LILLIAN COMMONS / MORGAN HILL MEDICAL CAMPUS NOISE AND VIBRATION ASSESSMENT

Morgan Hill, California

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INTRODUCTION

The project site consists of 19.67 acres located at the southeast corner of the intersection of Barrett Avenue and Juan Hernandez Drive in Morgan Hill, California. Barrett Avenue, Barrett Elementary School, and residential uses bound the site to the north, the U.S. Highway 101/Tennant Avenue southbound off-ramp bounds the site to the east, vacant land bounds the site to the south, and residential uses bound the site to the west.

The proposed project is a general plan amendment, planned development master plan, subdivision, and development of the project site. The two vacant parcels would be subdivided into three parcels (A through C). The existing medical office site, parcel D, would be included as part of the overall planned development master plan. Development of the parcels would include five uses: a 4,500 square foot urgent care facility on the existing medical site, a 10,000 square foot medical office building, a 100,000 square foot hospital, a three-story parking structure, a 10,000 square foot commercial retail/restaurant building, and a 203-unit multifamily residential development.

This report evaluates the project's potential to result in significant impacts with respect to the applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and vibration, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency section discusses land use compatibility utilizing noise-related policies in the City's General Plan; and 3) 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 provide a compatible project in relation to adjacent noise sources and land uses.

SETTING

Fundamentals of Environmental Noise

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

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more

intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 p.m. - 10:00 p.m.) and a 10 dB addition to nocturnal (10:00 p.m. - 7:00 a.m.) noise levels. The *Day/Night Average Sound Level* (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 12-17 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. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of

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

Annoyance

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

Fundamentals of Groundborne Vibration

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

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

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

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

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

TABLE 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 p.m. and 7:00 a.m.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m.to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

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

TABLE 2 Typical Noise Levels in the Environment

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

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

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

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

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

Regulatory Background - Noise

The State of California and the City of Morgan Hill have established regulatory criteria that are applicable in this assessment. The State of California Environmental Quality Act (CEQA) Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines. 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.

2019 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn}/CNEL in any habitable room.

2019 California Building Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings, as set forth in the 2010 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). These standards were not altered in the 2019 revisions. Section 5.507 states that either the prescriptive (Section 5.507.4.1) or the performance method (Section 5.507.4.2) shall be used to determine environmental control at indoor areas. The prescriptive method is very conservative and not practical in most cases; however, the performance method can be quantitatively verified using exterior-to-interior calculations. For the purposes of this report, the performance method is utilized to determine consistency with the Cal Green Code. Both of the sections that pertain to this project are as follows:

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

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

City of Morgan Hill General Plan. The Safety, Services and Infrastructure Chapter in the Morgan Hill 2035 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of Morgan Hill. The following policies are applicable to the proposed project:

Policy SSI-8.1- *Exterior Noise Level Standards:* Require new development projects to be designed and constructed to meet acceptable exterior noise level standards (as shown in Table SSI-1) as follows:

- Apply a maximum exterior noise level of 60 dBA L_{dn} in residential areas where outdoor use is a major consideration (e.g., backyards in single-family housing developments and recreation areas in multi-family housing projects). Where the City determines that providing an L_{dn} of 60 dBA or lower cannot be achieved after the application of reasonable and feasible mitigation, an L_{dn} of 65 dBA may be permitted.

- Indoor noise levels should not exceed an L_{dn} of 45 dBA in new residential housing units.

- Noise levels in new residential development exposed to an exterior L_{dn} 60 dBA or greater should be limited to a maximum instantaneous noise level (e.g., trucks on busy streets, train warning whistles) in bedrooms of 50 dBA. Maximum instantaneous noise levels in all other habitable rooms should not exceed 55 dBA. The maximum outdoor noise level for new residences near the railroad shall be 70 dBA L_{dn}, recognizing that train noise is characterized by relatively few loud events.

Policy SSI-8.2- *Impact Evaluation:* The impact of proposed development project on existing land uses should be evaluated in terms of the potential for adverse community response based on significant increase in existing noise levels, regardless of compatibility guidelines.

Policy SSI-8.3- *Commercial and Industrial Noise Level Standards:* Evaluate interior noise levels in commercial and industrial structures on a case-by-case basis based on the use of the space.

Policy SSI-8.4- *Office Noise Level Standards:* Interior noise levels in office buildings should be maintained at 45 dBA L_{eq} (hourly average) or less, rather than 45 dBA L_{dn} (daily average).

Policy SSI-8.5- *Traffic Noise Level Standards:* Consider noise level increases resulting from traffic associated with new projects significant if: a) the noise level increase is 5 dBA L_{dn} or greater, with a future noise level of less than 60 dBA L_{dn}, or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater.

Policy SSI-8.6- *Stationary Noise Level Standards:* Consider noise levels produced by stationary noise sources associated with new projects significant if they substantially exceed existing ambient noise levels.

Policy SSI-8.7- *Other Noise Sources:* Consider noise levels produced by other noise sources (such as ballfields) significant if an acoustical study demonstrates they would substantially exceed ambient noise levels.

Policy SSI-8.9- *Site Planning and Design:* Require attention to site planning and design techniques other than sound walls to reduce noise impacts, including: a) installing earth berms, b) increasing the distance between the noise source and the receiver; c) using non-sensitive structures such as parking lots, utility areas, and garages to shield noise-sensitive areas; d) orienting buildings to shield outdoor spaces from the noise source; and e) minimizing the noise at its source.

Policy SSI-9.1- *Techniques to Reduce Traffic Noise:* Use roadway design, traffic signalization, and other traffic planning techniques (such as limiting truck traffic in residential areas) to reduce noise caused by speed or acceleration of vehicles.

Policy SSI-9.2 - *Noise Barrier Dimensions:* If noise barriers are deemed the only effective mitigation for development along major transportation corridors, require an acoustical analysis to determine necessary dimensions.

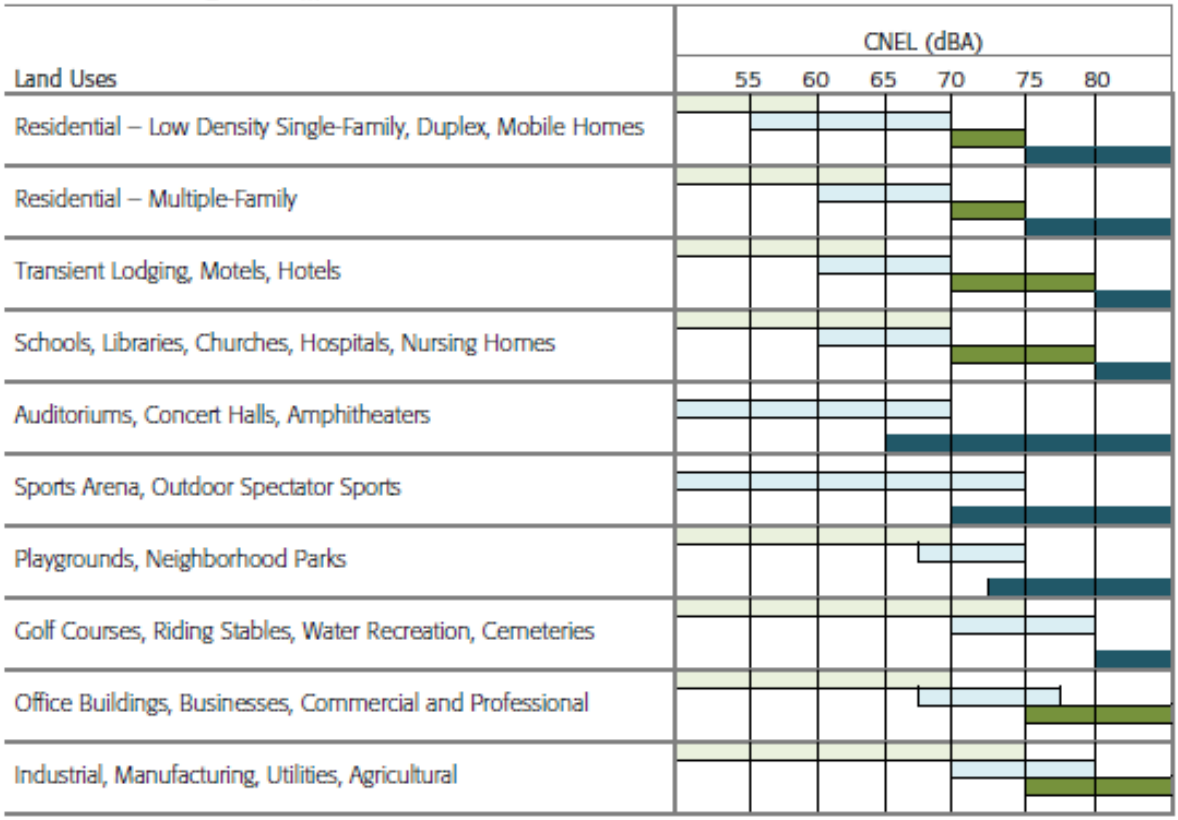
Policy SSI-9.3- *Sound Wall Design:* The maximum height of sound walls shall be eight feet. Residential projects adjacent to the freeway shall be designed to minimize sound wall height through location of a frontage road, use of two sound walls or other applicable measures. Sound wall design and location shall be coordinated for an entire project area and shall meet Caltrans noise attenuation criteria for a projected eight-lane freeway condition. If two sound walls are used, the first shall be located immediately adjacent to the freeway right-of-way and the second shall be located as necessary to meet Caltrans noise requirements for primary outdoor areas. The minimum rear yard setback to the second wall shall be 20 feet.

Policy SSI-9.5- *Noise Studies for Private Development:* In order to prevent significant noise impacts on neighborhood residents which are related to roadway extensions or construction of new roadways, require completion of a detailed noise study during project-level design to quantify noise levels generated by projects such as the Murphy Avenue extension to Mission View Drive and the Walnut Grove Extension to Diana Avenue. The study limits should include noise sensitive land uses adjacent to the project alignment as well as those along existing segments that would be connected to new segments. A significant impact would be identified where traffic noise levels would exceed the "normally acceptable" noise level standard for residential land uses and/or where ambient noise levels would be substantially increased with the project. Project specific mitigation measures could include, but not be limited to, considering the location of the planned roadway alignment relative to existing receivers in the vicinity, evaluating the use of noise barriers to attenuate project-generated traffic noise, and/or evaluating the use of "quiet pavement" to minimize traffic noise levels at the source. Mitigation should be designed to reduce noise levels into compliance with "normally acceptable" levels for residential noise and land use compatibility.

Policy SSI-9.6- *Earth Berms:* Allow and encourage earth berms in new development projects as an alternative to sound walls if adequate space is available.

Policy SSI-9.7- *Sound Barrier Design:* Require non-earthen sound barriers to be landscaped, vegetated, or otherwise designed and/or obscured to improve aesthetics and discourage graffiti and other vandalism.

TABLE SSI-1 STATE OF CALIFORNIA LAND USE COMPATIBILITY GUIDELINES FOR COMMUNITY NOISE ENVIRONMENTS



Normally Acceptable:
Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and the needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable:
New construction or development should generally be discouraged. If new construction does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable:
New construction or development generally should not be undertaken.

Source: Governor's Office of Planning and Research, General Plan Guidelines 2003.

