APPENDIX G

Noise and Vibration Assessment

FRY'S SITE NOISE AND VIBRATION ASSESSMENT

Morgan Hill, California

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INTRODUCTION

The project proposes that existing vacant land located east of U.S. Highway 101 (US 101) between Cochrane Road and Half Road in Morgan Hill, California be developed by a Master Plan (MP) Planned Development (PD). This proposed development would be subdivided into three main zoning designations: approximately 54.7 acres of industrial use, approximately 2.92 acres of commercial use, and approximately 28 acres of attached low-density residential use. The proposed industrial development includes two potential scenarios located west of DePaul Drive and south of the commercial parcel. Scenario one, which is proposed for this project, consists of a general light industrial development with four legal lots designated for flexible industrial and commercial uses. Scenario two is an alternate industrial/warehouse development that consists of three legal lots designated for flexible industrial and commercial uses. The proposed commercial parcel would be located along Cochrane Road at the northernmost portion of the project site. The proposed residential property would be located between Mission View Drive and the future DePaul Drive extension, north of Half Road. A maximum 319 units are proposed at this residential development.

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.

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

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

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

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

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

- Apply a maximum exterior noise level of 60 dBA L_{dn} in residential areas where outdoor use is a major consideration (e.g., backyards in single-family housing developments and recreation areas in multi-family housing projects). Where the City determines that

providing an L_{dn} of 60 dBA or lower cannot be achieved after the application of reasonable and feasible mitigation, an L_{dn} of 65 dBA may be permitted.

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

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

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

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

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

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

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

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

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

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

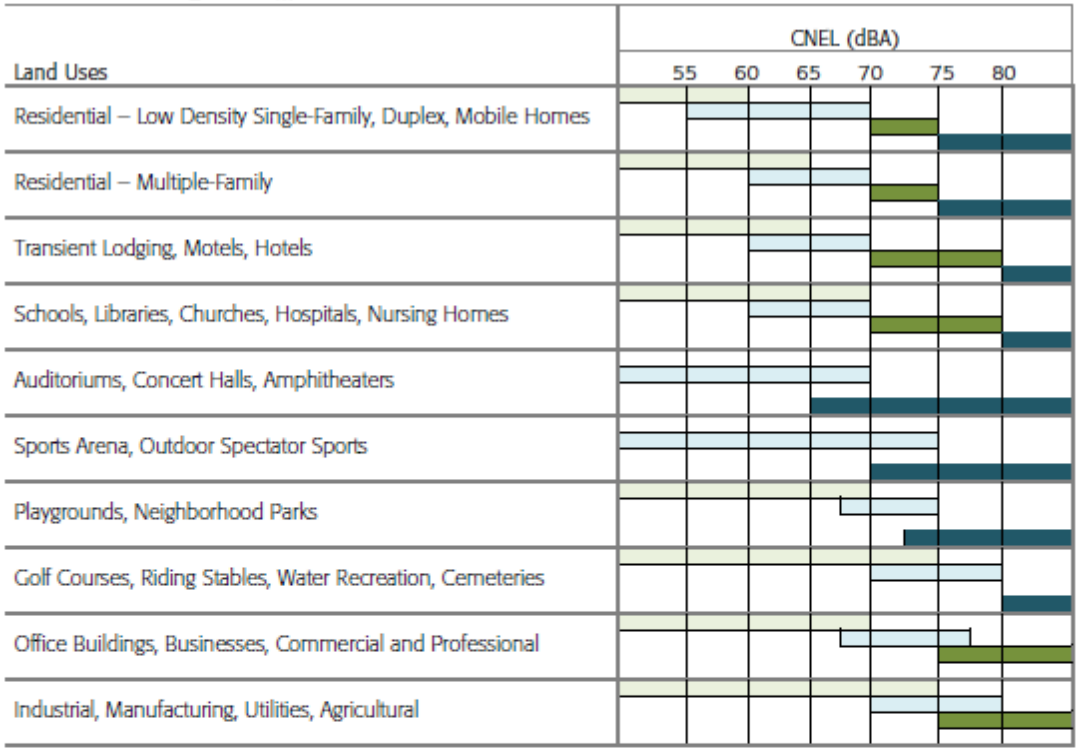
Policy SSI-9.3- *Sound Wall Design:* The maximum height of sound walls shall be eight feet. Residential projects adjacent to the freeway shall be designed to minimize sound wall height through location of a frontage road, use of two sound walls or other applicable measures. Sound wall design and location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

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

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

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

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



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

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

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

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

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

City of Morgan Hill Municipal Code. The City of Morgan Hill's Municipal Code Chapter 8.28 states that "It is unlawful and a misdemeanor for any person to make or continue, or cause to be made or continued, any loud, disturbing, unnecessary or unusual noise or any noise which annoys, disturbs, injures or endangers the comfort, health, repose, peace or safety of other persons within the city." The following sections of the code would be applicable to the project:

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

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

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

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

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

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

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

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

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

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

Existing Noise Environment

The project site is located east of US 101 between Cochrane Road and Half Road in the City of Morgan Hill. The surrounding properties include the DePaul Health Center and a senior living center (northeast 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 Cochrane Road, 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 at the site 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 2019.

