Appendix F

Noise Analysis

THE CROSSWINDS AT MORGAN HILL PROJECT
NOISE AND VIBRATION ASSESSMENT

Morgan Hill, California

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INTRODUCTION

The project proposes a residential development at the northwest corner of the Half Road and Mission View Drive intersection in Morgan Hill, California. The 31-acre project site consists of the Assessor's Parcel Numbers 728-30-001, 728-30-002, 728-30-003, and 728-30-004. The project site is mostly undeveloped and consists of grassland and boxed nursery trees. A vacant single-family residence constructed in the 1950s is located on the southwestern section of the site. The project proposes to construct a total of 269 new residential units: 56 single-family, 64 duets, and 149 condominiums. There would be a total of 40 below-market-rate (BMR) units. The project would provide 606 parking spaces, including 538 covered spaces and 68 uncovered spaces. The project site would be accessed via three vehicular connections: two site entries from DePaul Drive and one entry from Mission View Drive. DePaul Drive is proposed to be extended approximately 2,000 feet south along the project site's eastern frontage to provide direct access to the project site.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to 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 groundborne 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 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 measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

SETTING

Fundamentals of Environmental Noise

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

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

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

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

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (L_{dn} or *DNL*) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

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}/CNEL. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn}/CNEL 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}/CNEL with open windows and 65-70 dBA L_{dn}/CNEL 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}/CNEL 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}/CNEL. At a L_{dn}/CNEL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn}/CNEL 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}/CNEL of 60-70 dBA. Between a L_{dn}/CNEL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn}/CNEL 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 Reactions 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	Virtually no risk of damage to normal 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 dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

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

Regulatory Background

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

State CEQA Guidelines. The CEQA 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; or

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

Pursuant to court decisions, the impacts of site constraints, such as exposure of the proposed project to excessive levels of noise and vibration, are not included in the Impacts and Mitigation Section of

this report. These items are discussed in a separate section addressing the project's consistency with the policies set forth in the City's General Plan.

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.

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-8.5- *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.

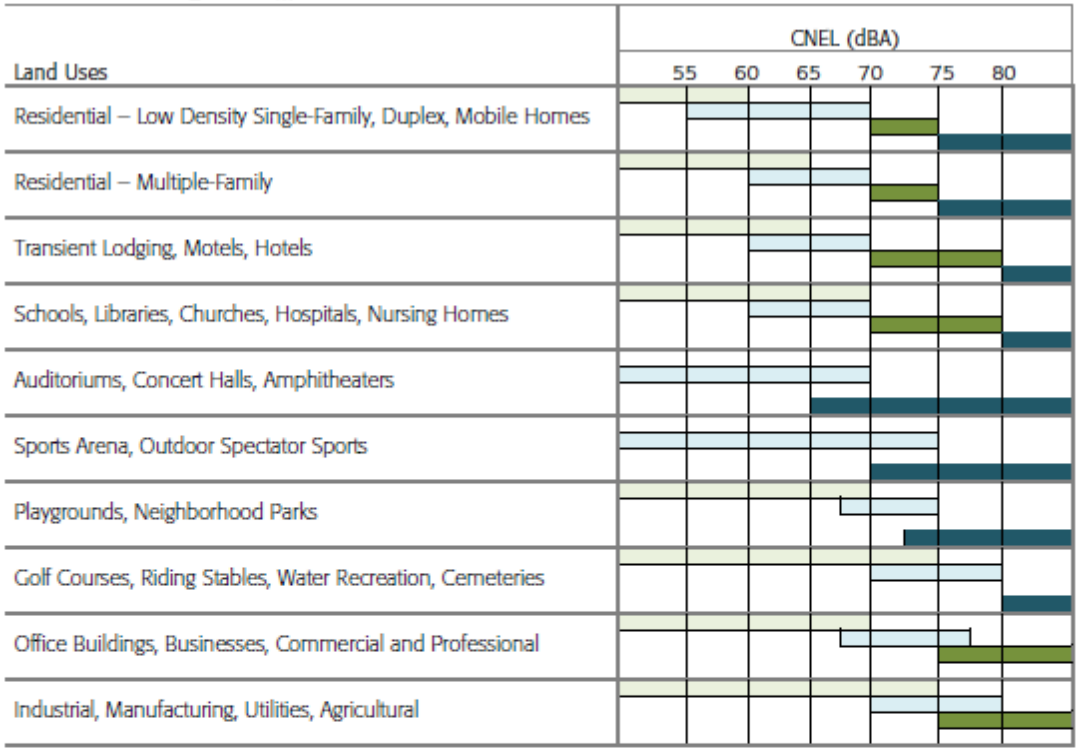
Policy SSI-9.3- *Sound Wall Design:* The maximum height of sound walls shall be eight feet. Residential projects adjacent to the freeway shall be designed to minimize sound wall height through location of a frontage road, use of two sound walls or other applicable measures. Sound wall design and location 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:

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.

Existing Noise Environment

The 31-acre project site is located at the northwest corner of the Half Road and Mission View Drive intersection in Morgan Hill, California. The surrounding properties include the DePaul Health Center and a senior living center (north of the project site), Terra Mia at Mission Ranch Residential Subdivision and orchards (east of site, opposite Mission View Drive), commercial uses (north of site, opposite Cochrane Road), single-family residences and vacant land (south of site, opposite Half Road), and Live Oak High School (southeast of the site, opposite Half Road and Mission View Drive).

The noise environment at the site and in the surrounding area results primarily from vehicular traffic along US 101. Local traffic along Mission View Drive and Half Road also contribute to the existing noise environment. In addition, occasional aircraft flyovers associated with nearby San Martin Airport and San José International Airport have some contribution to the noise environment.

A noise monitoring survey consisting of two long-term (LT-1 and LT-2) and two short-term (ST-1 and ST-2) noise measurements was made for a previous project (Morgan Hill Technology Center), which included the proposed residential development. These measurements were made between Tuesday, April 9, 2019 and Thursday, April 11, 2019. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made approximately 65 feet south of the centerline of Cochrane Road, just east of DePaul Drive. Hourly average noise levels at LT-1 typically ranged from 66 to 72 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 55 to 68 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on

Wednesday, April 10, 2019 was 71 dBA L_{dn}. The daily trend in noise levels at LT-1 is shown in Figures 2 through 4.

LT-2 was made southeast of the Half Road/Condit Road intersection, approximately 400 feet east of the centerline of the nearest through lane along northbound US 101. Hourly average noise levels at LT-2 typically ranged from 66 to 71 dBA L_{eq} during daytime hours and from 61 to 71 dBA L_{eq} during nighttime hours. The day-night average noise level on Wednesday, April 10, 2019 was 73 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, April 9, 2019 between 10:30 a.m. and 11:10 a.m. ST-1 was made in a single 10-minute interval, while ST-2 was made in two consecutive 10-minute intervals. The results of the measurements are summarized in Table 4.

Short-term noise measurement ST-1 was made from the sidewalk along Mission View Drive, approximately 35 feet from the centerline of the roadway. Passenger cars generated the majority of the noise at ST-1, with maximum instantaneous noise levels from vehicles ranging from 66 to 74 dBA. One jet flyover was also observed, producing a maximum instantaneous noise level of 61 dBA. The 10-minute L_{eq} measured at ST-1 was 64 dBA $L_{eq(10\text{-}min)}$. ST-2 was made at the end of DePaul Drive. During the first 10-minute interval, an emergency vehicle drove by, generating maximum instantaneous noise levels of 74 dBA. The siren from this vehicle contaminated the short-term measurement during this 10-minute period. To capture typical ambient noise levels, a second 10-minute measurement was made at this location. Typical vehicle pass-bys produced maximum instantaneous noise levels that ranged from 55 to 61 dBA, and jet flyovers were observed to generate maximum instantaneous noise levels ranging from 61 to 65 dBA. The 10-minute average noise levels measured at ST-2 ranged from 58 dBA $L_{eq(10\text{-}min)}$ without the emergency vehicle to 62 dBA $L_{eq(10\text{-}min)}$ with the emergency vehicle.

FIGURE 1 Noise Measurement Locations

Source: Google Earth 2021.