City of Morgan Hill Municipal Code. The City of Morgan Hill's Municipal Code Chapter 8.28 states that "It is unlawful and a misdemeanor for any person to make or continue, or cause to be made or continued, any loud, disturbing, unnecessary or unusual noise or any noise which annoys,

disturbs, injures or endangers the comfort, health, repose, peace or safety of other persons within the city." The following sections of the code would be applicable to the project:

C. Blowers, Fans, and Combustion Engines. The operation of any noise-creating blower, power fan or internal combustion engine, the operation of which causes noise due to the explosion of operating gases or fluids, unless the noise from such blower or fan is muffled and such engine is equipped with a muffler device to deaden such noise;

D. 1. Construction activities as limited below. "Construction activities" are defined as including but not limited to excavation, grading, paving, demolition, construction, alteration or repair of any building, site, street or highway, delivery or removal of construction material to a site, or movement of construction materials on a site. Construction activities are prohibited other than between the hours of seven a.m. and eight p.m., Monday through Friday and between the hours of nine a.m. to six p.m. on Saturday. Construction activities may not occur on Sundays or federal holidays. No third person, including but not limited to landowners, construction company owners, contractors, subcontractors, or employers, shall permit or allow any person working on construction activities which are under their ownership, control or direction to violate this provision. Construction activities may occur in the following cases without violation of this provision:

a. In the event of urgent necessity in the interests of the public health and safety, and then only with a permit from the chief building official, which permit may be granted for a period of not to exceed three days or less while the emergency continues and which permit may be renewed for periods of three days or less while the emergency continues.

b. If the chief building official determines that the public health and safety will not be impaired by the construction activities between the hours of eight p.m. and seven a.m., and that loss or inconvenience would result to any party in interest, the chief building official may grant permission for such work to be done between the hours of eight p.m. and seven a.m. upon an application being made at the time the permit for the work is issued or during the progress of the work.

c. The city council finds that construction by the resident of a single residence does not have the same magnitude or frequency of noise impacts as a larger construction project. Therefore, the resident of a single residence may perform construction activities on that home during the hours in this subsection, as well as on Sundays and federal holidays from nine a.m. to six p.m., provided that such activities are limited to the improvement or maintenance undertaken by the resident on a personal basis.

d. Public work projects are exempt from this section and the public works director shall determine the hours of construction for public works projects.

e. Until November 30, 1998, construction activities shall be permitted between the hours of ten a.m. to six p.m. on Sundays, subject to the following conditions. No power-driven vehicles, equipment or tools may be used during construction activities, except on the interior of a building or other structure which is enclosed by exterior siding (including windows and doors) and roofing, and which windows and doors are closed during construction activities. Construction activities must be situated at least one hundred fifty feet from the nearest occupied dwelling. No delivery or removal of construction material to a site, or movement of construction materials on a site, is permitted. No activity, including but not limited to the playing of radios, tape players, compact disc players or other devices, which creates a loud or unusual noise which offends, disturbs or harasses the peace and quiet of the persons of ordinary sensibilities beyond the confines of the property from which the sound emanates is allowed.

2. If it is determined necessary in order to ensure compliance with this section, the chief building official may require fences, gates or other barriers prohibiting access to a construction site by construction crews during hours in which construction is prohibited by this subsection. The project manager of each project shall be responsible for ensuring the fences, gates or barriers are locked and/or in place during hours in which no construction is allowed. This subsection shall apply to construction sites other than public works projects or single dwelling units which are not a part of larger projects.

G. Loading or Unloading Vehicles and Opening Boxes. The creation of loud and excessive noise in connection with loading or unloading any vehicle or the opening and destruction of bales, boxes, crates and containers;

J. Pile Drivers, Hammers and Similar Equipment. The operation, between the hours of eight p.m. and seven a.m. of any pile driver, steam shovel, pneumatic hammer, derrick, steam or electric hoist or other appliance, the use of which is attended by loud or unusual noise.

(Ord. 1405 N.S. § 1, 1998; Ord. 1196 N.S. § 4 Exh. A, 1994; Ord. 328 N.S. § A (part), 1972)

(Ord. No. 2276 N.S., § 29, 5-2-2018)

Chapter 18.76 establishes quantitative noise performance standards:

18.76.090 - Noise.

A. No land use or activity may produce a noise level in excess of the standards in Table 18.76-1.

Table 18.76-1: Maximum Noise Levels

Receiving Land Use	Maximum Noise Level at Lot Line of Receiving Use [1]
Industrial and Wholesale	70 dBA
Commercial	65 dBA
Residential or Public/Quasi Public	60 dBA

Notes:
[1] The planning commission may allow an additional 5 dBA noise level at the lot line if the maximum noise level shown in Table 18.76-1 cannot be achieved with reasonable and feasible mitigation.

B. Noise standards in Table 18.76-1do not apply to noise generated by vehicle traffic in the public right-of-way or from temporary construction, demolition, and vehicles that enter and leave the site of the noise-generating use (e.g., construction equipment, trains, trucks).
C. All uses and activities shall comply with Municipal Code Chapter 8.28 (Noise).

(Ord. No. 2277 N.S., § 5(Exh. A), 6-6-2018)

Existing Noise Environment

The noise environment at the site and in the surrounding area results primarily from vehicular traffic along U.S. Highway 101. Secondary noise sources include traffic along Tennant Avenue. Local traffic along Barrett Avenue and Juan Hernandez Drive would also affect the noise environment at the site and surrounding area. Occasional overhead aircraft associated with the San Martin Airport are also audible at times at the project site.

A noise monitoring survey was performed at the site beginning on Tuesday, September 24, 2019 and concluding on Thursday, September 26, 2019. The monitoring survey included two long-term noise measurements (LT-1 and LT-2) and three short-term noise measurements (ST-1 through ST-3), which are shown in Figure 1.

Long-term noise measurement LT-1 was installed on a utility pole, approximately 30 feet west of the centerline of Juan Hernandez Drive. This measurement would represent the ambient noise environment of the nearest residential receptors to the west of the project site. The daily trend in noise levels at LT-1 is shown in Figures 2 through 4. Hourly average noise levels at LT-1 ranged from 60 to 67 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 56 to 63 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level measured on Wednesday, September 25, 2019 was 67 dBA L_{dn}.

LT-2 was made at the end of Barrett Avenue, approximately 65 feet west of the centerline of the nearest through lane along southbound U.S. Highway 101. Currently, only a chain-link fence is located between LT-2 and U.S. Highway 101, so this measurement location had direct line-of-sight to the traffic along the highway. LT-2 was chosen to represent the ambient noise environment at the nearest residences and the Barrett Elementary School to the north of the site. Hourly average noise levels at this location typically ranged from 77 to 81 dBA L_{eq} during the day and from 73 to

79 dBA L_{eq} at night. The day-night average noise level measured on Wednesday, September 25, 2019 was 83 dBA L_{dn}. The daily trend in noise levels at LT-2 is shown in Figures 5 through 7.

Short-term noise measurements were made on Tuesday, September 24, 2019 between 7:40 a.m., and 8:40 a.m. The results of these short-term measurements are summarized in Table 4. The primary noise source at ST-1 and ST-2 was U.S. Highway 101, while the primary noise source at ST-3 was Tennant Avenue.

ST-1 was made in front of 945 Barrett Avenue, approximately 20 feet north of the centerline of the roadway. This measurement was made over a 10-minute period. Typical noise levels due to U.S. Highway 101, which was the dominant noise source, ranged from 62 to 65 dBA. Local vehicular traffic along Barrett Avenue, which consisted of about 10 cars in this time period, generated noise levels of 63 to 68 dBA. Other noise sources observed included a car horn (69 dBA) and car door slam (66 dBA). The 10-minute average noise level measured at ST-1 was 64 dBA $L_{eq(10\text{-}min)}$.

ST-2 was made from the center of the project site, approximately 490 feet west of the centerline of the nearest through lane along southbound U.S. Highway 101, approximately 425 feet east of the centerline of Juan Hernandez Drive, and approximately 390 feet south of the centerline of Barrett Avenue. The dominant noise source at ST-2 was also U.S. Highway 101, which generated noise levels ranging from 54 to 57 dBA. Local traffic along Juan Hernandez Drive generated noise levels of 54 to 57 dBA. The 10-minute average noise level at ST-2 was 56 dBA $L_{eq(10\text{-}min)}$.

ST-3 was made approximately 40 feet south of the centerline of Tennant Avenue in front of the single-family residence located at 800 Tennant Avenue. The dominant noise source at ST-3 was Tennant Avenue, and this measurement represents the ambient noise environment of the residence and nearby Bethel Baptist Church. Eastbound traffic along Tennant Avenue generated noise levels ranging from 75 to 80 dBA at ST-3, while westbound traffic ranged from 62 to 66 dBA. The maximum instantaneous noise level of 93 dBA was generated by an eastbound-traveling motorcycle. The 10-minute average noise level at ST-3 was 76 dBA $L_{eq(10\text{-}min)}$.

TABLE 4 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location	Date, Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10\text{-}min)}$
ST-1: ~20 feet north of the centerline of Barrett Avenue	9/24/2019, 7:40-7:50	69	68	66	63	61	64
ST-2: Center of project site	9/24/2019, 8:00-8:10	59	59	58	56	55	56
ST-3: ~40 feet south of the centerline of Tennant Avenue	9/24/2019, 8:30-8:40	93	83	79	73	62	76

