4300 STEVENS CREEK BOULEVARD NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The project proposes a mixed-use development at 4300 Stevens Creek Boulevard in San José, California. The project site includes parcels on both sides of Lopina Way, north of Albany Drive and south of Stevens Creek Boulevard, between the Stevens Creek Mazda and Stevens Creek Volkswagen dealerships. The project would demolish the existing approximately 163,000 square feet (s.f.) of office/commercial buildings and construct two seven-story residential buildings (Building C and Building D), a six-story office building (Building A), and a six-story parking garage (Building B). In addition, the project proposes to vacate the existing Lopina Way and relocate it to the eastern property line. The existing Lopina Way would be replaced with a landscaped promenade. The residential buildings would have a combined total of 582 residential units and would be located on the west side of the project site. Approximately 10,000 square feet of ground floor retail would be located within Building C with a retail courtyard along Stevens Creek Boulevard. Pool decks, terrace spaces, and amenity spaces are being proposed on the third floors of residential Buildings C and D. Both buildings would have two levels of above-grade and one level of below-grade residential parking. On the east side of the site, an approximately 300,000 square foot office building without outdoor courtyards and terraces on the second and fifth floors, and a six-story, above-grade parking garage is proposed.

This report evaluates the project's potential to result in significant environmental noise or 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, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency section discusses land use compatibility utilizing noise and vibration-related policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts to a less than significant level.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (*frequency*) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is 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* (*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 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 DNL with open windows and 65-70 dBA DNL 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 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 increase 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.

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 vibration levels produce.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much 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.

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 induce structural 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. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. 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.

Damage caused by vibration can be classified as cosmetic or structural. Cosmetic damage includes minor cracking of building elements (exterior pavement, room surfaces, etc.). Structural damage includes threatening the integrity of the building. Damage resulting from construction related vibration is typically classified as cosmetic damage. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. 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.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

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

TABLE 2 Typical Noise Levels in the Environment

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

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

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

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal 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 – Noise

The State of California and the cities of San José and Santa Clara have established regulatory criteria that are applicable in this assessment. The State 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) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

(e) For a project located within 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;

(f) For a project within the vicinity of a private airstrip, if the project would expose people residing or working in the project area to excessive noise levels.

Pursuant to recent court decisions, the impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration identified in Checklist Questions (a) is not included in the Impacts and Mitigation Section of this report. This item is discussed in a separate section addressing the consistency of the project with applicable General Plan policies. Checklist items (a) through (d) are applicable in the assessment of potential impacts resulting from the proposed project at off-site receptors. Checklist items (e) and (f) are not applicable to this project because the project is not located within an airport land use plan, is not within two miles of an airport, and is not in the vicinity of a private air strip.

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the DNL noise level resulting from the project at noise sensitive land uses of 3 dBA or greater would be considered a significant impact when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dBA DNL or greater would be considered a significant impact when projected noise levels would remain within those considered acceptable for the affected land use.

2016 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

2016 California Green Building Standards Code (Cal Green Code). The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2016 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). 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 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 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 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.

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 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 San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 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 San José. The following policies are applicable to the proposed project:

EC-1.1 Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state, and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

- The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

- The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1). The acceptable exterior noise level objective is established for the City, except in the environs of the San José International Airport and the Downtown, as described below:

    - For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding by buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation techniques to achieve the 60 dBA DNL standard for noise from sources other than aircraft and elevated roadway segments.

Table EC-1: Land Use Compatibility Guidelines for Community Noise in San José

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 55 60 65 70 75 80
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]	
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	
3. Schools, Libraries, Museums, Meeting Halls, Churches	
4. Office Buildings, Business Commercial, and Professional Offices	
5. Sports Arena, Outdoor Spectator Sports	
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters	

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

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:

- Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable:

- New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

EC-1.2 Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable;" or
- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

EC-1.3 Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land uses.

