ALAMEDA AQUATIC CENTER NOISE AND VIBRATION ASSESSMENT

Exhibit 6 Item 5-A
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INTRODUCTION

The project proposes an Aquatic Center on approximately 2.35 acres of undeveloped park land at the Jean Sweeney Open Space Park in Alameda, California. The proposed aquatic center would include an approximately 5,740-square-foot, one-story, L-shaped building and two outdoor pools (one 30-meter swimming pool and one activity pool). During events and competitions, the aquatic center would have amplified sound, and a permanent scoreboard, which would only be used during competitions, would be mounted on the pool storage.

There would be a perforated wind-wall around the exterior of the facility serving as the perimeter fencing. It would be a maximum height of 12 feet with vegetation planting along the base and would not be lighted.

The service enclosure/trash would be located in the parking lot to the east side. It would be serviceable from both sides and approximately 8 feet tall. There would be pool storage on the south side of the building.

The project proposes to provide lighting for the aquatic center through a combination of pole lighting, illuminated building signage, wall grazer lighting, recessed down lighting, wall mounted fixture lighting. All lighting would consist of down lights, and the pools would have lighting in the water. The building will have exterior low-level lighting along the perimeter and walkways leading to the entrance. Typical lighting would occur on the pool deck and in the pools during winter months and dusk hours.

A surface parking lot would be constructed to the west of the aquatic center with a total of 72 parking spaces. The adjacent parking lot to the north for the Peralta Community College District would accommodate 125 shared spaces for overflow parking. This parking would be available nights, weekends, and for special events.

The proposed aquatic center would be open seven days a week, except on City holidays. Proposed hours of operation are weekdays from 5:30 a.m. to 9:30 p.m.; Saturdays from 7:00 a.m. to 9:30 p.m.; and Sundays from 7:00 a.m. to 8:00 p.m. The primary uses of the aquatic center would be for swim lessons, practices, swim meets, and public swimming. A total of 180 spectator seats are proposed around the perimeter of the 30-meter pool. Typical regular hourly attendance is expected to be approximately 35 to 45 people. It is anticipated that the aquatic center would have approximately 100,000 to 150,000 visitors per year, with a daily average of 450 visitors and an hourly average of 37visitors.

Events would include swim meet competitions that would occur twice per year, with up to 500 visitors. The swim meet events are typically one to two days long and would take place primarily on weekends during the hours of 9:00 a.m. to 6:00 p.m. The swim meet events would have approximately eight to 10 teams with six to 10 members per team. Not all teams would be present at the same time but rather staggered throughout the day, with a maximum of 185 attendees on site at any given time. Most teams are expected to carpool or use vans.

The facility would also host smaller community events that would be held six to eight times per year, with approximately 100 people in attendance. These user events are community events, such as watching a movie in the pool, or holiday related, such as Halloween or Santa events. These events usually occur on Saturdays or Sundays between noon and 4:00 p.m., with approximately 100 people or less. Movies in the pool events would take place during operating hours in the evening. Water polo tournaments are not scheduled at this facility but may be requested by the School District if the District's pools are not available. Water polo games would include 10 to 12 players per team with approximately 20 spectators, or approximately 40 people per hour throughout a given day. These are typically one-to-two-day events that usually occur on weekends.

The facility would employ three full-time staff and would have part-time staff supporting programming. During the winter season, part-time staff numbers would range from five to 10 per day with three staff members on deck per hour per day. The summer part-time staffing would range from 20 to 30 per day, with 10 to 15 staff members on deck per hour.

This report evaluates the project's potential to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses ambient noise conditions in the project vicinity; and the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to mitigate project 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 the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

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

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.

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling.[1] Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} if the windows are closed.

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

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.

Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

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

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One 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.

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

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

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

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

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 which could 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.

Regulatory Background – Noise

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

Federal Government

Federal Transit Administration. The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[3] which limit daytime construction noise to 80 dBA L_{eq} at residential land uses, to 85 dBA L_{eq} at commercial and office uses, and to 90 dBA L_{eq} at industrial land uses.

State of California

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

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

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

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

Alameda County

Oakland International Airport: Airport Land Use Commission Compatibility Plan. The Airport Land Use Compatibility Plan was prepared for the Alameda County ALUC in December 2012, and included noise compatibility policies to prevent the development of noise-sensitive land uses in portions of the airport environ that are exposed to significant levels of aircraft noise. The compatibility of new nonresidential development with noise levels generated by the Airport is provided in Table 3-1.

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

TABLE 3-1

NOISE COMPATIBILITY CRITERIA

Land Use Category	Exterior Noise Exposure (dB CNEL)		
	60	65	70
Agricultural, Recreational, and Animal-Related			
Outdoor amphitheaters			
Zoos; animal shelters; neighborhood parks; playgrounds			
Regional parks; athletic fields; golf courses; outdoor spectator sports; water recreation facilities			
Nature preserves; wildlife preserves; livestock breeding or farming			
Agriculture (except residences and livestock); fishing			
Residential, Lodging, and Care			
Residential, (including single-family, multi-family, and mobile homes)*			
Residential hotels; retirement homes; hospitals; nursing homes; intermediate care facilities			
Hotels; motels; other transient lodging			
Public			
Schools; libraries			
Auditoriums; concert halls; indoor arenas; places of worship; cemeteries			
Commercial and Industrial			
Office buildings; office areas of industrial facilities; medical clinics; clinical laboratories; commercial - retail; shopping centers; restaurants; movie theaters			
Commercial - wholesale; research and development			
Industrial; manufacturing; utilities; public rights-of-way			

Land Use	Acceptability	Interpretation/Comments
	Compatible	*Indoor Uses*: Standard construction methods will sufficiently attenuate exterior noise to an acceptable indoor community noise equivalent level (CNEL). *Outdoor Uses*: Activities associated with the land use may be carried out with essentially no interference from aircraft noise. * The maximum acceptable noise exposure for new residential development in the vicinity of OAK is anything below 60 CNEL (see Policy 3.3.1.2 (b).)
	Conditional	*Indoor Uses*: Building structure must be capable of attenuating exterior noise to the indoor CNEL of 45 dB; standard construction methods will normally suffice. *Outdoor Uses*: CNEL is acceptable for outdoor activities, although some noise interference may occur; caution should be exercised with regard to noise-sensitive uses.
	Incompatible	*Indoor Uses*: Unacceptable noise interference if windows are open; at exposures above 65 dB CNEL, extensive mitigation techniques are required to make the indoor environment acceptable for performance of activities. *Outdoor Uses*: Severe noise interference makes outdoor activities unacceptable.

Source: ESA, 2007; *California Airport Land Use Compatibility Handbook* (Caltrans, 2002); PUC 21001 *et seq.*, California State Aeronautics Act.
Note: The layout of this table was created using the framework developed in previous compatibility plans (Mead & Hunt, 2006).

Source: Oakland International Airport, Airport Land Use Compatibility Plan, December 2010, Amended December 15, 2012.

City of Alameda

City of Alameda General Plan 2040. Chapter 6 of the City of Alameda General Plan 2040, which was amended in June 2022, includes policies and actions with the goal of maintaining an adequate noise environment in the City of Alameda. The following are applicable to this proposed project:

Objective 6. Protect Alameda residents from the harmful effects of exposure to excessive noise from aircraft, buses, boats, trucks and automobiles, and adjacent land uses.

Policy HS-41: **Support Policies to Reduce Transportation Noise.** Support state and federal legislation to reduce transportation noise from cars, trucks, and aircraft.

Policy HS-58: **Business Operations.** To the extent feasible, through the development entitlement process, require local businesses to reduce noise impacts on the community by avoiding or replacing excessively noisy equipment and machinery, applying noise-reduction technology, and following operating procedures that limit the potential for conflicts.

Policy HS-59: **Require Noise Reduction Strategies in All Construction Projects.** Require a vibration impact assessment for proposed projects in which heavy-duty construction equipment would be used (e.g. pile driving, bulldozing) within 200 feet of an existing structure or sensitive receptor. If applicable, the City shall require all feasible mitigation measures to be implemented to ensure that no damage to structures will occur and disturbance to sensitive receptors will be minimized.

Policy HS-60: **Significant CEQA Impacts.** In making a determination of impact under the California Environmental Quality Act (CEQA), consider the following impacts to be "significant" if the proposed project causes: an increase in the day-night average sound level (L_{dn}) of 4 or more dBA if the resulting noise level would exceed that described as normally acceptable for the affected land use, as indicated by State guidelines, or any increase in L_{dn} of 6 dBA or more.

City of Alameda Municipal Code. Chapter IV of the City's Municipal Code includes noise control regulations, and the following apply to the proposed project:

Chapter 4-10.4 – Exterior Noise Standards

b. Exterior noise levels when measured at any receiving single or multiple family residential, school, hospital, church, public library or commercial property situated in the City do not conform to the provisions of this subsection when they exceed the noise level standards set forth in Table I or Table II (Tables 4 and 5, respectively, in this report) following:

TABLE 4 Receiving Land Use Noise Level Standards, dB(A) – Single or Multiple Family Residential, School, Hospital, Church, or Public Library Properties

Category	Cumulative Number of Minutes in Any One (1) Hour Time Period	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
1[a]	30	55	50
2	15	60	55
3	5	65	60
4	1	70	65
5	0	75	70

[a] For example, this means the measured noise level may not exceed fifty-five (55) dB(A) for more than thirty (30) minutes out of any one (1) hour time period.

TABLE 5 Receiving Land Use Noise Level Standards, dB(A) – Commercial Properties

Category	Cumulative Number of Minutes in Any One (1) Hour Time Period	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
1[a]	30	65	60
2	15	70	65
3	5	75	70
4	1	80	75
5	0	85	80

c. In the event the measured ambient noise level exceeds the applicable noise level standard in any category above, the applicable standards shall be adjusted so as to equal said ambient noise level.

d. Each of the noise level standards specified above shall be reduced by five (5) dB(A) for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

Chapter 4-10.5 – Prohibited Acts

b. *Specific Provisions.* The following acts, and the causing or permitting thereof, are a violation of this section:

7. Loading and Unloading. Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of 10:00 p.m. and 7:00 a.m. in such a manner as to cause a noise disturbance across a residential real property line. This action shall not apply to such activities where the items handled are still in interstate commerce.

8. Vibration. Operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the

property boundary of the source if on private property or at one hundred fifty (150′) feet (forty-six [46] meters) from the source if on a public space or public right-of-way.

10. Construction. Construction other than during the following hours: 7:00 a.m. to 7:00 p.m. Monday through Fridays and 8:00 a.m. to 5:00 p.m. on Saturdays.

Chapter 4-10.7 – Special Provisions (Exceptions)

e. *Construction*. The provisions of this section shall not apply to noise sources associated with construction provided the activities take place between the hours of 7:00 a.m. to 7:00 p.m. Monday through Fridays or 8:00 a.m. to 5:00 p.m. on Saturdays.

i. *City Parks.* The provisions of this Chapter shall not apply to recreational programs or activities conducted within City parks between the hours of 9:00 a.m. and 10:15 p.m.

Existing Noise Environment

The Alameda Aquatic Center is proposed on the west side of Jean Sweeney Open Space Park, southeast of the Wilma Chan Way/Atlantic Avenue intersection, in the City of Alameda. The site is bound by Wilma Chan Way to the west; Atlantic Avenue to the north; single-family residences and small commercial uses to the south; and the park to the east. Other surrounding land uses include single-family residences and the Ismaili Cultural Center to the north, opposite Atlantic Avenue and multi-family residences and commercial uses to the west, opposite Wilma Chan Way.

The noise environment at the site and in the surrounding area results primarily from distant traffic along Webster Street and local traffic along Wilma Chan Way and Atlantic Avenue. Aircraft associated with Oakland International Airport also contributes to the noise environment.

