eight a.m. and six p.m. Monday through Friday, nine a.m. and six p.m. on Saturday provided that the construction, demolition or repair activities during those hours meet the following standards:

(1) No individual piece of equipment shall produce a noise level exceeding one hundred ten (110) dBA at a distance of twenty-five (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 twenty-five feet from the equipment as possible.

(2) The noise level at any point outside of the property plane of the project shall not exceed one hundred ten (110) dBA.

(3) The holder of a valid construction permit for a construction project in a non-residential zone shall post a sign at all entrances to the construction site upon commencement of construction, for the purpose of informing all contractors and

subcontractors, their employees, agents, materialmen and all other persons at the construction site, of the basic requirements of this chapter.

(A) Said sign(s) shall be posted no less than three feet and no more than five feet above the ground level, shall be visible from the adjacent street, and shall be of a white background, with black lettering, which lettering shall be a minimum of one and one-half inches in height.

(B) Said sign shall read as follows:

CONSTRUCTION HOUSE FOR RESIDENTIAL PROPERTIES
MONDAY-FRIDAY 8:00 A.M. TO 6:00 P.M.
SATURDAY 9:00 A.M. TO 6:00 P.M.
SUNDAY/HOLIDAY CONSTRUCTION PROHIBITED

Existing Noise Environment

The project site is bordered by single-family residences to the northeast and the Goodwill of Silicon Valley to the southeast. Other land uses in the project vicinity include single-family residences and the Acme Children's Center to the southeast, opposite West Meadow Drive; Vision Care for Animals and the Animal Hospital of Palo Alto to the southwest, opposite El Camino Way; and single- and multi-family residences to the southwest, opposite El Camino Way and El Camino Real.

The noise environment at the site and in the surrounding area results primarily from transportation-related noise sources such as vehicular traffic along El Camino Real and train passbys along the Union Pacific Railroad (UPRR). Local traffic and aircraft also contribute to the ambient noise environment.

A noise monitoring survey, consisting of two long-term (LT-1 and LT-2) and two short-term (ST-1 and ST-2) noise measurements, was conducted between Monday, April 1, 2024, and Thursday, April 4, 2024, to document existing conditions in the project vicinity. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made along West Meadow Drive, approximately 50 feet northwest of the centerline. Hourly average noise levels at LT-1 typically ranged from 52 to 67 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 42 to 56 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Tuesday, April 2, 2024, and Wednesday, April 3, 2024, was 59 dBA L_{dn}. The daily trend in noise levels at LT-1 is shown in Figures A1 through A4 of Appendix A.

LT-2 was made along the northeastern boundary of the site, near the shared property line with the residence located at 4040 Wilkie Way. Hourly average noise levels at LT-2 typically ranged from 48 to 62 dBA L_{eq} during daytime hours and from 42 to 53 dBA L_{eq} during nighttime hours. The day-night average noise levels on Tuesday, April 2, 2024, and Wednesday, April 3, 2024, were 57 dBA L_{dn} and 54 dBA L_{dn}, respectively. The daily trend in noise levels at LT-2 is shown in Figures

A5 through A8 of Appendix A.

Short-term noise measurements ST-1 and ST-2 were made on Monday, April 1, 2024, between 10:30 a.m. and 10:50 a.m. ST-1 and ST-2 were made from an open space area on the project site. ST-1 was positioned in the center of the open space, approximately 30 feet from the nearest building façade of the existing senior assisted living center. ST-1 was positioned as far as possible from existing buildings, while ST-2 was positioned close to the existing buildings. These locations were selected to quantify any potential reflected noise from the building close to ST-2.

The dominant noise sources at ST-1 and ST-2 included jet aircraft (49 to 58 dBA) and train horns (55 to 61 dBA). Background ambient noise levels produced by vehicular traffic ranged from 42 to 43 dBA. During the first 10-minute measurement period for both measurements, emergency sirens generated noise levels of 55 to 64 dBA, which increased the average 10-minute L_{eq}. The 10-minute L_{eq} measured at ST-1 and ST-2 ranged from 46 dBA without the emergency sirens to 50 dBA with the sirens.

Table 1 summarizes the noise measurement results. There were no appreciable differences in measured noise levels due to noise reflected from the building.

TABLE 1 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location	Date, Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: center of open space near the northeastern property line	4/1/2024, 10:30-10:40	64	59	54	46	42	50
	4/1/2024, 10:40-10:50	60	57	48	43	41	46
ST-2: along the building façade in the open space near the northeastern property line	4/1/2024, 10:30-10:40	64	59	53	45	43	50
	4/1/2024, 10:40-10:50	61	57	46	43	42	46

FIGURE 1 Aerial Image of the Project Site and Surrounding Area with Long- and Short-Term Measurement Locations Identified

Source: Google Earth, 2024.

Construction Noise and Vibration Assessment

Temporary Construction Noise

Construction of the project would be completed in one phase over approximately 18 months beginning in January 2025. Construction activities would occur between 8:00 a.m. and 6:00 p.m. on weekdays. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

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

Section 9.10.060(b) of the City of Palo Alto Municipal Code states that construction activities are permitted between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturdays provided that no individual piece of equipment produces a noise level exceeding 110 dBA at a distance of 25 feet or noise levels of 110 dBA are exceeded anywhere outside the property plane. If the equipment is housed in a structure, the 110 dBA would be enforced at a distance of 25 feet from the structure. All construction activities are prohibited on Sundays and holidays.

The construction of the project would require minimal construction equipment. During the site preparation phase and grading/excavation phase, a mini excavator will be used. Similarly, during the construction of the building exterior, a small forklift would be used. The typical maximum instantaneous noise levels for a Bobcat E10 mini excavator would range from 59 to 67 dBA L_{max} at a distance of 25 feet. A small forklift would produce similar noise levels. Maximum instantaneous noise levels are expected to comply with the City of Palo Alto's threshold of 110 dBA.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. With the incorporation of construction best management practices as a project condition of approval, construction noise exposure at sensitive receptors would be reduced as much as possible resulting in a less-than-significant impact.

Construction Best Management Practices

Implement the following construction best management practices:

- Construction will be limited to the hours of 7:00 a.m. to 6:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturdays for any on-site or off-site work within 300 feet of any residential unit.

- The contractor shall use "new technology" power construction equipment with state-of-the-art noise shielding and muffling devices. All internal combustion engines used on the project site shall be equipped with adequate mufflers and shall be in good mechanical condition to minimize noise created by faulty or poorly maintained engines or other components.

- The unnecessary idling of internal combustion engines shall be prohibited.

- Staging areas and stationary noise-generating equipment shall be located as far as possible from noise-sensitive receptors such as residential uses.

- Substitute nail guns for manual hammering, where feasible.

- Substitute electrically powered tools for noisier pneumatic tools, where feasible.