EC-1.6 Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

EC-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

- Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

City of San José Municipal Code. The City's Municipal Code contains a Zoning Ordinance that limits noise levels at adjacent properties. Chapter 20.30.700 states that sound pressure levels generated by any use or combination of uses on a property shall not exceed 55 dBA at any property line shared with land zoned for residential use, except upon issuance and in compliance with a Conditional Use Permit. Chapter 20.40.600 states the sound pressure level generated by any use or combination of uses shall not exceed 60 dBA at any property line shared with land zoned for commercial/industrial uses, except upon issuance and in compliance with a Conditional Use Permit. The City Code does not define the acoustical time descriptor associated with the above noise level limits. A reasonable interpretation of the City Code would identify the ambient base noise level criteria as an average or median noise level (L_{eq}/L_{50}).

Chapter 20.100.450 of the Municipal Code establishes allowable hours of construction within 500 feet of a residential unit between 7:00 am and 7:00 pm Monday through Friday unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence.

Chapter 20.40.500 of the Municipal Code prohibits outdoor activity, including loading, sweeping, landscaping or maintenance, which occurs within 150 feet of any residentially zoned property, between the hours of 12:00 a.m. midnight and 6:00 a.m.

City of Santa Clara General Plan. The City of Santa Clara's General Plan establishes policies to control noise within the community. Applicable goals and policies presented in the General Plan are as follows:

5.10.6-G1 Noise sources restricted to minimize impacts in the community.

5.10.6-G2 Sensitive uses protected from noise intrusion.

5.10.6-G3 Land use, development and design approvals that take noise levels into consideration.

5.10.6-P1 Review all land use and development proposals for consistency with the General Plan compatibility standards and acceptable noise exposure levels defined on Table 5.10-1.

5.10.6-P2 Incorporate noise attenuation measures for all projects that have noise exposure levels greater than General Plan "normally acceptable" levels, as defined on Table 5.10-1.

5.10.6-P3 New development should include noise control techniques to reduce noise to acceptable levels, including site layout (setbacks, separation and shielding), building treatments (mechanical ventilation system, sound-rated windows, solid core doors and baffling) and structural measures (earthen berms and sound walls).

5.10.6-P4 Encourage the control of noise at the source through site design, building design, landscaping, hours of operation and other techniques.

5.10.6-P5 Require noise-generating uses near residential neighborhoods to include solid walls and heavy landscaping along common property lines, and to place compressors and mechanical equipment in sound-proof enclosures.

City of Santa Clara Code. The City Code establishes noise and vibration level performance standards for fixed sources. Section 9.10.40 of the City Code limits noise levels at residences to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA at night (10:00 p.m. to 7:00 a.m.), noise levels at commercial uses to 65 dBA during daytime hours and 60 dBA during nighttime hours, and noise levels at light industrial uses to 70 dBA at any time. The noise limits are not applicable to emergency work, licensed outdoor events, City-owned electric, water, and sewer utility system facilities, construction activities occurring within allowable hours, permitted fireworks displays, or permitted heliports. The City Code does not define the acoustical time descriptor such as L_{eq} (the average noise level) or L_{max} (the maximum instantaneous noise level) that is associated with the above limits. A reasonable interpretation of the City Code would identify the ambient base noise level criteria as an average or median noise level (L_{eq}/L_{50}).

Section 9.10.230 of the City Code states construction activities are not permitted within 300 feet of residentially zoned property except within the hours of 7:00 a.m. and 6:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

Regulatory Background – Vibration

The City of San José has established vibration guidelines applicable to this analysis.

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies to achieve the goal of minimizing vibration impacts on people, residences, and business operations in the City of San José. The following policies are applicable to the proposed project:

EC-2.3 Require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

City of Santa Clara Code. Section 9.10.050 of the City Code states "It shall be unlawful for any person to operate or cause, permit, or allow the operation of, any fixed source of vibration of disturbing, excessive, or offensive vibration on property owned, leased, occupied, or otherwise controlled by such person, such that the vibration originating from such source is above the vibration perception threshold of an individual at the closest property line point to the vibration source on the real property affected by the vibration."

Existing Noise Environment

The project site is located at 4300 Stevens Creek Boulevard in San José, California. The site includes parcels on both sides of Lopina Way, between Stevens Creek Boulevard to the north and Albany Drive to the south. As shown on Figure 1, the project site is surrounded by existing commercial and residential land uses. Commercial auto dealerships adjoin the project site along the western and eastern property lines, and are located to the north across Stevens Creek Boulevard. Residential land uses are located to the south opposite Albany Drive.