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

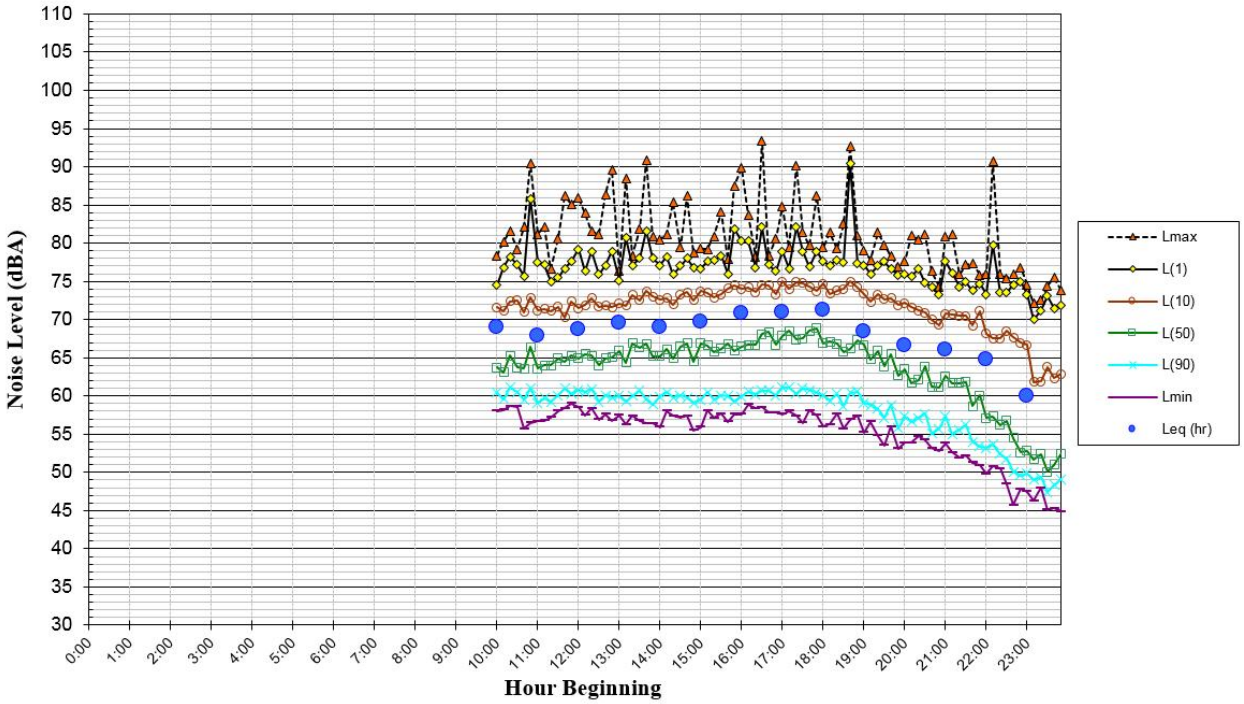


FIGURE 3 Daily Trend in Noise Levels at LT-1, Wednesday, April 10, 2019

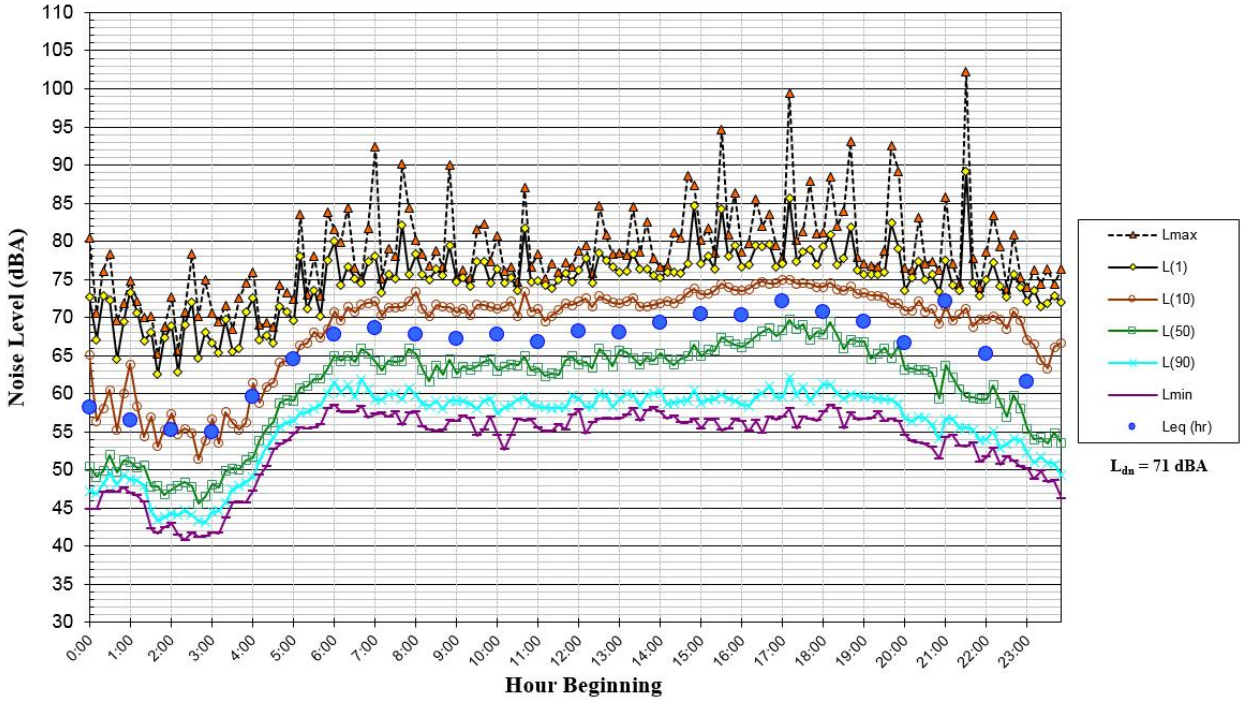


FIGURE 4 Daily Trend in Noise Levels at LT-1, Thursday, April 11, 2019

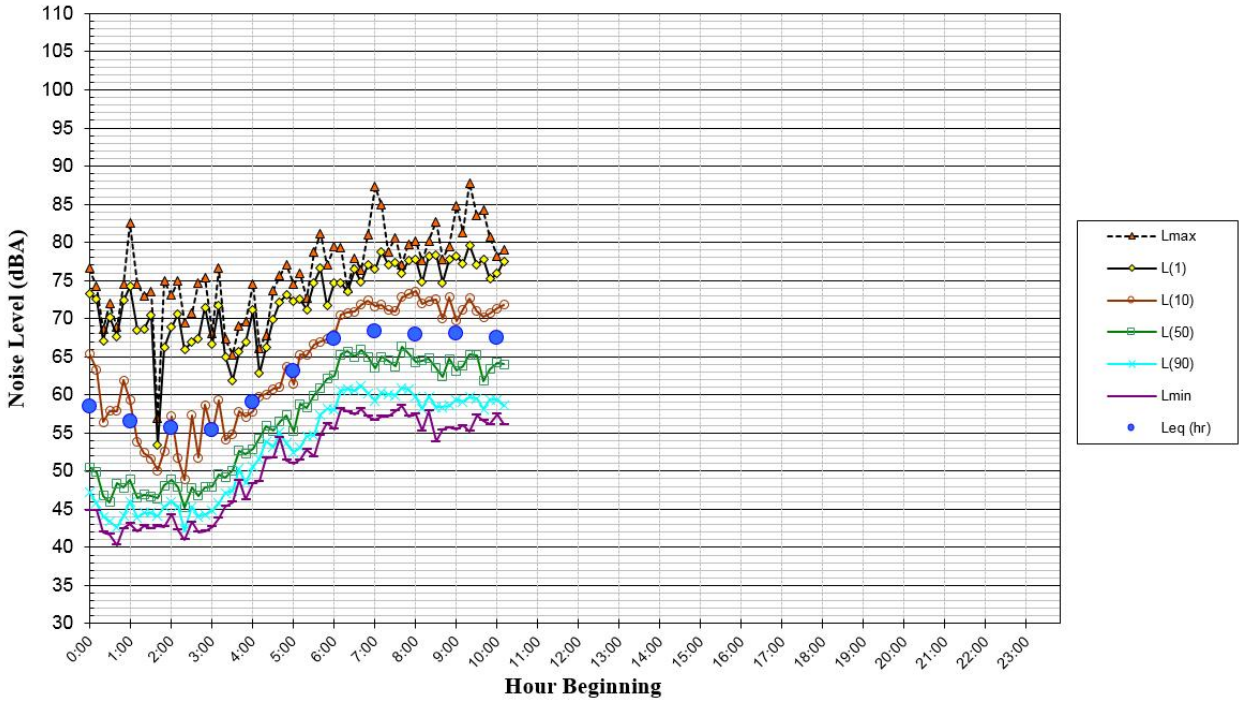


FIGURE 5 Daily Trend in Noise Levels at LT-2, Tuesday, April 9, 2019

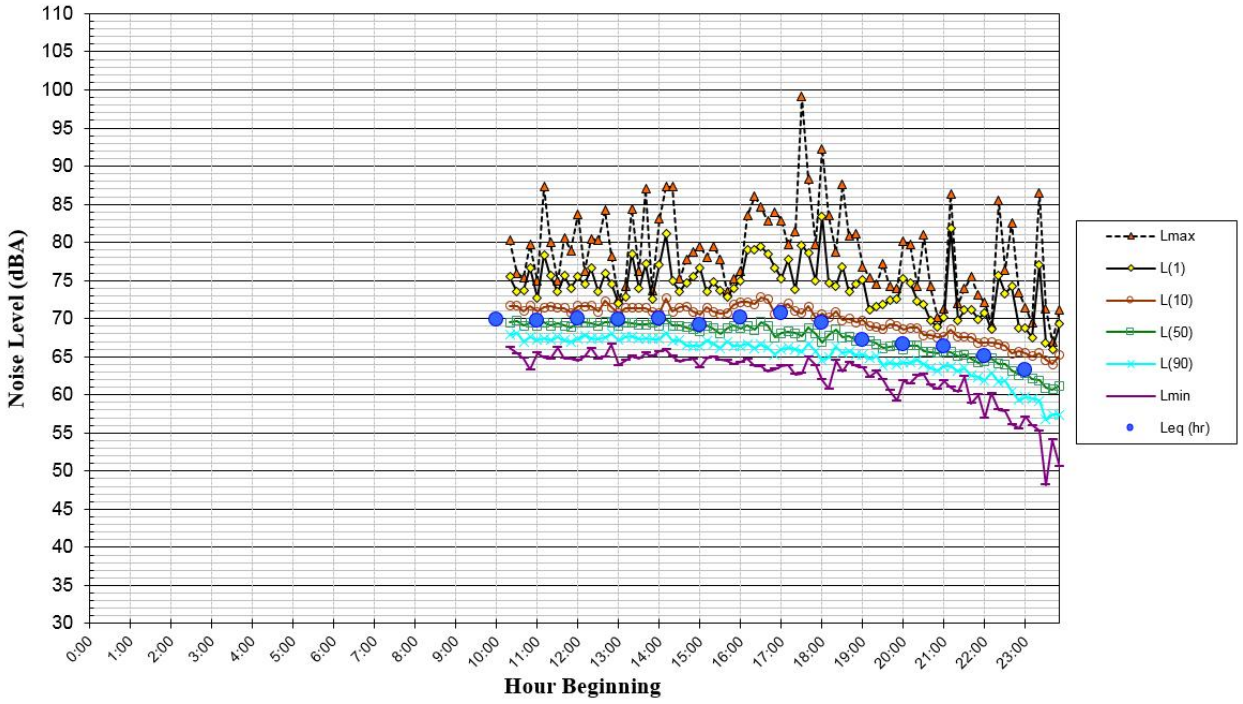


FIGURE 6 Daily Trend in Noise Levels at LT-2, Wednesday, April 10, 2019

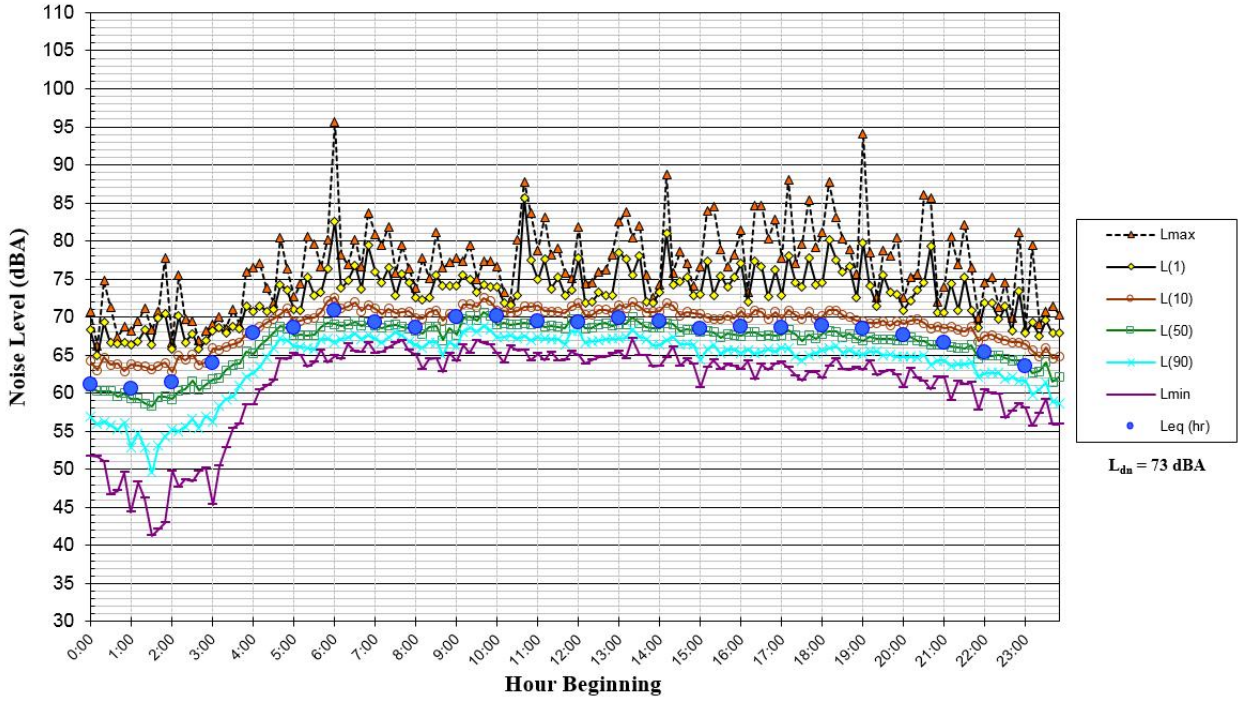


FIGURE 7 Daily Trend in Noise Levels at LT-2, Thursday, April 11, 2019

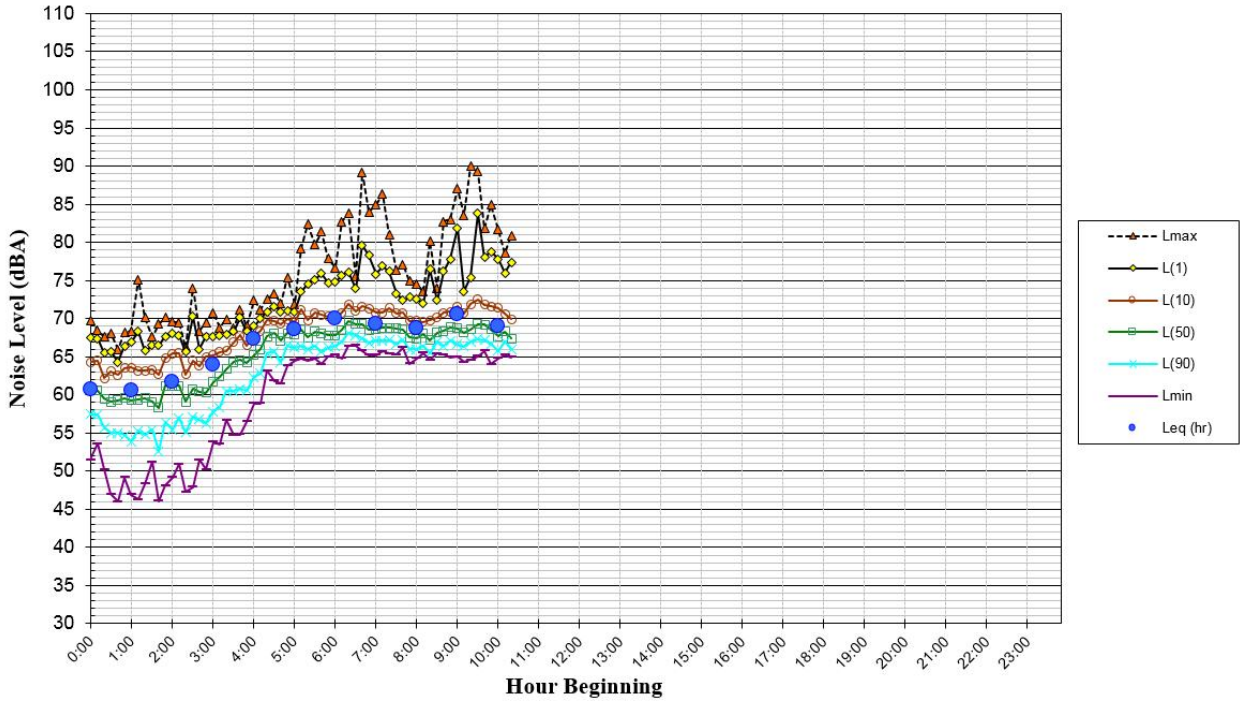


TABLE 4 Summary of Short-Term Noise Measurements (dBA)

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 from traffic along US 101 and the other surrounding local roadways. The traffic study completed by *Hexagon Transportation Consultants* for the proposed project included traffic volume turning movements for intersections surrounding the project site and throughout the City of Morgan Hill. Peak hour volumes for the cumulative 2035 General Plan (GP) scenario included two project scenarios: cumulative 2035 plus project industrial warehouse buildout and cumulative 2035 plus project light industrial buildout. The cumulative 2035 GP plus project light industrial buildout scenario provided the worst-case traffic volumes and is the scenario proposed for this project; therefore, the increase calculated from this scenario, as it compares to the existing volumes, was used to estimate worst-case traffic noise levels under future 2035 conditions. The future noise level increase along Cochrane Road would be 3 dBA L_{dn} above existing conditions, and the future noise level increase along Mission View Drive would be 1 dBA L_{dn} above existing conditions.

Peak hour traffic volumes along US 101 were not included in the traffic study. 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.

Future Exterior Noise Environment

Residential Component

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, 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}.

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

While a detailed site plan showing outdoor use areas was not available at the time of this study, the residential component of the proposed project would likely include common use picnic areas and potential backyard areas. This parcel of land would also likely include neighborhood park areas and open space.