- A "noise disturbance coordinator" shall be designated to respond to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaints (e.g., beginning work too early, bad muffler, etc.) and institute reasonable measures warranted to correct the problem. A telephone number for the disturbance coordinator would be conspicuously posted at the construction site.

The implementation of these measures would reduce construction noise levels emanating from the site, minimizing disruption and annoyance. Considering that construction is temporary, with the implementation of these controls, as well as the Municipal Code limits regulating allowable construction hours, the impact would be reduced to a less-than-significant level.

Temporary Construction Vibration

Construction phases would include demolition, site preparation work, foundation work, and new building framing and finishing. As noted previously, the construction of the project would only require minimal construction equipment (i.e., mini-excavator and forklift).

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for new residential and modern commercial/industrial structures, 0.3 in/sec PPV for older residential structures, and a limit of 0.25 in/sec PPV for historic and some old buildings. The 0.3 in/sec PPV vibration limit would apply to properties near the project site and the 0.25 in/sec PPV vibration limit would apply to the nearest historic property.

According to the historical inventory of the City of Palo Alto,[2] there are no historical buildings located within 200 feet of the proposed project site. Additionally, the Goodwill building and medical office buildings surrounding the site were constructed post-World War II and would not be considered older buildings subject to the 0.25 in/sec PPV threshold. Conservatively, the 0.3 in/sec PPV threshold for older residential buildings is applied to all existing off-site structures surrounding the project site.

Table 2 presents vibration levels produced by typical construction equipment at a distance of 25 feet. These vibration levels represent heavy construction equipment that would not be used on the project site. However, these data are used to illustrate that even under worst-case conditions, vibration levels generated by the construction of the project would remain low.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 2 summarizes the vibration levels at each of the surrounding buildings in the project vicinity. Vibration levels are highest close to the source and then attenuate with increasing distance at the rate $\left({}^{D_{ref}}/_{D}\right)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet.

TABLE 2 Vibration Levels for Heavy Construction Equipment at 25 feet and the Nearest Surrounding Buildings

Equipment		PPV at 25 ft. (in/sec)	Estimated Vibration Levels at Nearest Building Façades Surrounding the Project Site, in/sec PPV			
			NE Res. (10ft)	SE Res. & Children's Center (150ft)	SW Goodwill (40ft)	SW Medical Offices (225ft)
Hydromill (slurry wall)	in soil	0.008	0.022	0.001	0.005	0.001
	in rock	0.017	0.047	0.002	0.010	0.002
Hoe Ram		0.089	0.244	0.012	0.053	0.008
Large bulldozer		0.089	0.244	0.012	0.053	0.008
Caisson drilling		0.089	0.244	0.012	0.053	0.008
Loaded trucks		0.076	0.208	0.011	0.045	0.007
Jackhammer		0.035	0.096	0.005	0.021	0.003
Small bulldozer		0.003	0.008	0.000	0.002	0.000

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

As shown in Table 2, the nearest older residential building to the northeast would be about 10 feet from the nearest expected construction area. At this distance, construction vibration levels from large construction equipment would be at or below 0.24 in/sec PPV, which is below the conservative 0.3 in/sec PPV threshold. Smaller equipment would be best represented by the "small bulldozer," which would produce vibration levels below 0.01 in/sec PPV at the nearest buildings. This is a less-than-significant impact.

[2] https://www.cityofpaloalto.org/files/assets/public/v/1/planning-amp-development-services/historic-preservation/historic-inventory/city-historic-inventory-list.pdf

Operational Noise Assessment

A significant impact would result if the proposed project would result in a substantial permanent increase in noise levels at sensitive receptors in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA L_{dn} or greater, with a future noise level of less than 60 dBA L_{dn}; or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater. Based on the ambient noise levels measured at the project site and the surrounding area, existing residential receptors surrounding the site would be exposed to existing noise levels below 60 dBA L_{dn}. Assuming a standard 1% to 2% traffic volume increase per year along the surrounding major roadways, which is typical for built-out areas such as this, a 2 dBA L_{dn} increase would be estimated by 2044. Therefore, the future noise levels at the residential receptors to the northeast would remain under 60 dBA L_{dn}, while the future noise levels at the residential receptors to the southeast would exceed 60 dBA L_{dn}. A significant noise increase would occur at the northeast residences if project-generated operations would permanently increase noise levels by 5 dBA L_{dn} and at the southeast residences if project-generated operations would permanently increase noise levels by 3 dBA L_{dn}.

Section 9.10.040 of the Municipal Code states that any noise generated at the project site shall not exceed ambient levels at residential properties by 6 dBA or at commercial properties by 8 dBA. The northeast residences have existing ambient noise levels represented by LT-2, with daytime noise levels ranging from 48 to 62 dBA L_{eq} (average of 52 dBA L_{eq}) and nighttime noise levels ranging from 42 to 53 dBA L_{eq} (average of 48 dBA L_{eq}). The southeast receptors (including the residences and children's center) and southwest receptors (including the Goodwill and medical offices) would be represented by noise levels measured at LT-1, which include daytime noise levels of 52 to 67 dBA L_{eq} (average of 57 dBA L_{eq}) and nighttime noise levels of 42 to 56 dBA L_{eq} (average of 49 dBA L_{eq}). Conservatively, daytime and nighttime thresholds applied at the property lines of the surrounding receptors are summarized in Table 3.

TABLE 3 Summary of Operational Noise Thresholds Applied at Each Receiving Property Line

Receptor	Daytime L_{eq}, dBA	Nighttime L_{eq}, dBA
Northeast Residences	58	54
Southeast Residences & Children's Center	63	55
Southwest Goodwill	65	57
Southwest Medical Offices	65	57

Project Traffic

A traffic study was not required for the proposed project. The additional units included in the project expansion would generate project trips insignificant compared to the traffic volumes along the surrounding roadways. Therefore, the additional project trips would not result in a measurable or detectable noise level increase over the existing ambient noise environment. The project would not result in a permanent noise increase of 3 dBA L_{dn} or more at noise-sensitive receptors in the project vicinity. This is a less-than-significant impact.

Mechanical Equipment

The project would install new mechanical equipment for heating, ventilation, and air conditioning (HVAC). Two heat pumps (Daikin RXYQ96TTJU) will be installed on the rooftop of the building, and 30 interior fan coils (Daikin FXAQ07PVJU) will be installed within the new residential units.3

According to the manufacturer's specification sheet for the Daikin heat pumps, noise levels would be 61 dBA at 3 feet. The Daikin wall-mounted units would generate indoor noise levels of 31 to 36 dBA at 3 feet. These quiet units would, therefore, not be audible at the residential exteriors. Surrounding off-site receptors would only be exposed to noise levels generated by the rooftop heat pumps. Assuming the equipment runs continuously during the daytime and nighttime hours, the estimated day-night average noise level for the Daikin heat pump unit would be 67 dBA L_{dn} at 3 feet.