FIGURE 1 Noise Measurement Locations

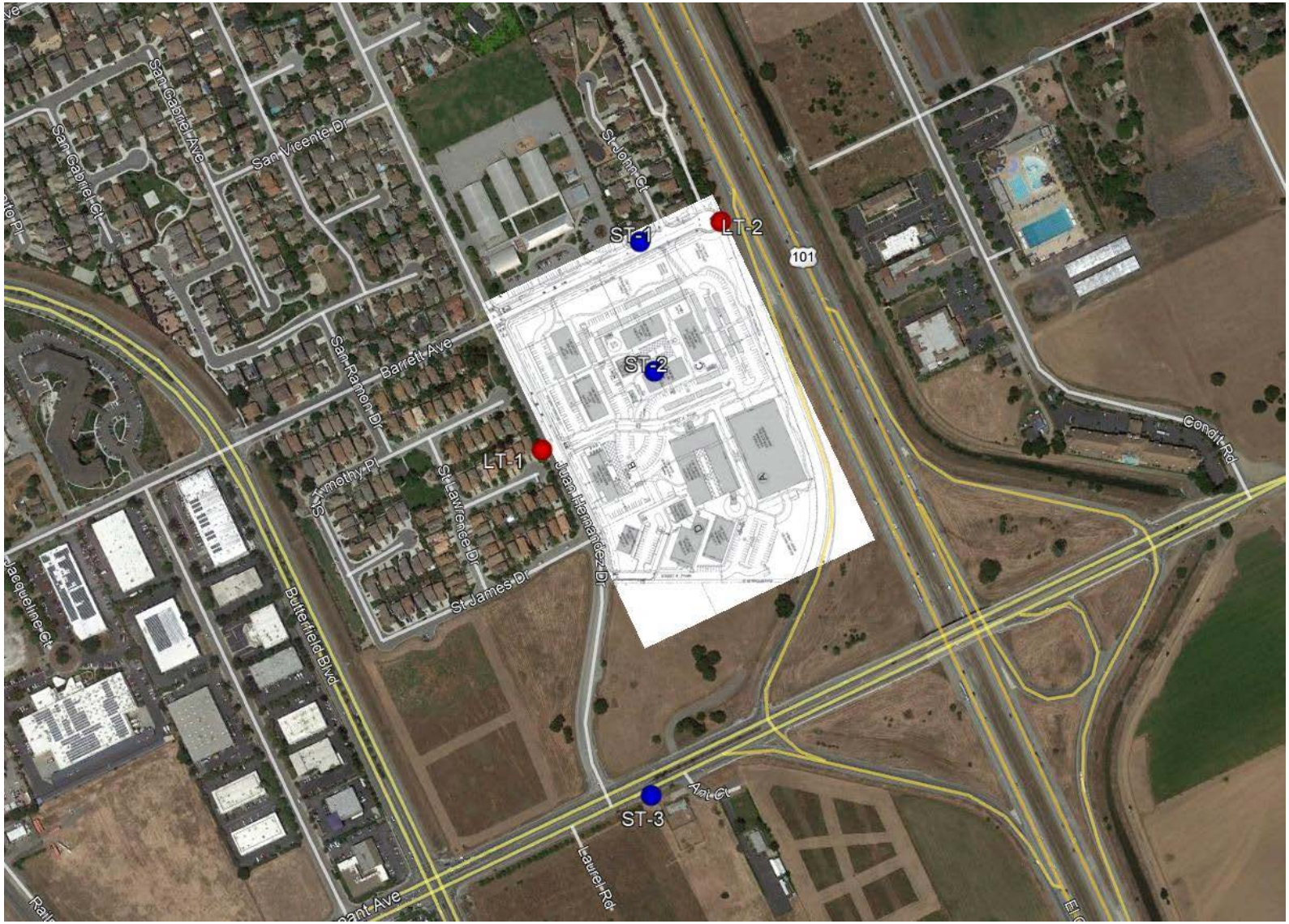


FIGURE 2 Daily Trend in Noise Levels at LT-1, Tuesday, September 24, 2019

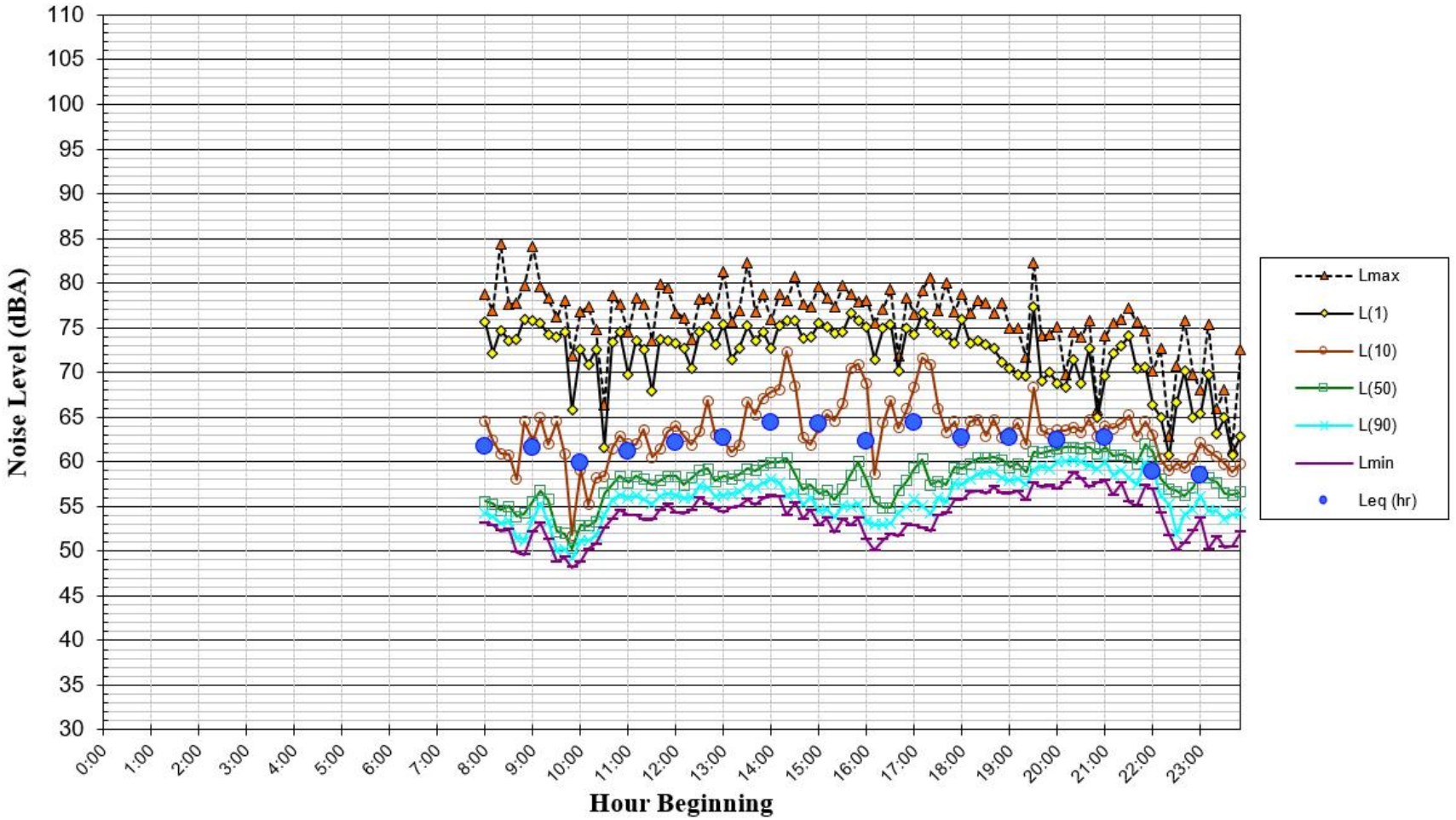


FIGURE 3 Daily Trend in Noise Levels at LT-1, Wednesday, September 25, 2019

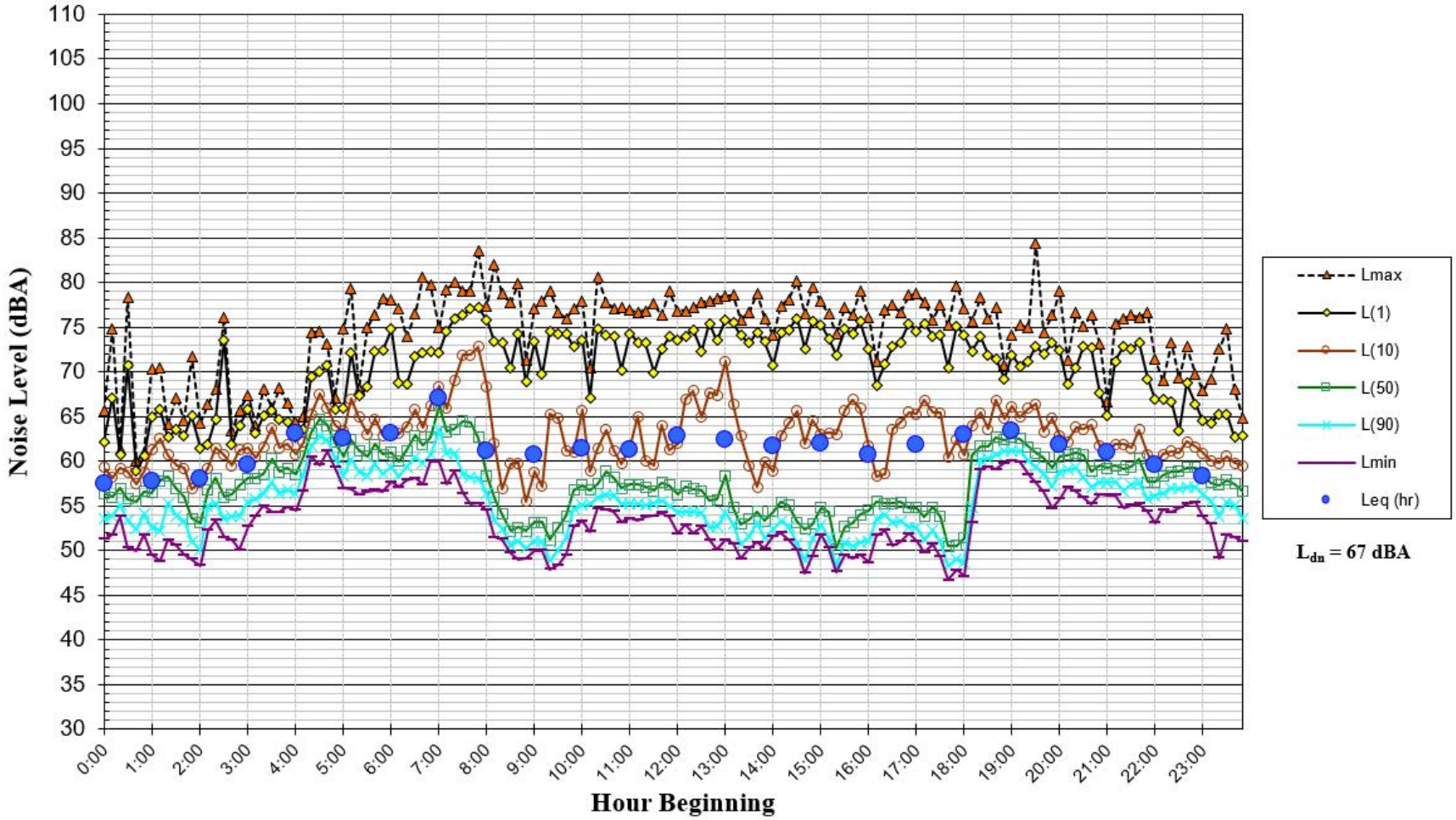


FIGURE 4 Daily Trend in Noise Levels at LT-1, Thursday, September 26, 2019

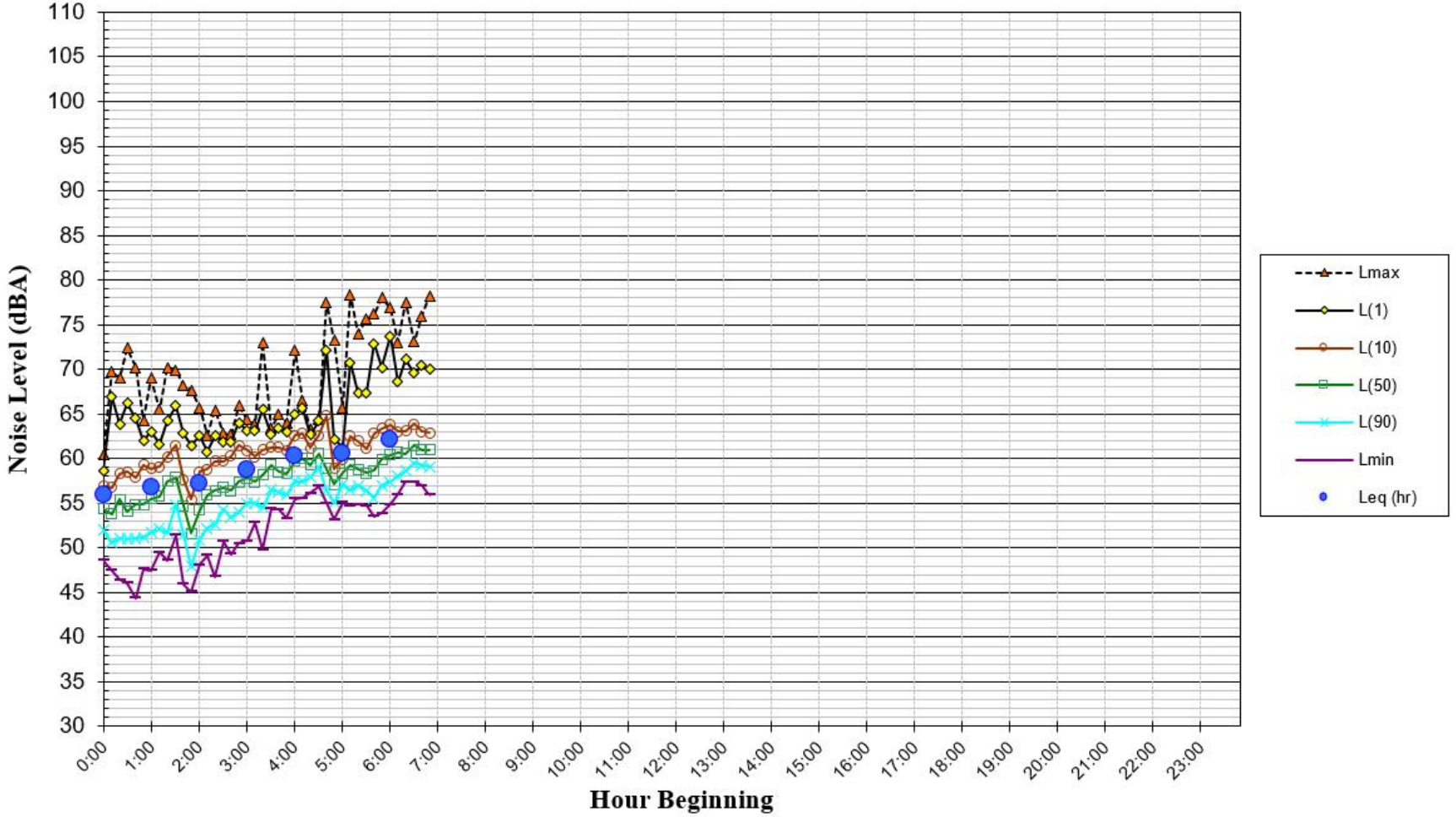


FIGURE 5 Daily Trend in Noise Levels at LT-2, Tuesday, September 24, 2019

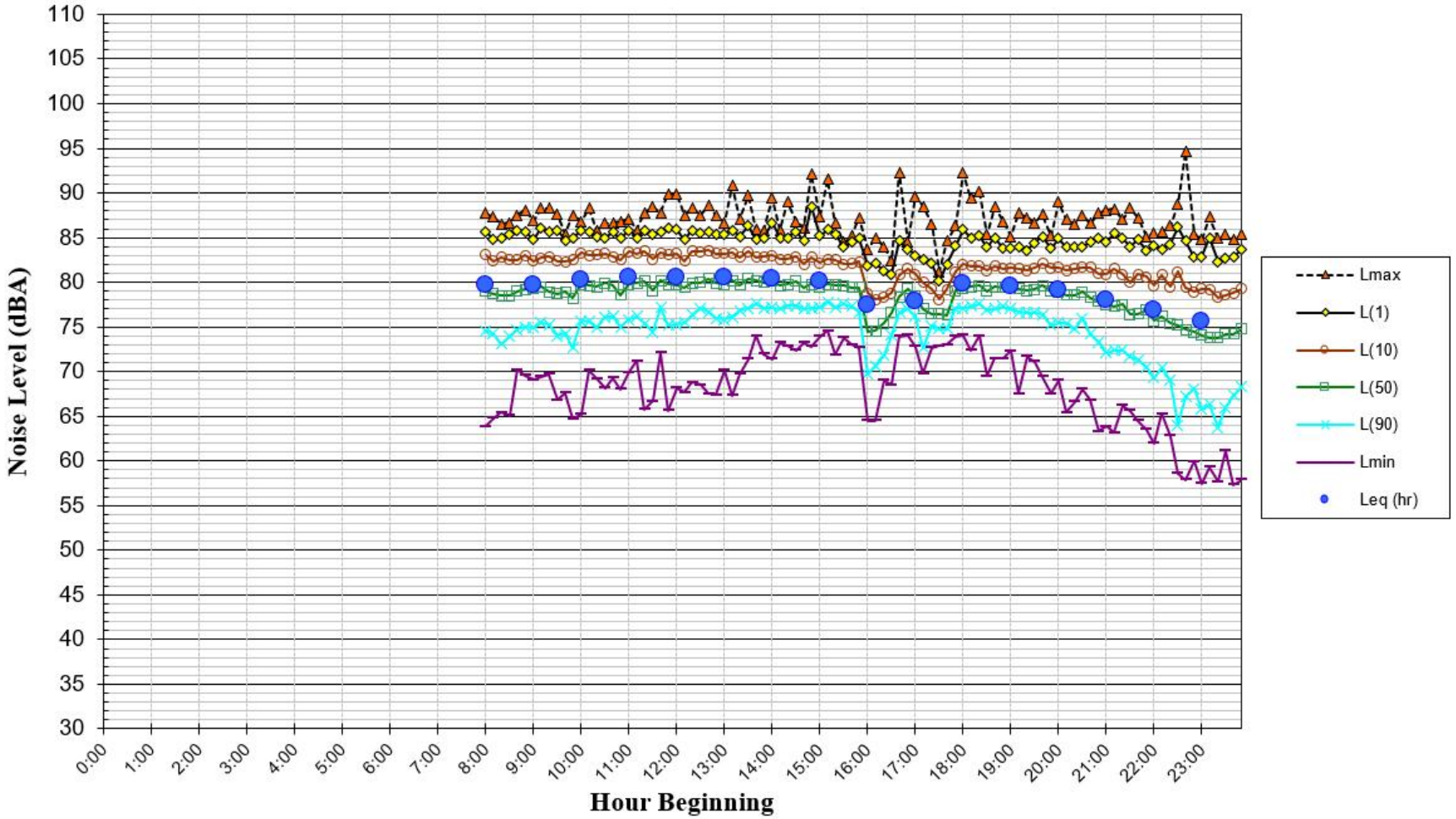