A noise monitoring survey was performed to quantify and characterize ambient noise levels at the site and in the project vicinity beginning on Wednesday, May 24, 2017 and concluding on Friday, May 26, 2017. The monitoring survey included four long-term noise measurements (LT-1 through LT-4) and five short-term noise measurements (ST-1 through ST-5). The noise environment at the site and at the nearby land uses results primarily from vehicular traffic along Stevens Creek Boulevard and other local streets, distant traffic on Interstate 280 (I-280), and the operation of equipment at the adjacent auto dealerships. General aviation aircraft also contribute to the noise environment.

Long-term noise measurement LT-1 was made near the midpoint of the eastern site boundary. This location was selected to quantify the noise environment produced by the Oak Tree Mazda auto dealership. During this noise measurement, sounds from the auto dealership's wash station, repair bay, and air compressor were audible. Hourly average noise levels at this location typically ranged from 61 to 66 dBA L_{eq} during the day and from 57 to 62 dBA L_{eq} at night. The day-night average noise level on Thursday, May 25, 2017 was 67 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figure 2.

Long-term noise measurement LT-2 was made near the midpoint of the western site boundary adjacent to Stevens Creek Volkswagen. At this noise measurement location, sounds produced by the auto dealership's wash station, repair bay, and loudspeaker were audible. Hourly average noise levels typically ranged from 59 to 71 dBA L_{eq} during the day and from 50 to 65 dBA L_{eq} at night. The day-night average noise level from Wednesday, May 24, 2017 through Friday, May 26, 2017 was 69 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figure 3.

Long-term noise measurement LT-3 was made behind 4340 Stevens Creek Boulevard, approximately 35 feet north of the Albany Drive centerline. This location was selected to quantify the noise environment along Albany Drive near the closest residential receptors to the project site. Hourly average noise levels at this location typically ranged from 61 to 73 dBA L_{eq} during the day and from 53 to 64 dBA L_{eq} at night. The day-night average noise level on Thursday, May 25, 2017 was 68 dBA DNL. The daily trend in noise levels at LT-3 is shown in Figure 4.