The section of the project identified as the residential parcel would be to the north of Half Road, between DePaul Drive and Mission View Drive. Due to the commercial/industrial parcel located to the west of the residential component of the project, it is likely that structures on the commercial/industrial parcel would provide some shielding from US 101 traffic noise. However, this would require further investigation once a detailed site plan is available.

The setback of the residential parcel from the centerline of the nearest through lane along northbound US 101 would range from approximately 1,025 to 1,860 feet. At these distances and assuming no shielding from the future light industrial project buildings, the future exterior noise levels would potentially range from 62 to 67 dBA L_{dn}. Future construction of the warehouse or light industrial buildings on the parcel west of the future residences would provide some shielding from Highway 101. However, each project scenario would include 24-hour truck trips totaling 385 daily trips for the warehouse scenario and 248 for the light industrial scenario. Based on the analysis included in Impact 1c of this report, future exterior noise levels at the western boundary of the future residential site, which would be approximately 30 feet from the centerline of the DePaul Drive extension, would be 69 dBA L_{dn} under the warehouse scenario and 67 dBA L_{dn} under the light industrial scenario.

The proposed neighborhood parks and open space would be expected to be compatible with the City's noise thresholds; however, the private or common use outdoor use areas associated with the residential component of the proposed project would potentially exceed the 60 dBA L_{dn} standard, and noise control measures would potentially be required.

Commercial and Industrial Use Component

Outdoor use areas at commercial and industrial uses should be maintained at or below 70 and 75 dBA L_{dn}, respectively, to be considered normally acceptable.

The commercial/industrial buildings shown in Figure 1 for the proposed project do not show common outdoor use areas. However, the specific designs for commercial land fronting Cochrane Road have not be determined at this time. Therefore, future outdoor use areas may be proposed. Outdoor use areas associated with the commercial parcel fronting Cochrane Road would potentially exceed 70 dBA L_{dn} if direct line-of-sight exists between the outdoor use area and US 101 or Cochrane Road, based on future noise levels at LT-1 and LT-2, which would be 74 and 75 dBA L_{dn}, respectively.