A noise monitoring survey consisting of three long-term (LT-1 through LT-3) and three short-term (ST-1 through ST-3) noise measurements was made between Wednesday, January 15, 2025, and Friday, January 17, 2025. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made in front of 1850 8th Street, approximately 20 feet east of the centerline of the roadway. Hourly average noise levels at LT-1 typically ranged from 51 to 65 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 41 to 64 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Thursday, January 16, 2025, was 57 dBA L_{dn}. The daily trend in noise levels at LT-1 is shown in Figures A1 through A3 of Appendix A below.

LT-2 was made along Wilma Chan Way, approximately 35 feet east of the centerline. Hourly average noise levels at LT-2 typically ranged from 68 to 72 dBA L_{eq} during daytime hours and from 59 to 71 dBA L_{eq} during nighttime hours. The day-night average noise level on Thursday, January 16, 2025, was 73 dBA L_{dn}. The daily trend in noise levels at LT-2 is shown in Figures A4 through A6 of Appendix A.

FIGURE 1 Aerial Image of the Project Site and Surrounding Area with the Noise Measurement Locations Identified

Source: Google Earth, 2025.

LT-3 was made behind the residence at 2001 Bartlet Drive, approximately 60 feet north of the centerline of Atlantic Avenue. Hourly average noise levels at LT-3 typically ranged from 58 to 71 dBA L_{eq} during daytime hours and from 47 to 61 dBA L_{eq} during nighttime hours. The day-night average noise level on Thursday, January 16, 2025, was 65 dBA L_{dn}. The daily trend in noise levels at LT-2 is shown in Figures A7 through A9 of Appendix A.

Short-term, 10-minute noise measurements ST-1 through ST-3 were made on Wednesday, January 15, 2025, between 1:00 p.m. and 1:50 p.m. Table 6 summarizes the noise measurement results at each location.

ST-1 was made along the walking trail located on the project site, approximately 250 feet south of the Atlantic Avenue centerline and approximately 610 feet east of the Wilma Chan Way centerline. Background traffic noise from Atlantic Avenue consisted of 48 passenger vehicles (46 to 52 dBA) and four heavy trucks (50 to 54 dBA). Additionally, a jet flying overhead generated noise levels of 59 dBA. The 10-minute L_{eq} measured at ST-1 was 50 dBA.

ST-2 was made along the northern boundary of the project site, approximately 35 feet south of the Atlantic Avenue centerline. During the ST-2 measurement, traffic along Atlantic Avenue included one bus (66 dBA) and 58 passenger cars (63 to 72 dBA). Nearby train horns were audible at ST-2, generating noise levels of 52 to 54 dBA. Additionally, a helicopter (64 dBA) and jet (53 dBA) contributed to the noise measurement during ST-2. The 10-minute L_{eq} measured at ST-2 was 63 dBA.

ST-3 was made in the food bank parking lot, approximately 60 feet east of the Wilma Chan Way centerline. Traffic along Wilma Chan Way included 189 passenger cars (58 to 78 dBA). Traffic noise from nearby Atlantic Avenue generated noise levels ranging from 60 to 62 dBA at ST-3. A nearby train horn generated noise levels of 57 dBA at ST-3. The 10-minute L_{eq} measured at ST-3 was 64 dBA.

TABLE 6 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: walking trail roundabout at the park	1/15/2025, 13:00-13:10	60	55	52	50	49	50
ST-2: ~35 feet south of the Atlantic Avenue centerline	1/15/2025, 13:20-13:30	72	70	68	64	57	63
ST-3: ~60 feet east of the Wilma Chan Way centerline	1/15/2025, 13:40-13:50	78	71	69	64	61	64

IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA and provides a discussion of each project impact.

Significance Criteria

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

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

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

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

Impact 1a: **Temporary Construction Noise.** Noise-sensitive land uses surrounding the project site would be exposed to a temporary increase in ambient noise levels for a period exceeding one year. However, temporary construction noise levels are not expected to exceed FTA thresholds at the property lines of the nearest surrounding noise-sensitive land uses. With the incorporation of construction best management practices, the impact would be reduced to a **less-than-significant** level.

The project's construction schedule assumed that the earliest possible start date would be early November 2025 with completion by late May 2027 (a total construction period of about 20 months). The applicant proposes construction between 7:00 a.m. and 4:00 p.m. Construction phases would include demolition, site preparation, grading, trenching, building construction, architectural coating, and paving. 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 of time.

Chapter 4-10.5 of the City's Municipal Code limits construction work hours to between 7:00 a.m. and 7:00 p.m. Monday through Fridays and 8:00 a.m. to 5:00 p.m. on Saturdays.

While the City of Alameda does not establish noise level thresholds for construction activities, this analysis uses the noise limits established by the Federal Transit Administration (FTA) to identify the potential for impacts due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*. During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be applied at residential land uses, 85

dBA L_{eq} shall be applied at commercial and office uses, and 90 dBA L_{eq} shall be applied at industrial land uses.

Construction activities for individual projects are typically carried out in phases. 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. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 7) from the equipment.

Table 8 shows the hourly average noise level ranges, by construction phase, typical for various types of projects. Hourly average noise levels generated by construction typically are about 71 to 89 dBA L_{eq} for recreational facilities, measured at a distance of 50 feet from the center of a busy construction site. 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 often results in lower construction noise levels at distant receptors.

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

TABLE 7 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

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/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.

TABLE 8 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

Equipment expected to be used in each construction phase are summarized in Table 9, along with the quantity of each type of equipment and the reference noise level at 50 feet, assuming the operation of the two loudest pieces of construction equipment for each construction phase, per recommendation by the FTA.

TABLE 9 Construction Noise Levels for the Proposed Project at a Distance of 50 feet

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet, dBA L_{eq}
Demolition	20	Concrete/Industrial Saw (1)[a] Excavator (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)[a]	85
Site Preparation	10	Grader (1)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)[a]	84
Grading/Excavation	30	Excavator (2) Grader (1)[a] Rubber-Tired Dozer (1)[a]	83
Trenching/Foundation	20	Tractor/Loader/Backhoe (1)[a] Excavator (2)[a]	82
Building – Exterior	180	Forklift (3) Tractor/Loader/Backhoe (1)[a] Welder (2)[a]	82
Building – Interior/ Architectural Coating	100	Air Compressor (1)[a] Aerial Lift (2)[a]	75
Paving	20	Paving Equipment (1)[a] Roller (1) Tractor/Loader/Backhoe (1)[a]	84

[a] Denotes two loudest pieces of construction equipment per phase.

Temporary construction noise was also assessed at the receiving property lines of all existing receptors in the area that would have direct exposure to the project site. Table 10 summarizes the hourly average noise levels calculated for all construction equipment operating simultaneously in each phase for the proposed building construction when the source levels are positioned at the center of the project site and propagated to the receiving property lines. Noise levels in Table 10 do not assume reductions due to intervening buildings or existing barriers.

As shown in Tables 9 and 10, construction noise levels would intermittently range from 75 to 85 dBA L_{eq} at a distance of 50 feet from the operational equipment. Construction noise levels would range from 61 to 77 dBA L_{eq} at the nearest residential uses and the cultural center when activities are focused near the center of the proposed project site. Construction noise levels would range from 52 to 63 L_{eq} at the adjoining college building, from 52 to 71 dBA L_{eq} at the surrounding commercial and office buildings, and from 43 to 54 dBA L_{eq} at the park when activities are focused near the center of the proposed project site.

TABLE 10 Construction Noise Levels for the Proposed Project at the Receiving Property Lines in the Project Vicinity

	Calculated Hourly Average Noise Levels, L_{eq} (dBA)					
	South Res. & Comm. (275ft)	**West Alameda Food Bank (360ft)**	**West Comm. (500ft)**	**North Res. & Ismaili Cultural Center (145ft)**	**East College & Office Buildings (720ft)**	**East Park (2,035ft)**
Demolition	71	69	66	77	63	54
Site Preparation	70	67	65	75	61	52
Grading/ Excavation	70	67	64	75	61	52
Trenching/ Foundation	68	66	63	74	60	51
Building – Exterior	67	64	61	72	58	49
Building – Interior/ Architectural Coating	61	58	56	66	52	43
Paving	70	68	65	76	62	53

To minimize annoyance and disruption to all surrounding receptors, the following construction best management practices shall be incorporated into the proposed project as a condition of approval.

Construction Best Management Practices

Construction best management practices shall include, but are not limited to, the following:

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

- Prohibit unnecessary idling of internal combustion engines.

- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses.

- 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.

- Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.

- Designate a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

With the implementation of the above best management practices, construction noise levels would be reduced as much as possible at the surrounding receptors minimizing disruption and annoyance. Since the FTA thresholds are not expected to be exceeded during project construction, and with the understanding that construction activities would occur for a limited period of time, the temporary construction noise impact would be less-than-significant.

Mitigation Measure 1a: None required.

Impact 1b: **Permanent Noise Level Increase/Exceed Applicable Standards.** Operational noise levels would be exempt from the Municipal Code standards between 9:00 a.m. and 10:00 p.m., and noise outside of these hours would not exceed the Municipal Code standards. During swim meet tournaments that occur two weekends a year, noise levels would be substantially increased. This is a **potentially significant** impact.

According to Policy HS-60 of the City's General Code, a significant impact would occur if the proposed project causes: an increase of 4 dBA L_{dn} or more if the resulting noise level would exceed the normally acceptable limit for the affected land use; or any increase of 6 dBA L_{dn} or more.

Chapter 4-10.4 of the City's Municipal code provides exterior noise standards for noise-sensitive uses (i.e., residences, hospitals, churches, etc.) and commercial uses. For activities occurring for more than 30 minutes in a given hour, noise levels would be limited to 55 dBA L_{50} during daytime hours and 50 dBA L_{50} during nighttime hours for noise-sensitive uses and to 65 dBA L_{50} during daytime hours and 60 dBA L_{50} during nighttime hours for commercial uses. For activities occurring for more than five minutes in a given hour, noise levels would be limited to 65 dBA L_{08} during daytime hours and 60 dBA L_{08} during nighttime hours for noise-sensitive uses and to 75 dBA L_{08} during daytime hours and 70 dBA L_{08} during nighttime hours for commercial uses. Maximum instantaneous noise levels would be limited to 75 dBA L_{max} during daytime hours and 70 dBA L_{max} during nighttime hours for noise-sensitive uses and to 85 dBA L_{max} during daytime hours and 80 dBA L_{max} during nighttime hours for commercial uses.

Where ambient conditions exceed these standards, ambient noise levels would be used as the daytime and nighttime standards. Additionally, a 5 dBA penalty shall be applied to the daytime and nighttime standards when the noise source consists of simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Table 11 summarizes the applicable standards for the proposed project at each of the surrounding receptors.

Additionally, Chapter 4-10.7 of the Municipal Code includes exemptions for the standards in Table 11, which includes noise generated at recreational programs or activities conducted within City parks between the hours of 9:00 a.m. and 10:15 p.m.