FIGURE 2 Daily Trend in Noise Levels at LT-1, Tuesday, April 9, 2019

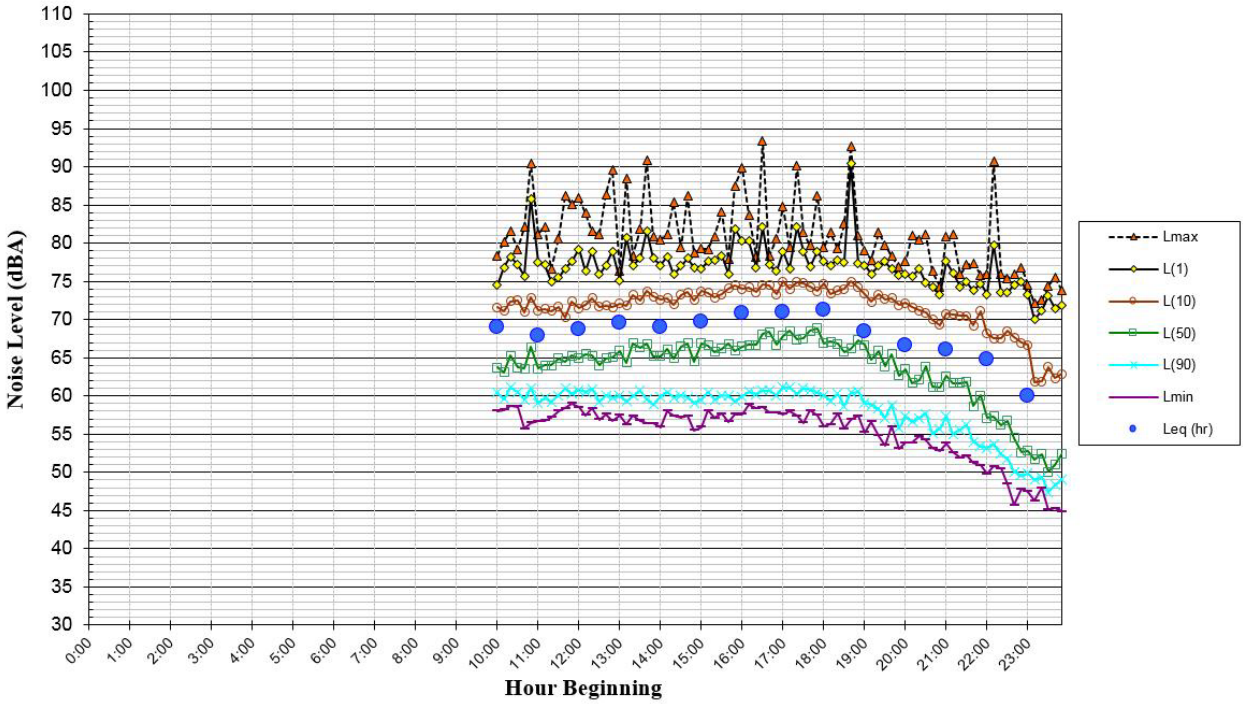


FIGURE 3 Daily Trend in Noise Levels at LT-1, Wednesday, April 10, 2019

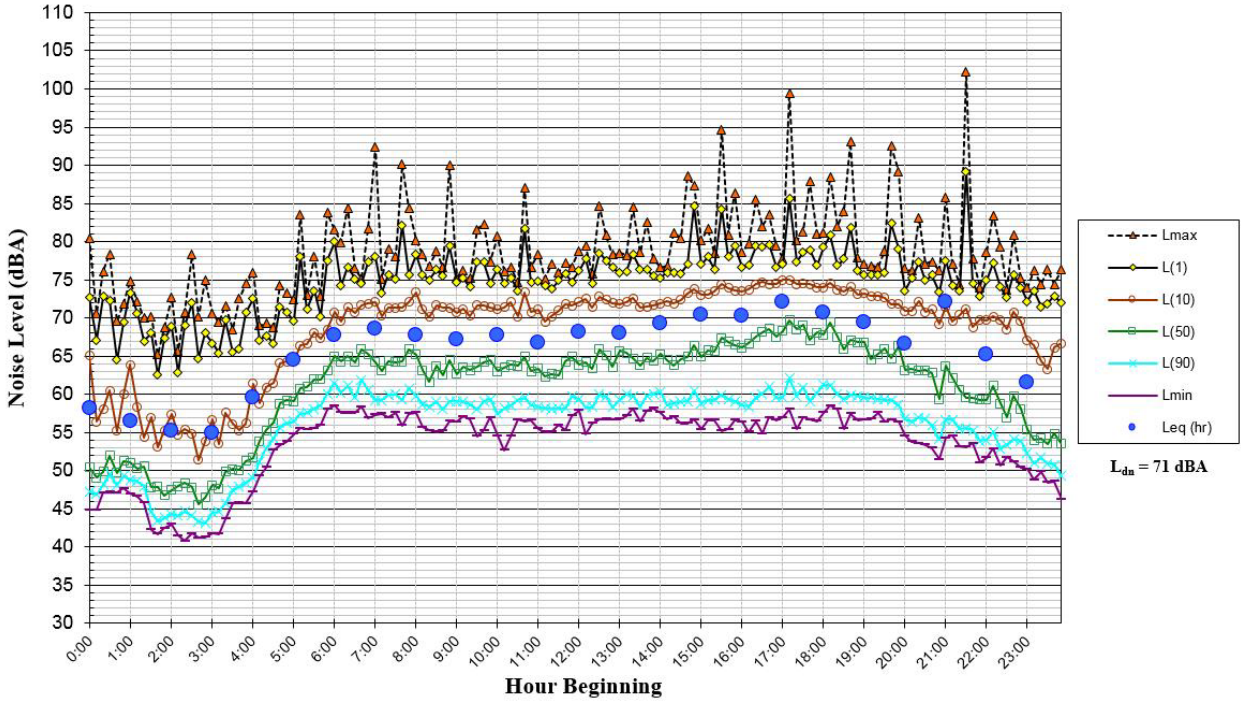


FIGURE 4 Daily Trend in Noise Levels at LT-1, Thursday, April 11, 2019

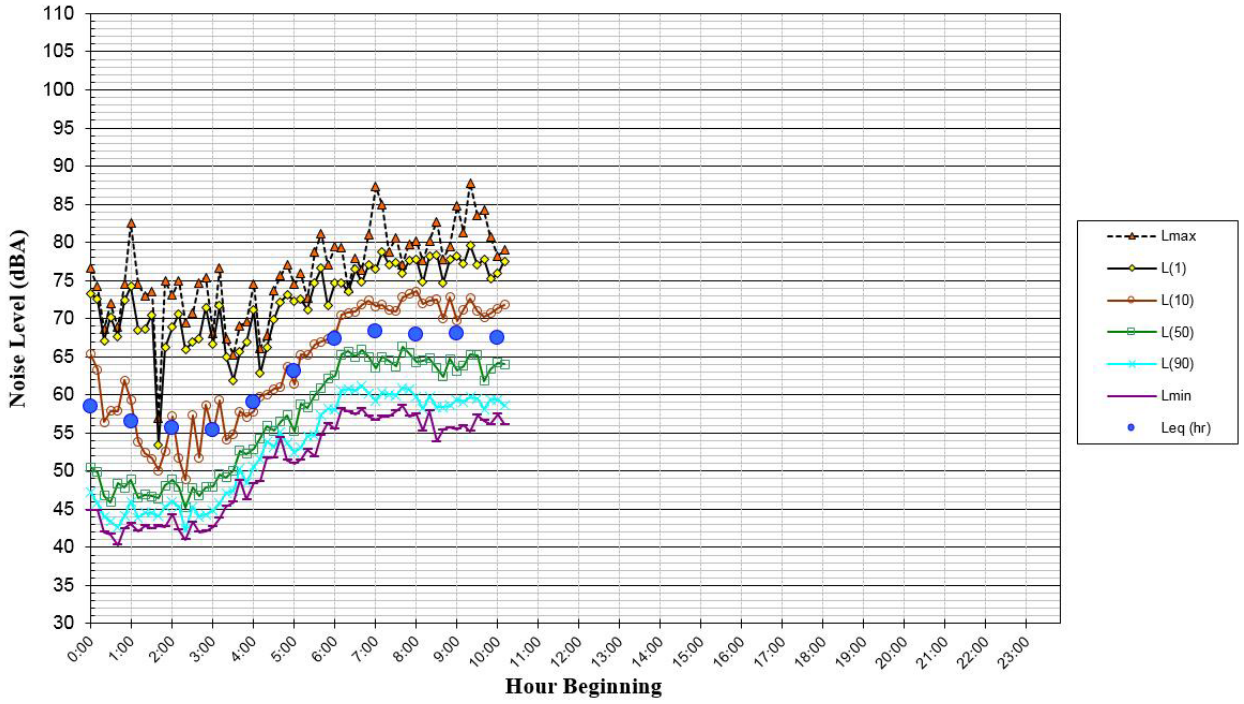


FIGURE 5 Daily Trend in Noise Levels at LT-2, Tuesday, April 9, 2019

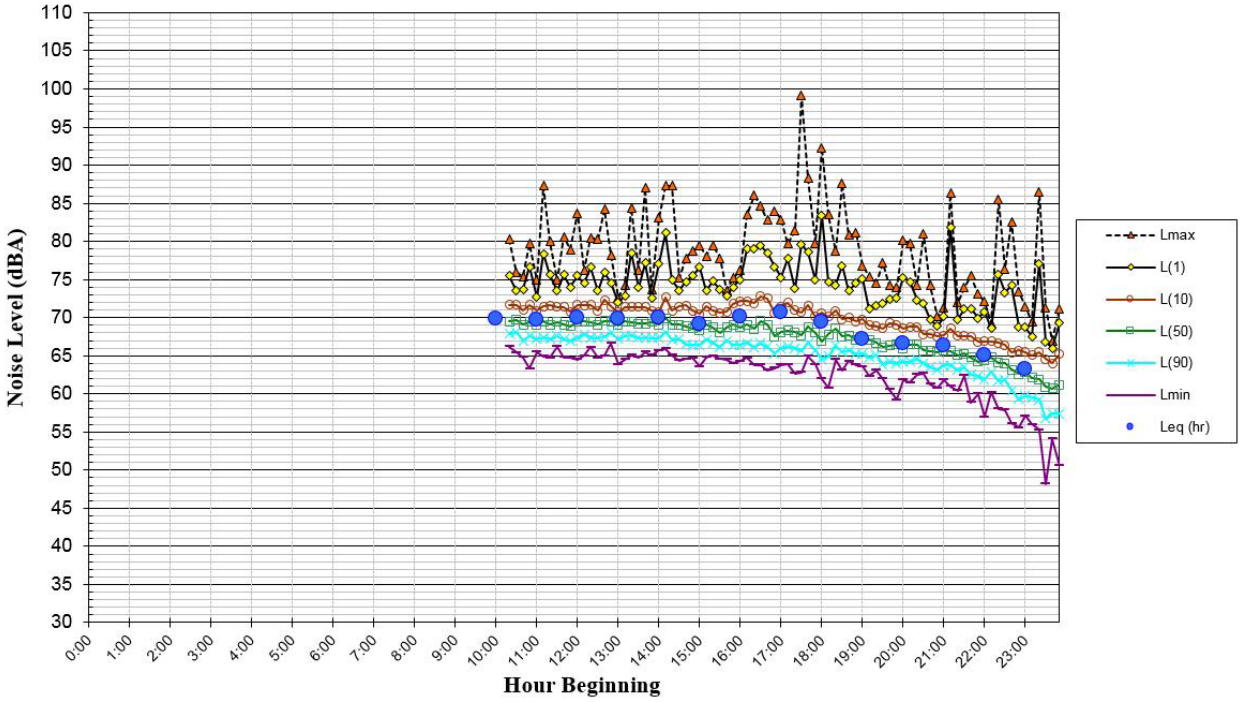


FIGURE 6 Daily Trend in Noise Levels at LT-2, Wednesday, April 10, 2019

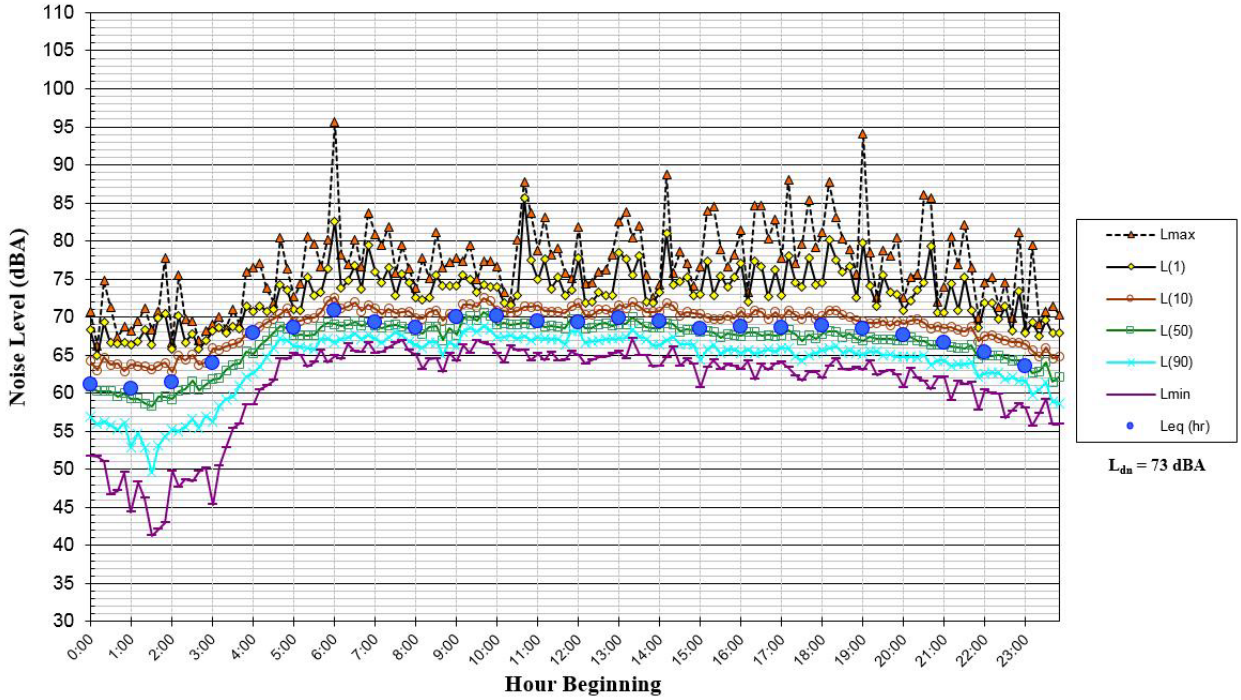


FIGURE 7 Daily Trend in Noise Levels at LT-2, Thursday, April 11, 2019

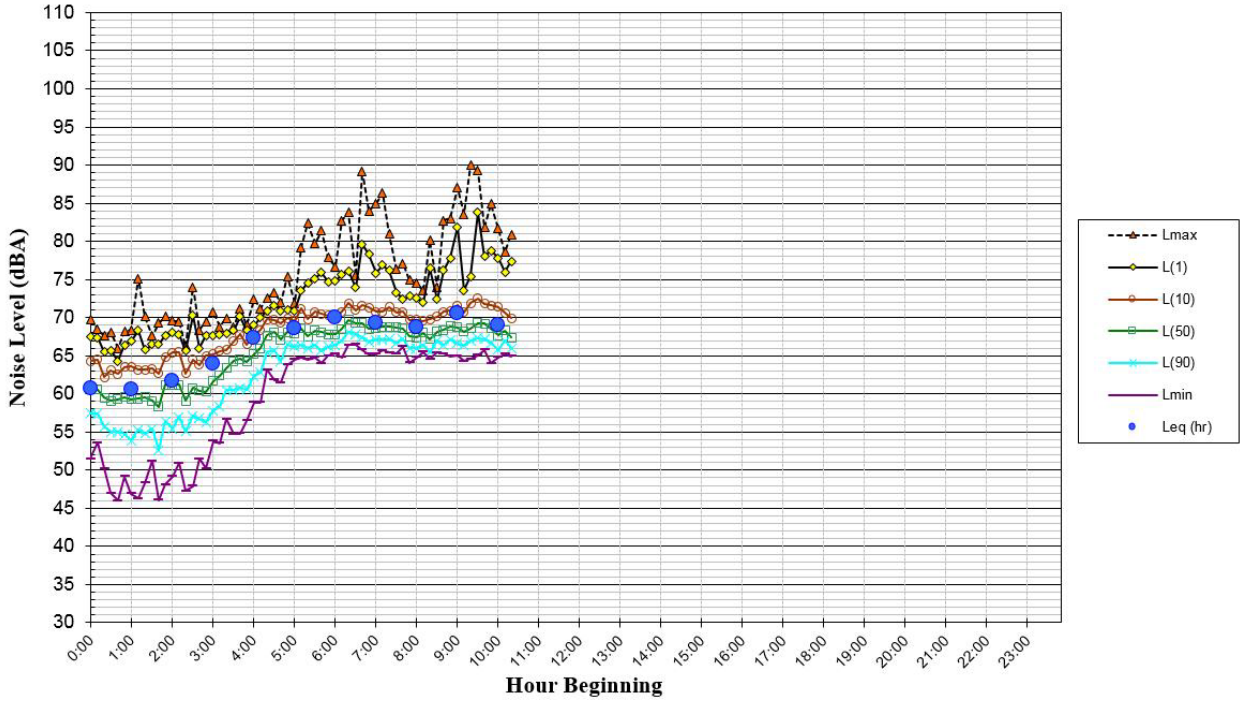


TABLE 4 Summary of Short-Term Noise Measurements (dBA)

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: ~35 feet east of the centerline of Mission View Drive	4/9/2019, 10:30-10:40	74	73	69	59	55	64
ST-2: End of DePaul Drive	4/9/2019, 10:50-11:00	76	75	62	58	56	62
	4/9/2019, 11:00-11:10	64	61	59	57	55	58

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility Assessment

The future noise environment at the project site would continue to result primarily from traffic along US 101. The traffic study completed for the proposed project by *Hexagon Transportation Consultants* did not include future traffic volumes for US 101. To estimate the future noise increase at the project site, US 101 peak hour volumes from the Caltrans website[1] were used to estimate the noise level increase expected by the year 2035, assuming a typical 1% to 2% increase in traffic volumes each year. The future noise increase calculated along US 101 would be up to 2 dBA L_{dn} by the year 2035.

[1] http://www.dot.ca.gov/trafficops/census/docs/2016_aadt_volumes.pdf

Additionally, the project's traffic study included peak hour turning movements for local intersections surrounding the project site and throughout the City of Morgan Hill. Along with the projected 2035 peak hour volumes estimated for US 101, these traffic volumes were used as inputs in SoundPLAN, version 8.2, to estimate the worst-case scenario 2035 noise levels. SoundPLAN is a three-dimensional ray-tracing computer modeling program. Calculations in SoundPLAN accounted for the source of noise (traffic), the frequency spectra of the noise source, and the topography of the area. Posted traffic speed were used for each roadway. At a distance of 75 feet from the centerline of each roadway, the future exterior noise levels would be 65 dBA L_{dn} along DePaul Drive, 67 dBA L_{dn} along Mission View Road, and 67 dBA L_{dn} along Half Road.

Future Exterior Noise Environment

Policy SSI-8.1 and Table SSI-1 of the City's General Plan states that noise levels at outdoor use areas of residential land uses should be maintained at or below 60 dBA L_{dn} to be considered normally acceptable with the noise environment. The exterior noise standard would be applied at common outdoor use areas and private backyards, but the exterior noise standard would not be applied at small private decks or balconies that may be proposed by the project. For neighborhood parks and playgrounds, the exterior noise standard is 70 dBA L_{dn}.