The commercial site adjacent to Cochrane Road could result in future exterior noise levels above the City's thresholds. Noise control measures may be required to reduce exterior noise levels at proposed commercial outdoor activity areas.

Future Interior Noise Environment

Residential Component
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.

With minimum setbacks from the centerline of the nearest through lane along northbound US 101 of 1,025 to 1,860 feet, future exterior noise levels ranging from 62 to 67 dBA L_{dn}. Assuming a 15 dBA exterior-to-interior noise reduction, future interior noise levels would range from 47 to 52 dBA L_{dn}, which would exceed the 45 dBA L_{dn} threshold. Noise insulation features would be required.

Commercial and Industrial Use Component
Hourly average noise levels during business hours would need to meet the 50 dBA $L_{eq(1\text{-}hr)}$ threshold established by the 2019 Cal Green Code within proposed nonresidential buildings. Additionally, Policy SSI-8.4 of the City of Morgan Hill General Plan states that interior noise levels in office buildings should be maintained at 45 dBA $L_{eq(1\text{-}hr)}$ or less.

Standard construction materials for commercial and industrial buildings would provide at least 20 to 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so windows may be kept closed at the occupants' discretion.

The western façades of the proposed industrial buildings would have setbacks from the centerline of the nearest through lane along US 101 of approximately 250 to 570 feet. Assuming a minimum of 20 dBA of exterior-to-interior noise reduction, the future interior noise levels at the western façade of nonresidential buildings adjacent to US 101 would range from 43 to 55 dBA $L_{eq(1\text{-}hr)}$ during the daytime hours and from 37 to 55 dBA $L_{eq(1\text{-}hr)}$ during nighttime hours. Using standard construction materials, the State's interior noise standards would potentially be exceeded. Measures may be required to reduce exterior noise levels sufficiently to achieve compatible interior noise levels. For interior space located on the eastern building façades, which would be 600 to 950 feet from the centerline of the nearest through lane along US 101, the future interior noise levels would be at or below 45 dBA $L_{eq(1\text{-}hr)}$, and therefore are expected to be compatible with the City's interior noise requirements.

The commercial portion of the project fronting Cochrane Road would be 530 feet or more from the centerline of the nearest through lane along US 101 and would be 65 feet or more from the centerline of Cochrane Road. The future interior noise levels would potentially range from 46 to 52 dBA $L_{eq(1\text{-}hr)}$ during daytime hours and from 35 to 48 dBA $L_{eq(1\text{-}hr)}$ during nighttime hours. This would potentially exceed the City and State standards of 45 dBA $L_{eq(1\text{-}hr)}$ and 50 dBA $L_{eq(1\text{-}hr)}$, respectively, and would require noise insulation features to be compatible with the noise environment at the site.

Recommendations to Reduce Future Exterior and Interior Noise Levels

An acoustical study shall be conducted during the application process when project-specific information, such as building elevations, layouts, floor plans, and position of buildings on the site, is known for the residential, commercial, and industrial components of the proposed project. The studies shall determine compliance with the noise and land use compatibility standards, identify potential noise impacts, and propose site-specific measures to reduce exposure to exterior and interior noise levels that exceed maximum permissible levels.

The following general recommendations shall be considered to reduce exterior noise levels to meet the normally acceptable thresholds of 60 dBA L_{dn} at residential uses and 70 dBA L_{dn} at neighborhood parks and commercial uses near Cochrane Road:

- When developing project site plans, locate noise-sensitive outdoor use areas away from major roadways or other significant sources of noise. Shield noise-sensitive spaces with buildings or noise barriers to reduce exterior noise levels. The final detailed design of the heights and limits of proposed noise barriers shall be completed at the time that the final site and grading plans are submitted.

The following general recommendations shall be considered to reduce interior noise levels to meet the normally acceptable thresholds of 45 dBA L_{dn} at residences and 45 dBA $L_{eq(1\text{-}hr)}$ at potential offices or 50 dBA $L_{eq(1\text{-}hr)}$ for all other nonresidential uses at the site along Cochrane Road:

- If future exterior noise levels at residential building façades are between 60 and 65 dBA L_{dn}, incorporate adequate forced-air mechanical ventilation to reduce interior noise levels to acceptable levels by closing the windows to control noise.

- If future exterior noise levels at residential building façades 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.

- If the 45 dBA $L_{eq(1\text{-}hr)}$ threshold would not be met at office building interiors or the 50 dBA $L_{eq(1\text{-}hr)}$ threshold would not be met at all other nonresidential building interiors, other site-specific measures, such as increasing setbacks of the buildings from the adjacent roadways, using shielding by other buildings or noise barriers to reduce noise levels, implementing

additional sound treatments to the building design, etc., shall be considered to reduce interior noise levels to meet the City of Morgan Hill threshold or the Cal Green Code threshold.

The following noise insultation features shall be incorporated into the proposed industrial buildings to reduce interior noise levels to acceptable levels:

- To meet the 50 dBA $L_{eq(1\text{-}hr)}$ threshold, incorporate an adequate forced-air mechanical ventilation system in order for windows to be kept shut at the occupants' discretion.

- Locate spaces that require a quieter interior noise environment along the eastern side of the proposed buildings.

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}. A single-family residence is currently located west of Mission View Drive and north of Half Road, located on the parcel of land that is proposed for future residential development. At the time of this assessment, it is unknown whether the existing single-family residence or the proposed residential development will be in place at the time of construction of the commercial and industrial buildings. To assess for potential construction noise impacts of both scenarios, noise levels were calculated at the existing western

property line of this residential parcel, adjacent to the proposed extension of DePaul Drive. This location is referred to as the project residential location, and daytime ambient noise levels would be represented by ST-2. The ambient noise environment for the existing residences along US 101 to the south 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 adjacent to the site and the commercial uses north of the site, opposite Cochrane Road. The daytime ambient noise levels at these uses would range from 66 to 72 dBA L_{eq}. The surrounding land uses evaluated for exposure to construction noise levels are shown in Figure 8.

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.). Tables 7 through 10 show the hourly average noise level ranges, by construction phase, as measured from the center of a busy construction site for each development parcel, including both industrial parcel scenarios. 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.

Construction activities for individual projects are anticipated to be carried out 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. For the purposes of this assessment, pile driving activities are not assumed. A detailed list of equipment expected to be used during each phase of construction was provided and assessed for each phase of construction. Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase 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 the surrounding land uses were estimated and are shown in Tables 7 through 10. Construction noise levels shown do not assume shielding from potential intervening buildings or temporary or permanent sound walls.

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
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 Surrounding Land Uses Evaluated for Exposure to Construction Noise Levels

TABLE 7 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of the Residential Development

Proposed Project Construction	Number of Days	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}			
		East Residential (625 feet)	Southeast Residential (875 feet)	Medical Facility & Cochrane Rd Residential (1,145 feet)	South Residential (1,555 feet)
Site Preparation	20	62	59	57	54
Grading	45	65	62	60	57
Trenching	20	60	57	54	52
Build Exterior	440	61	58	56	53
Build Interior	35	53	50	48	45
Paving	35	60	57	55	52

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

Proposed Project Construction	Number of Days	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}				
		North Commercial (275 feet)	East Commercial (385 feet)	Medical Facility & Cochrane Rd Residential (420 feet)	Northeast Commercial (500 feet)	Project Residential (1,450 feet)
Site Preparation	5	69	67	66	64	55
Grading	8	70	67	66	65	56
Trenching	10	64	61	60	58	49
Build Exterior	230	68	65	64	63	54
Build Interior	18	60	57	56	55	45
Paving	18	68	65	65	63	54

TABLE 9 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of the Industrial Warehouse Development

Proposed Project Construction	Number of Days	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}					
		Medical Facility & Cochrane Rd Residential (365 feet)	Project Residential (500 feet)	North Commercial (725 feet)	South Residential (845 feet)	Southeast Residential (1,285 feet)	East Residential (1,325 feet)
Site Preparation	30	70	67	64	62	59	58
Grading	70	71	69	65	64	61	60
Trenching	80	69	66	63	61	58	58
Build Exterior	260	70	68	64	63	59	59
Build Interior	60	72	70	66	65	61	61
Paving	90	71	68	65	64	60	60

TABLE 10 Estimated Construction Noise Levels at Nearby Land Uses during the Construction of the Industrial Commercial Development

Proposed Project Construction	Number of Days	Estimated Noise Levels at Nearby Land Uses, dBA L_{eq}					
		Medical Facility & Cochrane Rd Residential (365 feet)	Project Residential (500 feet)	North Commercial (725 feet)	South Residential (845 feet)	Southeast Residential (1,285 feet)	East Residential (1,325 feet)
Site Preparation	3	67	64	61	62	56	55
Grading	6	66	64	60	64	55	55
Trenching	10	61	58	55	61	50	50
Build Exterior	220	65	62	59	63	54	53
Build Interior	10	57	55	51	65	47	46
Paving	10	65	63	59	64	54	54

