IV. ENVIRONMENTAL IMPACT ANALYSIS
D. NOISE

INTRODUCTION

The noise data and analysis in this section is based upon evaluation conducted by Illingworth & Rodkin, Inc. (I&R) for the proposed 1000 Gibraltar Drive Project ("proposed Project"). The analysis contained within this section is based on an evaluation of existing noise data, information contained within Section III (Project Description), and modeling of traffic data contained in Section IV.E (Transportation).

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 IV.D-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 IV.D-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* (*DNL* or L_{dn}) 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 DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dB lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dB with open windows. With standard construction and closed windows in good condition, the noise attenuation factor is around 20 dB for an older structure and 25 dB for a newer dwelling. Sleep and speech interference are therefore of concern when exterior noise levels are about 57 to 62 dBA DNL with open windows and 65 to 70 dBA DNL if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL 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 DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL 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 DNL of 60-70 dBA. Between a DNL of 70-80 dBA, each decibel increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL 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.

Table IV.D-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.

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

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

Table IV.D-2
Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
	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
	80 dBA	Garbage disposal
Noisy urban area, daytime		
Gas lawn mower at 30 feet	70 dBA	Vacuum cleaner
Commercial area		Normal speech face to face
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), Caltrans, September 2018

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 IV.D-3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table IV.D-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 IV.D-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 IV.D-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 IV.D-3
Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

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

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

Regulatory Background

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

State CEQA Guidelines. 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;

(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 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 Milpitas General Plan. The Noise Element in the Milpitas General Plan (Last Amended April 2015) sets forth policies to guide public and private planning to attain and maintain acceptable noise levels and promote a comprehensive and long-range program of achieving acceptable noise levels. The City's noise compatibility standards are derived from guidelines published by the California Office of Planning and Research and are shown in Table 6-1 (Figure IV.D-1). The following policies are applicable to the proposed Project:

6-I-1 Use the guidelines in Table 6-1 (Noise and Land Use Compatibility) as review criteria for development Projects.

6-I-2 Require an acoustical analysis for Projects located within a "conditionally acceptable" or "normally unacceptable" exterior noise exposure area. Require mitigation measures to reduce noise to acceptable levels.

6-I-3 Prohibit new construction where the exterior noise exposure is considered "clearly unacceptable" for the use proposed.

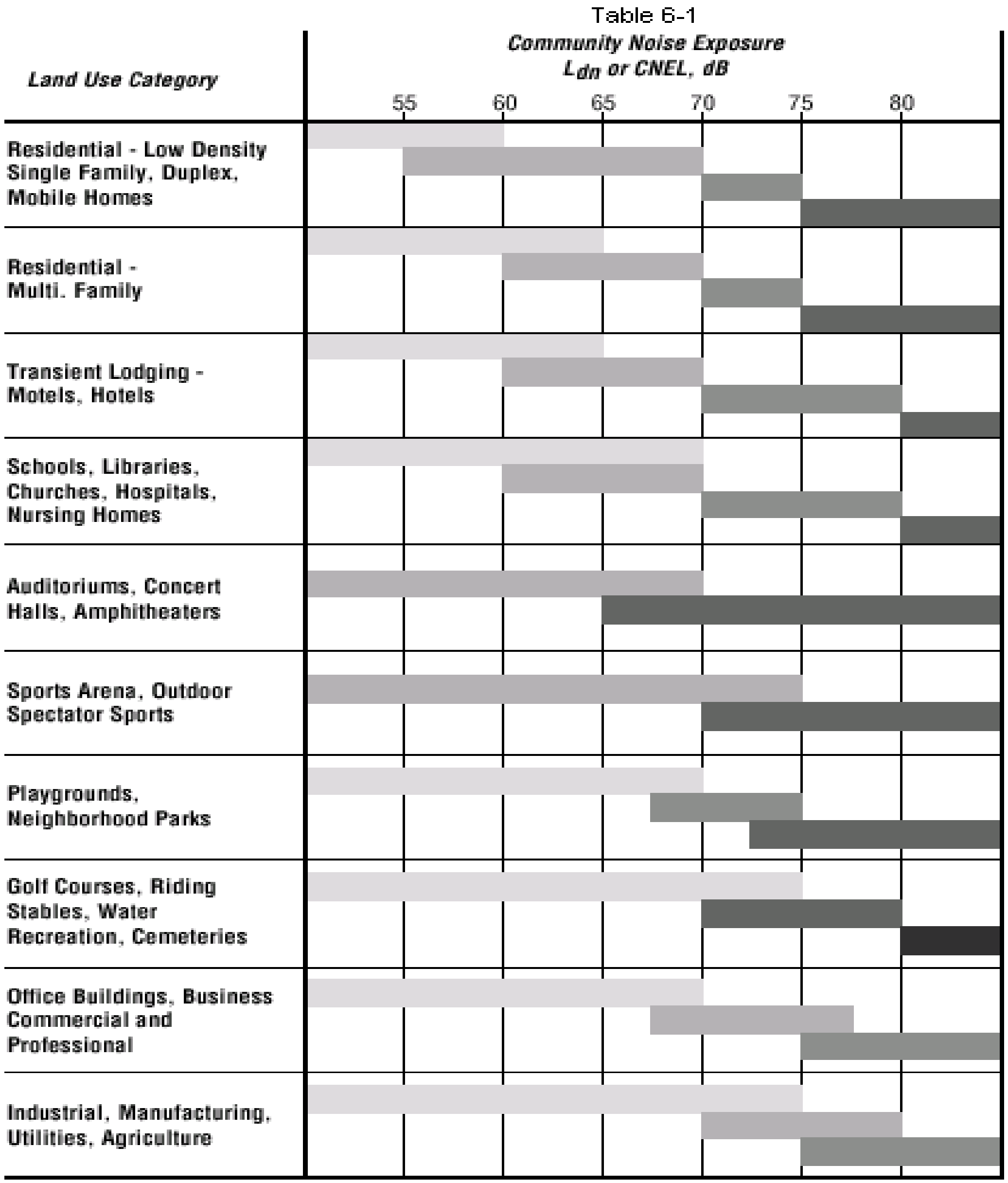
6-I-7 Avoid residential DNL exposure increases of more than 3 dB or more than 65 dB at the property line, whichever is more restrictive.