FIGURE 6 Daily Trend in Noise Levels at LT-2, Wednesday, September 25, 2019

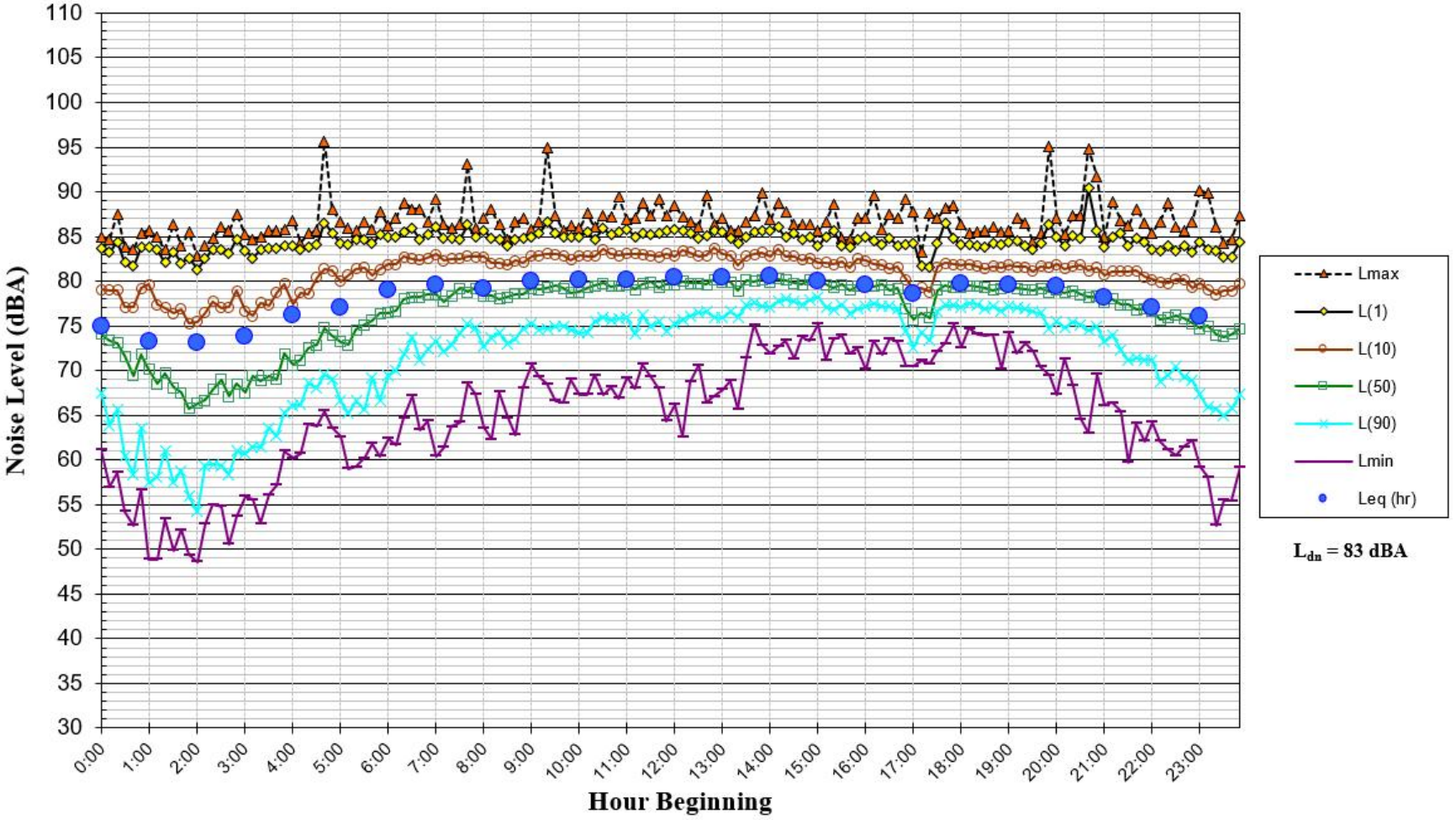
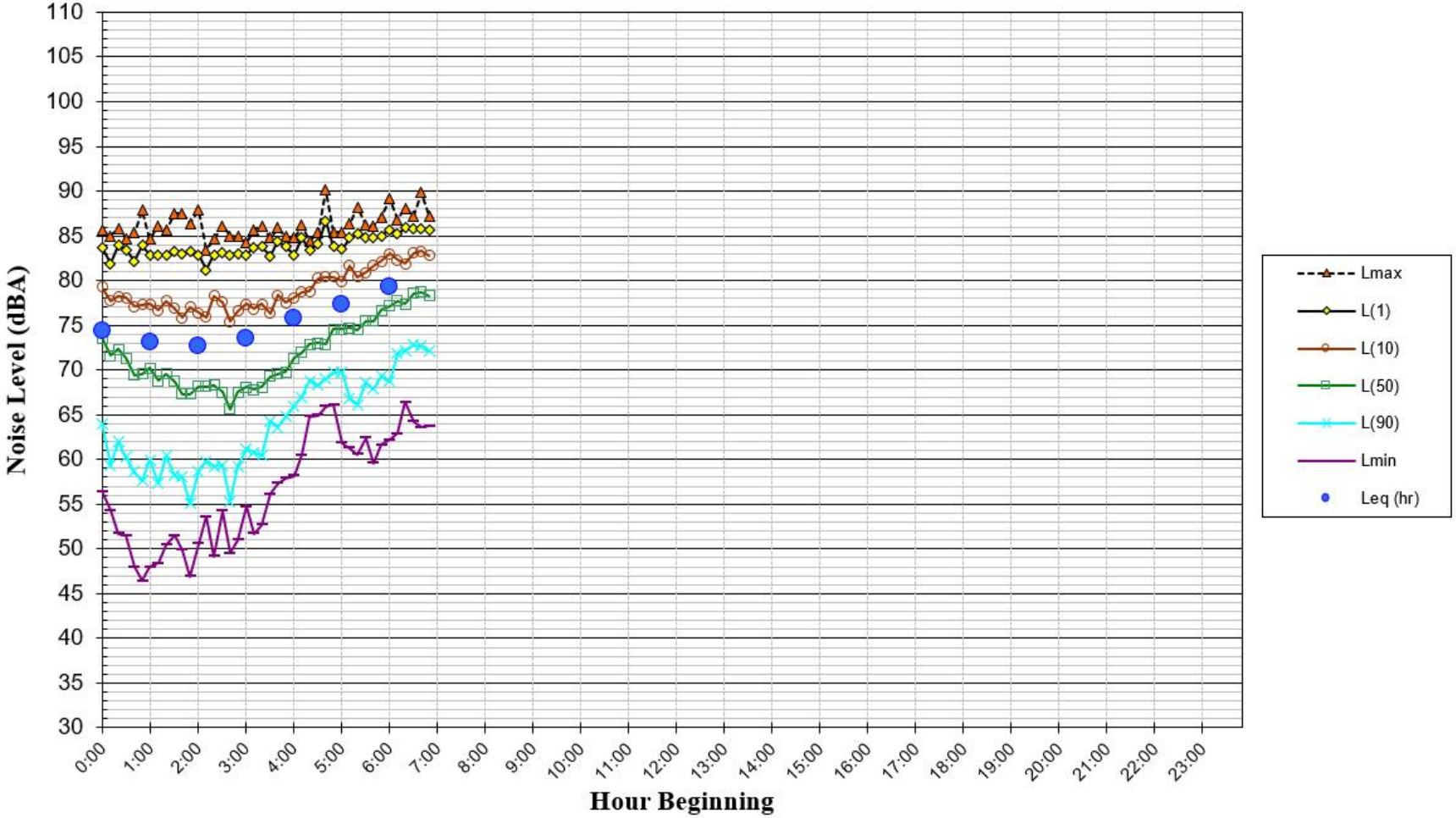


FIGURE 7 Daily Trend in Noise Levels at LT-2, Thursday, September 26, 2019



GENERAL PLAN CONSISTENCY ANALYSIS

The impacts of site constraints, such as exposure of the proposed project to excessive levels of noise, are not considered under CEQA. This section addresses Noise and Land Use Compatibility for consistency with the policies set forth in the City's General Plan.