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. However, due to the large size of the project site, construction activities would be distributed and would not be expected to expose any one noise-sensitive receptor to excessive construction noise for a period of more than 1 consecutive year. Further, the nearest existing receptors, which would be the residence and medical facility at the corner of Cochrane Road and DePaul Drive and the residence at the corner of Half Road and Condit Road, are exposed to existing ambient noise levels ranging from 66 to 72 dBA L_{eq} during typical daytime hours. According to Tables 7 through 10, construction noise levels during the majority of project construction would not exceed ambient conditions by more than 5 dBA L_{eq}. All other noise-sensitive receptors would be located more than 500 feet from most construction activities. 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 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 by up to 5 dBA, 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 four existing plus project scenarios: 1) existing plus project commercial and warehouse; 2) existing plus project warehouse buildout; 3) existing plus project commercial and light industrial; and 4) existing plus project light industrial buildout. For each of these scenarios, peak hour turning movement traffic volumes were provided at 41 intersections in the City of Morgan Hill. By comparing the traffic volumes for all existing plus project scenarios along each roadway segment included in the traffic study to the existing volumes, the project-generated traffic noise increase was calculated.

A traffic noise increase of 2 dBA L_{dn} or less was calculated along each roadway segment in the existing plus project commercial and warehouse, existing plus project warehouse buildout, and existing plus project commercial and light industrial scenarios. Under the existing plus project light industrial buildout scenario, a 3 dBA L_{dn} traffic noise increase was calculated along Half Road, west of Mission View Drive; along Half Road, east and west of the future DePaul Drive extension; and along Condit Road, north of Main Avenue. However, these segments are located adjacent to US 101, which is the dominant noise source in the vicinity. Ambient noise levels were measured at the corner of Half Road and Condit Road (LT-2), and the peak hourly average noise level at LT-2 was measured to be 71 dBA L_{eq}, with a day-night average noise level of 73 dBA L_{dn}. In comparison to the high traffic volumes along US 101, the existing and existing plus project traffic volumes along Half Road, between Mission View Drive and Condit Road, and along Condit Road, north of Main Avenue, would be insignificant. Therefore, even with a doubling of the traffic along the local roadways near US 101 under existing plus project light industrial buildout

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

conditions, the overall noise level increase would be less than 3 dBA L_{dn} due to the substantially higher existing and future traffic volumes along US 101. 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 could potentially generate noise in excess of standards established in the City's General Plan and Municipal Code at sensitive receptors on- and off-site. The incorporation of measures to reduce noise levels generated by mechanical equipment and truck deliveries as project conditions of approval would result in a **less-than-significant** impact.

Mechanical Equipment

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 for heating, ventilation, and cooling purposes, exhaust fans, emergency generators, and other similar equipment could produce noise levels exceeding ambient levels when located near existing or proposed land uses. The site plans provided for the industrial buildings do not show details pertaining to mechanical equipment, such as type, number, location, etc. Based on the use expected for these buildings, which would be a warehouse or a manufacturing facility, these buildings would likely include mechanical equipment, such as heating, ventilation, air conditioning systems, exhaust fans, chillers, etc. Typically, most of the equipment would be located on the roof; however, a large nearby warehouse building in Morgan Hill, which would be similar to the proposed buildings, was recently measured for similar type of noise sources, and loud chillers were identified in the loading dock area along the building façade. This equipment generated noise levels ranging from 61 to 62 dBA at a distance of 20 feet and dominated the mechanical equipment noise in the surrounding area. Assuming similar noise levels at the proposed buildings and assuming the equipment to be located near the dock doors nearest the surrounding receptors, which would represent the worst-case scenario, mechanical equipment noise was estimated at the nearby receptors.

Assuming no shielding effects, the existing residences south of the project site would potentially be exposed to mechanical equipment noise at or below 35 dBA L_{eq}. The existing residences east of the project site would be exposed to mechanical equipment noise below 30 dBA L_{eq}, and the medical facility would be exposed to mechanical equipment noise at or below 38 dBA L_{eq}. The future residences proposed at the parcel west of Mission View Drive and north of Half Road would also be exposed to mechanical equipment noise generated at the site. The nearest equipment to the property line of the future residential site would be more than 200 feet, and at this distance, mechanical equipment noise would reach levels at or below 40 dBA L_{eq}. Considering the ambient conditions of the project site, which would be above 50 dBA L_{eq} during daytime and nighttime hours according to the ambient noise measurements discussed above, mechanical equipment noise

from the industrial buildings is not expected to result in a significant impact at on-site or off-site receptors.

Additionally, mechanical equipment is expected at the commercial site fronting Cochrane Road and could potentially be located at the future residential development. Due to the number of variables inherent in the mechanical equipment needs of an individual project (number and types of units, locations, size, housing, specs, etc.), the impacts of mechanical equipment noise on nearby noise-sensitive uses should be assessed during the final design stage of the individual projects.

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

Truck Deliveries

The City's Municipal Code does not specify delivery times; however, it does state that "the creation of loud and excessive noise in connection with loading or unloading any vehicle" is unlawful. However, specific noise level thresholds are not provided. Therefore, the estimated future noise levels due to truck trips would be compared to existing ambient noise levels at existing noise-sensitive receptors in the project vicinity. For the future residences included as part of the proposed project, the noise levels estimated for truck deliveries will be compared to the exterior noise thresholds provided by the City of Morgan Hill in Table SSI-1 of the General Plan. For single-family residences, exterior noise levels must be at or below 60 dBA L_{dn} to be considered normally acceptable.

Truck delivery noise would include both maneuvering activities occurring at the loading docks and truck pass-by activities occurring at driveways and along roadways, specifically the future DePaul Drive extension. Trucks maneuvering would generate a combination of engine, exhaust, and tire noise, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air brakes. Heavy trucks used for incoming deliveries typically generate maximum instantaneous noise levels of 70 to 75 dBA L_{max} at a distance of 50 feet. The noise level of backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA L_{max} at a distance of 50 feet. To estimate the pass-by noise levels for heavy trucks traveling at speeds of 15 to 35 mph, Federal Highway Administration's Traffic Noise Model (FHWA TNM), version 2.5, was used to model various hourly scenarios for truck traffic.

Deliveries for the proposed project would occur 24 hours a day under both the warehouse and light industrial project scenarios. Under the warehouse scenario, which is shown in Figure 9, there would be approximately 194 loading docks and approximately 385 daily truck trips. Approximately 124 loading docks would be included in the light industrial scenario, with an estimated 248 daily truck trips. Figure 10 shows the light industrial site plan. The following analysis discusses the noise due to truck deliveries for each scenario.

FIGURE 9 Site Plan for the Warehouse Project Scenario

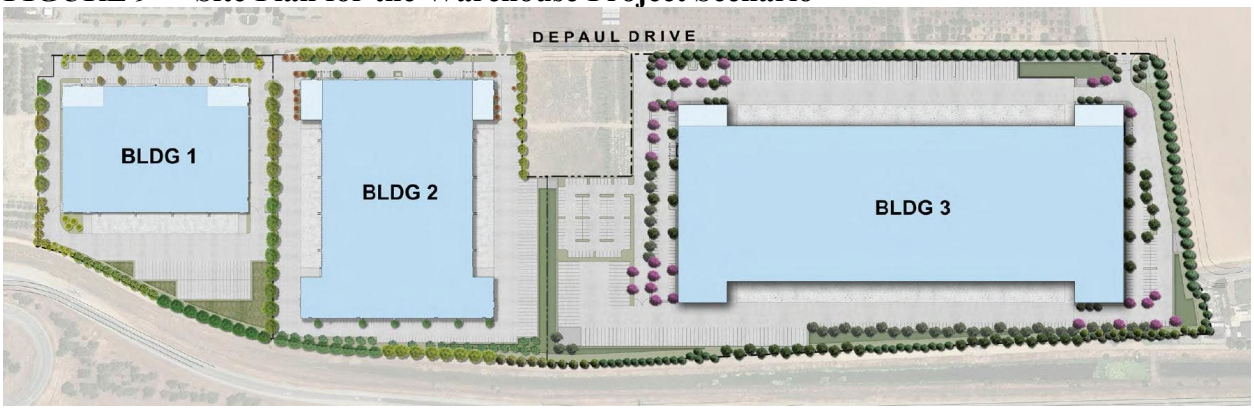
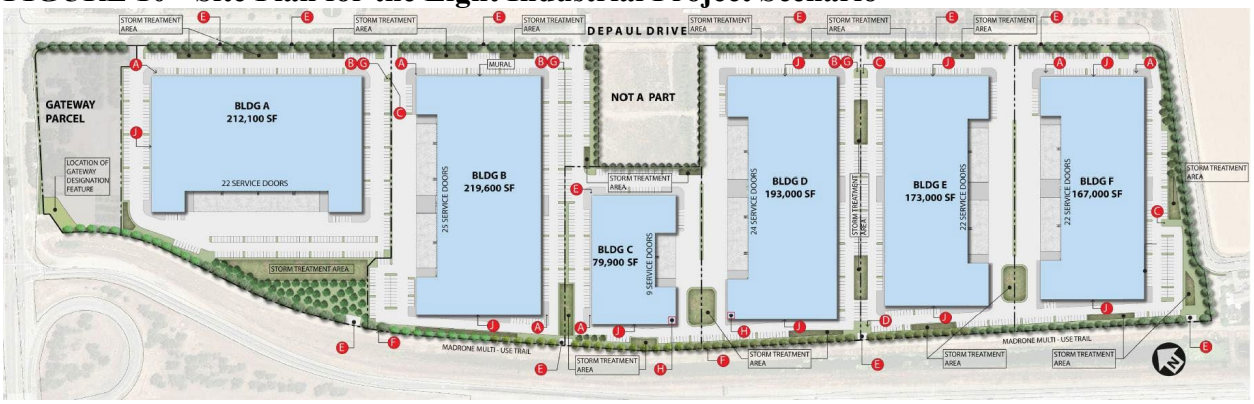