6-I-10 Reduce the noise impact in existing residential areas where feasible. Noise mitigation measures should be implemented with the cost shared by public and private agencies and individuals.

6-I-11 Minimize noise impacts on neighbors caused by commercial and industrial Projects.

6-I-12 New noise-producing facilities introduced near sensitive land uses which may increase noise levels in excess of "acceptable" levels will be evaluated for impact prior to approval; adequate mitigation at the noise source will be required to protect noise-sensitive land uses.

6-I-13 Restrict the hours of operation, technique, and equipment used in all public and private construction activities to minimize noise impact. Include noise specifications in requests for bids and equipment information.



INTERPRETATION:

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 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 or development 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 should generally not be undertaken.

Figure IV.D-1. City of Milpitas General Plan Table 6-1

1000 Gibraltar Drive
City of Milpitas, California

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City of Milpitas Municipal Code. Chapter 213 of the City's Zoning Ordinance contains a Noise Abatement Section that limits noise levels at adjacent properties. The following policies are applicable to the proposed Project:

Code Section V-213-3 limits operational noise in residential areas to 65 dBA DNL at the property line or to an increase of less than 3 dBA DNL, whichever is more restrictive. Operational noise that "occurs with such intensity, frequency or in such a manner as to disturb the peace and quiet of reasonable person of normal sensitivity residing in that area" at a distance of 50 feet from the property line of the noise source or 100 feet from any nonstationary noise source shall be limited to the hours of 7:00 am and 10:00 pm. Construction operations are limited to between the hours of 7:00 am and 7:00 pm on weekdays and weekends. No construction is permitted on holidays.

Existing Noise Environment

The Project site is bordered to the north by existing commercial and industrial uses, to the east by South Milpitas Boulevard, and to the south and west by Gibraltar Drive. Existing residences are located approximately 500 feet to the south of the Project site. The predominant noise sources affecting the Project site include local vehicular traffic along South Milpitas Boulevard, Gibraltar Drive, and Ames Avenue, and distant vehicular traffic along Interstate 680 (I-680), Montague Expressway, and Great Mall Parkway. Occasional train pass-bys along Union Pacific Railroad (UPRR) tracks would also be audible at the Project site. Due to COVID-19 conditions at the time of this study, traffic volumes along the surrounding roadways were substantially reduced and not representative of typical conditions. A noise monitoring survey was not completed to document ambient noise levels during this time period because resultant noise levels would not be representative of typical existing conditions.

In order to establish the environmental baseline for the Project, noise data contained in the City of Milpitas General Plan, the Milpitas General Plan Update Existing Conditions Report (Existing Conditions Report),[1] and measurements from prior Projects were reviewed. According to the noise contours included in the Existing Conditions Report, existing noise levels at the Project site would be up to 65 dBA DNL, depending on setback distance from South Milpitas Boulevard. The noise contours in the vicinity of the Project site are shown in Figure IV.D-2. According to Table 4.6-2 of the Existing Conditions Report, existing noise levels along South Milpitas Boulevard between East Calaveras Boulevard and Montague Expressway are 70 dBA DNL at a distance of 40 feet from the centerline. According to Table 4.6-3, UPRR activity generates noise levels of 76 dBA DNL at 100 feet from the center of the tracks with warning horns and 67 dBA DNL at 100 feet without warning horns.

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[1] De Novo Planning Group "Milpitas General Plan Update: Existing Conditions Report," prepared for City of Milpitas, June 2018.