Consistency Analysis Thresholds

The Safety, Services and Infrastructure Chapter in the Morgan Hill 2035 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of Morgan Hill. The applicable General Plan policies were presented in detail in the **Regulatory Background** section of this report and are summarized below for the proposed project:

- The City's acceptable exterior noise level objective is 60 dBA L_{dn} or less for the proposed residential uses, according to Policy SSI-8.1. Outdoor use areas for commercial uses are required to have exterior noise levels at or below 70 dBA L_{dn}, and the exterior noise threshold for playgrounds and neighborhood parks would be 70 dBA L_{dn} (Table SSI-1).

- Policy SSI-8.1 also states that indoor noise levels of residential uses should be maintained at or below 45 dBA L_{dn}, and where new residential developments are exposed to exterior noise levels of 60 dBA L_{dn} or greater, maximum instantaneous noise levels should be limited to 50 dBA L_{max} in bedrooms and to 55 dBA L_{max} in every other room. Policy SSI-8.4 limits interior noise levels in office buildings to 45 dBA L_{eq} or less.

Additionally, the State of California requires that all nonresidential land uses adhere to the Cal Green Code, which states the following:

- The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas of nonresidential uses during any hour of operation.

Noise and Land Use Compatibility

The project proposes to construct two three-story, three four-story residential buildings, and a clubhouse/leasing office building on Parcel C, which is located on the northern half of the project site. The outdoor uses on Parcel C would include a pool, a playground, a play field, and two parks. Development on Parcel B, which is adjacent to Juan Hernandez Drive, would consist of a 10,000-square foot, one-story commercial retail/restaurant building. This retail building would include two areas of outdoor dining. The project proposes a 100,000-square foot, three-story medical office/hospital building, which includes a plaza, on Parcel A, along with a three-story parking structure to the east of the hospital and a park to the west. This parcel is located adjacent to U.S. Highway 101. Parcel D currently includes the existing medical offices and proposes the construction of a 4,500-square foot, one-story urgent care facility and a 10,000-square foot, one-story medical office building. Parcel D does not appear to include any new outdoor use areas.

The future noise environment at the project site would continue to result primarily from vehicular traffic along U.S. Highway 101, with the local roadways remaining as secondary sources of noise. Based on the traffic study completed in March 2020, traffic volumes along the local roadways in the project vicinity would increase by 2 dBA L_{dn} under future cumulative plus project conditions. Therefore, future plus project noise levels at the project site would be approximately 69 dBA L_{dn} at a distance of 30 feet from the centerline of Juan Hernandez Drive (LT-1).

Peak hour traffic volumes along U.S. Highway 101 were not included in the traffic study. To estimate the future noise increase at the project site under future conditions, a conservative 1% to 2% increase in traffic volumes each year through 2035 was assumed. This would result in a noise level increase of 2 dBA L_{dn} over existing conditions. Future noise levels would be approximately 85 dBA L_{dn} at a distance of 65 feet from the centerline of nearest through lane along southbound U.S. Highway 101 (LT-2).

Future Exterior Noise Environment

Parcel A

The outdoor use areas associated with the buildings on Parcel A include a plaza at the hospital and a park to the west of the hospital.

The plaza would be shielded from both U.S. Highway 101 and Juan Hernandez Drive by the hospital and other intervening project buildings, with setbacks from both roadways of over 400 feet. At these distances and assuming shielding by the proposed project buildings, the future exterior noise levels at this commercial outdoor use area would be below 70 dBA L_{dn}.

The park would be shielded from U.S. Highway 101 by the hospital and other intervening project buildings. The park would be partially shielded from Juan Hernandez Drive by the proposed buildings on Parcels B and D as well. The setback from the center of the park to the centerline of Juan Hernandez Drive would be approximately 300 feet. At this distance and assuming at least partial shielding by the project buildings, the future exterior noise levels at park would be below 70 dBA L_{dn}.

Parcel B

The one-story restaurant/retail building on Parcel B would include an outdoor dining area on the northern and eastern building façades. The project buildings would provide partial shielding for both outdoor dining areas.

The center of the outdoor dining area along the northern building façade would be located approximately 120 feet from the centerline of Juan Hernandez Drive and approximately 800 feet from the centerline of the nearest through lane along U.S. Highway 101. At these distances, and assuming partial shielding, the future exterior noise levels at the outdoor dining area north of the proposed restaurant building on Parcel B would be below 70 dBA L_{dn}.

The center of the outdoor dining area along the eastern building façade would be completely shielded from Juan Hernandez Drive and would be set back from the centerline of the nearest

through lane along U.S. Highway 101 by approximately 770 feet. At this distance, and assuming partial shielding from intervening project buildings, the future exterior noise levels at the dining area to the east of the proposed restaurant building on Parcel B would be below 70 dBA L_{dn}.

Parcel C

Parcel C would include an outdoor pool area, a tot lot playground, a play field, and two parks. The project buildings would provide partial shielding for the pool, the playground, the play field, and one of the parks.

The proposed pool area, which is located between three four-story residential buildings and the club house, would be subject to the residential exterior noise limit of 60 dBA L_{dn}, while the playground, play field, and parks would be subject to the City's limit of 70 dBA L_{dn}.

The center of the pool is approximately 455 feet from the centerline of the nearest through lane along U.S. Highway 101. At this distance and with partial shielding from intervening project buildings, future exterior noise levels would be below 60 dBA L_{dn}.

The center of the tot lot would be approximately 580 feet from the centerline of the nearest through lane along U.S. Highway 101 and approximately 340 feet from the centerline of Juan Hernandez Drive. With partial shielding from both roadways provided by project buildings, the future exterior noise levels would be below 70 dBA L_{dn}.

The play field would be partially shielded, but unlike the pool and tot lot, this outdoor use area would have direct line-of-sight to U.S. Highway 101, with the center of the field set back approximately 320 feet from the centerline of the nearest through lane. At this distance, the future exterior noise levels would be 71 dBA L_{dn}, which exceeds the 70 dBA threshold by 1 dBA.

The park adjoining U.S. Highway 101 would have direct line-of-sight to the highway, with the center of the park set back approximately 170 feet from the centerline of the nearest through lane. At this distance and with minimal to no shielding, the future exterior noise levels would be 79 dBA L_{dn}, which exceeds the 70 dBA threshold by 9 dBA.

The park adjoining Barrett Avenue would have direct line-of-sight to the highway, with partial shielding due to project buildings and off-site existing buildings. The center of the park would be set back approximately 485 feet from the centerline of the nearest through lane along U.S. Highway 101. At this distance and with partial shielding, the future exterior noise levels would be 65 dBA L_{dn}, which would meet the 70 dBA threshold.

Parcel D

There are no proposed outdoor use areas on Parcel D.

All proposed outdoor use areas on Parcels A, B, and D, as well as the pool area, tot lot, and the park adjoining Barrett Avenue on Parcel C, would meet the City's exterior noise thresholds. Therefore, these exterior environments would be compatible with the City's requirements. The noise environment at the play field and the park adjoining U.S. Highway 101 would exceed the

City's "normally acceptable" thresholds established by the City of Morgan Hill. However, the play field would only exceed the "normally acceptable" threshold by 1 dBA, falling within the "conditionally acceptable" threshold. Due to the nature of this outdoor use area and the fact that the future exterior noise levels would only exceed the threshold by 1 dBA, no mitigation would be recommended for this outdoor use area. The future exterior noise levels at the park adjoining U.S. Highway 101 would exceed the "conditionally acceptable" threshold of 75 dBA L_{dn}, falling within the "clearly unacceptable" category. This outdoor use area would require mitigation.

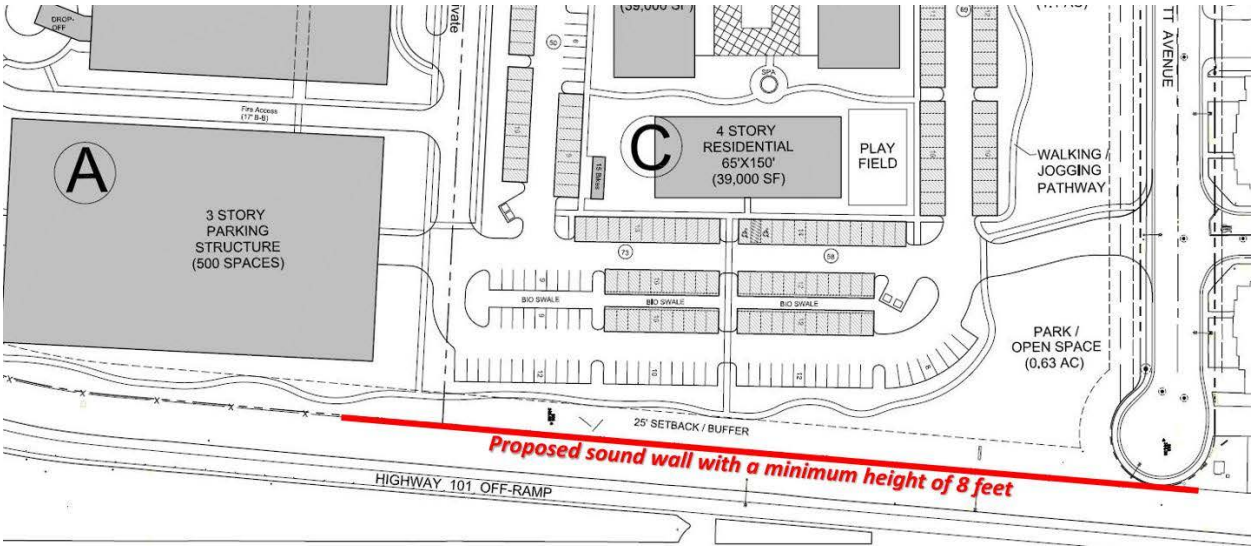
Recommended Measures to Reduce Exterior Noise Levels

Methods available to reduce exterior noise levels at the park adjoining U.S. Highway 101 include site planning alternatives (e.g., increased setbacks and using the proposed buildings as noise barriers), the construction of traditional noise barriers or earth berms, or a combination of the above. For the proposed project, the park could be relocated to a more compatible location on Parcel C, farther from U.S. Highway 101 or to a location where it is shielded by project buildings. Assuming this redesign would not be feasible, the optimal measure for noise reduction would be to construct a sound wall or a specially-designed barrier capable of reducing noise levels. Ideally, a barrier to reduce noise levels by up to 9 dBA would be desirable; however, due to the large area of the park (0.63 acres) and the setback of the center of the park from the centerline of the nearest through lane, achieving 9 dBA of reduction may not be practical.

The location of the barrier would be along the western boundary of the project, aligned with the existing 5-foot barrier located west of the single-family residences along St. John Court. On the southern side, the barrier should end just past the proposed parking structure. The total length of the barrier should be approximately 680 feet. Figure 8 shows the location of the proposed barrier. The height of the noise barrier would need to break the line-of-sight from a 5-foot high receptor at the center of the park to the traffic noise source. Due to the setback of the center of the park, a barrier with a height of 8 feet, as measured from the pad elevation, would reduce the future exterior noise levels to 73 dBA L_{dn}, which would meet the "conditionally acceptable" threshold. With a height of 10 feet, future exterior noise levels would be 72 dBA L_{dn}. A taller barrier would not be practical for the additional reduction it may provide.

The proposed barrier should be continuous from grade to top, with no cracks or gaps, and have a minimum surface density of three lbs/ft^2 (e.g., one-inch thick marine-grade plywood, ½-inch laminated glass, concrete masonry units (CMU)). The final recommendations shall be confirmed when detailed site plans and grading plans are available. With the implementation of this proposed barrier, the exterior noise environment would be below 75 dBA L_{dn}, the "conditionally acceptable" threshold.

FIGURE 8 Recommended Barrier Location



Future Interior Noise Environment

Standard construction materials for commercial uses would provide about 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so windows may be kept closed at the occupant's discretion and would provide an additional 5 dBA reduction.