The site plan indicates that the single-family detached homes along the eastern and southern boundaries of the project site and the duplexes located on the interior of the site would have privacy fences or barrier walls surrounding the private backyards. Each privacy fence was assumed to be continuous from grade to top, with no cracks or gaps, and be constructed from materials having a minimum surface density of three lbs/ft^2. While a height was not specified in the site plan, conservative heights of 6 feet were assumed for this analysis. These privacy fences were included as inputs to the SoundPLAN model, along with the proposed residential buildings.

The site plan shows several neighborhood parks and playground uses: a basketball court and activity area just east of the court along the western boundary, two smaller open space areas and a seating area along the northern boundary, an open space in the southeastern corner, and an open space and playground at the center of the site. A receptor was positioned at the center of each of these spaces. Along the western boundary, future exterior noise levels at the basketball court and activity area would be 66 to 67 dBA L_{dn}. The two smaller open space areas and the seating area along the northern boundary would be partially shielded from surrounding traffic noise by intervening project buildings. At the center of these spaces, the future exterior noise levels would range from below 60 to 62 dBA L_{dn}. The open space at the southeastern corner of the project site would have direct line-of-sight to traffic noise along both Mission View Drive and Half Road, with future exterior noise levels up to 70 dBA L_{dn} at the center of the space. The open space and playground located at the center of the project site would be partially shielded from the surrounding project buildings. At the center of these spaces, the future exterior noise levels would be 61 dBA L_{dn}. All neighborhood parks and playground uses proposed by the project would meet the City's exterior noise thresholds and would not require additional attenuation.

The backyards of the single-family detached homes located adjacent to the surrounding roadways would have the most exposure to traffic noise. Due to the orientation of the residences, there would be additional attenuation from the buildings at most of the backyards; however, some backyards

would be facing the roadways, such as units 55 and 56 in the southwestern corner of the project site. With a 6-foot privacy fence, the future exterior noise levels at the centers of these backyards would be 65 dBA L_{dn}. The backyards of units 43 through 53, which are located along the southern boundary would have future exterior noise levels at or below 60 dBA L_{dn}, assuming privacy fences of 6 feet tall. The backyards of units 41 and 42 would also have less shielding. At the centers of these backyards, the future exterior noise levels would be 61 and 60 dBA L_{dn}, respectively. Along the eastern boundary, the backyards of units 1 through 40 would be approximately 95 to 145 feet from the centerline of Mission View Drive with partial shielding from the residences and the privacy fences. At these distances and with the partial shielding, future exterior noise levels would be at or below 60 dBA L_{dn}.