TABLE 11 Standards Applied to Each of the Surrounding Receptors

Receptor	Ambient Meter	Daytime Standards			Nighttime Standards		
		More than 30 minutes, dBA L_{50}	More than 5 minutes, dBA L_{08}	Max. Level, dBA L_{max}	More than 30 minutes, dBA L_{50}	More than 5 minutes, dBA L_{08}	Max. Level, dBA L_{max}
South Residences	LT-1[a]	55	65	75	50	60	70
South Commercial Uses	LT-2[b]	68	75	85	60	70	83
West Alameda Food Bank	LT-2[b]	68	75	85	60	70	83
West Commercial Uses	LT-2[b]	68	75	85	60	70	83
North Residences	LT-3[c]	58	67	80	50	60	74
North Ismaili Cultural Center	LT-3[c]	58	67	80	50	60	74
East College	LT-3[c]	58	67	80	50	60	74
East Offices	LT-3[c]	65	75	85	60	70	80

[a] LT-1 represents the existing ambient noise environment at south residences. L_{50} noise levels at LT-1 typically range from 49 to 54 dBA L_{50} (average of 51 dBA L_{50}) during daytime hours and from 39 to 52 dBA L_{50} (average of 47 dBA L_{50}) during the nighttime hours; L_{08} noise levels typically range from 53 to 63 dBA L_{08} (average of 56 dBA L_{08}) during daytime hours and from 43 to 63 dBA L_{08} (average of 51 dBA L_{08}) during the nighttime hours; and L_{max} noise levels typically range from 65 to 92 dBA L_{max} (average of 72 dBA L_{max}) during daytime hours and from 53 to 91 dBA L_{max} (average of 65 dBA L_{max}) during the nighttime hours. Existing ambient L_{dn} at LT-1 is 57 dBA.

[b] LT-2 represents the existing ambient noise environment at south residences. L_{50} noise levels at LT-2 typically range from 65 to 69 dBA L_{50} (average of 68 dBA L_{50}) during daytime hours and from 47 to 66 dBA L_{50} (average of 55 dBA L_{50}) during the nighttime hours; L_{08} noise levels typically range from 73 to 77 dBA L_{08} (average of 75 dBA L_{08}) during daytime hours and from 61 to 76 dBA L_{08} (average of 69 dBA L_{08}) during the nighttime hours; and L_{max} noise levels typically range from 81 to 87 dBA L_{max} (average of 84 dBA L_{max}) during daytime hours and from 79 to 96 dBA L_{max} (average of 83 dBA L_{max}) during the nighttime hours. Existing ambient L_{dn} at LT-2 is 73 dBA.

[c] LT-3 represents the existing ambient noise environment at south residences. L_{50} noise levels at LT-3 typically range from 55 to 62 dBA L_{50} (average of 58 dBA L_{50}) during daytime hours and from 41 to 56 dBA L_{50} (average of 48 dBA L_{50}) during the nighttime hours; L_{08} noise levels typically range from 62 to 73 dBA L_{08} (average of 67 dBA L_{08}) during daytime hours and from 51 to 65 dBA L_{08} (average of 56 dBA L_{08}) during the nighttime hours; and L_{max} noise levels typically range from 73 to 91 dBA L_{max} (average of 80 dBA L_{max}) during daytime hours and from 67 to 84 dBA L_{max} (average of 74 dBA L_{max}) during the nighttime hours. Existing ambient L_{dn} at LT-1 is 65 dBA.

Project Traffic

The traffic study included peak hour turning movements for existing and existing plus project traffic volumes at four intersections in the vicinity of the project site. By comparing the existing plus project traffic scenario to the existing scenario, the project's contribution to the noise level increase was determined to be less than 1 dBA L_{dn} or less along each roadway segment in the project vicinity. The calculated increases are summarized in Table 12. Therefore, the project would not result in a measurable or detectable permanent noise increase at noise-sensitive receptors in the project vicinity.[4]

TABLE 12 Project-Generated Traffic Noise Level Increase

Roadway	Segment	Noise Level Increase, dBA L_{dn}
Atlantic Avenue	West of Wilma Chan Way	0
	Wilma Chan Way to Bartlett Drive	0
	Bartlett Drive to the project driveway	0
	Project driveway to Challenger Drive	0
	East of Challenger Drive	0
Wilma Chan Way	North of Atlantic Avenue	0
	South of Atlantic Avenue	0
Bartlett Drive	North of Atlantic Avenue	0
Challenger Drive	North of Atlantic Avenue	0

Mechanical Equipment

The northwestern building proposed at the site would contain mechanical equipment associated with the pool operations. Additionally, an enclosure containing a transformer is shown at the north end of the pool deck. All equipment located within the building and the transformer enclosure would be adequately shielded from all surrounding receptors. The City's daytime and nighttime standards, as well as the existing ambient noise level conditions, would not be exceeded. For all existing receptors in the project vicinity, the noise level increase due to fully enclosed mechanical equipment would not be measurable or detectable (0 dBA L_{dn} increase).

The roof of the mechanical equipment building would include two exhaust fans (EF), an HVAC rooftop unit (RTU), 25 pool heating heat-pump chillers (HP), and two heat pump water heaters (HPWH). The roof of the administration building shows two variable refrigerant volume condensing units (CU), one variable refrigerant flow HVAC unit (VRF), a gravity relief exhaust (GR), and a gravity intake vent (GI). The applicant provided specification sheets for all selected equipment expected at the project buildings, and the manufacturers' noise levels are used as source levels in this analysis:

4 The traffic study assumed events would have up to 800 daily visitors with up to 500 visitors at any time. With fewer visitors, the peak-hour traffic volumes would be less than analyzed assuming 800 visitors. Therefore, the updated visitor numbers would be less than assumed previously. This would remain a less-than-significant impact.

- Samsung DVM Heat Pump Chiller, Model Number AG015DSVAJG/AA (HP) – 61 dBA at 3 feet
- Greenheck Belt Drive Centrifugal Roof Exhaust Fan, Model Number GB-098-4 (EF) – 43 dBA (inlet) at 3 feet
- Greenheck HVAC Rooftop Unit, Model Number RVE-40-36D-5A-1-D2 (RTU) – 67 dBA at 3 feet
- Rheem Air to Water 135k BTUh Heat Pump, Model Number HPHD-135VNU-483 (HPWH) – 62 dBA at 10 feet
- Samsung DVM S Eco Series Heat Pump Condensing Unit, Model Number AM060MXMDCH/AA (CU) – 58 to 60 dBA at 3 feet
- Samsung DVM S2 Series Heat Recovery Condensing Unit, Model Number AM072BXVGJR/AA (VRF) – 54 dBA at 3 feet

Assuming both exhaust fans, the HVAC unit, all 25 heat pump chillers, and both heat pump water heaters located on the roof of the mechanical building operate simultaneously over a 24-hour period, the combined noise level would be 76 dBA L_{eq} at 3 feet, and the day-night average noise level would be 82 dBA L_{dn} at 3 feet. While source levels were not provided for the gravity relief exhaust and gravity intake vent located on the roof of the administration building, these units would be small and generate negligible noise. Assuming both heat pump condensing units and the heat recovery condensing unit located on the roof of the administration building operate simultaneously over a 24-hour period, the combined noise level would be up to 64 dBA L_{eq} at 3 feet, and the day-night average noise level would be 70 dBA L_{dn} at 3 feet.

The site plan shows parapet walls surrounding the rooftops that would be tall enough to break the line-of-sight to all surrounding receptors. These parapet walls would be solid from top to bottom with no cracks or gaps. It is assumed that walls would have a minimum surface weight of three lbs/ft^2. For all surrounding receptors, the parapet walls surrounding the rooftops and the elevation of the equipment would provide a minimum 10 dBA attenuation.

Table 13 summarizes the estimated noise levels at all surrounding receptors, assuming all equipment on the rooftops of both buildings operates continuously during daytime and nighttime hours. Conservatively, 10 dBA attenuation is applied to all noise levels in Table 13.

While the surrounding receptors are not subject to the City's standards between 9:00 a.m. and 10:15 p.m., the City noise standards would apply during morning hours before 9:00 a.m. and nighttime hours after 10:15 p.m.

The City's daytime and nighttime noise standards (see Table 11) would not be exceeded at the surrounding receptors. For all surrounding receptors, the noise level increase due to mechanical equipment operations would not be measurable or detectable (0 dBA L_{dn} increase).

TABLE 13 Operational Noise Levels Due to Rooftop Mechanical Equipment

Location of Equipment		**South Res. & Comm. Uses**	**West Alameda Food Bank**	**West Comm. Uses**	**North Res. & Ismaili Cultural Center**	**East College & Offices**
Mechanical Equipment Building	Distance from Center of Roof, feet	325	415	555	100	655
	L_{50}, dBA	25[a]	23[a]	21[a]	36[a]	< 20[a]
Admin Building	Distance from Center of Roof, feet	275	490	630	165	600
	L_{50}, dBA	< 20[a]	< 20[a]	< 20[a]	23[a]	< 20[a]
Combined	**L_{50}, dBA**	**26[a]**	**23[a]**	**21[a]**	**36[a]**	**< 20[a]**
	L_{dn}, dBA	**32[a]**	**30[a]**	**27[a]**	**42[a]**	**26[a]**
	Noise Level Increase, dBA L_{dn}	**0**	**0**	**0**	**0**	**0**

[a] A conservative 10 dBA attenuation is applied to all surrounding receptors due to the elevation of the equipment and the parapet walls surrounding the rooftops.

Pool Activities

The proposed Aquatics Center is expected to have approximately 35 to 45 people per hour during typical operations. Proposed hours of operation are from 5:30 a.m. to 9:30 p.m. Monday through Friday, 7:00 a.m. to 9:30 p.m. on Saturdays, and 7:00 a.m. to 8:00 p.m. on Sundays.

During swim meet competition events, up to 185 people would be at the aquatic center at any given time between 9:00 a.m. and 6:00 p.m. These events would occur up to twice a year. Smaller events would host up to 100 attendees six to eight times a year, with operating hours in the afternoon and evenings (i.e., between noon and 4:00 p.m. or between 7:00 p.m. and 10:00 p.m.). While water polo tournaments are not expected, water polo matches would include a maximum of 40 people per hour throughout a day for one-to-two days.

Illingworth & Rodkin, Inc. (I&R) has monitored noise levels at existing aquatic facilities in the Bay Area that would represent activities proposed at the Alameda Aquatic Center. In August 2006, noise measurements were made at the Ridgway Pool in Santa Rosa, California, as part of the Calistoga Pool Facility Project.[5] The Ridgway Pool has a 25-yard lap pool with nine lanes for competition and a 35-by-50-foot recreational pool with a water feature and a 20-foot slide. Since the dominant noise source at the recreational pool was from the water feature, these source levels were not used for this project; however, measurements were made at the competition pool when public swimming did not occur (i.e., the water feature was off). Activities at the competition pool included Masters Swimming, lap swimming, and practices by the Neptune Swim Team. Masters swimming and lap swimming typically generated average noise levels ranging from 50 to 57 dBA at 115 feet, with maximum noise levels up to 70 dBA. These source levels are used in this assessment for lap swimming activities.

In August 2003, I&R made measurements at the Petaluma Swim Center,[6] which consists of one large T-shaped pool that is 50 meters long by 25 yards wide in the deeper end and about 20 yards wide at the shallow end. During busy periods, the attendance was as high as 200 people, which is more than the expected number of visitors at the Alameda Aquatic Center. While recreational swim produced noise levels that ranged from 66 to 67 dBA at about 100 feet, these source levels were adjusted for the worst-case attendance expected at the Alameda Aquatic Center, which is up to 45 people per hour on a typical day. For purposes of this study, recreational swim is expected to produce noise levels that would range from 60 to 61 dBA at 100 feet. Lifeguards would likely have whistles, which means maximum noise levels would be up to 80 dBA at 100 feet. Noise levels generated by swim lessons were also measured at Petaluma Swim Center. Noise from swim lessons ranged from about 55 to 58 dBA at 100 feet.

A noise survey completed by *I&R* at the Spieker Pool on Bancroft Way on February 7, 2013[7] established noise levels resulting from water polo practices (splashing, yelling, occasional whistles) and a dual swim meets (PA system, splashing, and yelling). While the swim meet had an attendance of 500 spectators, the noise levels were adjusted to accommodate the maximum of 185 spectators expected at Alameda Aquatic Center. The women's water polo practice generated noise levels of 68 dBA at 100 feet, with maximum noise levels due to whistles up to 80 dBA. During a swim meet

[5] Final Noise Study Calistoga Pool Facility, Calistoga, CA, Illingworth & Rodkin, Inc., February 26, 2007.