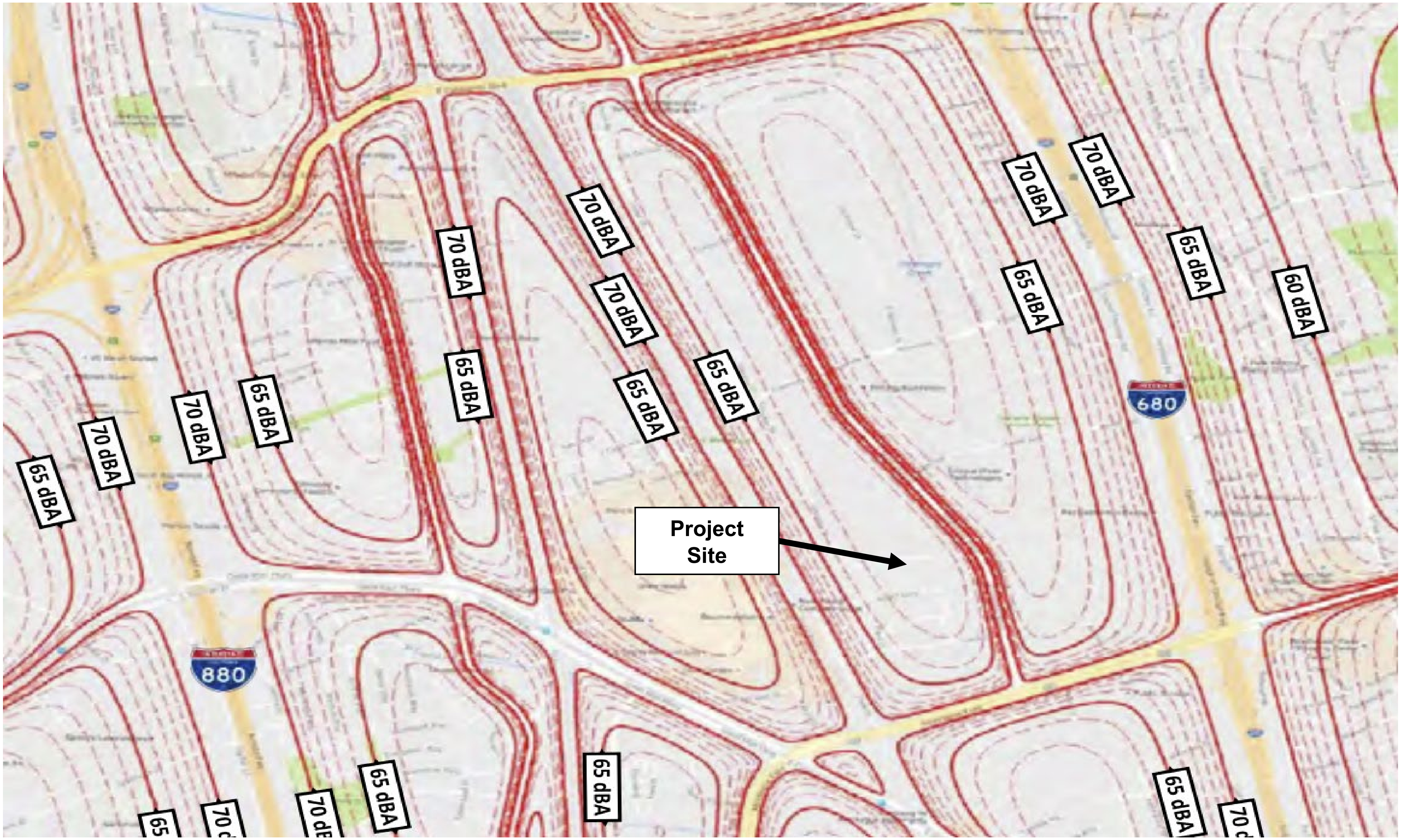

Figure IV.D-2. Project Site in Relation to Noise Contours from Milpitas General Plan Update Existing Conditions Report

1000 Gibraltar Drive
City of Milpitas, California

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After reviewing these data, the Federal Highway Administration's (FHWA) Traffic Noise Model, version TNM 2.5, (TNM 2.5) was used to calculate existing noise conditions specific to the proposed Project. Existing traffic noise levels were calculated along the major roadways surrounding the site, which include I-680, I-880, South Milpitas Boulevard, Montague Expressway, Great Mall Parkway/Capitol Avenue, Abel Street, and Gibraltar Drive. Calculations accounted for the source of noise (traffic) from the Project's traffic study and the Caltrans Traffic Census Program,[2] the frequency spectra of the noise source, the topography of the area, and existing buildings and barriers. The Caltrans truck volumes from the AADT distribution data was used to establish the volume mix along I-680 and I-880 of 95% autos, 3% medium trucks, and 2% heavy trucks.

Based on the review of available data and TNM 2.5 model results, existing noise levels at the site, under normal traffic conditions, would range from 58 dBA DNL near the western façade of the proposed building to 65 dBA DNL near the eastern façade of the proposed building.