FIGURE 10 Site Plan for the Light Industrial Project Scenario



Warehouse Project Scenario

The site plan in Figure 9 shows three proposed buildings as part of the warehouse project scenario. Building 1 shows loading docks along the western building façade; Building 2 shows loading docks on the northern and southern façades; and Building 3 shows loading docks on the eastern and western building façades. From the orientation of the loading docks at Buildings 1 and 2, truck maneuvering would be shielded from the medical facility and existing residence east of DePaul Drive, and the orientation of Building 3 would provide shielding for the existing residences located southwest of the Condit Road/Half Road intersection. For purposes of estimating the worst-case scenario, a conservative 10 dBA reduction is assumed for the maneuvering calculations at these receptors. Additionally, the existing residences east of Mission View Drive and southwest of the Mission View Drive/Half Road intersection would also be shielded by the future residential development planned north of Half Road between DePaul Drive and Mission View Drive. A conservative 10 dBA reduction was also applied to the truck maneuvering calculations for these receptors.

Table 11 summarizes the distances from each of the existing receptors to the nearest loading docks at which truck maneuvering would occur. The table also shows the estimated maximum instantaneous noise levels calculated at these distances, compared to the daytime and nighttime ambient noise levels. The ambient noise levels for the residence and medical facility along DePaul Drive were represented LT-1, which was discussed previously in this report. LT-2 measurements were used to represent the existing ambient noise levels at the residences southwest of the Condit Road/Half Road intersection. The ambient noise levels used to represent the residences east of Mission View Drive and southwest of the Mission View Drive/Half Road intersection were estimated by calculated using the measurements at LT-2 and the setback distances from US 101 for each receptor. As shown in the table, truck maneuvering at the proposed warehouse project scenario would fall below the range of ambient noise levels at each of the existing noise-sensitive receptors surrounding the site.

TABLE 11 Estimated Noise Levels Due to Truck Maneuvering for Existing Noise-Sensitive Receptors Under Warehouse Scenario

Receptor	Distance	Ambient Noise Levels, dBA		Estimated Noise Level, L_{max} dBA[a]
		Daytime L_{max}	Nighttime L_{max}	
Existing Residence & Medical Facility along DePaul Drive	590 feet	78 to 89 dBA	68 to 76 dBA	39 to 44 dBA
Existing Residence southwest of Mission View Drive/Half Road intersection	900 feet	56 to 75 dBA	55 to 63 dBA	35 to 40 dBA
Existing Residences east of Mission View Drive	1,100 feet	55 to 74 dBA	54 to 62 dBA	33 to 38 dBA
Existing Residences southwest of Condit Road/Half Road intersection	400 feet	68 to 87 dBA	67 to 75 dBA	42 to 47 dBA

[a] Estimations include a conservative 10 dBA reduction due to the intervening buildings.

Based on the site plan for the warehouse scenario, the most likely truck route would be from the north along DePaul Drive because of the proximity of the US Highway 101 interchange. It would be possible, however, for trucks to travel west along Half Road, continuing along Condit Road. Trucks are not expected to travel east along Half Road or along Mission View Drive. To estimate the worst-case scenario noise levels due to truck pass-bys, all daily truck trips were calculated assuming the nearest possible route to the surrounding residences.

For the warehouse scenario, the traffic study stated that there would be 385 daily truck trips, with 38 peak AM truck trips and 42 peak PM truck trips. These truck trips were input into TNM to estimate the peak hour noise levels during the AM and PM hours. It was assumed that the remaining daily truck trips would be evenly distributed throughout the remaining 22 hours of the day, which would be about 14 truck trips per hour. Based on these assumptions, trucks traveling 15 to 35 mph would result in hourly average noise levels ranging from 60 to 65 dBA L_{eq} at a distance of 30 feet. Assuming the peak AM and PM truck trips occur during the daytime hours between 7:00 a.m. and 10:00 p.m., the day-night average noise level due to truck trips for the

warehouse scenario would be up to 67 dBA L_{dn} at a distance of 30 feet. When the day-night average noise level due to the truck pass-bys is added to the ambient day-night average noise level at the existing surrounding receptors, the increase in ambient noise levels due to the project can be calculated.

Table 12 summarizes the ambient noise levels and calculated noise levels due to truck pass-bys for each of the surrounding noise-sensitive receptors, assuming the worst-case scenario described above. The residences east of Mission View Drive would be mostly shielded from truck pass-bys by the intervening residential development planned for the future. Therefore, a conservative 10 dBA reduction was applied to the estimated levels for those receptors only. While the residence located southwest of the Mission View Drive/Half Road intersection would also be partially shielded, if trucks do use Half Road, this residence would have direct line-of-sight. No attenuation was applied to noise levels calculated at this residence.

TABLE 12 Estimated Noise Levels Due to Truck Pass-bys for Existing Noise-Sensitive Receptors Under Warehouse Scenario

Receptor	Distance	Ambient Noise Levels, dBA			Estimated Noise Level, dBA	
		Daytime L_{eq}	Nighttime L_{eq}	L_{dn}	L_{eq}	L_{dn}
Existing Residence & Medical Facility along DePaul Drive	30 feet	66 to 72 dBA	55 to 67 dBA	71 dBA	60 to 65 dBA	72 dBA
Existing Residence southwest of Mission View Drive/Half Road intersection	665 feet	54 to 58 dBA	48 to 58 dBA	61 dBA	46 to 51 dBA	61 dBA
Existing Residences east of Mission View Drive	895 feet	53 to 57 dBA	47 to 58 dBA	60 dBA	35 to 40 dBA[a]	60 dBA
Existing Residences southwest of Condit Road/Half Road intersection	30 feet	66 to 71 dBA	61 to 71 dBA	73 dBA	60 to 65 dBA	74 dBA

[a] Estimations include a conservative 10 dBA reduction due to the intervening buildings.

Estimated noise levels due to truck pass-bys would fall at or below the range of hourly average ambient noise levels during daytime and nighttime hours of the existing noise-sensitive receptors surrounding the site. Additionally, the day-night average noise levels at the residences east of Mission View Drive and southwest of the Mission View Drive/Half Road intersection would not increase due to truck pass-bys for the warehouse scenario, while a 1 dBA L_{dn} increase would occur at the existing residence and medical facility along DePaul Drive and at the residence southwest of the Condit Road/Half Road intersection.

The future residential development to be constructed east of the future DePaul Drive would have direct line-of-sight to the loading docks of Building 3 located on the eastern building façade and

to truck pass-bys along DePaul Drive. The nearest potential property line of these future residences would be approximately 195 feet from the nearest loading docks at Building 3. At this distance, noise levels due to truck maneuvering would range from 58 to 63 dBA L_{max}. The setback of the nearest residential property line to the centerline of DePaul Drive would be about 30 feet, and at this distance, the hourly average truck pass-bys would range from 59 to 64 dBA L_{eq}. Due to the close proximity of the truck pass-bys compared to the loading docks, noise levels due to the truck pass-bys would dominate the noise environment at the future residential development.

Since the future residences do not currently reside on this development site, the noise level increase over ambient conditions would not apply here. However, to estimate the day-night average noise level based on the existing noise environment with the inclusion of the truck noise, the data collected at LT-2 were used. The future day-night average noise level with the project truck noise would be 69 dBA L_{dn}. It should also be noted that the truck trips included in the traffic study and used in this analysis represent the entire project site. Trucks accessing Buildings 1 and 2 would most likely not pass by the future residential site. However, the truck trip distribution per building is unknown at this time and were not included as part of this analysis. While the future warehouse buildings would provide partial shielding from US 101 for the residential development and all 385 daily truck trips would not likely pass by these residences, the future estimated noise level of 69 dBA L_{dn} would represent the worst-case scenario.