[6] Los Altos Aquatic Center Noise Study, Los Altos, CA, Illingworth & Rodin, Inc., November 25, 2003.

[7] Cal Aquatics Facility, Noise and Vibration Assessment, Berkeley, CA, Illingworth & Rodkin, Inc., February 7, 2013.

with up to 500 spectators, average noise levels typically reached 77 dBA, with maximum noise levels reaching 87 dBA at a distance of 100 feet. When adjusted for 185 attendees, typical average noise levels would be about 73 dBA at 100 feet.

Additionally, noise source levels collected by *I&R* at similar neighborhood parks, which would occur during the smaller events at proposed aquatics center (i.e., movie nights or holiday events) would include:

- Amplified sound – average hourly noise levels of 72 dBA L_{eq} at a distance of 50 feet from the speakers; and
- Local events and gatherings – average hourly noise levels of 59 dBA L_{eq} at a distance of 50 feet from the center of the gatherings for events with up to 100 people.

This analysis considers four worst-case scenarios: typical daily activities, swim meet competition tournaments, days with smaller events, and potentially days with water polo tournaments if the local high schools are unable to host their tournaments, which is not expected at this time. Each of these scenarios are discussed below.

Typical Daily Activities

On typical days, the facility will support swim team practices, open lap swim, swim lessons, and open family swim. A typical day would include the following activities:

- Between 5:30 a.m. and 7:00 a.m., when all activities would be subject to the City's nighttime thresholds summarized in Table 11, swim team practice or lap swimming would occur at the 30-meter pool;
- Between 7:00 a.m. and 9:00 a.m., when all activities would be subject to the City's daytime thresholds summarized in Table 11, swim team practice or lap swimming would occur at the 30-meter pool;
- Between 9:00 a.m. and 10:00 a.m., when all activities would be exempt from City thresholds, in accordance with Chapter 4-10.7 of the City's Municipal Code, swim team practice or lap swimming would occur at the 30-meter pool and swim lessons would occur at the recreational pool;
- Between 10:00 a.m. and 10:00 p.m., when all activities would be exempt from City thresholds, in accordance with Chapter 4-10.7 of the City's Municipal Code, lap swimming would occur at the 30-meter pool and swim lessons and open swim would occur at the recreational pool.

Table 14 summarizes the expected L_{50} and L_{max} noise levels for each time period described above propagated to the nearest property lines of the surrounding receptors, as well as the total L_{dn} generated by the proposed aquatics center activities on typical days and the future L_{dn} expected at the surrounding receptors when the project is operational. The facility's buildings would be located to the east of both pools and to the north of the recreational pool. The buildings would provide a minimum attenuation of 10 dBA for the east receptors during all activities at the pool deck and for the north receptors for activities occurring at the recreational pool. Additionally, the pool storage area on the north side of the pool would have a 10-foot-tall corrugated solid metal panel fence along the north side, which would be attached to the facility's building by a gate. Assuming the

TABLE 14 Operational Noise Levels for the Aquatics Center on Typical Days

Pool Activity		South Res. & Comm. Uses	West Alameda Food Bank	West Comm. Uses	North Res. & Ismaili Cultural Center	East College & Offices
Lap Swim/ Swim Practice (5:30 a.m. to 9:00 a.m.)	Dist., feet	255[a]	300[a]	445[a]	175[a]	770[a]
	L_{max}, dBA	63	62	58	57[b]	44[c]
	L_{50}, dBA	50	49	45	44[b]	31[c]
Lap Swim/Swim Practice & Swim Lessons (9:00 a.m. to 10:00 a.m.)	Dist., feet	255[a,d]	300[a] 405[d]	445[a] 555[d]	175[a] 180[d]	770[a] 675[d]
	L_{max}, dBA	63	62	58	57[b]	44[c]
	L_{50}, dBA	53	51	47	47[b,c]	34[c]
Lap Swim/Swim Practice, Swim Lessons & Recreational Swim (10:00 a.m. to 10:00 p.m.)	Dist., feet	255[a,d]	300[a] 405[d]	445[a] 555[d]	175[a] 180[d]	770[a] 675[d]
	L_{max}, dBA	72	68	65	65[c]	53[c]
	L_{50}, dBA	56	53	50	49[b,c]	37[c]
Combined	**Operational L_{dn}, dBA[e]**	**55**	**52**	**49**	**48**	**36**
	Future L_{dn}, dBA[f]	**59**	**73**	**73**	**65**	**65**
	Noise Level Increase, dBA L_{dn}	**2**	**0**	**0**	**0**	**0**

[a] Distance measured from the center of lap pool, which represents the center of the combined noise source.
[b] A conservative 9 dBA attenuation is applied for the north receptors due to the 10-foot solid corrugated fence along the north side of the pool storage area, which partially shields the lap pool.
[c] A conservative 10 dBA attenuation is applied for the north and east receptors due to the intervening project buildings, which partially shields the recreational pool for the north receptors and both pools for the east receptors.
[d] Distance measured from the center of recreational pool, which represents the center of the combined noise source.
[e] Operational L_{dn} is generated by typical daily operations at the Alameda Aquatic Center.
[d] Future L_{dn} is calculated by adding the Operational L_{dn} to the existing ambient L_{dn} at each of the receptors.

fence and gates (when closed) to be solid from ground to top, the fence would provide a minimum attenuation of 9 dBA for lap pool activities at the north receptors. These attenuations are applied in Table 14.

The City's nighttime noise standards (see Table 11) would not be exceeded by lap swimming occurring between 5:30 a.m. and 7:00 a.m. at the surrounding receptors. The City's daytime noise standards (see Table 11) would not be exceeded by lap swimming and swim lessons occurring between 7:00 a.m. and 9:00 a.m. at the surrounding receptors. All combined activities at the Alameda Aquatic Center on a typical day (i.e., lap swimming, swim lessons, and recreational swim) would be exempt from the City's noise standards between 9:00 a.m. and 10:15 p.m.

Typical daily activities would result in a 2 dBA L_{dn} increase in noise levels at the south residences, which would not exceed the City's 4 dBA L_{dn} threshold. For all other receptors, the noise level increase due to the Aquatics Center typical daily activities would not be measurable or detectable (0 dBA L_{dn} increase).

Swim Meet Tournaments

The swim meet events would typically be one to two days long and would take place primarily on weekends between 9:00 a.m. and 6:00 p.m. The swim meet events would have approximately eight to 10 teams with six to 10 members per team. Not all teams would be present at the same time but rather staggered throughout the day, with a maximum of 185 attendees on site at any given time.

Table 15 summarizes the worst-case L_{50} and L_{max} noise levels, the operational L_{dn}, the future L_{dn}, and the estimated noise level increase during the swim meet tournaments when noise levels are propagated to the property lines of the surrounding receptors. The facility's buildings and pool storage fence would provide a minimum attenuation of 10 dBA for the east receptors and a minimum attenuation of 9 dBA for the north receptors. This attenuation is applied in Table 15.

Since park activities are not subject to the City's standards between 9:00 a.m. and 10:15 p.m., swim meet tournaments at the facility would be exempt from the City standards. The noise level increase during days with swim meet tournaments would result in a 5 dBA L_{dn} increase at the south residences, which would exceed the City's 4 dBA L_{dn} threshold. For all other receptors, the noise level increase on days with swim meet tournaments would not be measurable or detectable (0 dBA L_{dn} increase).

Small Events

The facility would host smaller community events six to eight times per year, with approximately 100 people in attendance. These community events would include movie in the pool events (occurring during operating hours in the evening) or holiday related, such as Halloween or Santa events (occurring on Saturdays or Sundays between noon and 4:00 p.m.). Table 16 summarizes the worst-case L_{50} and L_{max} noise levels, the operational L_{dn}, the future L_{dn}, and the estimated noise level increase during small events propagated to the property lines of the surrounding receptors, assuming a minimum attenuation of 10 dBA for the east receptors and 9 dBA at the north receptors.

TABLE 15 Operational Noise Levels for the Aquatics Center during Swim Meet Tournaments

Pool Activity		South Res. & Comm. Uses	West Alameda Food Bank	West Comm. Uses	North Res. & Ismaili Cultural Center	East College & Offices
Swim Meet Tournaments	Dist., feet	255[a]	300[a]	445[a]	175[a]	770[a]
	L_{max}, dBA	75	73	70	69[b]	55[c]
	L_{50}, dBA	65	63	60	59[b]	45[c]
	Operational L_{dn}, dBA[d]	60	59	56	55	41
	Future L_{dn}, dBA[e]	62	73	73	65	65
	Noise Level Increase, dBA L_{dn}	5	0	0	0	0

[a] Distance measured from the center of lap pool, which represents the center of the combined noise source.
[b] A conservative 9 dBA attenuation is applied for the north receptors due to the 10-foot solid corrugated fence along the north side of the pool storage area, which partially shields the lap pool.
[c] A conservative 10 dBA attenuation is applied for the north and east receptors due to the intervening project buildings, which partially shields the recreational pool for the north receptors and both pools for the east receptors.
[d] Operational L_{dn} is generated by swim meet tournament operations at the Alameda Aquatic Center.
[e] Future L_{dn} is calculated by adding the Operational L_{dn} to the existing ambient L_{dn} at each of the receptors.

TABLE 16 Operational Noise Levels for the Aquatics Center during Small Events

Pool Activity		South Res. & Comm. Uses	West Alameda Food Bank	West Comm. Uses	North Res. & Ismaili Cultural Center	East College & Offices
Local Events with up to 100 visitors	Dist., feet	270[a]	455[a]	600[a]	170[a]	630[a]
	L_{50}, dBA	45	40	38	40[b]	27[c]
	Operational L_{dn}, dBA[d]	37	32	30	32[b]	< 20[c]
	Future L_{dn}, dBA[e]	57	73	73	65	65
	Noise Level Increase, dBA L_{dn}	0	0	0	0	0
Amplified Sound	Dist., feet	270[a]	455[a]	600[a]	170[a]	630[a]
	L_{50}, dBA	57	53	50	52[b]	40[c]
	Operational L_{dn}, dBA[d]	50	45	43	45[b]	32[c]
	Future L_{dn}, dBA[e]	58	73	73	65	65
	Noise Level Increase, dBA L_{dn}	1	0	0	0	0

[a] Distance measured from the center of pool deck, which represents the center of the combined noise source.
[b] A conservative 9 dBA attenuation is applied for the north receptors due to the 10-foot solid corrugated fence along the north side of the pool storage area, which partially shields the lap pool.
[c] A conservative 10 dBA attenuation is applied for the north and east receptors due to the intervening project buildings, which partially shields the recreational pool for the north receptors and both pools for the east receptors.
[d] Operational L_{dn} is generated by small event operations at the Alameda Aquatic Center.
[e] Future L_{dn} is calculated by adding the Operational L_{dn} to the existing ambient L_{dn} at each of the receptors.

The L_{50} standards summarized in Table 11 would be exceeded at the south residences during the small events using amplified sound. Since all park activities are not subject to the City's standards between 9:00 a.m. and 10:15 p.m., small community events at the facility would be exempt from the City standards.

The noise level increase during small gatherings would not be measurable or detectable (i.e., 0 dBA L_{dn} increase). The use of amplified sound would result in a noise level increase of 1 dBA L_{dn} at the south residences, which would not exceed the City's 4 dBA L_{dn} threshold. For all other receptors, the noise level increase due to amplified sound would not be measurable or detectable (0 dBA L_{dn} increase).