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

Noise and Land Use Compatibility

The applicable State and General Plan policies were presented in detail in the Regulatory Background section and are summarized below for the proposed Project:

- The City's acceptable exterior noise level objective for Industrial, Manufacturing, Utilities, and Agriculture land use is 70 dBA DNL (Figure IV.D-1).

Future Exterior Noise Environment

The future exterior noise environment at the Project site would result primarily from distant and local vehicular traffic as well as train activity along UPRR tracks. Phase I of the Valley Transit Authority's Bay Area Rapid Transit Silicon Valley Expansion Program (BSV) was completed in June 2020. Table 4.13-3 of the Bart Silicon Valley 2nd Supplemental EIR3 includes calculated noise levels of the VTA Alum Rock to Santa Teresa light rail line at impacted sensitive receptors. The nearest sensitive receptors, at the Parc Metropolitan Condos would be exposed to noise levels of up to 62 dBA DNL at approximately 280 feet. Considering the Project site would be as close as approximately 650 feet, the light rail would not influence the ambient noise

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[2] https://dot.ca.gov/programs/traffic-operations/census

[3] *Santa Clara Valley Transportation Authority, "Final 2nd Supplemental Environmental Impact Report: BART Silicon Valley Phase 1 – Berryessa Extension", February 2011.*

environment. Therefore, while light rail could occasionally be audible at the Project site, it is not anticipated to measurably contribute to the future noise environment.

In order to estimate the future noise level at the Project site, existing and future traffic conditions from the Project's traffic study were compared. For purposes of estimating the worst-case scenario, the cumulative plus Project peak hour traffic scenario was compared to the existing peak hour traffic scenario. Assuming Project buildout of all Projects considered in the cumulative plus Project traffic scenario, the future traffic conditions in the Project site vicinity are anticipated to increase by up to 3 dBA DNL.

Noise sensitive outdoor use areas, labeled as amenity areas in the site plans, would be located to the east and west of the proposed building. These land uses would be located as close as 200 feet from the center of South Milpitas Boulevard (eastern amenity area) and 150 feet from the center of Gibraltar Drive (western amenity area). The western amenity area would be as close as 720 feet to the centerline of UPRR tracks. Based on these setback distances, the future exterior noise exposure would be up to 68 dBA DNL at the amenity area to the east and 61 dBA DNL at the amenity area to the west. This would be considered compatible with the City's threshold of 70 dBA DNL.

Future Interior Noise Environment

Hourly average noise levels during business hours would need to meet the 50 dBA Leq(1-hr) threshold established by the 2019 Cal Green Code within proposed nonresidential buildings.

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. Assuming a minimum of 20 dBA of exterior-to-interior noise reduction, the future interior noise levels would be at or below 50 dBA Leq(1-hr), and therefore would be compatible with the 2019 Cal Green Code interior noise requirements.

ENVIRONMENTAL IMPACTS

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

Significance Criteria

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

- 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.
    - A significant temporary noise impact would be identified if construction would occur outside of the hours specified in the Municipal Code. Additionally, a significant temporary noise increase would be identified if construction-related noise would result in hourly average noise levels exceeding 60 dBA Leq at the property lines shared with residential land uses, and the ambient noise environment by at least 5 dBA Leq, for a period of more than one year.
    - A significant permanent noise level increase would occur if Project-generated traffic would result in a noise level increase of more than 3 dBA DNL.
    - 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.

Project Impacts and Mitigation Measures

Impact NOISE-1a: Temporary Construction Noise. Existing noise-sensitive land uses would not be exposed to construction noise levels in excess of the significance thresholds for a period of more than one year.

Construction operations are limited to between the hours of 7:00 am and 7:00 pm on weekdays and weekends. No construction is permitted on holidays. Neither the City of Milpitas nor the State of California specify quantitative thresholds for the impact of temporary increases in noise due to construction. The threshold for speech interference indoors is 45 dBA (see Setting Section, Effects of Noise). Assuming a 15 dB exterior-to-interior reduction for standard residential construction with windows open and a 25 dB exterior-to-interior reduction for standard commercial construction, assuming windows are closed, this would correlate to an exterior threshold of 60 dBA Leq at residential land uses and 70 dBA Leq at commercial land uses. Therefore, the Project would be considered to generate a significant temporary construction noise impact if Project construction activities exceeded 60 dBA Leq at nearby residences or exceeded 70 dBA Leq at nearby commercial land uses and exceeded the ambient noise environment by 5 dBA Leq or more for a period longer than one year.

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.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The highest maximum noise levels generated by Project construction would typically range from about 80 to 90 dBA Lmax at a distance of 50 feet from the noise source. Table IV.D-4 shows the hourly average noise level ranges, by construction phase for various types of construction Projects. A list of typical maximum instantaneous noise levels measured at 50 feet are provided in Table IV.D-5. Typical hourly average construction-generated noise levels for similar buildings are about 75 to 89 dBA Leq, as measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). 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 can provide an additional 5 to 10 dBA noise reduction at distant receptors.