The rooftop heat pumps would be 28 feet above the ground, and with setbacks of 10 feet or more from the edge of the rooftop, minimum attenuation of 15 dBA was calculated for each unit at each receiving receptor surrounding the site. Note, the residences to the northeast would be completely shielded by the existing assisted living building and would not be exposed to mechanical equipment noise generated by the project additions.

Each of the neighboring northeast residences would be exposed to different mechanical equipment noise levels from the additions. Table 4 summarizes the total noise level exposure from mechanical equipment associated with the on-site additions, as estimated at each of the northeast residential property lines identified in Figure 2. Table 4 also summarizes the estimated noise levels at Goodwill.

3 The plans have been updated since this analysis to include fewer residential units, greater square footage, and one additional rooftop heat pump. Due to the low noise levels generated by the Daikin heat pumps and the distance to the neighboring residences, the addition of a third heat pump would not change the project's impacts, as discussed further in this report.

FIGURE 2 Northeast Residential Receptors with Direct Line-of-Sight to the Additions on the Northeast Building Façade

TABLE 4 Estimated Operational Noise Levels for Residential Heat Pumps

Receptor	Distance from Rooftop Heat Pumps, feet	Hourly L_{eq}, dBA	L_{dn}, dBA	Noise Level Increase, dBA L_{dn}
R1	95 to 205	< 20[a]	24[a]	0
R2	65 to 155	21[a]	27[a]	0
R3	55 to 130	23[a]	29[a]	0
R4	60 to 125	23[a]	29[a]	0
R5	60 to 125	22[a]	29[a]	0
R6	60 to 140	22[a]	28[a]	0
R7	85 to 180	< 20[a]	25[a]	0
R8	125 to 225	< 20[a]	23[a]	0
Goodwill	40 to 120	26[a]	32[a]	0

[a] Minimum attenuation of 15 dBA was applied to ground-level receptors due to setbacks and elevation of the rooftop equipment.

Based on the estimated noise levels in Table 4, mechanical equipment L_{eq} noise levels would not exceed the City's daytime or nighttime thresholds. For all existing receptors, the noise level increase due to mechanical equipment would not be measurable or detectable (0 dBA L_{dn} increase). This would be a less-than-significant impact.

Potential for Reflected Train Noise

There is concern that the additional residential units proposed along the northeast façade of the building would reflect train horn noise upon the rear areas of Wilkie Way residences. Reflected

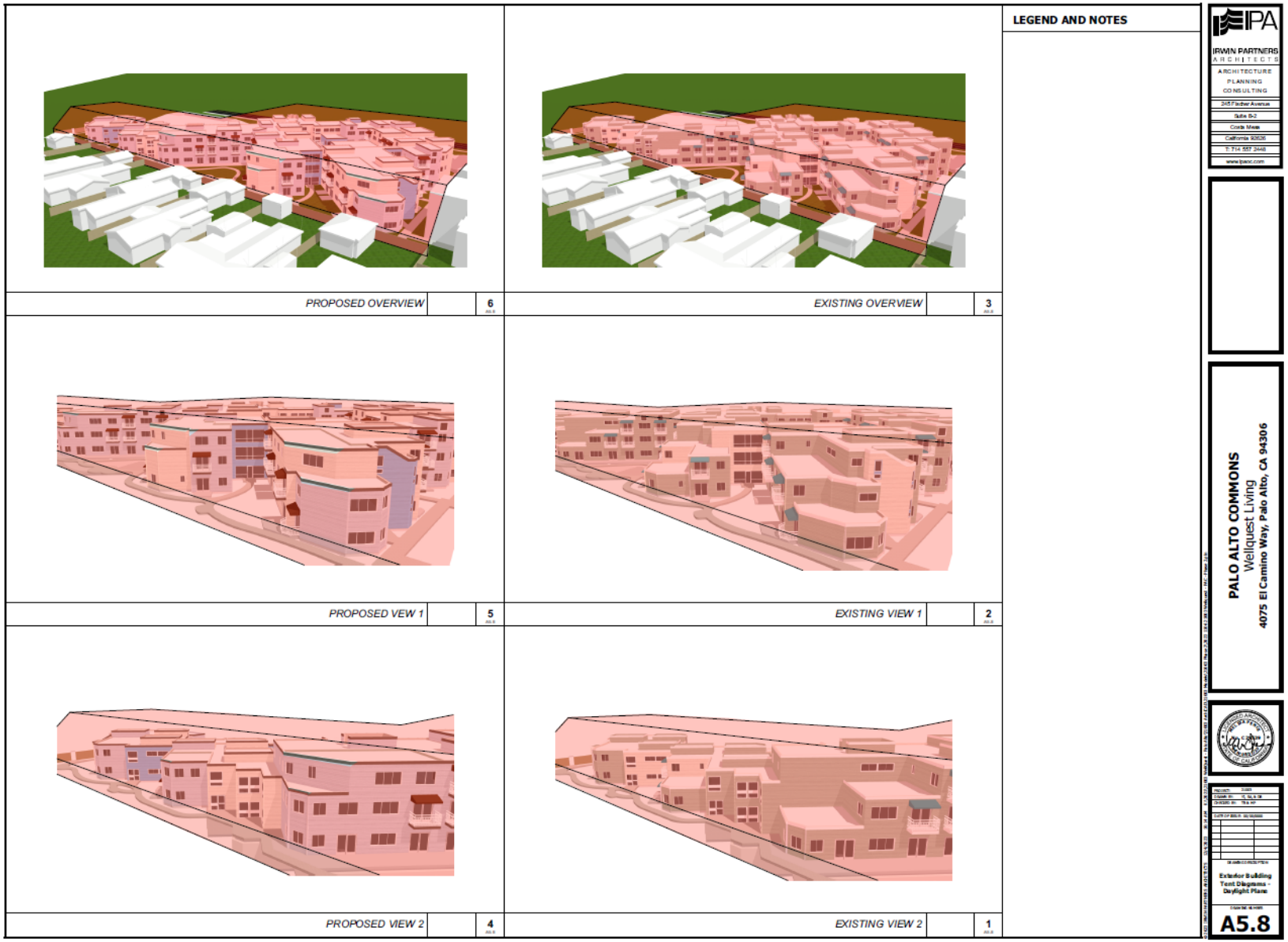
noise could be of concern if the design of the northeast building façade was relatively flat reflecting plane parallel to the UPRR and Wilkie Way.