All duplexes are located along the interior of the site. The backyards of these units would be surrounded by privacy fences, as well as the surrounding residential structures. With the partial shielding and location of these units, the future exterior noise levels at the center of these backyards would be at or below 60 dBA L_{dn}.

The three-story condominiums are attached buildings along the western boundary of the project site. The orientation of these buildings shows garage access on one side of the building and the front door access on the other. While there is open area between the buildings, these open spaces would be the location of the front door access walkways and would not be considered common outdoor use areas subject to the exterior noise thresholds established by the City. These buildings would not include outdoor use areas.

At the center of the project, there is also a common use pool area. While the site plan does show the pool area to include a fence surrounding the space, this fence is not assumed to be solid and would not provide attenuation. At the center of this outdoor use area, the future exterior noise levels would be 61 dBA L_{dn}.

The proposed neighborhood parks and playground areas would be compatible with the City's noise thresholds. With the inclusion of 6-foot privacy fences, the backyards for the single-family detached units would be compatible with the City's noise thresholds for all units except 41, 55, and 56. The backyards of the duplex units would be compatible with the City's thresholds. The exterior noise levels at the common use pool would exceed the City's 60 dBA L_{dn} standard. Backyards of units 41, 55, and 56 and the common use pool area would require noise control measures to meet the 60 dBA L_{dn} threshold. Alternatively, the City could permit the project to be constructed without additional attenuation under a conditionally acceptable condition. The backyards of the three units and the pool area at which the normally threshold is exceeded would meet the conditionally acceptable threshold established in the City's General Plan. Since the majority of the outdoor use areas at the project site do meet the normally acceptable threshold, the City could provide conditionally acceptable permission for the project.

Recommended Measures to Reduce Exterior Noise Levels

Methods available to reduce exterior noise levels include site planning alternatives (e.g., increased setbacks and using the proposed buildings as noise barriers), the construction of traditional noise barriers, or a combination of the above. For the proposed project, orienting residential units 41,

55, and 56 to face the opposite direction would help to provide additional shielding by project buildings. This would further reduce exterior noise levels. Assuming this option is not feasible, the optimal solution would be to construct privacy fences taller than 6 feet.