(Potential) Water Polo Tournaments

Water polo tournaments are not scheduled at this facility but may be requested by the School District if the District's pools are not available. Water polo games would include 10 to 12 players per team with approximately 20 spectators, or approximately 40 people per hour. This typical attendance is assumed each hour between 9:00 a.m. and 6:00 p.m. for one to two days on weekends.

Table 17 summarizes the worst-case L_{50} and L_{max} noise levels, the operational L_{dn}, the future L_{dn}, and the estimated noise level increase during the potential water polo tournaments propagated to the property lines of the surrounding receptors. The facility's buildings and pool storage fence would provide a minimum attenuation of 10 dBA for the east receptors and 9 dBA for the north receptors. This attenuation is applied in Table 17.

The L_{50} standards summarized in Table 11 would be exceeded at the south residences during water polo tournaments. Since all park activities are not subject to the City's standards between 9:00 a.m. and 10:15 p.m., potential water polo tournaments at the facility would be exempt from the City standards.

The noise level increase during days with water polo tournaments would result in a 2 dBA L_{dn} increase at the south residences, which would not exceed the City's 4 dBA L_{dn} threshold. For all other receptors, the noise level increase due to the water polo tournaments would not be measurable or detectable (i.e., 0 dBA L_{dn} increase) at the other surrounding receptors.

TABLE 17 Operational Noise Levels for the Aquatics Center during Potential Water Polo Tournaments

Pool Activity		South Res. & Comm. Uses	West Alameda Food Bank	West Comm. Uses	North Res. & Ismaili Cultural Center	East College & Offices
(Potential) Water Polo Tournaments	Dist., feet	255[a]	300[a]	445[a]	175[a]	770[a]
	L_{max}, dBA	79	78	74	73[b]	59[c]
	L_{50}, dBA	58	57	53	52[b]	38[c]
	Operational L_{dn}, dBA[d]	54	52	49	48[b]	34[c]
	Future L_{dn}, dBA[e]	59	73	73	65	65
	Noise Level Increase, dBA L_{dn}	2	0	0	0	0

[a] Distance measured from the center of the lap pool, which represents the center of the combined noise source.
[b] A conservative 9 dBA attenuation is applied for the north receptors due to the 10-foot solid corrugated fence along the north side of the pool storage area, which partially shields the lap pool.
[c] A conservative 10 dBA attenuation is applied for the north and east receptors due to the intervening project buildings, which partially shields the recreational pool for the north receptors and both pools for the east receptors.
[d] Operational L_{dn} is generated (potential) water polo tournament operations at the Alameda Aquatic Center.
[e] Future L_{dn} is calculated by adding the Operational L_{dn} to the existing ambient L_{dn} at each of the receptors.

Truck Loading and Unloading

While the site plan does not show loading zones, concessions at the Aquatics Center would require regular deliveries. It is assumed that loading and unloading activities would occur at the trash enclosures and along the curb of Atlantic Avenue.

Truck maneuvering noise would include a combination of engine, exhaust, and tire noise, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air brakes. For uses such as the Aquatics Center, medium-sized delivery and trash trucks would be expected. Medium-sized delivery trucks typically generate maximum noise levels of 60 to 65 dBA at 50 feet. The noise level of backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA at a distance of 50 feet.

For all loading and unloading activities, including trash pickup, truck maneuvering would take up to five minutes per delivery. It is assumed that the proposed project would be in accordance with Chapter 4-10.5 of the City's Municipal Code, which prohibits loading and unloading activities between the hours of 10:00 p.m. and 7:00 a.m. Therefore, the daytime L_{08} standards provided in Table 11 for each receptor would apply to this noise source.

Table 18 summarizes expected noise levels generated by typical truck deliveries at the surrounding receptors. All noise levels in Table 18 are unattenuated.

Based on the estimated noise levels in Table 18, truck loading/unloading activities would not exceed the City's L_{08} or L_{50} daytime standards, which are summarized in Table 11. For all existing receptors, the noise level increase due to truck loading/unloading activities would not be measurable or detectable (0 dBA L_{dn} increase).

TABLE 18 Operational Noise Levels for Truck Loading and Unloading Activities at the Aquatics Center

Truck Loading and Unloading Activity		**South Res. & Comm. Uses**	**West Alameda Food Bank**	**West Comm. Uses**	**North Res. & Ismaili Cultural Center**	**East College & Offices**
Street Loading Zone	Dist., feet	350[a]	375[a]	510[a]	65[a]	610[a]
	L_{08}, dBA	43 to 48	43 to 48	40 to 45	58 to 63	38 to 43
	L_{50}, dBA	37 to 40	37 to 40	34 to 37	52 to 55	33 to 36
Trash Enclosure Area	Dist., feet	320[b]	815[b]	960[b]	240[b]	275[b]
	L_{08}, dBA	44 to 49	36 to 41	34 to 39	46 to 51	45 to 50
	L_{50}, dBA	38 to 41	30 to 33	29 to 32	41 to 44	39 to 42
Combined	**L_{08}, dBA**	**Up to 52**	**Up to 48**	**Up to 46**	**Up to 63**	**Up to 51**
	L_{50}, dBA	**Up to 44**	**Up to 41**	**Up to 38**	**Up to 55**	**Up to 43**
	Operational L_{dn}, dBA[c]	**30**	**27**	**24**	**41**	**29**
	Future L_{dn}, dBA[d]	**57**	**73**	**73**	**65**	**65**
	Noise Level Increase, dBA L_{dn}	**0**	**0**	**0**	**0**	**0**

[a] Distance measured from the center of the street loading zone, which represents the center of the combined noise source.
[b] Distance measured from the center of the trash enclosure loading zone, which represents the center of the combined noise source.
[c] Operational L_{dn} is generated by typical daily operations at the Alameda Aquatic Center.
[d] Future L_{dn} is calculated by adding the Operational L_{dn} to the existing ambient L_{dn} at each of the receptors.

Total Combined Project-Generated Noise

Operational L_{50} and L_{max} noise levels due to project-generated activities (i.e., traffic, mechanical equipment, typical daily activities, swim meets, small events, potential water polo matches, and truck loading/unloading) would be exempt from City's standards between 9:00 a.m. and 10:15 p.m., and activities occurring between 5:30 a.m. and 9:00 a.m. on typical days would not exceed the City's noise standards summarized in Table 11 at the surrounding receptors.

For all existing receptors in the project vicinity, the noise level increase due to project traffic, mechanical equipment, truck loading/unloading, typical daily activities, small events, and (potential) water polo tournaments would result in a permanent noise level increase of 2 dBA L_{dn} or less.

During swim meet tournaments, the noise level increase would potentially be up to 5 dBA L_{dn} at the south residences. However, this increase would occur for a maximum of four days per year. While this would be a significant increase, it would not be considered a permanent noise increase since the majority of the year, surrounding receptors would not be subject to an increase more than 2 dBA L_{dn} over existing ambient conditions. Therefore, this would be a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 2: Exposure to Excessive Groundborne Vibration. Construction-related vibration levels would not exceed applicable vibration thresholds at nearby sensitive land uses. This is a **less-than-significant** impact.

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include demolition, site preparation work, foundation work, and new building framing and finishing. Pile driving equipment, which can cause excessive vibration, is not expected to be required for the proposed project.

The California Department of Transportation (Caltrans) recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, which typically consist of buildings constructed since the 1990s. Conservative vibration limits of 0.3 in/sec PPV has been used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 3 for further explanation). For historical buildings and some old buildings, a vibration limit of 0.25 in/sec PPV would apply, and for ruins or ancient monuments, a cautious vibration limit of 0.08 in/sec PPV is often used to provide the highest level of protection. No historical buildings, ancient monuments or ruins have been identified within 200 feet of the project. Conservatively, the 0.3 in/sec PPV threshold would be applied for all structures in the project vicinity.

Table 19 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers

TABLE 19 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.3 in/sec PPV (feet)
Clam shovel drop		0.202	18
Hydromill (slurry wall)	in soil	0.008	1
	in rock	0.017	2
Vibratory Roller		0.210	19
Hoe Ram		0.089	9
Large bulldozer		0.089	9
Caisson drilling		0.089	9
Loaded trucks		0.076	8
Jackhammer		0.035	4
Small bulldozer		0.003	<1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., January 2025.

typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 19 also summarizes the distances to the 0.3 in/sec PPV threshold for older conventional buildings located 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. While construction noise levels increase based on the cumulative equipment in use simultaneously, construction vibration levels would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor sharing that property line. Further, construction vibration impacts are assessed based on damage to buildings on receiving land uses, not receptors at the nearest property lines.

The nearest off-site building would be the nearest residence to the north, which would be approximately 70 feet from the northern property line of the project site. When construction equipment is used along the northern property line, vibration levels would be below 0.07 in/sec PPV. All other buildings in the project vicinity would be 100 feet or more from the project site and would be exposed to construction vibration levels below 0.05 in/sec PPV. Therefore, vibration due to construction activities at the project site would be well below the 0.3 in/sec PPV threshold for conventional buildings. This would be a less-than-significant impact.

Neither cosmetic, minor, or major damage would occur at buildings located 30 feet or more from the project site. At these locations, and in other surrounding areas where vibration would not be

expected to cause cosmetic damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

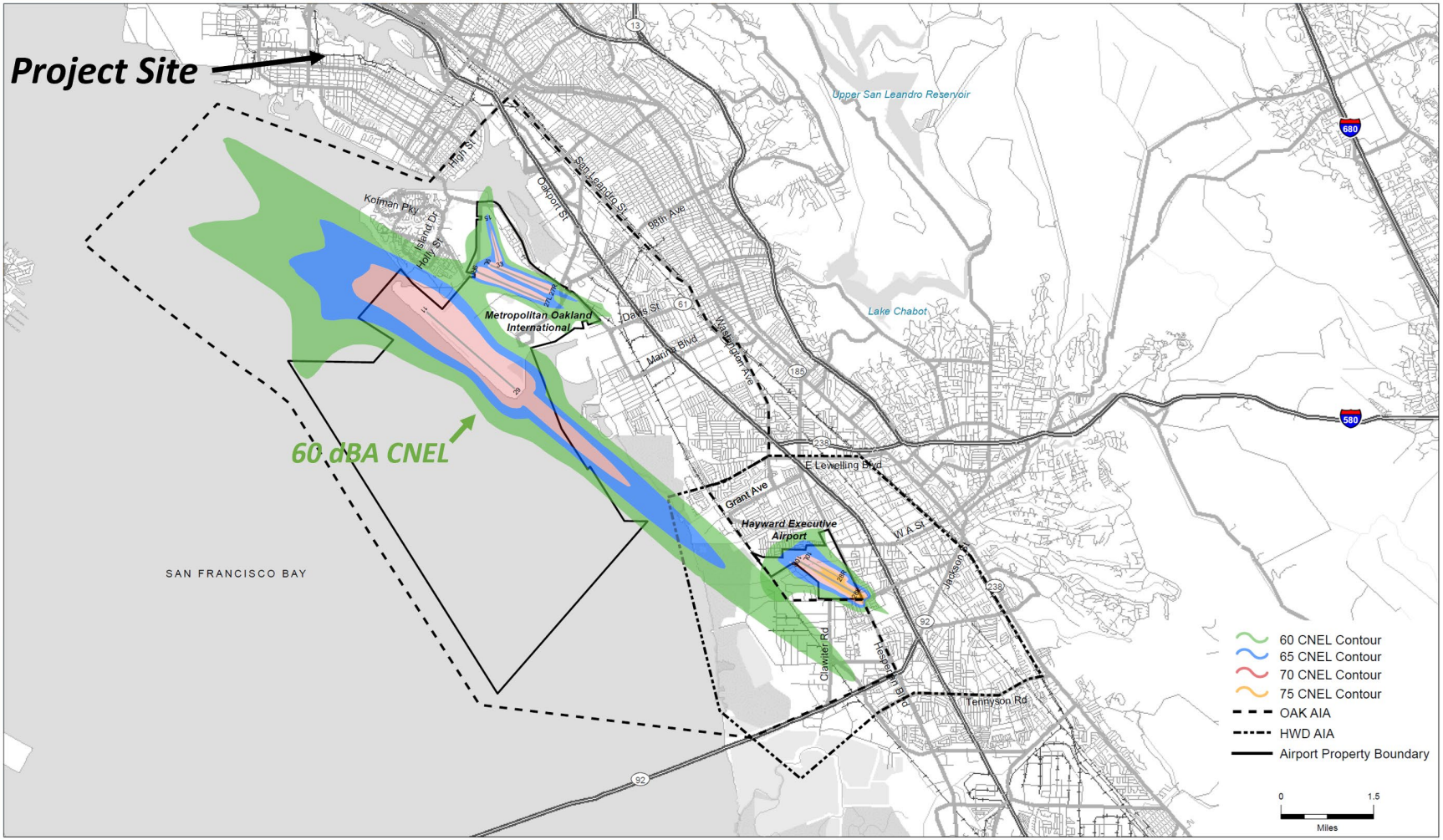
Mitigation Measure 2: **None required.**

Impact 3: **Excessive Aircraft Noise.** The project site is located more than 4 miles from Oakland International Airport and more than 11 miles from the Hayward Executive Airport. The noise environment attributable to aircraft is considered normally acceptable under the Alameda County ALUC noise compatibility policies. This is a **less-than-significant** impact.