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA L_{dn}, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA L_{dn}, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound-rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

<u>Parcel A</u>

The proposed hospital would be required to meet the Cal Green code, as well as the City's residential interior requirement of 45 dBA L_{dn} since occupants would be sleeping at the hospital. The eastern façade would be approximately 385 to 390 feet from the centerline of the nearest through lane along U.S. Highway 101. At this distance, the occupants would be exposed to future exterior noise levels ranging from 64 to 69 dBA L_{dn}, assuming partial shielding from the intervening parking structure. During daytime operational hours, the occupants would be exposed to future exterior noise levels of 62 to 67 dBA L_{eq} along the nearest façade, assuming partial shielding from the parking structure. Assuming standard commercial construction materials, future

interior noise levels would be below 60 dBA L_{dn} and below 50 dBA $L_{eq(1\text{-}hr)}$ during daytime operational hours. The interior noise levels at this land use would be compatible with the future noise environment, assuming standard construction materials.

Parcel B

The eastern façade of the proposed restaurant on Parcel B would be approximately 770 feet from the centerline of the nearest through lane along U.S. Highway 101. The western façade would be approximately 75 feet from the centerline of Juan Hernandez Drive. At these distances, the occupants would be exposed to future exterior noise levels of 61 to 65 dBA L_{eq} during daytime operational hours. Assuming standard construction materials, future interior noise levels would be below 50 dBA $L_{eq(1\text{-}hr)}$ during daytime operational hours. This would satisfy the Cal Green performance standard.

Parcel C

The nearest residential structure to U.S. Highway 101 would be approximately 290 feet from the nearest southbound through lane along U.S. Highway 101. The lower floors would receive partial shielding from the parking garage on Parcel A; however, the fourth floor would receive less shielding since the garage is only three stories tall. The occupants in the units along the eastern façade would be exposed to future exterior noise levels ranging from 73 to 76 dBA L_{dn}. Based on the typical maximum instantaneous noise levels measured at LT-2, these units would be exposed to future exterior noise levels ranging from 73 to 83 dBA L_{max}. Assuming standard residential construction, the future interior noise levels would range from 58 to 61 dBA L_{dn}, and the maximum instantaneous noise levels would range from 58 to 68 dBA L_{max}.

The two residential buildings on either side of the pool area would be partially shielded from U.S. Highway 101 by the eastern residential building and other project buildings. With a setback of approximately 390 feet from the centerline of the nearest through lane in the southbound direction, the units along the eastern façade would be exposed to future exterior noise levels ranging from 68 to 73 dBA L_{dn} and 68 to 80 dBA L_{max}. Assuming standard residential construction, the future interior noise levels would range from 53 to 58 dBA L_{dn}, and the maximum instantaneous noise levels would range from 53 to 65 dBA L_{max}.

The western façades of the two three-story residential buildings along Juan Hernandez Drive would be set back approximately 155 feet from the centerline of the roadway. At this distance, the units along these façades would be exposed to future exterior noise levels of 61 dBA L_{dn}, with maximum instantaneous noise levels ranging from 57 to 74 dBA L_{max}. Assuming standard residential construction, the future interior noise levels would be 46 dBA L_{dn}, and the maximum instantaneous noise levels would range from 42 to 59 dBA L_{max}.

To meet the interior noise thresholds for residential land uses, noise insulation features would be required for the buildings proposed on Parcel C.

Parcel D

While two medical office buildings exist on Parcel D, the project proposes to construct two additional one-story buildings on this parcel. The proposed building to the east of the existing

buildings would have direct line-of-sight to U.S. Highway 101, with the nearest building façade set back approximately 465 feet from the centerline of the nearest southbound through lane. At this distance, the nearest offices along this façade would be exposed to future exterior noise levels up to 68 dBA L_{dn}, assuming partial shielding from the intervening parking structure and hospital. During daytime operational hours, the occupants would be exposed to future exterior noise levels of 62 to 66 dBA L_{eq}, assuming partial shielding from the parking structure and hospital. Assuming standard commercial construction materials, future interior noise levels would be below 60 dBA L_{dn} and below 50 dBA $L_{eq(1\text{-}hr)}$ during daytime operational hours. The interior noise levels at this land use would be compatible with the future noise environment, assuming standard construction materials.

The second medical office building would be a one-story urgent care facility located along Juan Hernandez Drive. The nearest building façade would be set back approximately 60 feet from the centerline of the roadway. At this distance, the occupants would be exposed to future exterior noise levels of 66 dBA L_{dn}. During daytime operational hours, the occupants would be exposed to future exterior noise levels of 59 to 67 dBA L_{eq}. Assuming standard commercial construction materials, future interior noise levels would be below 60 dBA L_{dn} and below 50 dBA $L_{eq(1\text{-}hr)}$ during daytime operational hours. The interior noise levels at this land use would be compatible with the future noise environment, assuming standard construction materials.

Noise Insulation Features to Reduce Future Interior Noise Levels

Detailed unit layouts were not available at the time of this study; however, preliminary calculations were made to estimate noise insulation features required to reduce interior noise levels to 45 dBA L_{dn} or less in all residential units, 50 dBA L_{max} or less in residential bedrooms, and 55 dBA L_{max} or less in all other residential rooms. The following shall be implemented into the design of the proposed project:

- Preliminary calculations indicate that windows and doors with a minimum STC rating of 43, assuming a stucco exterior wall assembly with a STC rating of 46, would be required to meet the interior noise levels of 45 dBA L_{dn} and 50 dBA L_{max} within bedrooms at the nearest four-story residential building to U.S. Highway 101.

- The two residential buildings adjacent to the pool would require windows and doors with a minimum STC rating of 40 to 43 to meet the interior noise thresholds at the units nearest U.S. Highway 101.

- The two three-story buildings facing Juan Hernandez Drive would meet the interior noise levels of 45 dBA L_{dn} and 50 dBA L_{max} within bedrooms with standard construction materials and the inclusion of adequate forced-air mechanical ventilation.

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units on the project site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise

standards. Forced-air mechanical ventilation should also be implemented in all nonresidential buildings so windows can be kept shut to control interior noise levels.

- Once detailed site plans, unit layouts with dimensions, and elevations are available, a qualified acoustical consultant shall conduct a noise study to determine the required noise insulation recommendations based on the final site plans, building elevations, and floor plans of the proposed residential buildings. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

Significance Criteria

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

1. **Temporary or Permanent Noise Increases in Excess of Established Standards.** A significant impact would be identified if project construction or operations would result in a substantial temporary or permanent increase in ambient noise levels at sensitive receivers in excess of the local noise standards contained in the General Plan or Municipal Code.

2. **Generation of Excessive Groundborne Vibration.** A significant impact would be identified if the construction of the project would generate excessive vibration levels.

3. **Exposure of Residents or Workers to Excessive Noise Levels in the Vicinity of a Private Airstrip or an Airport Land Use Plan.** A significant impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1: **Temporary or Permanent Noise Increases in Excess of Established Standards**. Temporary noise increases resulting from project construction activities and permanent noise increases resulting from project traffic and on-site activities would potentially exceed the standards established in the City's General Plan and Municipal Code at the nearby sensitive receptors. The incorporation of construction best management practices and evaluation of mechanical equipment as the equipment is selected for the proposed project as part of the project‘s standard conditions of approval would result in a **less-than-significant** temporary or permanent noise impact.

Temporary Construction Noise Increases

The project would include the construction of a three-story, 100,000 square foot hospital, a one-story, 10,000 square foot medical office building, and a three-story parking structure on Parcel A; a one-story, 10,000 square foot restaurant/retail building on Parcel B; three four-story, 39,000 square foot residential apartment buildings, two three-story, 29,250 square foot residential apartment buildings, and a 3,000 square foot club house/office building on Parcel C; and a one-story, 4,500 urgent care facility on Parcel D. A list of construction equipment was not available at the time of this analysis; however, the project is expected to be constructed in three phases, starting January 2021 and concluding August 2024. On each parcel, construction would include site preparation, grading, trenching, building exterior and interior, and paving.

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), if the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Chapter 8.28 of the City of Morgan Hill's Municipal Code establishes allowable hours of construction between 7:00 a.m. and 8:00 p.m., Monday through Friday, and between the hours of 9:00 a.m. to 6:00 p.m. on Saturday. Construction activities may not occur on Sundays or federal holidays.

While quantitative noise thresholds for temporary construction are not provided in the City's General Plan or Municipal Code, the Fundamentals section of this report provides a threshold of 45 dBA for speech interference indoors. Assuming a 15 dBA exterior-to-interior reduction for standard residential construction and a 25 dBA exterior-to-interior reduction for standard commercial/industrial construction, this would correlate to an exterior threshold of 60 dBA L_{eq} at residential land uses. Additionally, temporary construction would be annoying to surrounding land uses if the ambient noise environment increased by at least 5 dBA L_{eq} for an extended period of time. Therefore, the temporary construction noise impacts would be considered significant if project construction activities exceed 60 dBA L_{eq} at nearby residences or 70 dBA L_{eq} at nearby industrial/commercial land uses and exceed the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year.

Construction activities generate considerable amounts of noise, especially during earth-moving activities and during the construction of the building's foundation when heavy equipment is used. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. Table 5 shows typical hourly average construction noise levels measured at a distance of 50 feet from the center of the active construction site. As shown in Table 5, typical hourly average construction-generated noise levels for residential buildings are about 81 to 88 dBA L_{eq}, as measured at a distance of 50

feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). For office buildings and hospitals, typical hourly average noise levels would range from 78 to 89 dBA L_{eq}, and for a parking structure, hourly average noise levels would range from 77 to 89 dBA L_{eq}. The typical range of maximum instantaneous noise levels for construction equipment used at this site would be 77 to 90 dBA L_{max} at 50 feet, as shown in Table 6.

TABLE 5 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.

TABLE 6 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.

Depending on the construction phasing for each parcel, on-site project buildings could potentially provide shielding for the surrounding residences. Further, if on-site parcels are completed and occupants reside while construction on other parcels is on-going, those on-site receptors would also be exposed to construction noise. However, details pertaining to the construction phasing were not available at the time of this study. Assuming worst-case conditions, no shielding effects were assumed for this analysis. Tables 7 through 10 estimate noise levels for each of the parcels at the property lines of the nearest receiving land uses based on the hourly average noise levels shown in Table 5.

TABLE 7 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of Parcel A

Proposed Project Construction	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}		
	East Residential (485 to 695 feet)	South Residential (770 to 1,085 feet)	North Residence and School (760 to 815 feet)
Ground Clearing	61 to 64	56 to 60	59 to 60
Excavation	48 to 69	44 to 65	47 to 65
Foundations	54 to 58	50 to 54	53 to 54
Erection	49 to 67	45 to 63	48 to 63
Finishing	51 to 69	47 to 65	50 to 65

TABLE 8 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of Parcel B

Proposed Project Construction	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}		
	East Residential (150 feet)	South Residential (1,085 feet)	North Residence and School (660 feet)
Ground Clearing	75	57	62
Excavation	70 to 80	52 to 62	57 to 67
Foundations	69	51	56
Erection	66 to 78	48 to 60	53 to 65
Finishing	66 to 80	48 to 62	53 to 67

TABLE 9 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of Parcel C

Proposed Project Construction	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}		
	East Residential (470 feet)	South Residential (1,445 feet)	North Residence and School (335 feet)
Ground Clearing	64	54	67
Excavation	56 to 69	46 to 59	59 to 72
Foundations	62	52	65
Erection	46 to 62	36 to 52	49 to 65
Finishing	53 to 69	43 to 59	56 to 72

TABLE 10 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of Parcel D

Proposed Project Construction	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}		
	East Residential (160 feet)	South Residential (840 feet)	North Residence and School (900 feet)
Ground Clearing	74	60	59
Excavation	69 to 79	55 to 65	54 to 64
Foundations	68	54	53
Erection	65 to 77	51 to 63	50 to 62
Finishing	65 to 79	51 to 65	50 to 64

Based on the results in Tables 7 through 10, construction noise levels at the nearby receptors would at times exceed the 60 dBA L_{eq} and would potentially exceed ambient noise levels by more than 5 dBA L_{eq} for a period of about 3.5 years.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Construction activities will be conducted in accordance with the provisions of the City's General Plan and the Municipal Code, which limits temporary construction work to between the hours of 7:00 a.m. and 8:00 p.m. Monday through Friday and between 9:00 a.m. to 6:00 p.m. on Saturday. Construction is prohibited on Sundays and federal holidays. Further, the City shall require the construction crew to adhere to the following construction best management practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity. A construction noise control plan, including, but not limited to, the following construction best management controls will be implemented as a standard condition of project approval:

- Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds);

- Impact tools (e.g., jackhammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools; and

- Stationary noise sources shall be located as far from noise-sensitive receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or include other measures.