Eight-foot tall privacy fences were modeled in SoundPLAN for the backyards of units 41, 55, and 56. At unit 41, the 8-foot tall fence would reduce exterior noise levels to at or below 60 dBA L_{dn}. However, the 8-foot tall fence would reduce exterior noise levels to 62 dBA L_{dn} at units 55 and 56, which would still exceed the City's threshold of 60 dBA L_{dn}. Assuming a privacy fence of 10-feet tall, the exterior noise levels at units 55 and 56 would be reduced to 60 dBA L_{dn}. Therefore, the backyard fences at unit 41 would need to be a minimum height of 8 feet to meet the City's threshold, and the backyard fences at units 55 and 56 would need to be a minimum height of 10 feet to meet the City's threshold.

For the pool area, positioning additional project buildings to the west of the outdoor use area would provide additional attenuation, but assuming this would not be feasible, constructing a solid fence or barrier along the western boundary of the pool area (or completely surrounding the pool area) would be recommended to reduce exterior noise levels. The barrier shall be continuous from grade to top, with no cracks or gaps, and be constructed from materials having a minimum surface density of three lbs/ft^2. With a western barrier of minimum height of 5 feet, future exterior noise levels at the pool area would be at or below 60 dBA L_{dn}.

With the implementation of an 8-foot privacy fence at unit 41, a 10-foot privacy fence at units 55 and 56, and a 5-foot western barrier at the pool area, the City's normally acceptable threshold of 60 dBA L_{dn} for residential uses would be achieved at the center of each outdoor use area. The final recommendations shall be confirmed when detailed site plans and grading plans are available.

Future Interior Noise Environment

A noise standard of 45 dBA L_{dn} would apply to residential interiors.

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.

The condominium buildings G through W are located along the western boundary of the project site, with western façades ranging from 75 to 100 feet from the centerline of DePaul Drive. At these distances, rooms facing DePaul Drive and US 101 would be exposed to future exterior noise levels ranging from 67 to 72 dBA L_{dn}. The northern and southern façades of these buildings would

be partially shielded by the adjacent buildings. Rooms along these façades would be exposed to future exterior noise levels ranging from 63 to 69 dBA L_{dn}.

Single-family detached residences 55 and 56 are located in the southwestern corner of the project site, adjacent to DePaul Drive and Half Road. While first-floor rooms in the rear of the residence would be partially shielded by the privacy fence, rooms in the upper level and along the other façades of the structure would have direct line-of-sight to the roadways. With setbacks of 55 feet from the centerline of DePaul Drive, rooms along the western façades of residences 55 and 56 would be exposed to future exterior noise levels ranging from 66 to 72 dBA L_{dn}. With a setback of 70 feet from the centerline of Half Road, rooms along the southern façade of residence 56 would be exposed to future exterior noise levels of 69 dBA L_{dn}.

Along the southern boundary of the site, residential units 41 through 54 would have setbacks of about 75 to 170 feet from the centerline of Half Road. The southern façades of the residences adjacent to Half Road would have direct line-of-sight (units 41, 44, 45, 48, 49, 52, and 53), while the buildings set back one row would have partial shielding from the intervening residences (units 42, 43, 46, 47, 50, 51, and 54). The rooms along the southern façades facing Half Road would be exposed to future exterior noise levels of 68 to 69 dBA L_{dn}. Additionally, units 41 and 42 have direct line-of-sight to Mission View Drive, with setbacks of approximately 265 to 275 feet from the centerline of the roadway. Rooms located along the eastern façades of units 41 and 42 would be exposed to future exterior noise levels of 63 to 66 dBA L_{dn}.

The residences along the eastern boundary of the project site (units 1, 4, 5, 8, 9, 12, 13, 16, 17, 20, 21, 24, 25, 28, 29, 32, 33, 36, 37, and 40) have direct line-of-sight to Mission View Drive, while the second row of residences along the eastern boundary (units 2, 3, 6, 7, 10, 11, 14, 15, 18, 19, 22, 23, 26, 27, 30, 31, 34, 35, 38, and 39) would be partially shielded from the roadway by the intervening buildings. The eastern façades of the residences facing Mission View Drive (units 1, 4, 5, 8, 9, 12, 13, 16, 17, 20, 21, 24, 25, 28, 29, 32, 33, 36, 37, and 40) would have setbacks ranging from 75 to 85 feet from the centerline of the roadway. Rooms along these façades would be exposed to future exterior noise levels of 68 to 70 dBA L_{dn}. The second row units would be exposed to future exterior noise levels of 63 to 66 dBA L_{dn}. Additionally, units 39 and 40 have direct line-of-sight to Half Road, with setbacks of approximately 130 to 140 feet from the centerline of Half Road. Rooms located along the southern façades of units 39 and 40 would be exposed to future exterior noise levels of 66 to 67 dBA L_{dn}.

The condominium buildings located along the northern boundary of the site (buildings A, B, E, and F) would have some direct line-of-sight to Half Road and Mission View Drive. The exterior-racing façades of building A would be exposed to future exterior noise levels ranging from 60 to 62 dBA L_{dn}. The exterior-racing façades of buildings B and E would be exposed to future exterior noise levels at or below 60 dBA L_{dn}. The exterior-racing façades of building F would be exposed to future exterior noise levels ranging from below 60 dBA L_{dn} along the eastern façade to 67 dBA L_{dn} along the western façade.

Assuming a 15 dBA exterior-to-interior noise reduction, future interior noise levels would be up to 57 dBA L_{dn} along DePaul Drive, up to 54 dBA L_{dn} along Half Road, and up to 55 dBA L_{dn} along

Mission View Drive. These interior noise levels would exceed the 45 dBA L_{dn} threshold and would require noise insulation features.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA L_{dn} or less:

- Preliminary calculations indicate that residential units nearest to DePaul Drive along the western boundary of the project site, adjacent to DePaul Drive (single-family residential units 55 and 56 and condominium units within 150 feet of the centerline of the roadway), would require windows and doors with a minimum rating of 31 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA L_{dn}. For the condominium units beyond 150 feet, the minimum STC rating for windows and doors would be 28.

- The first row of residential units located along the southern boundary of the project site, adjacent to Half Road (units 41, 44, 45, 48, 49, 52, and 53), would require windows and doors with minimum STC ratings of 30 with the incorporation of suitable forced-air mechanical ventilation to meet the City's 45 dBA L_{dn} threshold. The second row of residences (units 42, 43, 46, 47, 50, 51, and 54) would require the incorporation of suitable forced-air mechanical ventilation with standard construction materials to meet the City's interior noise threshold.

- The first row of residential units located along the eastern boundary of the project site, adjacent to Mission View Drive (units 1, 4, 5, 8, 9, 12, 13, 16, 17, 20, 21, 24, 25, 28, 29, 32, 33, 36, 37, and 40), and the second row residential unit 39 would require windows and doors with minimum STC ratings of 30 with the incorporation of suitable forced-air mechanical ventilation to meet the City's 45 dBA L_{dn} threshold. The second row of residences (units 2, 3, 6, 7, 10, 11, 14, 15, 18, 19, 22, 23, 26, 27, 30, 31, 34, 35, and 38) would require windows and doors with minimum STC ratings of 28 with the incorporation of suitable forced-air mechanical ventilation to meet the City's interior noise threshold.

- Building F along the northern boundary would require windows and doors with minimum STC ratings of 28 with the incorporation of suitable forced-air mechanical ventilation to meet the City's 45 dBA L_{dn} threshold. Buildings A and E along the northern boundary would satisfy the interior noise threshold with the incorporation of suitable forced-air mechanical ventilation and standard construction materials.

- Residential structures on the interior of the site would require a suitable form of forced-air mechanical ventilation, as determined by the local building official, with standard construction materials to achieve the interior noise standards.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA L_{dn} or less.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

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

- A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan or Municipal Code at existing noise-sensitive receptors surrounding the project site.

    - Hourly average noise levels during construction that would exceed 60 dBA L_{eq} at residential land uses or exceed 70 dBA L_{eq} at commercial land uses and exceed the ambient noise environment by at least 5 dBA L_{eq} for a period of more than one year would constitute a significant temporary noise increase in the project vicinity.