Figure 3 shows the views of the northeast façade of the building under existing and proposed project conditions. As shown in Figure 3, the northeast building façade is not a flat surface capable of focusing sound energy at Wilkie Way residences. The varied angles of the building scatter potential reflected noise in several directions, depending on the angle of incidence of the noise. The design of the building itself, under existing and proposed conditions, limits the potential for reflected train horn noise. Furthermore, the façades of the additional units proposed by the project make up a small percentage of the overall northeast façade, further limiting potential reflections.

Simultaneous noise measurements were made during the noise survey at ST-1 and ST-2 to demonstrate reflections experienced under existing conditions close to, and away from the building. These measurements were made to simulate potential reflections that could occur as a result of the project. ST-1 was made in the center of the open space area, as far as possible from the building façade to minimize the potential reflections of sound energy, and ST-2 was made near the building façade to maximize the potential reflections of sound energy. As noted previously, the predominant noise sources measured at ST-1 and ST-2 included jet aircraft (49 to 58 dBA) and train horns (55 to 61 dBA). Maximum noise levels produced by these sources varied between the two measurement positions by up to 1 dBA. A 1 dBA change in noise levels is only detectable in a laboratory environment and would not be detectable at Wilkie Way residences. A similar increase in noise levels could be expected with the project assuming reflections under practical conditions. Theoretically, assuming 100 percent of the sound energy, or all of the train noise, were to be reflected by the project back to a particular receptor along Wilkie Way, a maximum noise level increase of 3 dBA would be expected. A 3 dBA increase in noise levels is barely detectable outside of a laboratory environment. Therefore, the potential for reflected train horn noise would be less-than-significant under both practical and theoretical conditions.

(24-045)

FIGURE 3 Existing and Proposed Views of the Northeast Building Façade



APPENDIX A

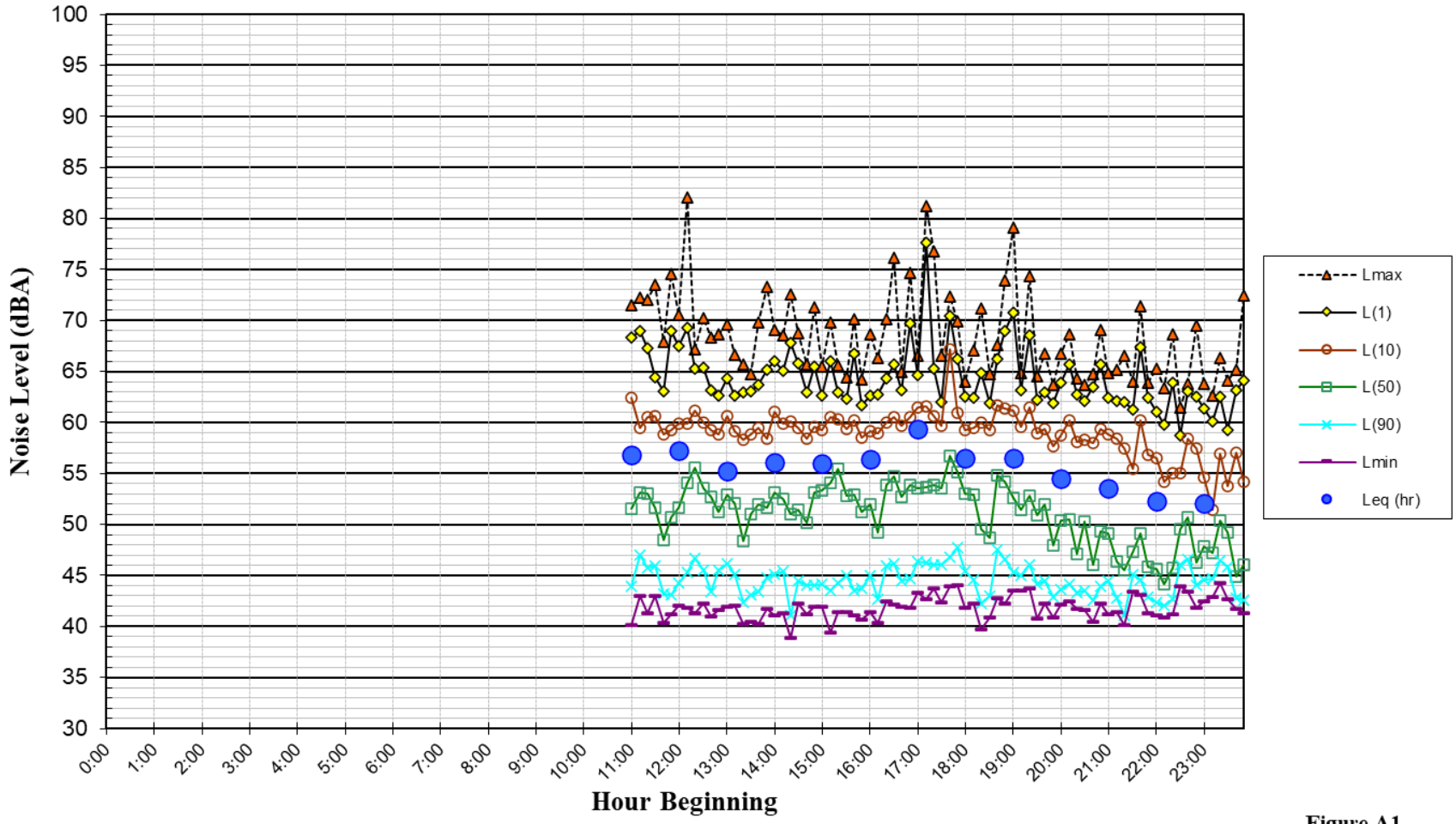
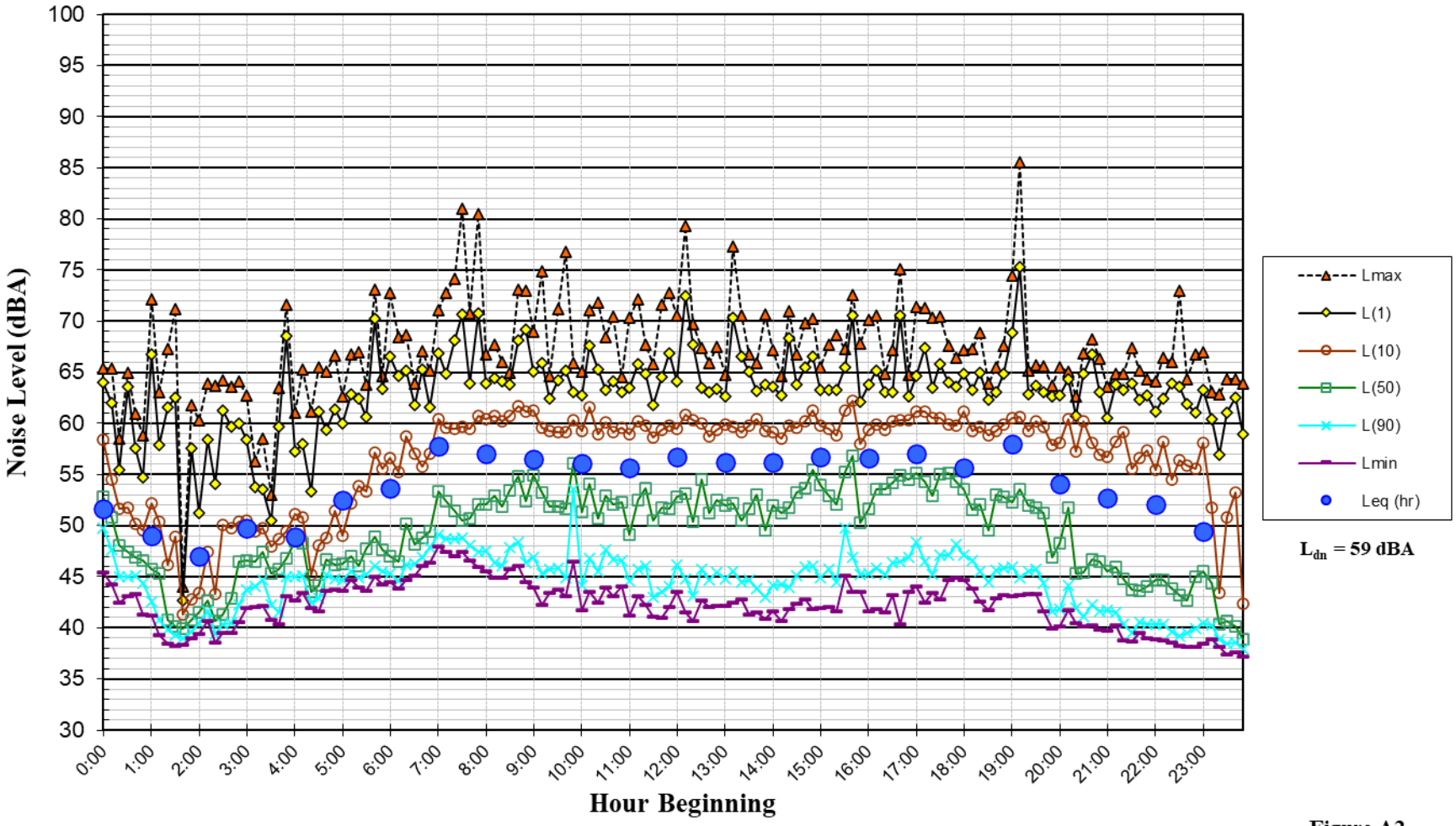