Oakland International Airport is a public-use airport located more than 4 miles southeast of the project site, and the Hayward Executive Airport is located more than 11 miles southeast of the project. According to the Alameda County ALUC, the project site lies well outside the 60 dBA CNEL/L_{dn} contour line (see Figure 2). The proposed project would be compatible with the City's exterior noise standards for aircraft noise and aircraft would not produce excessive noise levels for persons at the site. This would be a less-than-significant impact.

Mitigation Measure 3: **None required.**

FIGURE 2 Noise Contours for Oakland International Airport and Hayward Executive Airport



SOURCE: ESA Airports, ESRI, OAK Airport Master Plan, Caltrans California Airport Land Use Planning Handbook, 2002

Oakland International Airport Land Use Plan Update . 202229

Figure 3-3

Noise Compatibility Zones

Cumulative Impacts

Cumulative noise impacts would result from either cumulative traffic noise increases under future conditions or temporary construction noise from cumulative construction projects.

A significant cumulative traffic noise increase would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA L_{dn} or greater for future levels exceeding 60 dBA L_{dn} or was 5 dBA L_{dn} or greater for future levels at or below 60 dBA L_{dn}; and 2) if the project would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of 1 dBA L_{dn} or more attributable solely to the proposed project.

The traffic study completed for the proposed project did not include future cumulative traffic volumes. The addition of project trips (up to 66 peak hour trips on fall, winter, and spring days and up to 383 peak hour trips on summer days) to the existing traffic volumes along the surrounding roadways would not result in a measurable or detectable noise level increase (i.e., 0 dBA L_{dn}). Under future cumulative conditions, traffic volumes are likely to increase; therefore, these project trips would not result in a less-than-significant cumulative impact.

From the City's website,[8] the nearest planned or approved projects would be located more than 2,000 feet from the project site. Therefore, there would not be a cumulative construction impact associated with the proposed project.

[8] https://www.alamedaca.gov/Departments/Planning-Building-and-Transportation/Planning-Division