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise

barrier interrupts the line-of-sight between the noise source and receptor and if the barrier is constructed in a manner that eliminates any cracks or gaps.

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

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction. Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential receptors.

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

- Where feasible, temporary power service from local utility companies should be used instead of portable generators.

- Locate cranes as far from noise-sensitive receptors as possible.

- During final grading, substitute graders for bulldozers, where feasible. Wheeled heavy equipment are quieter than track equipment and should be used where feasible.

- Substitute nail guns for manual hammering, where feasible.

- Avoid the use of circular saws, miter/chop saws, and radial arm saws near the adjoining noise-sensitive receptors. Where feasible, shield saws with a solid screen with material having a minimum surface density of 2 lbs/ft^2 (e.g., such as ¾" plywood).

- Maintain smooth vehicle pathways for trucks and equipment accessing the site, and avoid local residential neighborhoods as much as possible.

- During interior construction, the exterior windows facing noise-sensitive receptors should be closed.

- During interior construction, locate noise-generating equipment within the building to break the line-of-sight to the adjoining receptors.

- The contractor shall prepare a detailed construction schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will 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 in it the notice sent to neighbors regarding the construction schedule.

The implementation of the reasonable and feasible controls outlined above would reduce construction noise levels emanating from the site in order to minimize disruption and annoyance. With the implementation of these measures, the lack of high-intensity construction equipment required for the proposed project, and the fact that noise generated by construction activities would occur over a temporary period, the temporary increase in ambient noise levels at receptors near the project site would be a less-than-significant impact.

Permanent Offsite Traffic Noise Increases

A significant permanent noise increase would occur if the project would substantially increase noise levels at existing sensitive receptors in the project vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA L_{dn} or greater, with a future noise level of less than 60 dBA L_{dn} at residences and the school; or b) the noise level increase is 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater at residences and the school. Based on the measurements made at LT-1 and LT-2, all existing noise-sensitive receptors along roadways serving the project site are currently exposed to noise levels exceeding 60 dBA L_{dn}. Therefore, a significant impact would occur if traffic due to the proposed project would permanently increase ambient levels by 3 dBA L_{dn}. For reference, a 3 dBA L_{dn} noise increase would be expected if the project would double existing traffic volumes along a roadway.

The AM and PM peak hour turning movements for 19 intersections in the project vicinity were provided in the traffic study prepared for the proposed project. The project-generated traffic noise increase was calculated by comparing the traffic volumes for all existing plus project scenarios along each roadway segment included in the traffic study to the existing volumes.

A traffic noise increase of 2 dBA L_{dn} or less was calculated along each roadway segment included in the traffic study except for the segments of Juan Hernandez Drive, north of Tennant Avenue, north and south of St. James Drive, and south of Barrett Avenue; and Barrett Avenue, east and west of San Ramon Drive where an increase of 3 dBA L_{dn} or more was calculated. However, the existing peak hour volumes along these segments are relatively low, and the high ambient noise levels in the vicinity range from 65 to 70 dBA L_{dn}, which are demonstrated by the noise contour provided in the City of Morgan Hill General Plan and the measured noise levels at LT-1. The peak hour traffic volumes included in the traffic study were modeled in the Federal Highway Administration's Traffic Noise Model (FHWA TNM), version 2.5, to estimate the peak hour noise levels based on the peak hour volumes for the existing plus project scenario. By adding the measured day-night average noise level at LT-1 of 67 dBA L_{dn} to the L_{dn} noise level estimated from TNM in an energy summation, the noise level increase was estimated to be 2 dBA L_{dn} along Juan Hernandez Drive and Barrett Avenue. Therefore, the proposed project would not cause a substantial permanent noise level increase at noise-sensitive receptors in the project vicinity. This is a less-than-significant impact.

A significant cumulative impact 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.

Cumulative traffic noise level increases were calculated by comparing the cumulative traffic volumes and the cumulative plus project volumes to existing traffic volumes. FHWA's TNM was used to model the cumulative and cumulative plus project scenarios along Juan Hernandez Drive, north of Tennant Avenue, north and south of St. James Drive, and north and south of Barrett Avenue; along St. James Drive, west of Juan Hernandez Drive; along Barrett Avenue, west of Juan Hernandez Drive, and east and west of San Ramon Drive. Using the same energy summation methodology as described above, the estimated noise level increase under both cumulative scenarios (with and without the project) for all segments would be 2 dBA L_{dn} or less when compared to the existing peak hour traffic volumes. The increase would be less than 3 dBA L_{dn} and would be the same for both cumulative and cumulative plus project scenarios.

Additionally, a traffic noise level increase of 3 dBA L_{dn} was calculated along Barrett Avenue, east and west of Butterfield Boulevard under both cumulative scenarios (with and without the proposed project). Since the same increase was calculated for the cumulative and the cumulative plus project scenarios, the project's contribution would be 0 dBA L_{dn}, which would not be considered "cumulatively considerable." All other segments included in the traffic study would have an increase of 2 dBA L_{dn} or less under cumulative conditions. This is a less-than-significant cumulative noise impact.

Permanent Onsite Noise Increases

Policy SSI-8.6 of the City of Morgan Hill General Plan states that noise levels produced by stationary noise sources associated with new projects, such as mechanical equipment, would result in a significant impact if the noise levels substantially exceed existing ambient noise levels. Further, Table 18.76-1 of the City's Municipal Code provide maximum noise level thresholds enforced at the property lines of the receiving land uses. At residential land uses, the noise level limit is 60 dBA.

Parking/Circulation

Noise sources within the proposed parking lots would include vehicle circulation, engine starts, doors slams, human voices, and occasional car alarms. The sound of slow-moving vehicles, engines starting, doors closing, and people talking in the parking lot would be expected to reach maximum levels of 50 to 60 dBA at a distance of 50 feet. The acoustic center of the parking lots are conservatively assumed to be the center of the lot as it is likely that most vehicles will be parked as close as possible to the project buildings. For this analysis, the distance from the center of the nearest parking lot to the nearest surrounding noise-sensitive property line was used to estimate the parking lot noise impact.

Existing ambient noise levels at the nearest residential land uses to the west were measured to range from 60 to 67 dBA L_{eq} during daytime hours and from 56 to 63 dBA L_{eq} during nighttime hours (see LT-1), and the primary source of noise at this location was from traffic along U.S. Highway 101, with Juan Hernandez Drive being the secondary source. The estimated day-night average noise level at LT-1 was 67 dBA L_{dn}. These residences would have direct line-of-sight to residential parking lots and the restaurant parking lot. The distance from the nearest parking lot to residential property lines would be approximately 135 feet. At this distance, noise levels generated by parking and vehicle circulation would range from 41 to 51 dBA, which is below typical daytime and nighttime ambient noise levels. The day-night average noise level attributable to parking lot operations would be 59 dBA at the property line, conservatively assuming parking lot noise levels of 51 dBA L_{eq} every hour in the 24-hour period. Additionally, parking lot noise would meet the 60 dBA standard established in Table 18.76-1 of the City's Municipal Code. This is a less-than-significant impact.

The existing residences to the north of the site, opposite Barrett Avenue are located along U.S. Highway 101 and would be represented by LT-2, which has daytime hourly average noise levels ranging from 77 to 81 dBA L_{eq} and nighttime hourly average noise levels ranging from 73 to 79 dBA L_{eq}. The day-night average noise level at LT-2 was calculated to be 83 dBA L_{dn}. Additionally, the existing elementary school located north of Barrett Avenue, which operates during daytime hours only, would be represented by ST-1. The daytime average noise level at ST-1 was measured to be 64 dBA L_{eq}, and the estimated day-night average noise level would be 67 dBA L_{dn}. The center of the nearest residential parking lot would be 205 feet from the nearest existing residential and elementary school property line. At this distance, the parking lot noise levels would range from 38 to 48 dBA L_{eq}, with a day-night average noise level of 54 dBA L_{dn}, assuming 48 dBA L_{eq} each hour in a 24-hour period. These noise levels would be below the ambient noise levels and below the Municipal Code limit of 60 dBA. This would be a less-than-significant impact.

ST-3 represented the nearest single-family residences to the south of the project site, and these residences would have direct line-of-sight to the existing and future medical office building parking lots on Parcel D. Daytime ambient noise levels at ST-3 was 76 dBA L_{eq}, and the estimated day-night average noise level would be 83 dBA L_{dn}. The center of the nearest parking lot would be approximately 820 feet from the nearest residential property line along Tennant Avenue. At this distance, parking lot noise levels would range from 26 to 36 dBA. These parking lots could be used each hour in a 24-hour period since one of the proposed medical buildings would be an urgent care facility. Assuming 36 dBA would occur each hour in a 24-hour period, the day-night average noise level at the nearest residential property line south of the project site would be 42 dBA L_{dn}. Parking lot noise would be below ambient noise levels and the 60 dBA limit for residences. This is a less-than-significant impact.

Due to the location of the parking garage along U.S. Highway 101 and away from all surrounding noise-sensitive receptors, which would be shielded from parking garage noise by the other project buildings, parking lot noise from the parking garage would not result in a significant impact at existing noise-sensitive receptors.

Truck Deliveries

The proposed restaurant and retail building would likely require weekly truck deliveries. While details pertaining to the number of deliveries, hours of deliveries, and locations for loading zones were not available at the time of this study, it is assumed for commercial use of this size that 1 to 2 vendor trucks would make deliveries per week. While the City of Morgan Hill does not define allowable delivery hours, it is assumed that the proposed commercial building would restrict truck deliveries to the hours of 7:00 a.m. to 7:00 p.m. to reduce the potential impact to surrounding residences.

It is assumed that deliveries would occur in the parking lot to the south of the one-story restaurant building. Vendor delivery trucks typically generate maximum noise levels of 60 to 65 dBA L_{max} at a distance of 50 feet. Low speed truck noise results from 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. The noise levels produced by backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically between 65 to 75 dBA L_{max} at a distance of 50 feet.

The nearest residential property line, which would be west of the project site, is approximately 100 feet from the nearest potential delivery zone. At this distance, maximum noise levels would range from 56 to 61 dBA L_{max}, with backup alarms reaching levels up to 71 dBA L_{max}. Assuming a delivery would take about 15 to 20 minutes, the hourly average noise level would be about 63 dBA L_{eq}, and assuming this would occur during one daytime hour in a 24-hour period, the day-night average noise level would be 50 dBA L_{dn}. With ambient hourly average noise levels ranging from 60 to 67 dBA L_{eq} during daytime hours and a day-night average noise level of 67 dBA L_{dn}, the nearest residences would be exposed to delivery noise levels below ambient levels and below the 60 dBA threshold for residential land uses. This would be a less-than-significant impact.

Mechanical Equipment

The proposed project would be expected to include mechanical equipment for heating, ventilation, and air conditioning at the hospital and medical office building on Parcel A, at the restaurant on Parcel B, at each of the residential buildings on Parcel C, and at the urgent care facility on Parcel D. Additionally, the hospital would likely have an emergency backup generator. At the time of this study, details pertaining to the type, size, quantities, locations, noise levels generated, and potential screening for the equipment was unavailable. Based on the type of land use and size of each building, typical source levels are used to estimate potential mechanical equipment noise impacts; however, as details for the equipment is made available, this impact should be reevaluated to ensure compliance with existing ambient conditions.

Typical mechanical equipment associated with hospital buildings produce total noise source levels ranging from about 63 to 67 dBA L_{eq} at a distance of 50 feet. The nearest residential property line is approximately 400 feet from the nearest hospital façade. While most of the hospital would be shielded by the intervening project buildings, the worst-case scenario would assume the equipment to be located at the façade with direct exposure to the receiving property lines. At 400 feet, mechanical equipment noise generated at the hospital would range from 45 to 49 dBA. Assuming this equipment to operate continuously during daytime and nighttime hours, the day-night average

noise level would be 55 dBA L_{dn}. These levels would be below the LT-1 ambient noise levels of 60 to 67 dBA L_{eq} during daytime hours, 56 to 63 dBA L_{eq} during nighttime hours, and 67 dBA L_{dn}. The maximum noise level threshold of 60 dBA for receiving residential land uses would also be met. This would be a less-than-significant impact.