Figure A1

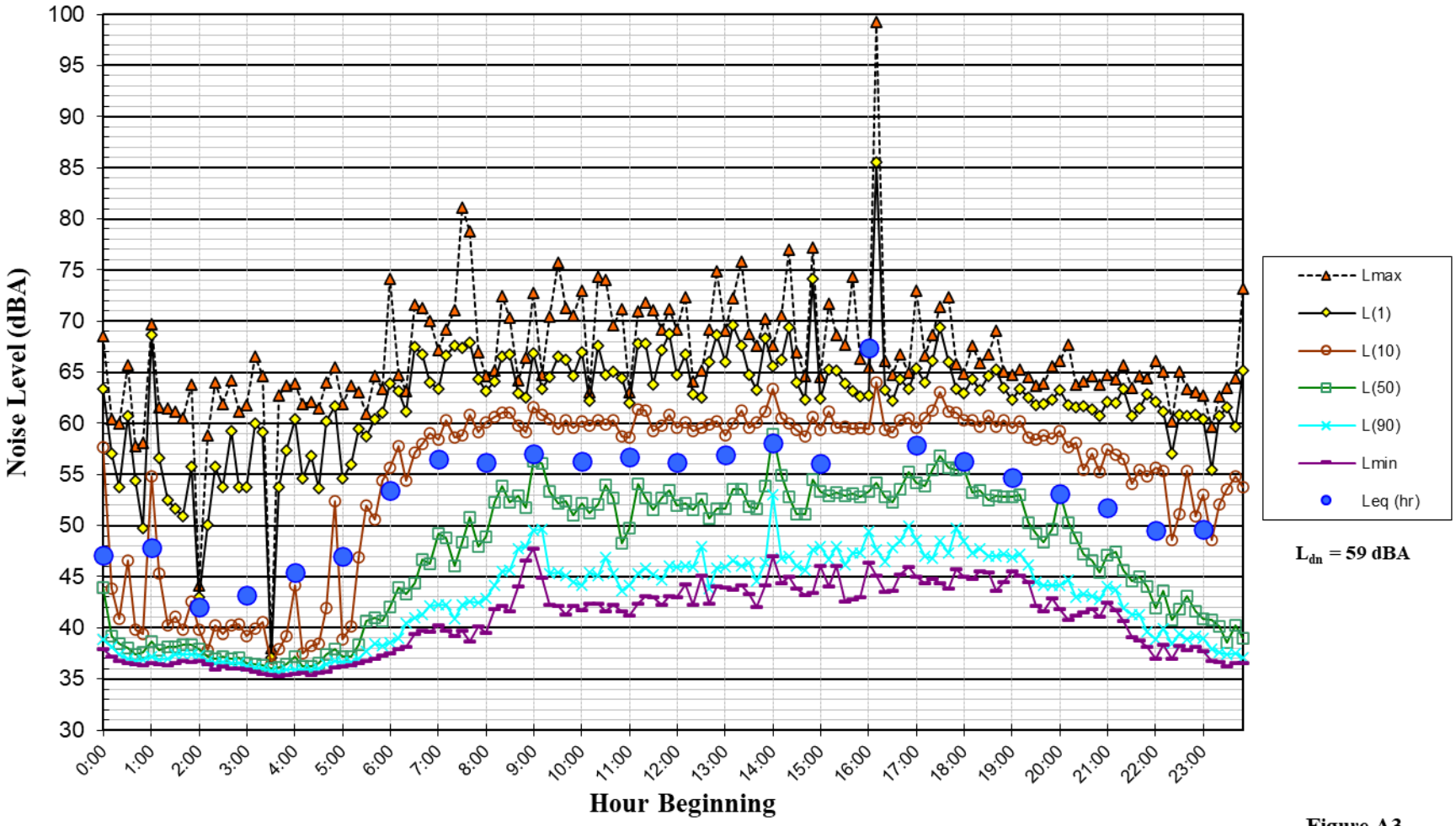
Noise Levels at Noise Measurement Site LT-1
~50 feet northwest of the centerline of West Meadow Drive
Tuesday, April 2, 2024



L_{dn} = 59 dBA

Figure A2

Noise Levels at Noise Measurement Site LT-1
~50 feet northwest of the centerline of West Meadow Drive
Wednesday, April 3, 2024