Based on the expected construction schedule provided for the proposed Project, site preparation would start at the beginning of January 2021, and paving would conclude in October 2021, which would equate to approximately 10 months of construction. Table IV.D-6 summarizes the number of days anticipated for each construction phase and the estimated noise levels calculated at the property lines of the nearest sensitive receptors. Equipment for each phase was used as inputs into the FHWA's Roadway Construction Noise Model (RCNM) to predict the combined average noise level. To model worst-case conditions, it was assumed that all equipment per phase would be operating simultaneously. For construction noise, the use of multiple pieces of equipment simultaneously would add together as a collective noise source. While every piece of equipment per phase would likely be scattered throughout the site, the noise-sensitive receptors surrounding the site would be subject to the collective noise source generated by all equipment operating at once. Therefore, to assess construction noise impacts at the receiving property lines of noise-sensitive receptors, the collective worst-case hourly average noise level for each phase was centered at the geometrical center of the site and propagated to the nearest property line of the surrounding land uses. These land uses are shown in Figure IV.D-3 and noise level estimates are shown in Table IV.D-6. These levels do not assume reductions due to intervening buildings or existing barriers.

Ambient noise levels at the nearest noise-sensitive receptors to the south would typically range from 56 to 63 dBA Leq during daytime hours based on FHWA TNM 2.5 model results. Ambient noise levels at commercial land use receptors in the Project site vicinity would typically range from 56 to 67 dBA Leq during daytime hours. Estimated construction noise levels shown in Table IV.D-6 would exceed ambient levels by more than 5 dBA Leq throughout construction, which is expected to last approximately 10 months. The duration of Project construction is not expected to exceed one year, which would represent a ***less-than-significant*** impact. However, the inclusion of standard construction best management practices should be considered in order to reduce construction noise received at nearby receptors to the extent feasible. No additional mitigation measures are required.

Table IV.D-4
Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

Construction Activity	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.