    - A significant permanent noise level increase would occur if project-generated traffic would result in: a) a noise level increase of more than 3 dBA L_{dn} and the total day-night average noise level exceeding the "normally acceptable" category at an existing noise environment meeting the "normally acceptable" threshold; b) a noise level increase of more than 5 dBA L_{dn} and the total day-night average noise level remains "normally acceptable" at an existing noise environment meeting the "normally acceptable" threshold; c) a noise level increase of more than 3 dBA L_{dn} at a "conditionally acceptable" existing noise environment; or d) a noise level increase of more than 3 dBA L_{dn} at an "unacceptable" existing noise environment.

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

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

- A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices as part of the project's Noise Control Plan would result in a **less-than-significant** temporary noise impact.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance

between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time. The proposed project would not require pile driving, which can cause excessive noise.

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. Construction for the proposed project is anticipated to take place during these allowable hours.

While 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 25 dBA exterior-to-interior reduction for standard commercial, this would correlate to an exterior threshold of 60 dBA L_{eq} at residential land uses and 70 dBA L_{eq} at commercial 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 impact would be considered significant if project construction activities produced noise levels exceeding 60 dBA L_{eq} at residential land uses or 70 dBA L_{eq} at commercial land uses and the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year at surrounding receptors.

For the residences located to the east of the project site, opposite Mission View Drive, and southeast of the site, opposite Mission View Drive and Half Road, daytime ambient noise levels would be represented by ST-1, which was 64 dBA L_{eq}. The ambient noise environment for the existing residences along US 101 to the southwest of the site, opposite Half Road, would be represented by measurements made at LT-2, which ranged from 66 to 71 dBA L_{eq} during daytime hours. LT-1 would represent the ambient noise environment for the medical facility to the north of the project site. The daytime ambient noise levels at these uses would range from 66 to 72 dBA L_{eq}.

The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 5). Table 6 shows typical hourly average construction-generated noise levels 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.). As shown in Table 6, typical residential developments generate construction noise levels ranging from 72 to 88 dBA L_{eq} at a distance of 50 feet from the center of the active site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors; however, for purposes of assessing a worst-case scenario, construction noise levels in this report are estimated assuming no attenuation due to intervening buildings.

Construction activities for the proposed project would be completed in stages. 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. Demolition, site preparation, and grading/excavation for the proposed project shall be completed for the entire project site. However, the trenching and exterior and interior building construction shall be completed in three phases, which are identified in Figure 8. Equipment expected to be used in each construction stage are summarized in Table 7, along with the quantity of each piece of equipment. For the purposes of assuming worst-case conditions, all pieces of equipment shown per stage are assumed to be operating simultaneously. Note that the number of excavators proposed in the trenching stages for each phase was 1.5; however, for purposes of worst-case conditions, 2 excavators were assumed for modeling purposes.

In addition to the residential development phases, the proposed project includes the construction of the DePaul Drive extension, which would continue south along the western boundary of the project site, ending in a cul-de-sac just north of Half Road. Table 7 also shows the stages and equipment to be used during the construction of the roadway extension. Note, these stages would overlap with the residential development; however, the construction site for the roadway extension would not be located on the project site and therefore would have different distances to the off-site receptors.

FHWA's Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each stage of construction, assuming every piece of equipment would operate simultaneously, which would represent the worst-case scenario. Based on the hourly average noise levels calculated with RCNM, construction noise levels for each construction stage was estimated at a distance of 50 feet from the center of the active construction site and are shown in Table 7. Construction noise levels shown do not assume shielding from potential intervening buildings or temporary or permanent sound walls.

Table 8 summarizes the construction noise levels propagated from the center of the active construction site to the nearest property line of the surrounding land uses, except for the medical center and the high school. Noise levels at these existing land uses were calculated at the nearest noise-sensitive outdoor areas where extensive use would occur. For the stages occurring on the entire project site, the center of the active construction site was positioned at the geometrical center of the entire site, while the center of the active construction site would be positioned at the geometrical center of the specific phase, as shown in Figure 8. The DePaul extension construction source location was positioned at the centerline of the roadway along the alignment nearest to each specific receptor.

Additionally, an offsite sewer line would be constructed as part of the proposed project. This sewer line would be constructed during the grading/excavation phase of the project and would run along the north side of Half Road and the east side of Condit Road, connecting to the existing sewer line at East Main Avenue. Total construction of the sewer line would last 18 days. The only existing residences that would be subject to noise from the construction of the offsite sewer line would be the single-family residences located west of Condit Road near the Half Road intersection, approximately 25 feet or more from the work area. However, due to the close proximity of Highway 101 and the short duration of the sewer line construction, noise levels due to the offsite

sewer construction would not substantially increase over those noise level shown in the tables for the grading/excavation phase of the project.

An alternative construction method, which includes underground water tanks, may potentially be used for this project. This work would be completed by hand, as they are modular systems, during the grading/excavation phase. With this approach, the number of work days for this phase would increase to 18 days, and the total time of construction would increase by 16 days. Additionally, the grading/excavation phase would include one additional excavator. As shown in the table below, this alternative would result in up to a 1 dBA increase during this phase of construction.

TABLE 5 Construction Equipment, 50-foot Noise Emission Limits

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

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

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

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

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

TABLE 6 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.

FIGURE 8 Construction Phasing for the Proposed Project

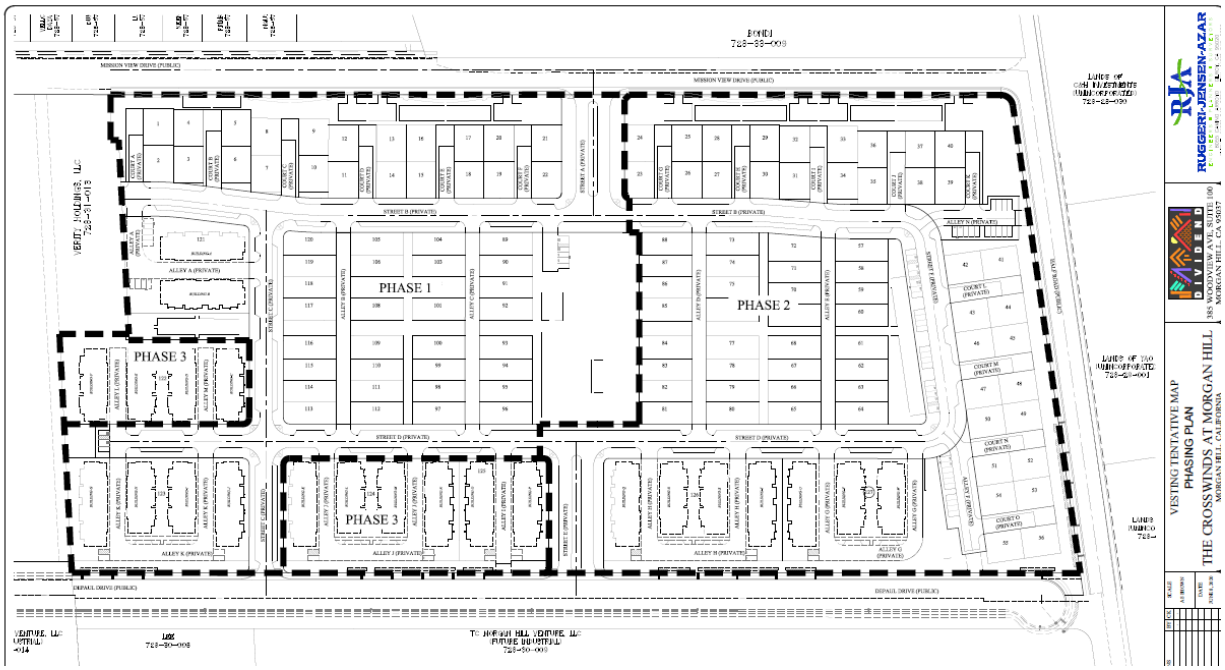


TABLE 7 Estimated Construction Noise Levels during the Construction of the Proposed Residential Development