Three locations have been proposed for the emergency generator, which are shown in Figure 9. Option 1, which is to the south of the parking garage, would be 745 feet or more from the nearest residential land use surrounding the site. This location would also be at least partially shielded by intervening existing and proposed on-site buildings. Option 2, which would be located to the north of the existing medical building, would be 315 feet or more from the nearest surrounding residential property lines. This option would have direct line-of-sight to the nearest residences located to the east. Option 3, which would be south of the parking lot in the southeastern corner of the project site. The residence to the east, which would be 670 feet or more from the generator, would be mostly shielded by intervening existing and proposed on-site buildings. The single-family residences along Tennant Avenue would be 650 feet or more from the generator with direct line-of sight.

At the time of this study, specific equipment, size, and any noise-suppressing features such as enclosures, mufflers, etc., were not available. For purposes of this analysis, it is assumed that a 1500 kW emergency generator would be used for this project. A 1500 kW generator would typically generate noise levels up to 89 dBA at a distance of 50 feet, assuming no enclosure or noise control features. With the inclusion of sufficient noise control features, noise levels could be reduced to 65 dBA at 50 feet from the generator. Emergency generators are typically tested monthly for a period of one hour between 7:00 a.m. and 10:00 p.m. Table 11 summarizes the worst-case noise levels at the property line of the nearest residential land use for each location option.

Based on measurements at LT-1, the ambient noise levels at the east residences range from 60 to 67 dBA L_{eq} during daytime hours, with a day-night average noise level of 67 dBA L_{dn}. Options 1 and 3 with a suppressor would be at or below the ambient noise levels and below the 60 dBA noise threshold established in the Municipal Code. Option 2, however, would exceed both ambient and maximum noise thresholds without a noise suppressor. Daytime ambient noise levels at ST-3, which would represent the south residences, was 76 dBA L_{eq}, and the estimated day-night average noise level would be 83 dBA L_{dn}. All options with a noise suppressor would be below the ambient noise levels and the 60 dBA threshold. With noise suppression features implemented into the project, this would be a less-than-significant impact.

Once the emergency generator is selected and the noise levels are available, adequate noise-suppressing features such as enclosures, mufflers, etc., should be selected. As shown in Table 11, noise-suppressing features would be required to not exceed ambient noise levels and the 60 dBA noise level threshold.

FIGURE 9 Proposed Locations for the Emergency Generator

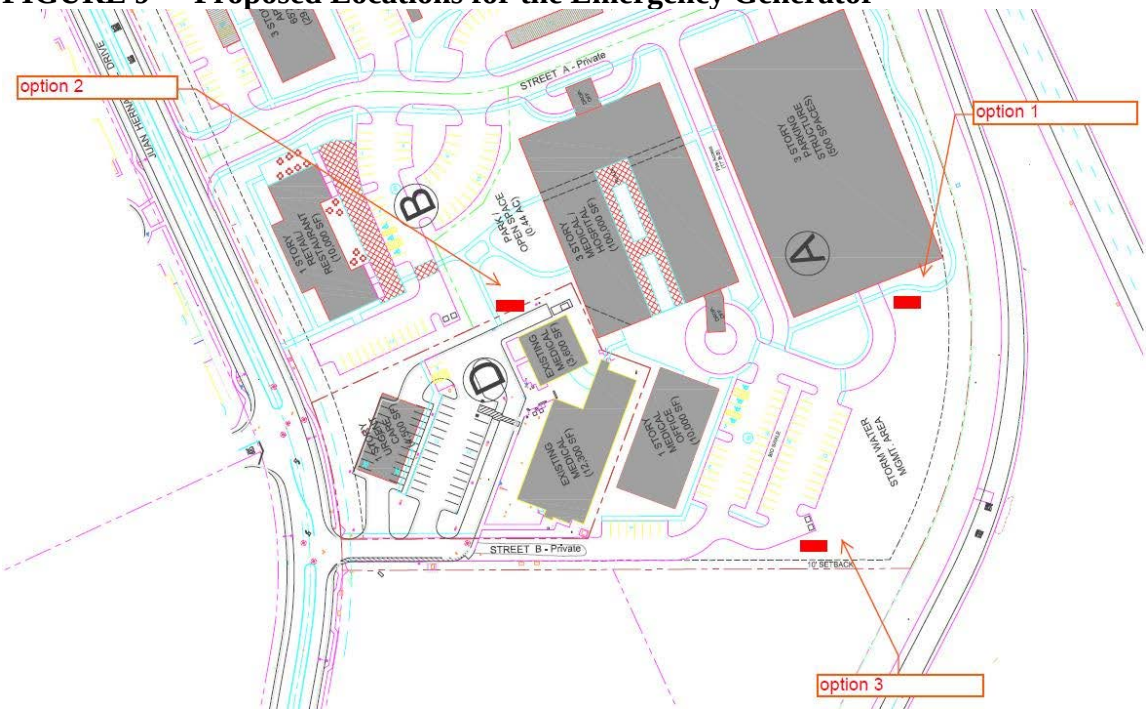


TABLE 11 Estimated Emergency Generator Noise Levels for All Location Options

Receptor		Option 1		Option 2		Option 3	
		L_{eq}	L_{dn}	L_{eq}	L_{dn}	L_{eq}	L_{dn}
East Residence	No suppressor[a]	66 dBA	52 dBA	73 dBA	59 dBA	67 dBA	53 dBA
	With suppressor[a]	42 dBA	28 dBA	49 dBA	35 dBA	43 dBA	29 dBA
South Residence	No suppressor[a]	64 dBA	50 dBA	64 dBA	50 dBA	67 dBA	53 dBA
	With suppressor[a]	40 dBA	26 dBA	40 dBA	26 dBA	43 dBA	29 dBA

[a] These values are based on manufacturer's noise level data for generators of 1500 kW capacity.

The medical office building on Parcel A, the restaurant on Parcel B, and the urgent care facility on Parcel D are one-story commercial buildings of similar size. Each of these would include ventilation systems, which would generate noise levels of 61 to 62 dBA at a distance of 20 feet. The medical office building would be more than 400 feet from the nearest residential land use and would be shielded by existing and proposed medical buildings. The restaurant/retail building would be 105 feet from the nearest residential property line, while the urgent care facility would be approximately 135 feet from the nearest residential property line. Therefore, the restaurant would represent the worst-case scenario. It is assumed that up to three of units would operate simultaneously during daytime and nighttime hours. Under this assumption, mechanical equipment noise generated at the nearest façade of the restaurant/retail building would range from 51 to 52 dBA at 105 feet. The day-night average noise level, assuming 24-hour operations, would be 59 dBA L_{dn}. These levels would be below the LT-1 ambient noise levels of 60 to 67 dBA L_{eq}

during daytime hours, 56 to 63 dBA L_{eq} during nighttime hours, and 67 dBA L_{dn}. The maximum noise level threshold of 60 dBA for receiving residential land uses would also be met. This would be a less-than-significant impact.

Typical residential HVAC units are anticipated to generate noise levels of 53 to 63 dBA at 3 feet from the equipment, depending on the equipment selected. Without knowing the specific locations for these units, the worst-case conditions were assumed for this analysis, which would be ground-level units located at either ends of each residential building. For multi-family residential buildings, it is typical for multiple HVAC units to operate simultaneously at any given time. Assuming up to eight units would operate simultaneously from the same relative location at the edge of the nearest residential building façade, the worst-case scenario was calculated by estimating HVAC noise levels to the property lines of the nearest existing land uses surrounding the site, which would be the residences to the east and the residences and elementary school to the north. The nearest surrounding property line would be approximately 170 feet from the nearest project building façade. At this distance, worst-case scenario HVAC equipment noise would range from 27 to 37 dBA. Assuming these noise levels would operate continuously during the daytime and nighttime hours, the day-night average noise level at the nearest receiving property line would be 43 dBA L_{dn}. These noise levels would be below daytime and nighttime ambient hourly average noise levels measured at LT-1, LT-2, and ST-1, as well as the day-night average noise levels estimated at these measurement locations. The mechanical equipment noise would also be below the noise level thresholds established in Table 18.76-1 of the City's Municipal Code. This would be a less-than-significant impact.

The equipment proposed at each individual building included in the proposed project should be reviewed once design details are available to ensure that ambient noise environment at noise-sensitive receptors surrounding the site and the Table 18.76-1 thresholds would not be exceeded by mechanical equipment noise. Design planning should take into account these thresholds when selecting equipment for the proposed buildings and utilize site planning to locate equipment in less noise-sensitive areas. Other noise controls could include, but shall not be limited to, fan silencers, enclosures, screen walls, and interior wall treatments. A qualified acoustical consultant shall be retained to review mechanical equipment systems during final design of the proposed project. The consultant shall review selected equipment and determine specific noise reduction measures necessary to reduce noise to comply with the City's noise level requirements. The measures recommended by the acoustical consultant to ensure compliance with the City's requirements would be implemented as project conditions of approval, and therefore, this would be a less-than-significant impact.

Mitigation Measures: **No further mitigation required.**

Impact 2: **Exposure to Excessive Construction Vibration.** Construction-related vibration levels produced by construction activities occurring at the project site would not be excessive at the nearest land uses. **This is a less-than-significant impact.**

The construction of the project may generate vibration when heavy equipment or impact tools are used. Construction activities would generally include site preparation work, foundation work, and

new building framing and finishing. Pile driving, which can cause excessive vibration, is not anticipated as a foundation construction technique.

The California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards in order to reduce the potential for cosmetic damage to structures. Cosmetic damage is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. A vibration limit 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 above for further explanation). For historical buildings or buildings that are documented to be structurally weakened, a conservative limit of 0.08 in/sec PPV is often used to provide the highest level of protection.

No historical buildings or buildings that are documented to be structurally weakened adjoin the project site. Groundborne vibration levels exceeding 0.3 in/sec PPV at nearby buildings would have the potential to result in a significant vibration impact because such levels would be capable of cosmetically damaging adjacent buildings. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls.

Construction vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 12 presents typical vibration levels from construction equipment at 25 feet, which represents the distance of the nearest residential structure to the property line of the project site. Calculations were also made to estimate vibration levels at a distance of 60 feet (to represent the nearest residential buildings to the north and west. 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. Project-generated vibration levels would fall below the 0.3 in/sec PPV threshold when construction activities producing the highest vibration levels (e.g., vibratory roller) are 20 feet or more from the project site. Neither cosmetic, minor, or major damage would occur at conventional buildings located 60 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.

TABLE 12 Vibration Levels for Construction Equipment at Various Distances

Equipment		PPV at 25 ft. (in/sec)	PPV at 60 ft. (in/sec)
Clam shovel drop		0.202	0.077
Hydromill (slurry wall)	in soil	0.008	0.003
	in rock	0.017	0.006
Vibratory Roller		0.210	0.080
Hoe Ram		0.089	0.034
Large bulldozer		0.089	0.034
Caisson drilling		0.089	0.034
Loaded trucks		0.076	0.029
Jackhammer		0.035	0.013
Small bulldozer		0.003	0.001

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., September 2019.

Mitigation Measures: None Required

Impact 3: Exposure of Residents or Workers to Excessive Noise Levels in the Vicinity of a Private Airstrip or an Airport Land Use Plan. The project site would not be exposed to excessive aircraft noise. **This is a less-than-significant impact.**

Reid-Hillview Airport and Mineta San José International Airport are public airports located approximately 18 and 23 miles northwest of the project site, respectively. The San Martin Airport is located approximately 2.8 miles southeast of the site. The project site is located well outside of each airport's planning boundary and 60 dBA CNEL noise contour. Noise levels resulting from aircraft are insignificant at the site and would be clearly compatible with the proposed land uses. This is a less-than-significant impact.

Mitigation Measures: None Required