Hourly average noise levels and maximum instantaneous noise levels would not exceed ambient conditions at existing noise-sensitive receptors, and the day-night average noise levels at these receptors would not result in a significant permanent noise level increase. However, the future noise environment at the future on-site residential development would exceed acceptable noise levels established in Table SSI-1 of the City's General Plan. This would be a significant impact.

Light Industrial Project Scenario

The site plan in Figure 10 shows six buildings proposed as part of the light industrial project scenario. All buildings show the loading docks on the western, northern, or southern building façades. From these configurations, all existing and future noise-sensitive receptors would be shielded from truck maneuvering activities at the loading docks. The nearest existing or future receptor would be approximately 200 feet from the nearest loading dock. At this distance and assuming a conservative 10 dBA reduction, the maximum instantaneous noise levels due to intervening buildings would be at or below 50 dBA L_{max}. These levels would be below ambient maximum instantaneous noise levels at all surrounding receptors.

The assumed truck routes for the light industrial scenario would be the same as described above for the warehouse scenario. For purposes of modeling the worst-case scenario, all daily truck trips were calculated assuming the nearest possible route to the surrounding residences.

The traffic study stated that there would be 248 daily truck trips for the light industrial scenario, with 35 peak AM truck trips and 31 peak PM truck trips. These peak hour trips were also modeled in TNM, as well as the estimated hourly trips for the remaining 22 hours, which was calculated to be 8 trucks per hour assuming an even distribution of trucks. Trucks traveling 15 to 35 mph would result in hourly average noise levels ranging from 58 to 63 dBA L_{eq} at a distance of 30 feet. Assuming the peak AM and PM truck trips occur during the daytime hours between 7:00 a.m. and

10:00 p.m., the day-night average noise level due to truck trips for the light industrial scenario would be up to 64 dBA L_{dn} at a distance of 30 feet.

Table 13 summarizes the ambient noise levels and calculated noise levels due to truck pass-bys for each of the surrounding noise-sensitive receptors, assuming the worst-case scenario described above. With fewer trips, this scenario would result in lower overall hourly average noise levels than the warehouse scenario. However, a 1 dBA L_{dn} increase would still be expected at the existing residence and medical facility along DePaul Drive and at the residence southwest of the Condit Road/Half Road intersection.

TABLE 13 Estimated Noise Levels Due to Truck Pass-bys for Existing Noise-Sensitive Receptors Under Light Industrial Scenario

Receptor	Distance	Ambient Noise Levels, dBA			Estimated Noise Level, dBA	
		Daytime L_{eq}	Nighttime L_{eq}	L_{dn}	L_{eq}	L_{dn}
Existing Residence & Medical Facility along DePaul Drive	30 feet	66 to 72 dBA	55 to 67 dBA	71 dBA	58 to 63 dBA	72 dBA
Existing Residence southwest of Mission View Drive/Half Road intersection	665 feet	54 to 58 dBA	48 to 58 dBA	61 dBA	44 to 50 dBA	61 dBA
Existing Residences east of Mission View Drive	895 feet	53 to 57 dBA	47 to 58 dBA	60 dBA	33 to 39 dBA[a]	60 dBA
Existing Residences southwest of Condit Road/Half Road intersection	30 feet	66 to 71 dBA	61 to 71 dBA	73 dBA	58 to 63 dBA	74 dBA

[a] Estimations include a conservative 10 dBA reduction due to the intervening buildings.

The future residences east of DePaul Drive would have the same 30-foot setback from the centerline of the roadway for the light industrial scenario as it would for the warehouse scenario. At this distance, the future residences would be exposed to hourly average noise levels ranging from 58 to 63 dBA L_{eq}. The worst-case future day-night average noise level with the project truck noise would be 67 dBA L_{dn} under then light industrial scenario, when combined with existing day-night average noise levels estimated from LT-2.

Hourly average noise levels and maximum instantaneous noise levels would not exceed ambient conditions at existing noise-sensitive receptors, and the day-night average noise levels at these receptors would not result in a significant permanent noise level increase. However, the future noise environment at the future on-site residential development would exceed acceptable noise levels established in Table SSI-1 of the City's General Plan. This would be a significant impact.

Mitigation Measure 1c:

Trucks should be rerouted along the western side of the industrial/warehouse buildings, adjacent to US 101, to avoid increased heavy truck pass-by noise along the future DePaul Drive extension under both project scenarios. Implementing this western access roadway for truck deliveries would reduce the impact to a less-than-significant level.

Assuming a western access driveway would not be feasible, the current scenario of truck entrance driveways along DePaul Drive would potentially result in a future noise level exceedance over the City's 60 dBA L_{dn} threshold of 9 dBA under the warehouse scenario or 7 dBA under the light industrial scenario. Another method available to reduce exterior noise levels at these residences would be to construct a sound wall or a specially-designed barrier capable of reducing noise levels by up to 9 dBA for the warehouse scenario or up to 7 dBA for the light industrial scenario. The proposed sound wall or specially-designed barrier would need to break the line-of-sight from the outdoor use areas to the heavy truck noise sources. Under the warehouse scenario, a 10-foot sound wall or specially-designed fence would be required along the western boundary of the residential development, as measured from the base elevation of the site. Under the light industrial scenario, an 8-foot sound wall or specially-designed fence would be required. The sound walls would be solid and continuous from grade to top, with no cracks or gaps. This barrier would consist of a minimum surface density of three lbs/ft^2 (e.g., one-inch thick marine-grade plywood, ½-inch laminated glass, concrete masonry units (CMU)).

Other design options would be to increase the setback of the residential property lines, a combination of increased setbacks and sound walls, etc. The final recommendations shall be confirmed when detailed site plans for the residential and industrial/warehouse developments are available. With the implementation of rerouting the truck driveway entrances along the western side of the proposed industrial/warehouse development, increasing residential setback distances, and/or constructing a sound barrier, noise levels associated with truck deliveries would be at or below the City's exterior noise thresholds.

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 or at future on-site receptors. 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 14 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. 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. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

Worst-case scenario vibration levels were calculated at the nearest building façades surrounding the site, as measured from project's boundaries. The potential vibration levels for each piece of equipment at the surrounding receptors is also summarized in Table 14. The nearest existing building to the project site would be the residence to the south near LT-2. Located approximately 50 feet from the project's boundary, the worst-case vibration levels at this structure would be 0.098 in/sec PPV. All other surrounding buildings would be subject to vibration levels at or below 0.073 in/sec PPV. 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 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.**

[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.
[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.

TABLE 14 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Vibration Levels at Nearest Surrounding Building Façades (in/sec PPV)							
			North Comm. (155 ft)	East Res., opp. DePaul Dr. (65 ft)	Medical Facility (315 ft)	East Res., opp. Mission View Dr. (100 ft)	South Res., opp. Half Rd. (65 ft)	South Res. (50 ft)	West Comm. (515 ft)	Future East Res. (70 ft)
Clam shovel drop		0.202	0.027	0.071	0.012	0.044	0.071	0.094	0.007	0.0065
Hydromill (slurry wall)	in soil	0.008	0.001	0.003	0.0005	0.002	0.002	0.004	0.0003	0.0003
	in rock	0.017	0.002	0.006	0.001	0.004	0.004	0.008	0.001	0.005
Vibratory Roller		0.210	0.028	0.073	0.013	0.046	0.073	0.098	0.008	0.068
Hoe Ram		0.089	0.012	0.031	0.005	0.019	0.031	0.042	0.003	0.029
Large bulldozer		0.089	0.012	0.031	0.005	0.019	0.031	0.042	0.003	0.029
Caisson drilling		0.089	0.012	0.031	0.005	0.019	0.031	0.042	0.003	0.029
Loaded trucks		0.076	0.010	0.027	0.005	0.017	0.027	0.035	0.003	0.024
Jackhammer		0.035	0.005	0.012	0.002	0.008	0.012	0.016	0.001	0.011
Small bulldozer		0.003	0.0004	0.001	0.0002	0.0007	0.001	0.001	0.0001	0.001

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006 and modified by Illingworth & Rodkin, Inc., January 2020.

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 three future 2030 traffic scenarios: 2030 no project, 2030 plus project commercial and warehouse, and 2030 plus project commercial and light industrial. Additionally, three future cumulative 2035 GP scenarios were also included in the traffic study: cumulative 2035 GP no project, cumulative 2035 GP plus project warehouse buildout, and cumulative 2035 GP plus project light industrial buildout. Cumulative traffic noise level increases were calculated by comparing the traffic volumes of each of these scenarios to existing traffic volumes.