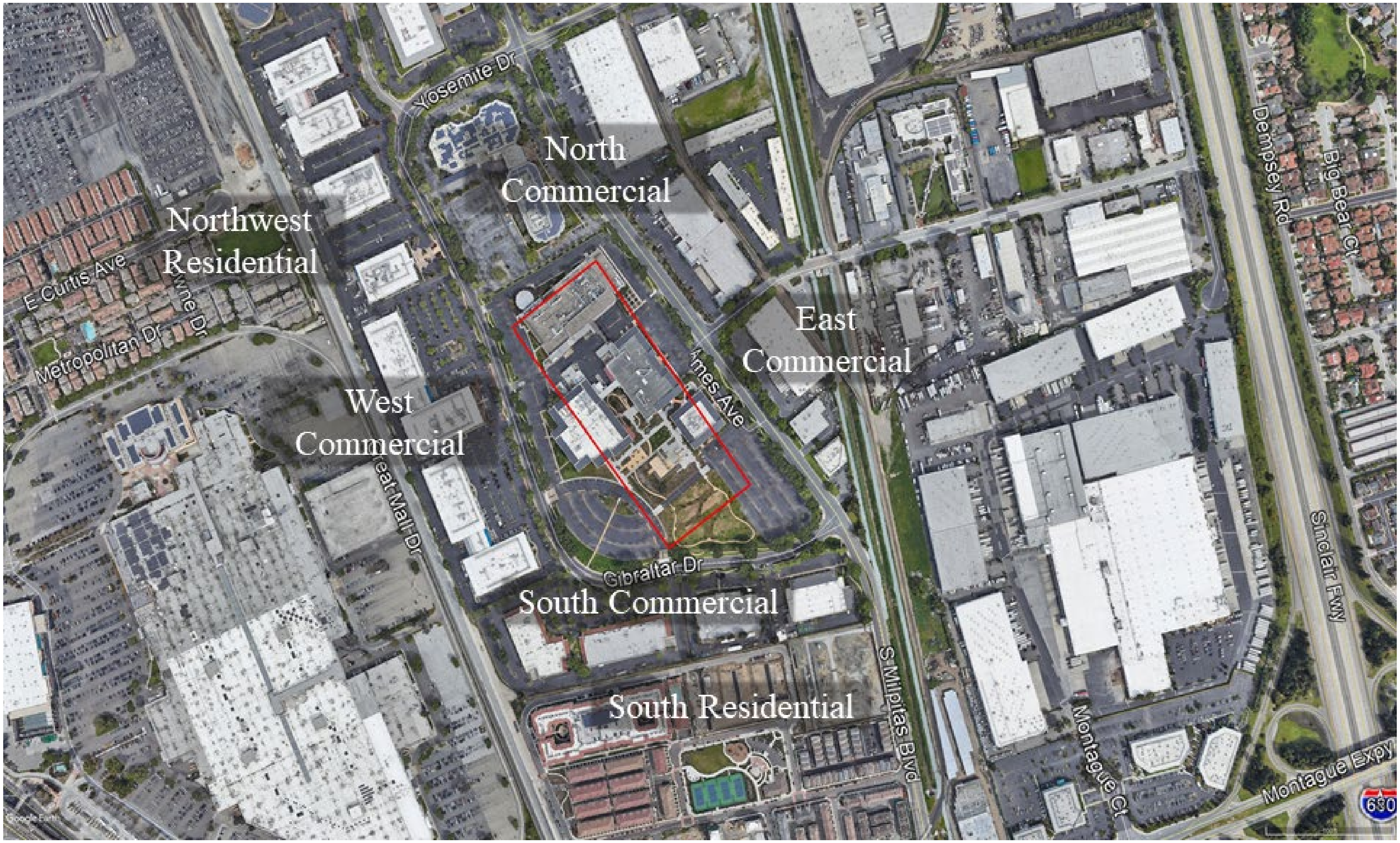


Figure IV.D-3. Project Site in Relation to Noise Sensitive Land Uses

1000 Gibraltar Drive
City of Milpitas, California

Table IV.D-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 IV.D-6
Estimated Construction Noise Levels at Nearby Land Uses

Phase	No. of Work Days	Calculated Hourly Average L_{eq} at Noise-Sensitive Receptors, dBA L_{eq}					
		East Comm. (460 ft)	West Comm. (570 ft)	North Comm. (710 ft)	South Comm. (730 ft)	South Res. (1,100 ft)	NW Res. (1,400 ft)
Demolition	25	70	68	66	66	63	63
Site Preparation	15	68	66	64	64	60	60
Grading & Excavation	14	71	69	67	67	63	63
Trenching & Foundation	50	60	59	57	56	53	53
Building Exterior	41	66	64	62	62	58	58
Building Interior	28	58	57	55	54	51	51
Paving	15	59	57	56	55	52	52

The following best management practices are recommended for consideration to reduce construction noise at receptors to the northwest and south:

Construction Best Management Practices

- Unless the Contractor requests in writing, and receives in advance, written approval from the City's Director of Public Works for a modified construction schedule, the City requires that construction activities be limited to 12-hour shifts between 7:00 a.m. and 7:00 p.m., Monday through Friday and construction shall not take place on weekends or City holidays. Per the City's Noise Ordinance, work shall not be conducted on the following City holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

- Utilize 'quiet' models of air compressors and other stationary noise sources where technology exists.

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

- Locate all stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from residential land uses to the east.

- 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.

- Prohibit all unnecessary idling of internal combustion engines.

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

Impact NOISE-1b: Permanent Noise Level Increase. The proposed Project is not expected to cause a substantial permanent noise level increase at the existing residential land uses in the Project vicinity.

Milpitas General Plan 6-I-7 limits residential DNL exposure increases to no more than 3 dB or more than 65 dB at the property line, whichever is more restrictive. The Project's traffic study included peak hour existing and existing plus Project traffic scenarios. By comparing the traffic volumes of existing plus Project traffic volumes to the existing volumes, a traffic noise increase of up to 3 dBA DNL would occur at the west link of the intersection of Milpitas Boulevard and Ames Avenue. Since this is the entrance to the Project site, and not in the vicinity of existing residential land uses, this is not considered a significant impact. Along every other roadway segment included in the traffic study, a noise level increase of 1 dBA DNL or less was calculated, which does not represent a significant permanent noise level increase. This is a ***less-than-significant*** impact and no mitigation measures are required.

Impact NOISE-1c: Noise Levels in Excess of Standards. The proposed Project is not expected to generate noise levels in excess of standards established in the City's General Plan or Municipal Code at the nearby sensitive receptors.

Code Section V-213-3 and General Plan 6-I-7 limit operational noise in residential areas to 65 dBA DNL at the property line or to an increase of less than 3 dBA DNL, whichever is more restrictive.

Mechanical Equipment

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. However, through discussion with the Project applicant, the Project proposes to include four to five 4-ton rooftop package units for office heating and air conditioning (HVAC). In addition, eight rooftop mounted exhaust fans will be constructed for air changes within the warehouse area.

Based on the size of the rooftop HVAC units, it is assumed that each unit will generate noise levels between 55 to 65 dBA at a distance of 10 feet. Exhaust fans from a similar size Project have been measured up to 68 dBA at a distance of 15 feet. Without knowing the specific locations of mechanical equipment on the rooftop, the worst-case-scenario was assumed, with all HVAC units located near the edge of the rooftop closest to the nearest receptors, and exhaust fans dispersed evenly throughout the rooftop. In this scenario, the property line of the nearest commercial receptors could be as close as approximately 200 feet from proposed HVAC units and/or exhaust fans. At this distance, HVAC units and exhaust fans could generate noise levels up to 44 dBA. The nearest residential receptors would be as close as approximately 575 feet from the edge of the rooftop. At this distance, noise levels from rooftop mechanical equipment would be up to 35 dBA. Considering the ambient noise conditions of the Project site, which would be above 50 dBA Leq during daytime and nighttime hours according to the existing noise environment above, mechanical equipment noise from the industrial buildings is not expected to result in a significant impact at nearby receptors. This is a ***less-than-significant*** impact and no mitigation measures are required.