L_{dn} = 59 dBA

Figure A3

Noise Levels at Noise Measurement Site LT-1
~50 feet northwest of the centerline of West Meadow Drive
Thursday, April 4, 2024

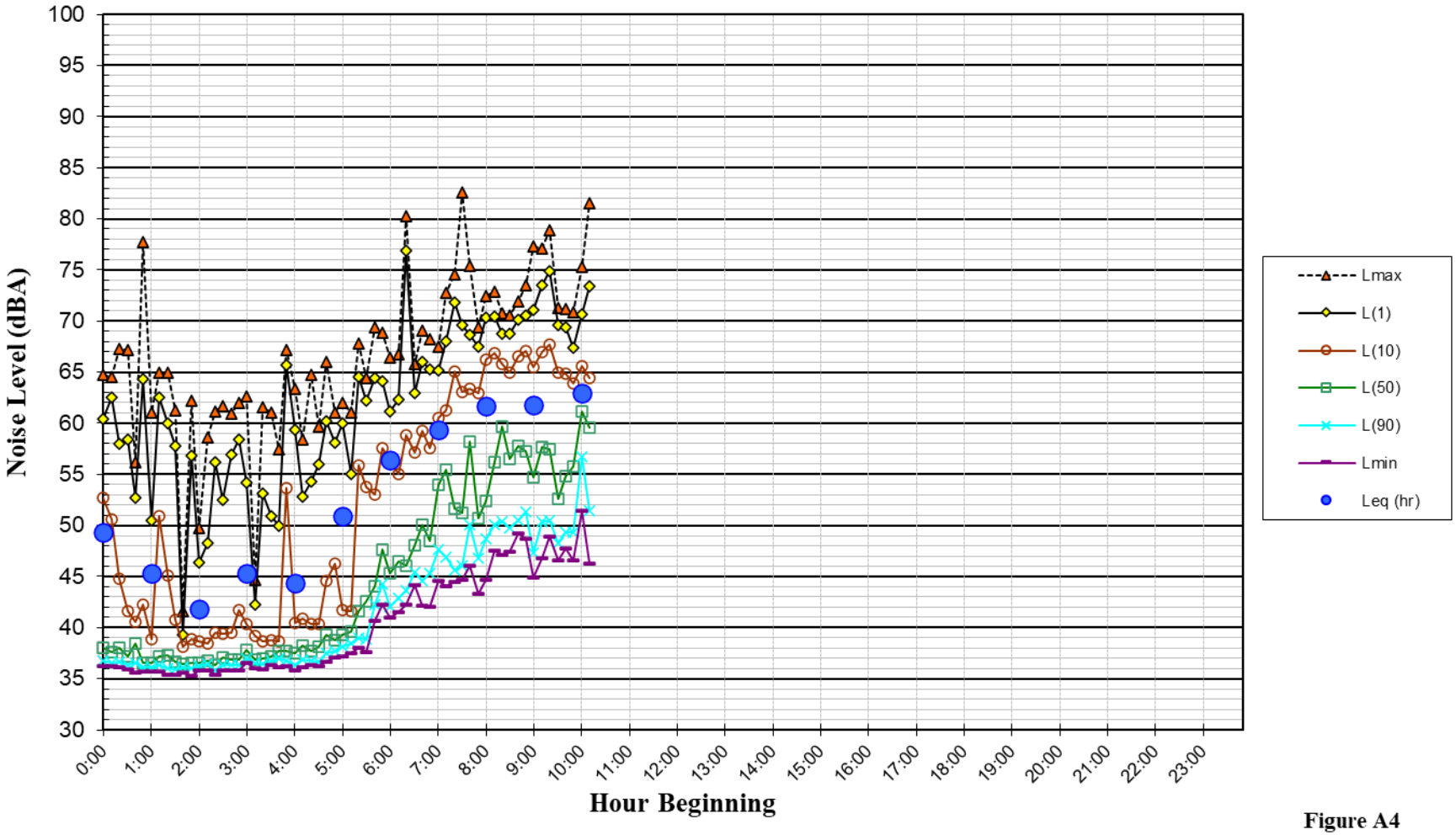


Figure A4

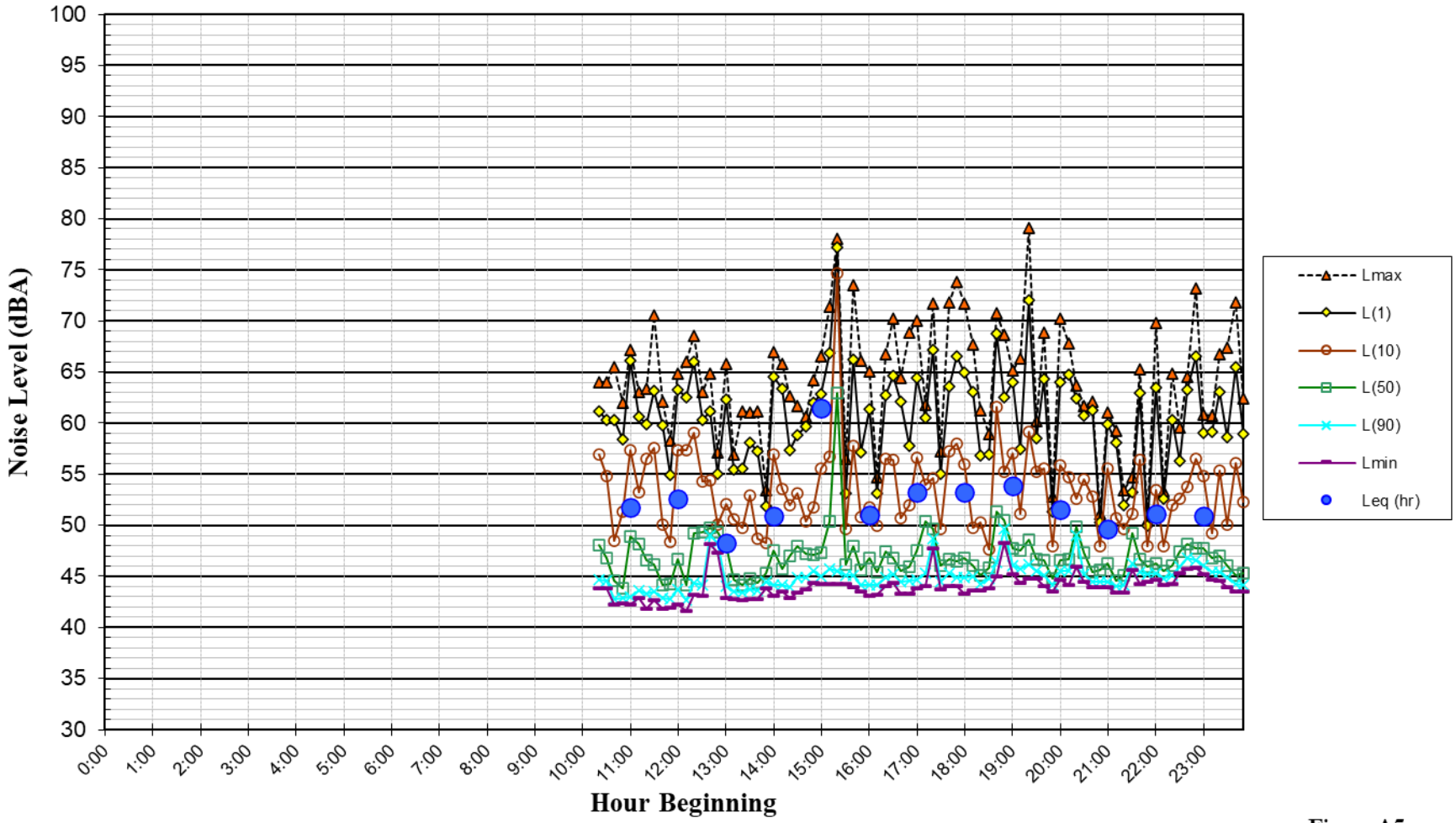

Noise Levels at Noise Measurement Site LT-2