Table 15 summarizes the roadway segments for each of the future 2030 scenarios resulting in a 3 dBA L_{dn} or more increase. The table also shows the cumulatively considerable contribution attributable to each of the plus project scenarios. This is calculated by subtracting the increase due to the project scenario from the increase due to the no project scenario. As shown in the table, all roadway segments resulting in a 3 dBA L_{dn} or more increase in the project scenarios would have a cumulatively considerable contribution of less than 1 dBA L_{dn} for the 2030 project scenarios.

Table 16 summarizes the same information for the cumulative 2035 scenarios. For all of the roadway segments resulting in a 3 dBA L_{dn} or more increase calculated for the cumulative 2035 plus project scenarios, the project resulted in a cumulatively considerable contribution of less than 1 dBA L_{dn}. Therefore, the proposed project would not result in a cumulative traffic noise increase under the warehouse or light industrial project scenarios.

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.

TABLE 15 Summary of Roadway Segments with Estimated Noise Level Increases of 3 dBA L_{dn} or more by the Year 2030 When Compared to Existing Volumes

Roadway	Segment	Estimated Noise Level Increase from Existing Conditions, dBA			Project Contribution to Overall Cumulative Increase, dBA	
		2030 No Project	2030 Plus Proj. Comm. & Warehouse	2030 Plus Proj. Comm. & Light Industry	2030 Plus Proj. Comm. & Warehouse	2030 Plus Proj. Comm. & Light Industry
Second Street	West of Monterey Rd.	2.6 dBA	2.6 dBA	2.6 dBA	0 dBA	0 dBA
Church Street	North of Dunne Ave.	0.9 dBA	0.9 dBA	0.9 dBA	0 dBA	0 dBA
Murphy Avenue	South of Dunne Ave.	3.2 dBA	3.3 dBA	3.3 dBA	0.1 dBA	0.1 dBA
	North of Tennant Ave.	3.8 dBA	3.8 dBA	3.8 dBA	0 dBA	0 dBA
	South of Tennant Ave.	3.5 dBA	3.6 dBA	3.6 dBA	0.1 dBA	0.1 dBA
Central Avenue	West of Butterfield Blvd.	2.6 dBA	2.6 dBA	2.6 dBA	0 dBA	0 dBA
Jarvis Drive	West of Butterfield Blvd.	4.3 dBA	4.3 dBA	4.3 dBA	0 dBA	0 dBA
Cochrane Road	East of DePaul Dr.	2.3 dBA	2.6 dBA	2.9 dBA	0.3 dBA	0.6 dBA
	West of DePaul Dr.	2.0 dBA	2.3 dBA	2.7 dBA	0.3 dBA	0.7 dBA
	West of Mission View Dr.	2.5 dBA	2.7 dBA	3.0 dBA	0.2 dBA	0.5 dBA
Mission View Drive	South of Cochrane Rd.	2.7 dBA	3.1 dBA	3.5 dBA	0.4 dBA	0.8 dBA
	North of Avenida De Los Padres	2.8 dBA	3.1 dBA	3.5 dBA	0.3 dBA	0.7 dBA
	South of Avenida De Los Padres	3.0 dBA	3.3 dBA	3.7 dBA	0.3 dBA	0.7 dBA

Roadway	Segment	Estimated Noise Level Increase from Existing Conditions, dBA			Project Contribution to Overall Cumulative Increase, dBA	
		2030 No Project	2030 Plus Proj. Comm. & Warehouse	2030 Plus Proj. Comm. & Light Industry	2030 Plus Proj. Comm. & Warehouse	2030 Plus Proj. Comm. & Light Industry
	North of Half Rd.	2.9 dBA	3.2 dBA	3.7 dBA	0.3 dBA	0.8 dBA
Half Road	West of Mission View Dr.	2.0 dBA	2.4 dBA	2.8 dBA	0.4 dBA	0.8 dBA
	East of DePaul Dr.	1.9 dBA	2.2 dBA	2.8 dBA	0.3 dBA	0.9 dBA
Condit Road	South of Main Ave.	2.4 dBA	2.5 dBA	2.7 dBA	0.1 dBA	0.3 dBA
	North of Diana Ave.	2.2 dBA	2.4 dBA	2.6 dBA	0.2 dBA	0.4 dBA
	South of Diana Ave.	2.2 dBA	2.4 dBA	2.6 dBA	0.2 dBA	0.4 dBA
Diana Avenue	West of Condit Rd.	3.9 dBA	3.9 dBA	3.9 dBA	0 dBA	0 dBA
Tennant Avenue	East of Condit Rd.	2.6 dBA	2.6 dBA	2.6 dBA	0 dBA	0 dBA
	East of Murphy Ave.	2.6 dBA	2.6 dBA	2.6 dBA	0 dBA	0 dBA
	West of Murphy Ave.	2.7 dBA	2.7 dBA	2.7 dBA	0 dBA	0 dBA

TABLE 16 Summary of Roadway Segments with Estimated Noise Level Increases of 3 dBA L_{dn} or more by the Year 2035 When Compared to Existing Volumes

Roadway	Segment	Estimated Noise Level Increase from Existing Conditions, dBA			Project Contribution to Overall Cumulative Increase, dBA	
		2035 GP No Project	2035 GP Plus Proj. Warehouse BO	2035 Plus Proj. Light Ind. BO	2035 GP Plus Proj. Warehouse BO	2035 Plus Proj. Light Ind. BO
Old Monterey Road	West of Monterey Rd.	4.3 dBA	4.3 dBA	4.3 dBA	0 dBA	0 dBA
Murphy Avenue	North of Dunne Ave.	6.6 dBA	6.7 dBA	6.7 dBA	0.1 dBA	0.1 dBA
	South of Dunne Ave.	4.0 dBA	4.0 dBA	4.0 dBA	0 dBA	0 dBA
	North of Diana Ave.[a]	12.8 dBA	12.9 dBA	12.9 dBA	0.1 dBA	0.1 dBA
	South of Diana Ave.	8.1 dBA	8.2 dBA	8.3 dBA	0.1 dBA	0.2 dBA
	North of Tennant Ave.	4.5 dBA	4.5 dBA	4.5 dBA	0 dBA	0 dBA
	South of Tennant Ave.	4.4 dBA	4.4 dBA	4.4 dBA	0 dBA	0 dBA
Central Avenue	West of Butterfield Blvd.	3.1 dBA	3.1 dBA	3.1 dBA	0 dBA	0 dBA
Cochrane Circle	North of Cochrane Rd.	2.8 dBA	2.8 dBA	2.8 dBA	0 dBA	0 dBA
Cochrane Road	East of US 101 NB ramps	2.5 dBA	2.6 dBA	2.7 dBA	0.1 dBA	0.2 dBA
	West of DePaul Dr.	2.6 dBA	2.7 dBA	2.8 dBA	0.1 dBA	0.2 dBA
Main Avenue	East of Condit Rd.	2.4 dBA	2.5 dBA	2.5 dBA	0.1 dBA	0.1 dBA
	West of Condit Rd.	2.6 dBA	2.6 dBA	2.7 dBA	0 dBA	0.1 dBA

Roadway	Segment	Estimated Noise Level Increase from Existing Conditions, dBA			Project Contribution to Overall Cumulative Increase, dBA	
		2035 GP No Project	2035 GP Plus Proj. Warehouse BO	2035 Plus Proj. Light Ind. BO	2035 GP Plus Proj. Warehouse BO	2035 Plus Proj. Light Ind. BO
	East of Murphy Ave.	2.8 dBA	2.8 dBA	2.8 dBA	0 dBA	0 dBA
Vista De Lomas	South of Burnett Ave.	2.4 dBA	2.5 dBA	2.5 dBA	0.1 dBA	0.1 dBA
Burnett Avenue	West of Vista De Lomas.	2.4 dBA	2.5 dBA	2.5 dBA	0.1 dBA	0.1 dBA
Diana Avenue	West of Condit Rd.	4.6 dBA	4.6 dBA	4.6 dBA	0 dBA	0 dBA
Tennant Avenue	East of Condit Rd.	3.8 dBA	3.7 dBA	3.7 dBA	-0.1 dBA	-0.1 dBA
	West of Condit Rd.	3.2 dBA	3.2 dBA	3.2 dBA	0 dBA	0 dBA
	East of Murphy Ave.	3.1 dBA	3.1 dBA	3.1 dBA	0 dBA	0 dBA
	West of Murphy Ave.	3.8 dBA	3.8 dBA	3.8 dBA	0 dBA	0 dBA
Madrone Parkway	East of Monterey Rd.	3.3 dBA	3.4 dBA	3.4 dBA	0.1 dBA	0.1 dBA

[a] Roadway segment does not currently exist.