Truck Deliveries

Truck delivery noise would include both maneuvering activities occurring at the loading docks and truck pass-by activities occurring along driveways to the east and west of the proposed building and along roadways, specifically Gibraltar Drive and South Milpitas Boulevard. 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 Lmax 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 Lmax at a distance of 50 feet.

The traffic study indicates there would be up to 13 peak hour heavy truck trips. Three entrances would be used for truck access to the warehouse: one entrance would be located at the intersection of Ames Avenue and South Milpitas Boulevard, and two entrances would be located along Gibraltar Drive. To estimate the pass-by noise levels for heavy trucks along local roadways based on trip distribution, Federal Highway Administration's Traffic Noise Model (FHWA TNM), version 2.5, was used to model various hourly scenarios for truck traffic along South Milpitas Boulevard and Gibraltar Drive. It was assumed trucks would be traveling at speeds of 35 mph.

Based on the assumptions outlined above, truck trips would increase existing noise levels along Gibraltar Drive and South Milpitas Boulevard by less than 1 dBA under peak hour conditions. Based on ambient noise levels along local roadways, truck deliveries would not measurably increase noise levels in the Project vicinity. This is a ***less-than-significant*** impact and no mitigation measures are required.

Impact NOISE-2: Generation of Excessive Groundborne Vibration due to Construction. Construction-related vibration levels are not anticipated to exceed 0.3 in/sec PPV at the nearest structures.

The City of Milpitas does not specify a construction vibration limit. For structural damage, 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, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.25 in/sec PPV for historic and some old buildings (see Table IV.D-3). The 0.3 in/sec PPV vibration limit would be applicable to buildings in the vicinity of the Project site.

Table IV.D-7 presents typical vibration levels from construction equipment at 80, 105, 130, and 170 feet, which represent distances measured from the Project site's property line to the nearest buildings. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Vibration levels are highest close to the source, and then attenuate with increasing distance at the rate $(D_{ref}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet.

Table IV.D-7
Estimated Construction Noise Levels at Nearby Land Uses

Equipment		PPV at 25 ft. (in/sec)	Vibration Levels at Nearest Buildings (in/sec PPV)			
			North Comm. (80 feet)	East Comm. (105 feet)	West Comm. (130 feet)	South Comm. (170 feet)
Clam shovel drop		0.202	0.056	0.042	0.033	0.025
Hydromill (slurry wall)	In soil	0.008	0.002	0.002	0.001	0.001
	In rock	0.017	0.005	0.004	0.003	0.002
Vibratory Roller		0.210	0.058	0.043	0.034	0.025
Hoe Ram		0.089	0.025	0.018	0.015	0.011
Large bulldozer		0.089	0.025	0.018	0.015	0.011
Caisson drilling		0.089	0.025	0.018	0.015	0.011
Loaded trucks		0.076	0.021	0.016	0.012	0.009
Jackhammer		0.035	0.010	0.007	0.006	0.004
Small bulldozer		0.003	0.001	0.001	0.000	0.000

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., October 2020.

Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity of construction activities. However, as indicated in Table IV.D-7, none of these construction activities would be anticipated to exceed 0.3 in/sec PPV at the nearest structures. Vibration levels may be perceptible to occupants but would not be anticipated to cause cosmetic or structural damage to the nearest buildings and would not be considered excessive. As construction moves away from the shared property lines, vibration levels would be even lower. This is a ***less-than-significant*** impact and no mitigation measures are required.

Impact NOISE-3: Excessive Aircraft Noise. The Project site is located approximately 4 miles from the nearest airport, and the proposed Project would not expose people working at the site to excessive aircraft noise.

Norman Y. Mineta San José International Airport is a public-use airport located approximately four miles southwest of the Project site. Figure IV.D-4 shows that the Project site lies well outside the 2037 60 dBA CNEL noise contour of the airport, according to the City's new Airport Master Plan Environmental Impact Report.[4] This means that future exterior noise levels due to aircraft would not exceed 60 dBA CNEL/DNL. Therefore, the proposed Project would be compatible with the City's exterior noise standards for aircraft noise. This is a ***less-than-significant*** impact and no mitigation measures are required.

CUMULATIVE IMPACTS

A significant impact would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA DNL or greater for future levels; 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 DNL or more attributable solely to the proposed Project.