Northernmost Corner of Project Site
Monday, April 1, 2024
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A5

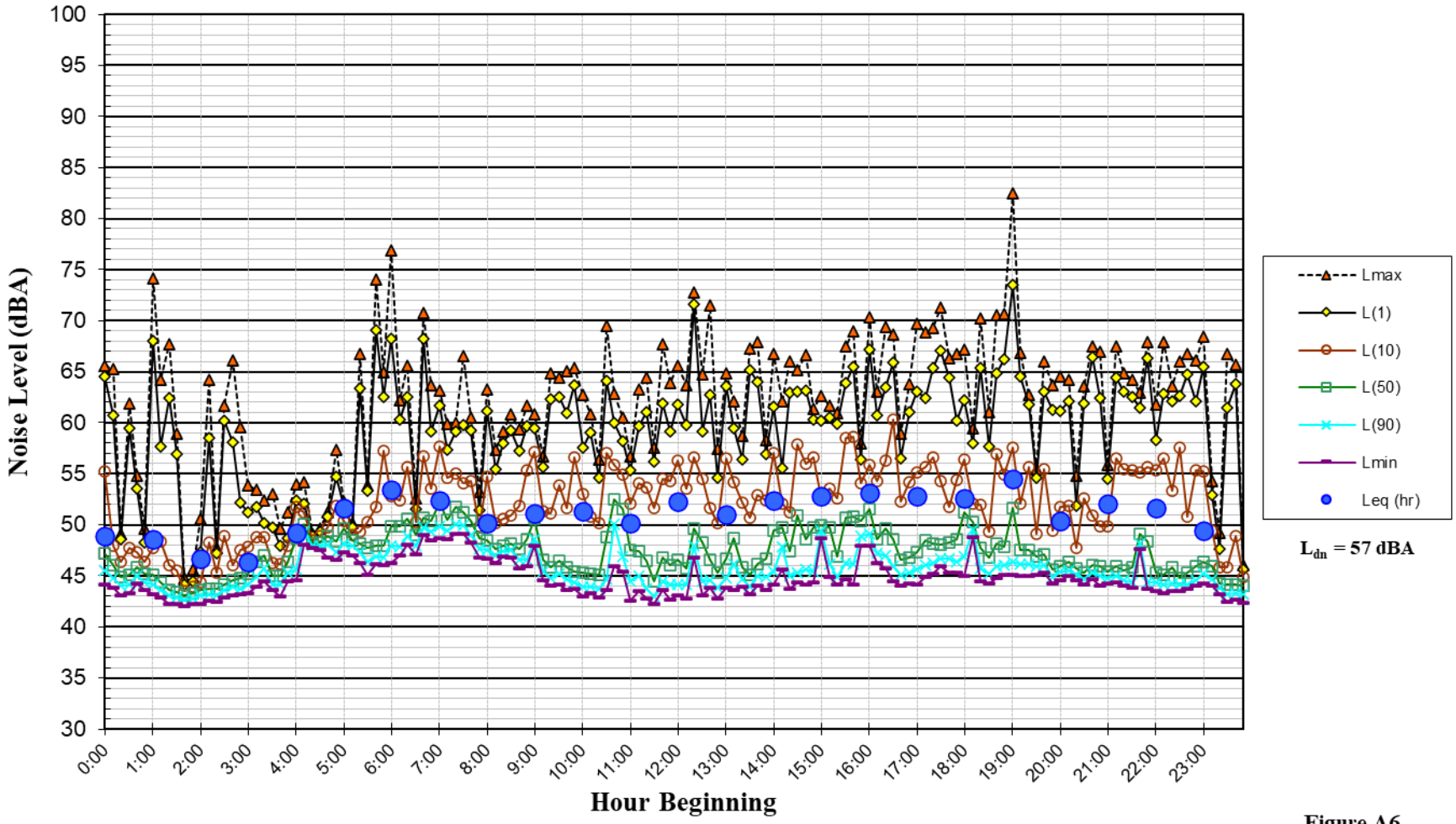

Noise Levels at Noise Measurement Site LT-2
Northernmost Corner of Project Site
Tuesday, April 2, 2024
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
L_{dn} = 57 dBA