Stage of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels at 50 feet
Demolition (full site)	4 days	Excavator (1)	77 dBA L_{eq}
Site Preparation (full site)	5 days	Grader (1) Scraper (3)	86 dBA L_{eq}
Grading/ Excavating (full site)	15 days 18 days[e]	Excavator (1)[e] Grader (1) Scraper (3) Tractor/Loader/Backhoe (1) Compactor (1)	87 dBA L_{eq}[f]
Trenching – Underground (Phase 1)	35 days	Tractor/Loader/Backhoe (1) Excavator (1.5[a])	83 dBA L_{eq}
Building Exterior (Phase 1)	175 days	Forklift (1) Tractor/Loader/Backhoe (1)	80 to 85 dBA L_{eq}[b]
Building Interior (Phase 1)	40 days	Air Compressor (4) Paving Equipment (1) Roller (1) Grader (1)	86 to 87 dBA L_{eq}[c]
Paving (Phase 1)	16 days	Cement and Mortar Mixer (2) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (2) Grader (2)	88 to 91 dBA L_{eq}[d]
Trenching – Underground (Phase 2)	35 days	Tractor/Loader/Backhoe (1) Excavator (1.5[a])	83 dBA L_{eq}

Stage of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels at 50 feet
Building Exterior (Phase 2)	175 days	Forklift (1) Tractor/Loader/Backhoe (1)	80 dBA L_{eq}
Building Interior (Phase 2)	40 days	Air Compressor (5) Paving Equipment (1) Roller (1) Grader (1)	86 to 87 dBA L_{eq}[c]
Paving (Phase 2)	16 days	Cement and Mortar Mixer (2) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (2) Grader (2)	88 to 91 dBA L_{eq}[d]
Trenching – Underground (Phase 3)	25 days	Tractor/Loader/Backhoe (1) Excavator (1.5[a])	83 dBA L_{eq}
Building Exterior (Phase 3)	75 days	Forklift (1) Tractor/Loader/Backhoe (1)	80 dBA L_{eq}
Building Interior (Phase 3)	40 days	Air Compressor (5) Paving Equipment (1) Roller (1) Grader (1)	86 to 87 dBA L_{eq}[c]
Paving (Phase 3)	12 days	Cement and Mortar Mixer (2) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (2) Grader (2)	88 to 91 dBA L_{eq}[d]
Grading/ Excavating (DePaul Drive Extension)	15 days	Grader (1) Scraper (1) Tractor/Loader/Backhoe (1) Compactor (1)	86 dBA L_{eq}
Trenching – Underground (DePaul Drive Extension)	35 days	Tractor/Loader/Backhoe (1) Excavator (1.5[a])	83 dBA L_{eq}
Paving (DePaul Drive Extension)	16 days	Cement and Mortar Mixer (2) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (2) Grader (2)	88 dBA L_{eq}

[a] List of equipment provided at the time of this study proposed 1.5 excavators; however, for purposes of modeling the worst-case scenario, 2 excavators were assumed in this analysis.

[b] Range of estimated noise levels represent the equipment for the building exterior stage of Phase 1 alone and during the overlapping period with the trenching stage of Phase 1.

[c] Range of estimated noise levels represent the equipment for the building interior stage alone of each phase and during the overlapping period with the building exterior stage.

[d] Range of estimated noise levels represent the equipment for the paving stage along of each phase and during the overlapping period with the building exterior and interior stages.

[e] Changes to grading/excavation would occur during the construction alternative only.

[f] The additional excavator in the grading/excavation would result in an increase of 1 dBA.

TABLE 8 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of the Proposed Residential Development

Stage of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)									
	East Residences		South Residences		High School		West Residences		Medical Facility	
	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}
Demolition (full site)	635 feet	55 dBA	870 feet	52 dBA	1,635 feet	46 dBA	1,530 feet	47 dBA	1,170 feet	49 dBA
Site Preparation (full site)	635 feet	64 dBA	870 feet	61 dBA	1,635 feet	56 dBA	1,530 feet	56 dBA	1,170 feet	59 dBA
Grading/ Excavating (full site)	635 feet	65 dBA[d]	870 feet	63 dBA[d]	1,635 feet	57 dBA[d]	1,530 feet	58 dBA[d]	1,170 feet	60 dBA[d]
Trenching – Underground (Phase 1)	400 feet	65 dBA	1,215 feet	55 dBA	1,900 feet	51 dBA	1,850 feet	52 dBA	795 feet	59 dBA
Building Exterior (Phase 1)	400 feet	62-67 dBA[a]	1,215 feet	53-57 dBA[a]	1,900 feet	49-53 dBA[a]	1,850 feet	49-53 dBA[a]	795 feet	56-61 dBA[a]
Building Interior (Phase 1)	400 feet	68-69 dBA[b]	1,215 feet	59-60 dBA[b]	1,900 feet	55-56 dBA[b]	1,850 feet	55-56 dBA[b]	795 feet	62-63 dBA[b]
Paving (Phase 1)	400 feet	70-73 dBA[c]	1,215 feet	60-63 dBA[c]	1,900 feet	56-59 dBA[c]	1,850 feet	57-59 dBA[c]	795 feet	64-67 dBA[c]
Trenching – Underground (Phase 2)	920 feet	58 dBA	525 feet	62 dBA	1,270 feet	55 dBA	1,330 feet	54 dBA	1,530 feet	53 dBA
Building Exterior (Phase 2)	920 feet	55 dBA	525 feet	60 dBA	1,270 feet	52 dBA	1,330 feet	52 dBA	1,530 feet	51 dBA
Building Interior (Phase 2)	920 feet	61-62 dBA[b]	525 feet	66-67 dBA[b]	1,270 feet	58-59 dBA[b]	1,330 feet	58-59 dBA[b]	1,530 feet	57-58 dBA[b]
Paving (Phase 2)	920 feet	63-65 dBA[c]	525 feet	68-70 dBA[c]	1,270 feet	60-63 dBA[c]	1,330 feet	60-62 dBA[c]	1,530 feet	58-61 dBA[c]
Trenching – Underground (Phase 3)	675 feet	60 dBA	1,180 feet	55 dBA	1,920 feet	51 dBA	1,565 feet	53 dBA	465 feet	64 dBA

Stage of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)									
	East Residences		South Residences		High School		West Residences		Medical Facility	
	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}	Distance	Hourly L_{eq}
Building Exterior (Phase 3)	675 feet	58 dBA	1,180 feet	53 dBA	1,920 feet	49 dBA	1,565 feet	50 dBA	465 feet	60 dBA
Building Interior (Phase 3)	675 feet	64-65 dBA[b]	1,180 feet	59-60 dBA[b]	1,920 feet	55-56 dBA[b]	1,565 feet	57-58 dBA[b]	465 feet	67-68 dBA[b]
Paving (Phase 3)	675 feet	65-68 dBA[c]	1,180 feet	61-63 dBA[c]	1,920 feet	56-59 dBA[c]	1,565 feet	58-61 dBA[c]	465 feet	69-71 dBA[c]
Grading/ Excavating (DePaul Drive Extension)	935 feet	60 dBA	665 feet	63 dBA	1,380 feet	57 dBA	585 feet	64 dBA	340 feet	69 dBA
Trenching – Underground (DePaul Drive Extension)	935 feet	57 dBA	665 feet	60 dBA	1,380 feet	54 dBA	585 feet	62 dBA	340 feet	66 dBA
Paving (DePaul Drive Extension)	935 feet	63 dBA	665 feet	66 dBA	1,380 feet	59 dBA	585 feet	67 dBA	340 feet	71 dBA

[a] Range of estimated noise levels represent the equipment for the building exterior stage of Phase 1 alone and during the overlapping period with the trenching stage of Phase 1.
[b] Range of estimated noise levels represent the equipment for the building interior stage alone of each phase and during the overlapping period with the building exterior stage.
[c] Range of estimated noise levels represent the equipment for the paving stage along of each phase and during the overlapping period with the building exterior and interior stages of each phase.
[d] The additional excavator in the grading/excavation would result in an increase of 1 dBA.

When construction activities occur near noise-sensitive receptors surrounding the site, construction noise levels would potentially exceed 60 dBA L_{eq} at nearby residences or 70 dBA L_{eq} at nearby commercial uses and exceed existing ambient conditions by 5 dBA L_{eq} or more. According to Table 8, construction noise levels during the majority of project construction would not exceed ambient conditions by more than 5 dBA L_{eq}. Therefore, extended exposure to excessive construction noise at the nearest noise-sensitive receptors would be minimal.

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.