APPENDIX A

FIGURE A1 Daily Trend in Noise Levels for LT-1, Wednesday, January 15, 2025

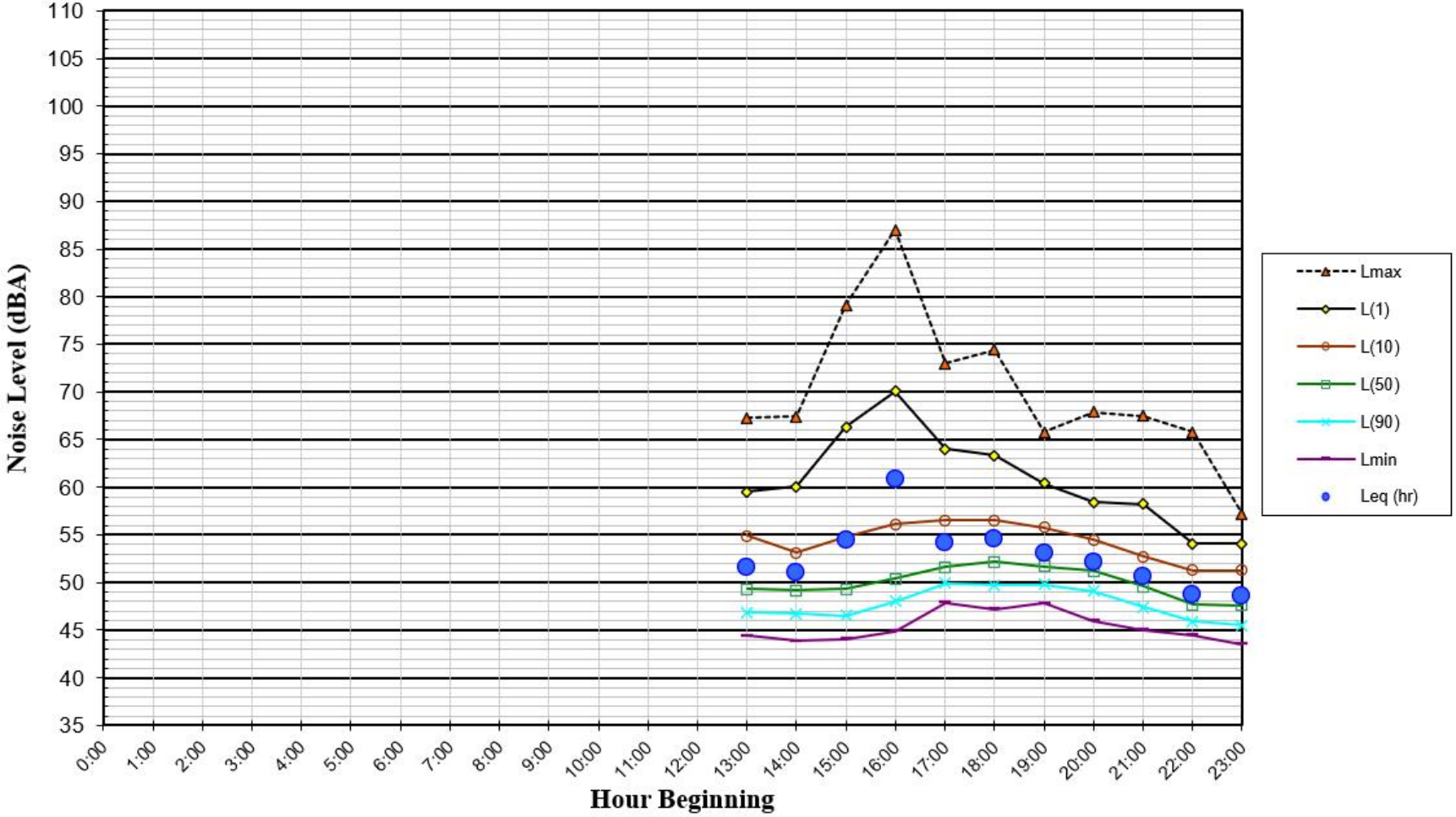


FIGURE A2 Daily Trend in Noise Levels for LT-1, Thursday, January 16, 2025

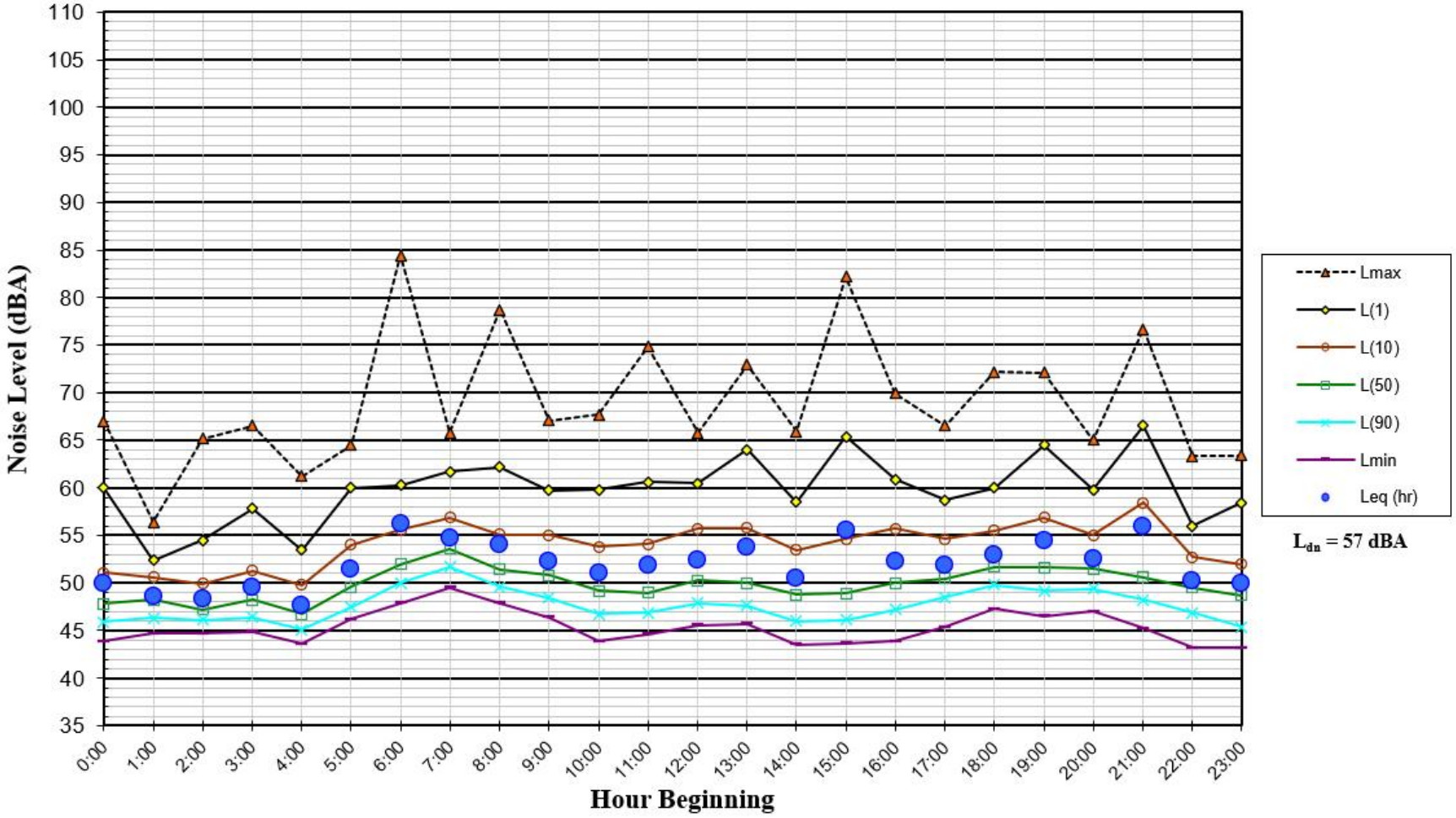


FIGURE A3 Daily Trend in Noise Levels for LT-1, Friday, January 17, 2025

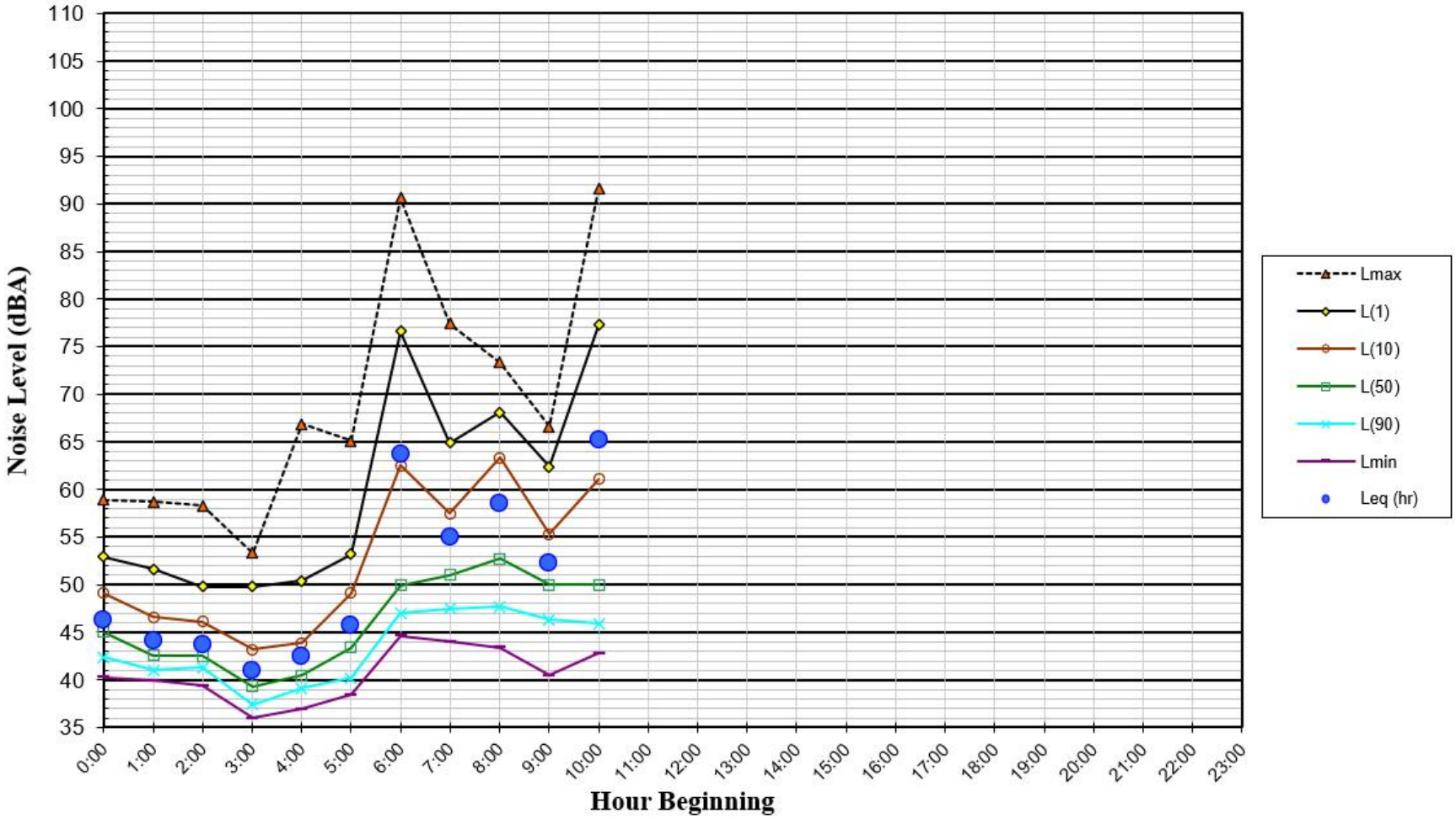


FIGURE A4 Daily Trend in Noise Levels for LT-2, Wednesday, January 15, 2025

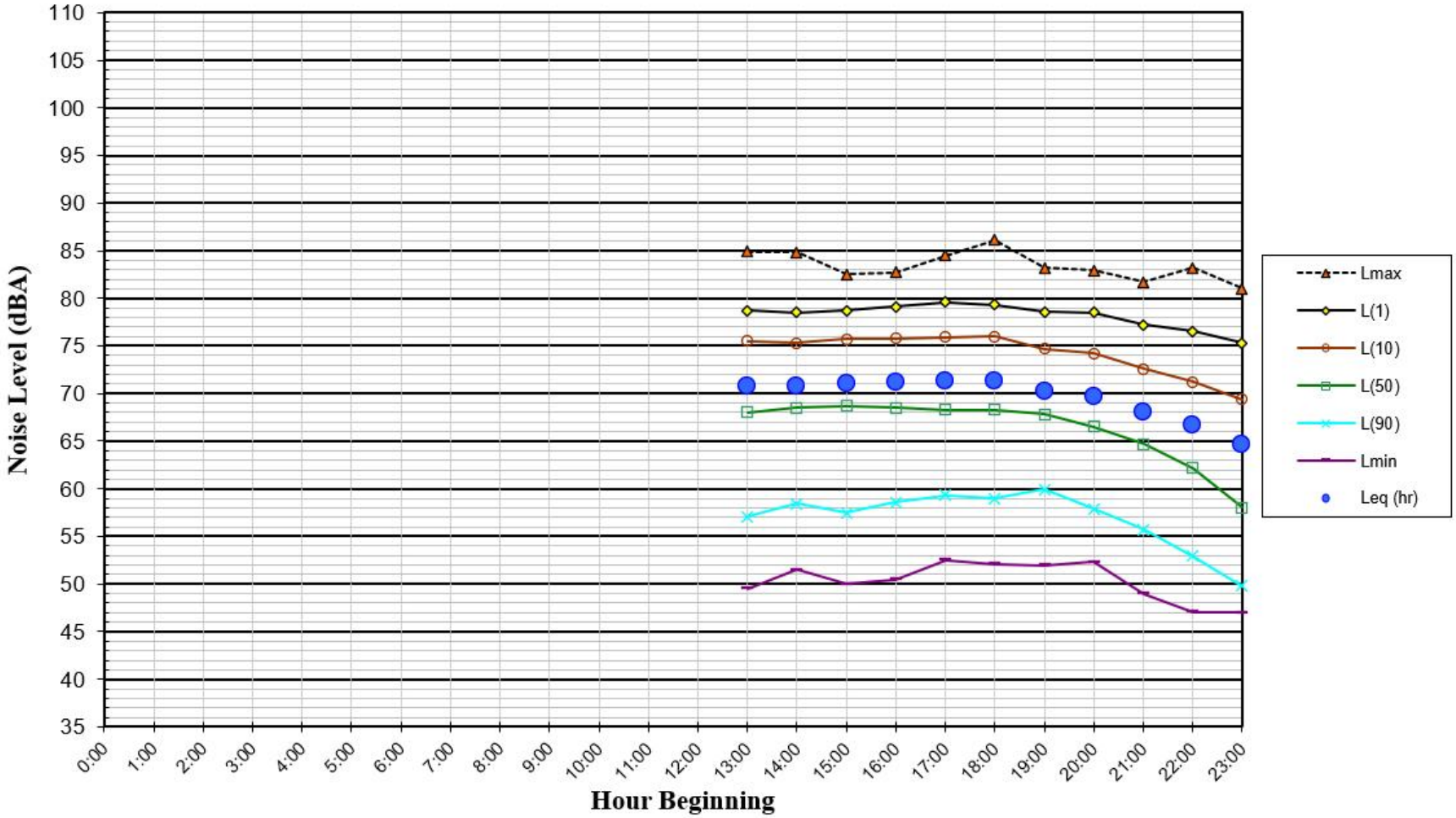