Figure A6

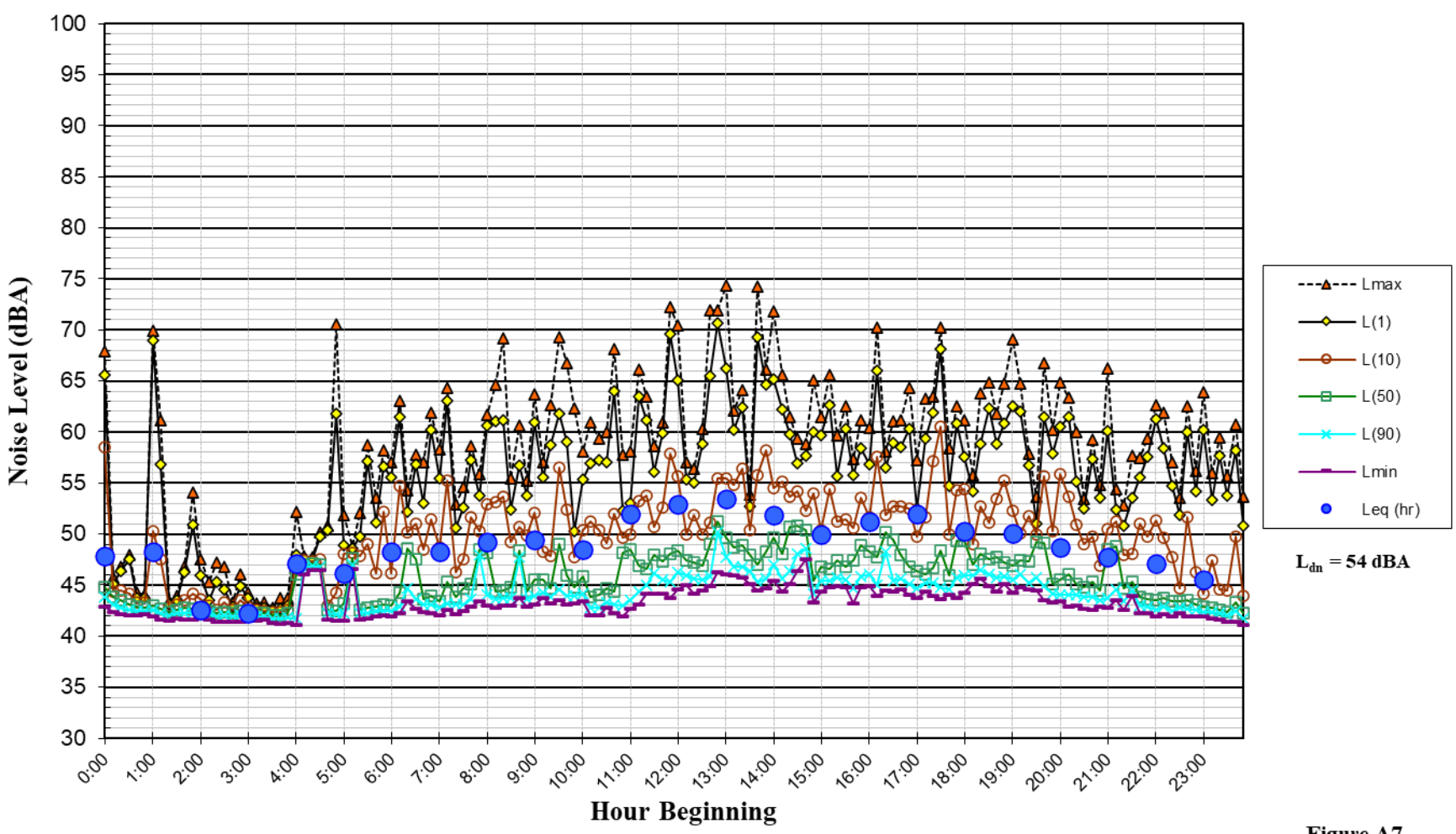

Noise Levels at Noise Measurement Site LT-2
Northernmost Corner of Project Site
Wednesday, April 3, 2024
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
Ldn = 54 dBA

Figure A7

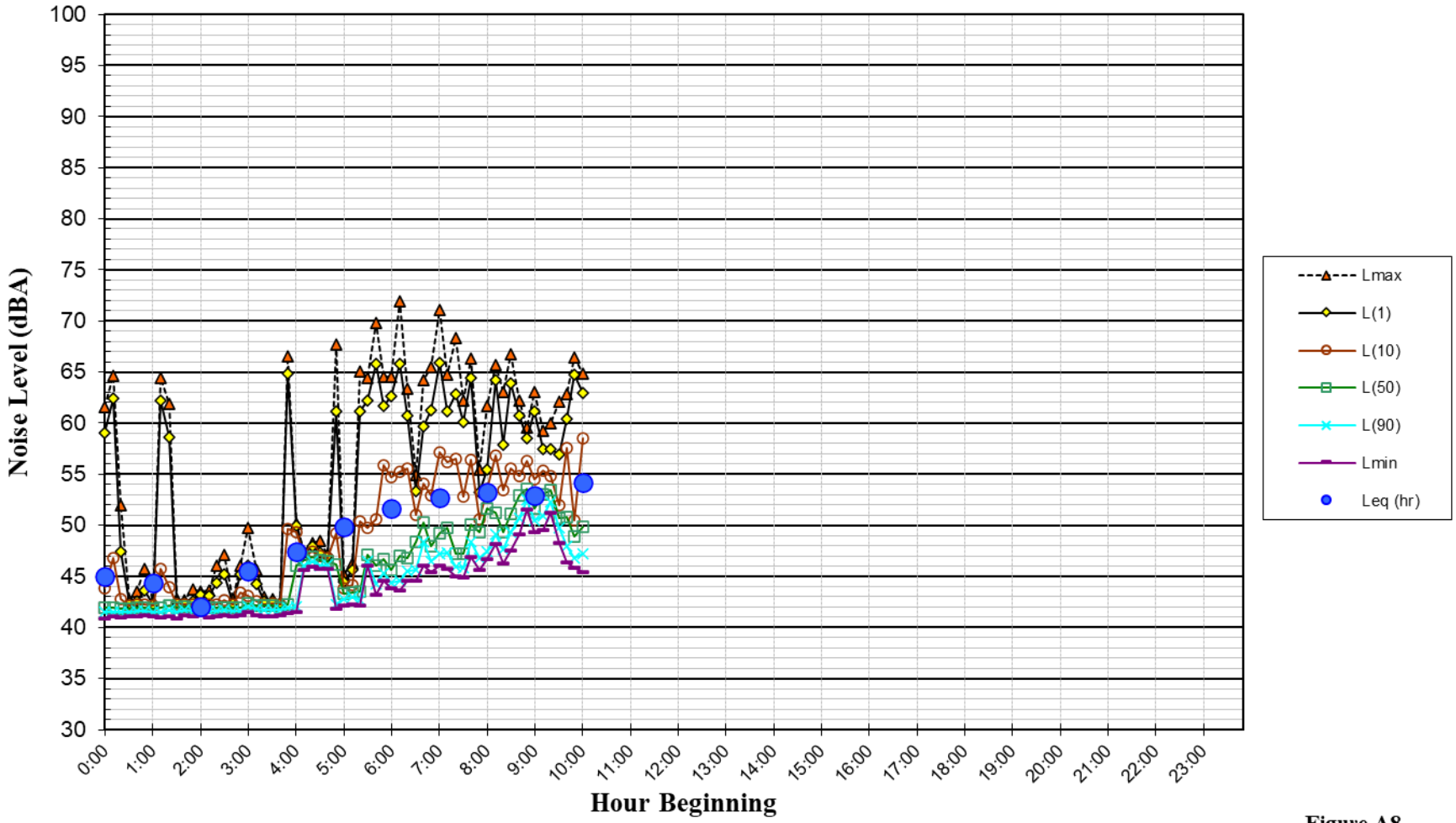

Noise Levels at Noise Measurement Site LT-2
Northernmost Corner of Project Site
Thursday, April 4, 2024
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure A8