Construction Best Management Practices

Develop a construction noise control plan, including, but not limited to, the following construction best management controls:

- 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 adjacent 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, if used, as far from adjoining 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, minimizing disruption and annoyance. With the implementation of these controls, as well as the Municipal Code limits on allowable construction hours, and considering that construction is temporary, the impact would be reduced to a less-than-significant level.

Mitigation Measure 1a: No further mitigation required.

Impact 1b: **Permanent Noise Level Increase.** The proposed project would not result in a substantial permanent noise level increase due to project-generated traffic at the existing noise-sensitive land uses in the project vicinity. This is a **less-than-significant** impact.

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; 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. According to the 2035 noise contours included in the Morgan Hill 2035 Draft Environmental Impact Report,[2] the surrounding residences would have future 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 traffic study completed for the proposed project included peak hour turning movements for 13 intersections in the project vicinity. When the existing plus project scenario is compared to the existing scenario, the noise level increase due to the proposed project is calculated to be 1 dBA L_{dn} or less along every roadway segment in the project vicinity. Therefore, the project would not result in a noise level increase 3 dBA L_{dn} or more. The project-generated traffic noise would not result in a substantial, permanent noise level increase at noise-sensitive receptors. This would be a less-than-significant impact.

Mitigation Measure 1b: **No mitigation required.**

Impact 1c: **Noise Levels in Excess of Standards.** The proposed project is not expected to generate noise in excess of standards established in the City's General Plan and Municipal Code at sensitive receptors surrounding the site. **This would be a less-than-significant**.

Under the City of Morgan Hill's Noise Element and Municipal Code, noise levels produced by the operation of the mechanical equipment would be considered significant if noise levels substantially exceed existing ambient noise levels.

Various mechanical equipment, such as heating, ventilation, and air conditioning (HVAC) units, are typical for residential dwellings. At the time of this study, the type, size, number, and generated noise levels of such units were unknown. Additionally, the locations of potential HVAC units on the project site is unavailable at this time. For purposes of assessing the worst-case scenario, each residential unit is assumed to have an HVAC system, and the units would be located along the exterior building façades at the rear of side of the structures.

Typical noise levels produced by residential HVAC units would range from 53 to 63 dBA at 3 feet during operation. These types of units typically cycle on and off continuously during daytime and nighttime hours. Therefore, multiple units clustered in the same general vicinity are usually

[2] Placeworks, "Morgan Hill 2035 DEIR," January 13, 2016.

operating simultaneously at any given time. The detached single-family residences are located along the eastern boundary of the project site in clusters of two or four units. Assuming up to three HVAC units would operate simultaneously at any given time for a 24-hour period, the estimated day-night average noise level at 3 feet would be up to 74 dBA DNL. The property lines of the nearest existing residences located east of the project site, opposite Mission View Drive, are approximately 120 feet from the nearest façades of the proposed single-family units along the eastern project site. At this distance, the hourly average noise levels would be up to 36 dBA L_{eq}, assuming up to three units operating simultaneously, and the day-night average noise level would be 58 dBA L_{dn}. According to ST-1 and the existing noise contours shown in the City's General Plan, the ambient noise levels at these residences would be 64 dBA L_{eq} and would exceed 60 dBA L_{dn}. Therefore, the proposed project would not exceed ambient noise levels at the residences to the east of the site.

All other surrounding land uses would be 150 feet or more from the nearest proposed residential building façades on the project site. Therefore, mechanical equipment noise generated at the site would be below 36 dBA L_{eq} on an hourly basis and would be below 58 dBA L_{dn} on a 24-hour basis. Ambient noise levels at existing noise-sensitive uses surrounding the site would not be exceeded by project-generated noise at the project site. This would be a less-than-significant impact.

Mitigation Measure 1c: None required.

Impact 2: Exposure to Excessive Groundborne Vibration. Construction-related vibration is not expected to exceed 0.3 in/sec PPV at existing buildings surrounding the project site. This is a **less-than-significant** impact.

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. While equipment and phasing information was not available at the time of this study, the proposed project is not expected to require pile driving, which can cause excessive vibration.

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, which typically consist of buildings constructed since the 1990s. Conservative vibration limits of 0.3 in/sec PPV has been used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 3 above for further explanation). For historical buildings or buildings that are documented to be structurally weakened, a cautious 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. For the purposes of this study, groundborne vibration levels exceeding the conservative 0.3 in/sec PPV limit at the existing residential and commercial buildings surrounding the site would have the potential to result in a significant vibration impact.

Table 9 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles,

compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 9 also summarizes the distances to the 0.08 in/sec PPV threshold for historical buildings and to the 0.3 in/sec PPV threshold for all other buildings.

TABLE 9 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.08 in/sec PPV (feet)	Minimum Distance to Meet 0.3 in/sec PPV (feet)
Clam shovel drop		0.202	58	18
Hydromill (slurry wall)	in soil	0.008	3	1
	in rock	0.017	6	2
Vibratory Roller		0.210	60	19
Hoe Ram		0.089	28	9
Large bulldozer		0.089	28	9
Caisson drilling		0.089	28	9
Loaded trucks		0.076	24	8
Jackhammer		0.035	12	4
Small bulldozer		0.003	1	<1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, FTA Report No. 0123, September 2018, as modified by Illingworth & Rodkin, Inc., January 2021.

Worst-case scenario vibration levels were estimated at the nearest building façades surrounding the site, as measured from project's boundaries. The nearest buildings surrounding the site range from 65 to 425 feet from the nearest boundaries of the project site. At these distances, construction vibration levels would be at or below 0.073 in/sec PPV for all potential equipment used at the site. The proposed offsite sewer line construction work would be about 75 feet from the nearest residential buildings, which would expose the buildings to vibration levels up to 0.063 in/sec PPV. The 0.3 in/sec PPV threshold would not be exceeded during construction activities at the project site. This would be a less-than-significant impact.

Mitigation Measure 2: None required.

Impact 3: Excessive Aircraft Noise. The project site is located more than four miles from a public airport or private-use airport and would not expose people residing or working in the project area to excessive noise levels. This is a **less-than-significant** impact.

San Martin Airport is a public non-towered airport located about 4.87 miles southeast of the project site. According to the Santa Clara County Airport Land Use Commission (ALUC)'s Comprehensive Land Use Plan for this airport, [3] the project site lies outside the 2022 55 dBA CNEL noise contour. While aircraft flyovers would at times be audible at project site, noise levels

[3] Santa Clara County Airport Land Use Commission, "Comprehensive Land Use Plan Santa Clara County: South County Airport," September 10, 2008 and amended November 16, 2016.

due to aircraft would not result in future exterior noise levels of 60 dBA L_{dn}/CNEL or more, and therefore, both the exterior and interior noise levels resulting from aircraft would be compatible with the proposed project.

Norman Y. Mineta San José International Airport is approximately 20 miles north of the project site. The project site lies outside the 2027 noise contour figure for the airport, which is shown in the airport's Master Plan.[4] The proposed project would be compatible with the aircraft noise generated from the nearest airports. This is a less-than-significant impact.

Mitigation Measure 3: **None required.**

[4]City of San José, "Norman Y. Mineta San José International Airport Master Plan Update Project: Eighth Addendum to the Environmental Impact Report," February 10, 2010.

Cumulative Impacts

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

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

The traffic study prepared for the proposed project included traffic scenarios for cumulative 2035 (no project) and cumulative 2035 plus project conditions. Cumulative traffic noise level increases were calculated by comparing the traffic volumes of both cumulative scenarios to existing traffic volumes.

A 3 dBA L_{dn} or more noise level increase was calculated for both cumulative scenarios (with and without the proposed project) along the following roadway segments: Mission View Drive, south of Cochrane Road; Mission View Drive, north and south of Avenida De Los Padres; Mission View Drive, north of Half Road; Half Road, west of Mission View Drive; Condit Road, north of Main Avenue; and Diana Avenue, west of Condit Road. Since a 3 dBA L_{dn} or more increase was calculated for both cumulative scenarios, the project's contribution to the overall noise level increase would be less than 1 dBA L_{dn}. All other roadway segments would result in a noise level increase of 2 dBA L_{dn} or less. Therefore, the proposed project would not result in a cumulative traffic noise increase under the proposed project.

There are no known approved projects surrounding the project site that would be constructed during the same timeframe as the proposed project. Therefore, the noise-sensitive receptors surrounding the project site would not be subject to cumulative construction impacts.