FIGURE A5 Daily Trend in Noise Levels for LT-2, Thursday, January 16, 2025

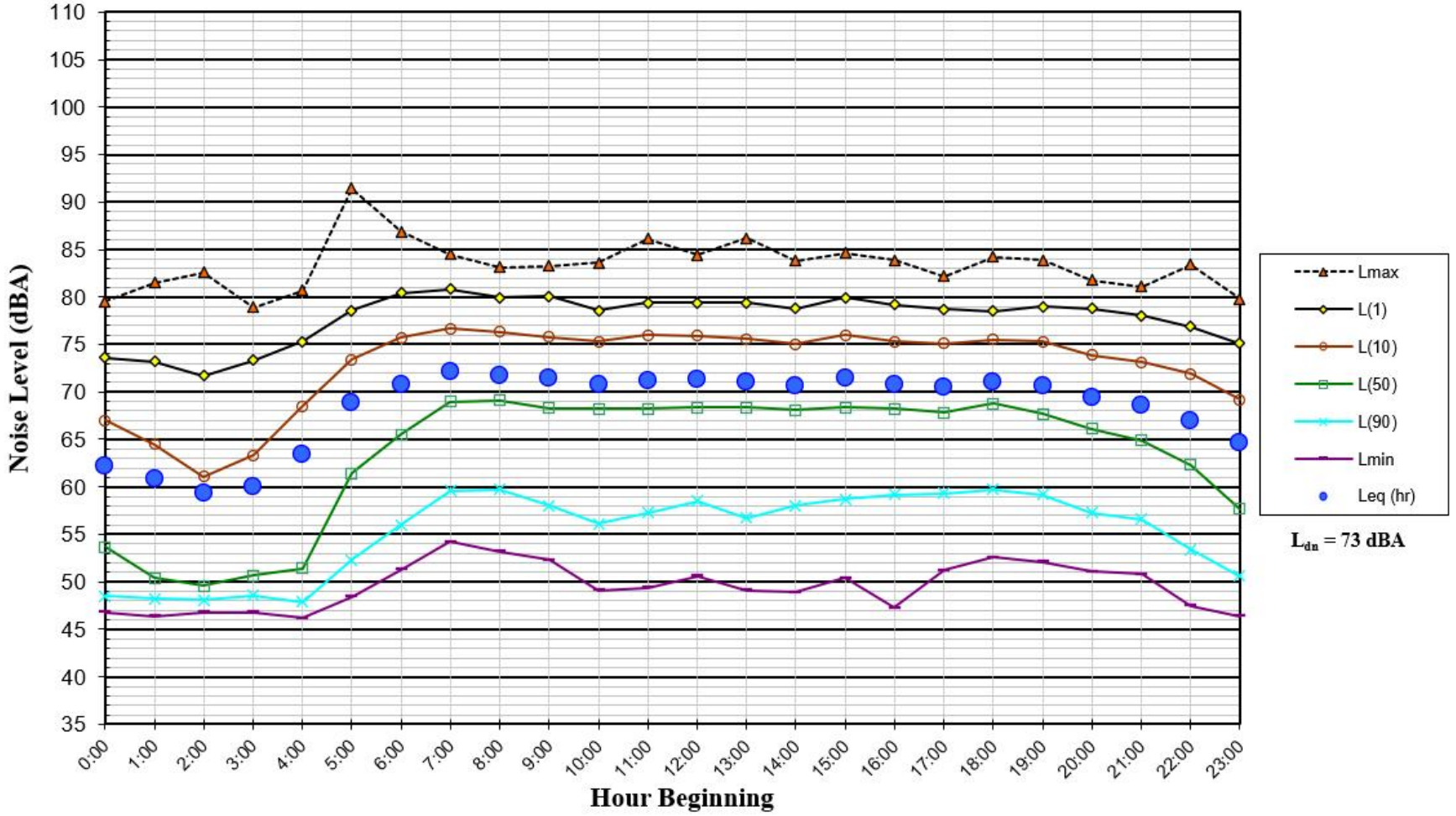


FIGURE A6 Daily Trend in Noise Levels for LT-2, Friday, January 17, 2025

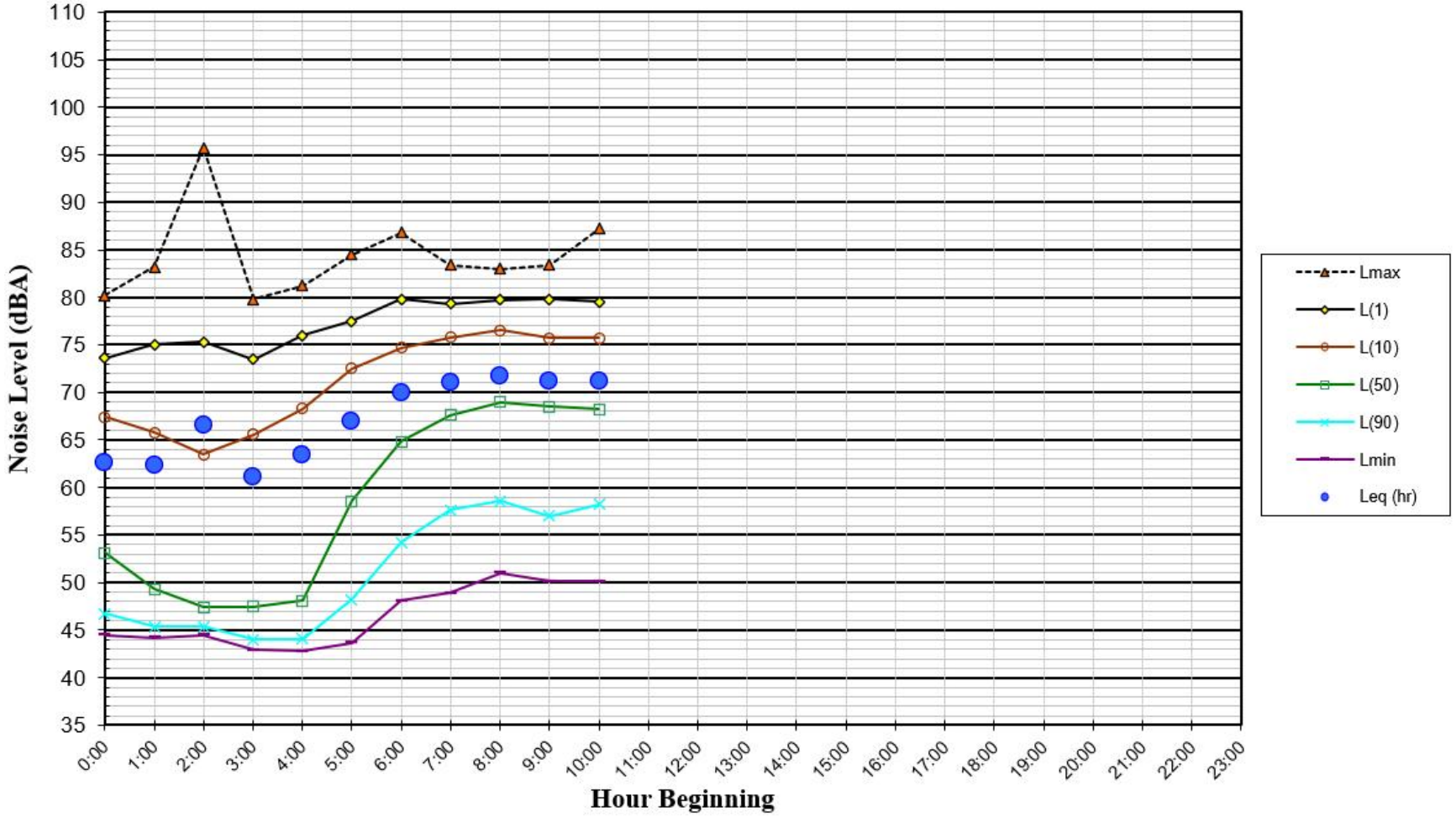


FIGURE A7 Daily Trend in Noise Levels for LT-3, Wednesday, January 15, 2025

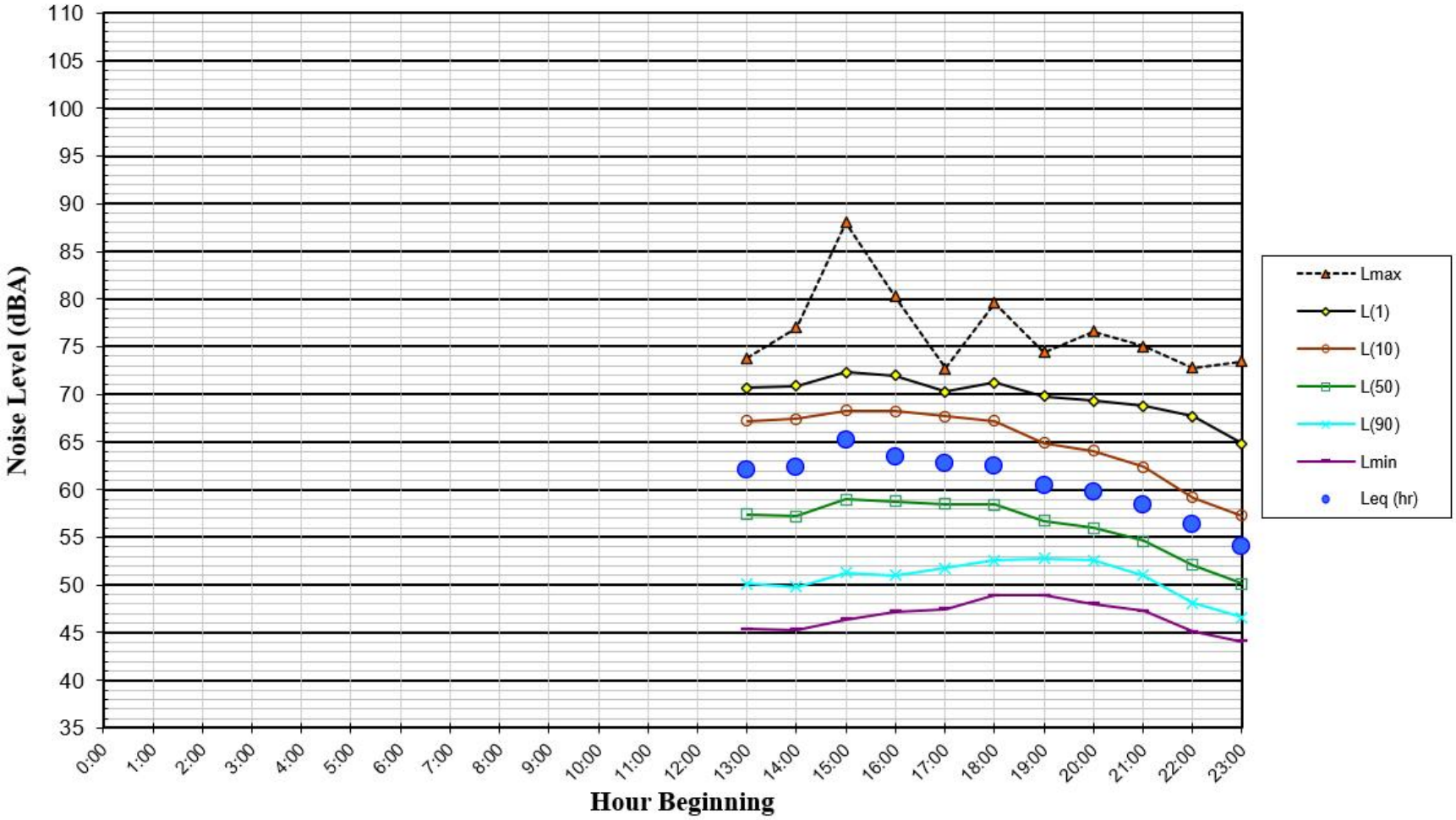


FIGURE A8 Daily Trend in Noise Levels for LT-3, Thursday, January 16, 2025

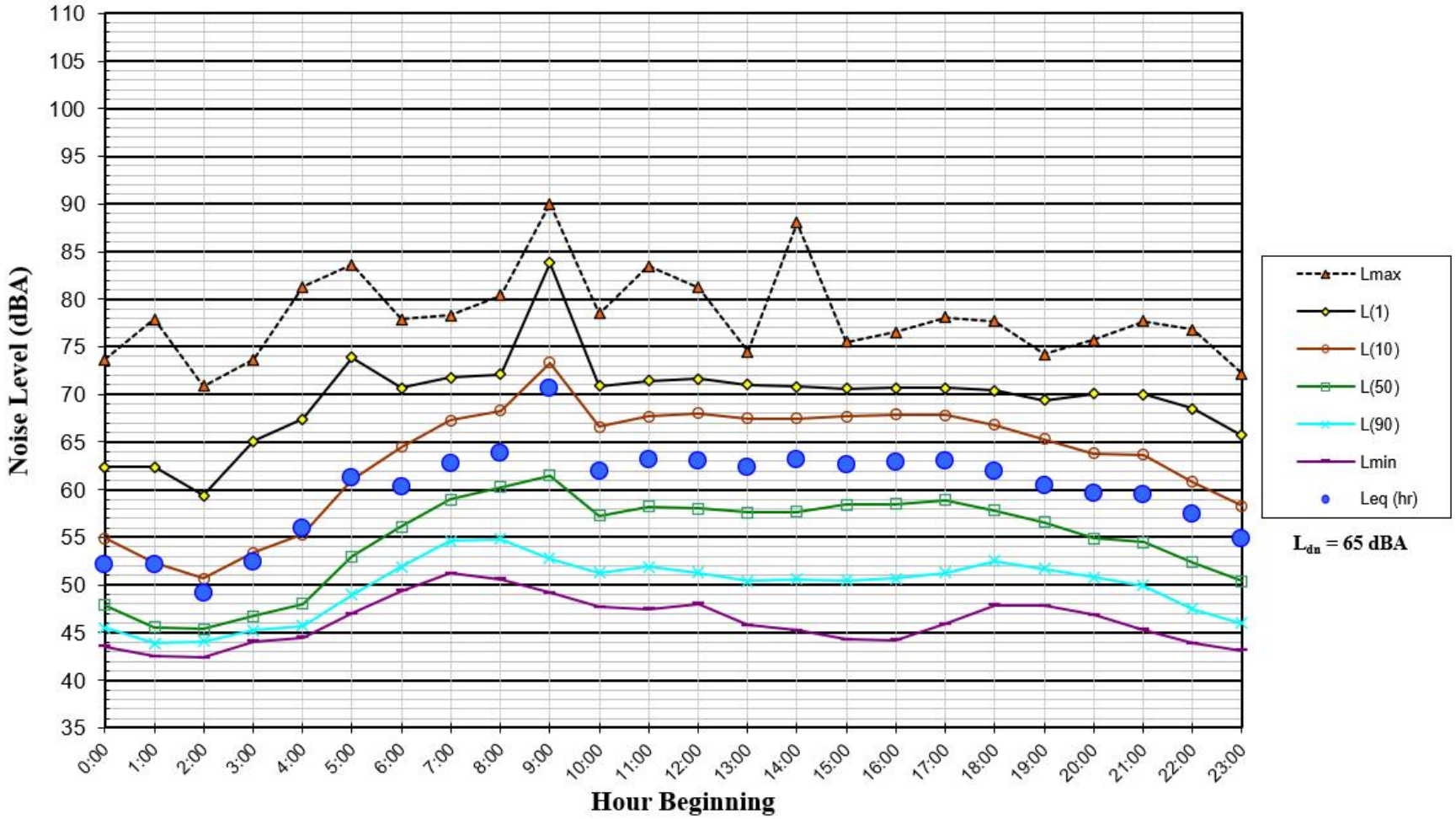


FIGURE A9 Daily Trend in Noise Levels for LT-3, Friday, January 17, 2025