Cumulative traffic noise level increases were calculated by comparing the cumulative no project traffic volumes and the cumulative plus project volumes to existing traffic volumes. A traffic noise increase of 3 dBA DNL or more was calculated along several roadways, however, since the same increase was calculated for both cumulative scenarios (no project and plus project), the project's contribution along these roadway segments would be less than 1 dBA DNL, which would not be considered a "cumulatively considerable" contribution. The project would not cause a significant cumulative noise increase at noise-sensitive uses in the project vicinity. This is a less-than-significant impact and no mitigation measures are required.

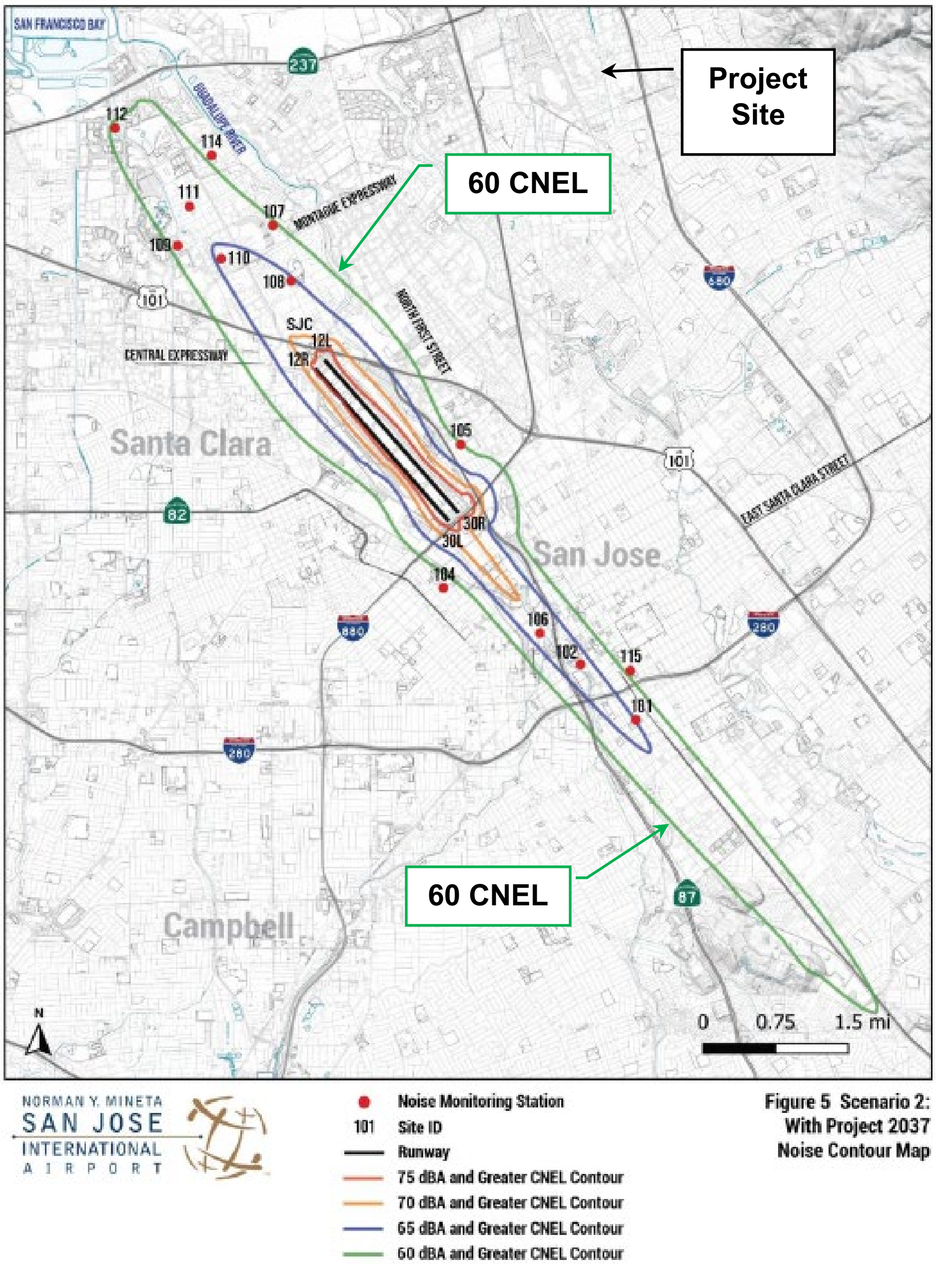
LEVEL OF SIGNIFICANCE AFTER MITIGATION

All impacts related to noise and vibration were determined to be less than significant; therefore, no mitigation measures are required.

[4] *David J. Powers & Associates, Inc., Integrated Final Environmental Impact Report, Amendment to Norman Y. Mineta San Jose International Airport Master Plan, April 2020.*

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

SAN JOSE INTERNATIONAL AIRPORT | Environmental Impact Report FINAL | October 2019



Source: BridgeNet International 2019

Figure IV.D-4. 2037 CNEL Noise Contours for San Jose International Airport Relative to Project Site

1000 Gibraltar Drive
City of Milpitas, California

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