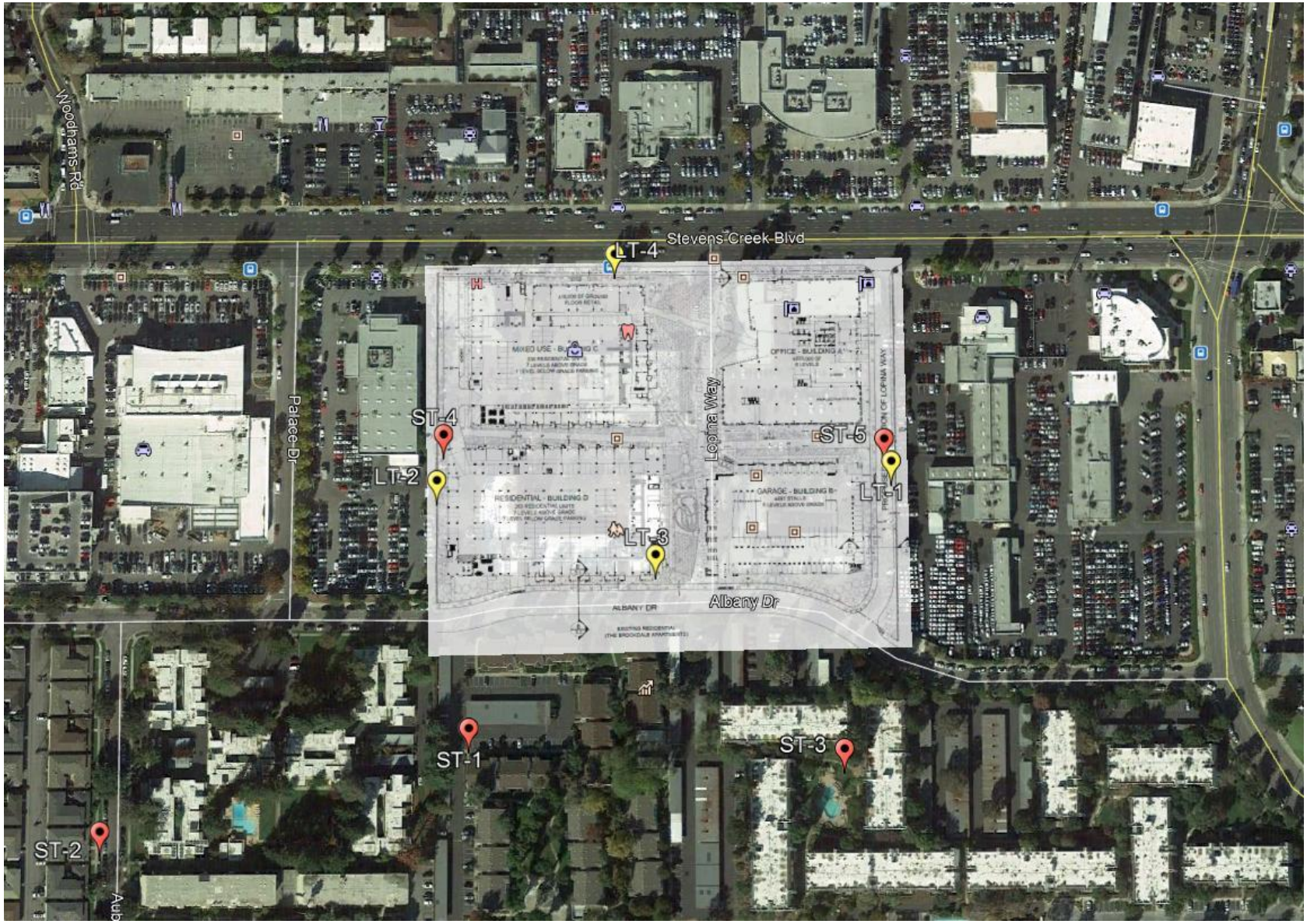
Long-term noise measurement LT-4 was made in front of 4360 Stevens Creek Boulevard, approximately 70 feet south of the Stevens Creek Boulevard centerline, in order to quantify the noise environment produced by vehicle traffic along the roadway. Hourly average noise levels at this location typically ranged from 67 to 76 dBA L_{eq} during the day and from 56 to 65 dBA L_{eq} at night. The day-night average noise level on Thursday, May 25, 2017 was 72 dBA DNL. The daily trend in noise levels at LT-4 is shown in Figure 5.

Short-term noise measurements were made to identify sources of noise and quantify the variation in noise levels in the project vicinity. Table 4 summarizes the results of the short-term noise measurements. During these measurements, the sky was overcast, winds were light at 3-4 mph, and temperatures were in the low 60's °F. Noise from traffic on I-280 was audible at all short-term measurement locations. During some of the short-term measurements, airplanes and equipment produced varying maximum instantaneous noise levels. Airplanes passing overhead produced maximum noise levels ranging from 61 to 67 dBA L_{max}. Various equipment at the auto dealerships produced maximum noise levels ranging from 60 to 81 dBA L_{max}. Air compressors generated noise levels ranging from 60 to 62 dBA L_{max}, PA announcements produced noise levels ranging from 56 to 63 dBA L_{max}, pneumatic wrenches produced noise levels up to 64 dBA L_{max}, and car wash blower-dryer produced noise levels ranging from 75 to 81 dBA L_{max}.

TABLE 4 Summary of Short-Term Noise Measurement Data

Noise Measurement Location	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: Park Kiely Apartments, Building M. 5/26/2017, 11:00 a.m. – 11:10 a.m.	64	61	59	56	55	57
ST-2: In front of 309 Auburn Way. 5/26/2017, 11:20 a.m. – 11:30 a.m.	68	65	62	59	56	60
ST-3: Park Kiely Apartments, Pool Area. 5/26/2017, 11:40 a.m. – 11:50 a.m.	67	62	59	58	56	58
ST-4: Along west boundary of site near LT-2. 5/26/2017, 12:00 p.m. – 12:10 p.m.	82	82	81	62	59	75
ST-5: Along east boundary of site near LT-1. 5/26/2017, 12:20 p.m. – 12:30 p.m.	64	63	59	57	56	57

FIGURE 1 4300 Stevens Creek Boulevard Noise Measurement Locations



Source: Google Earth

FIGURE 2 Daily Trend in Noise Levels at LT-1

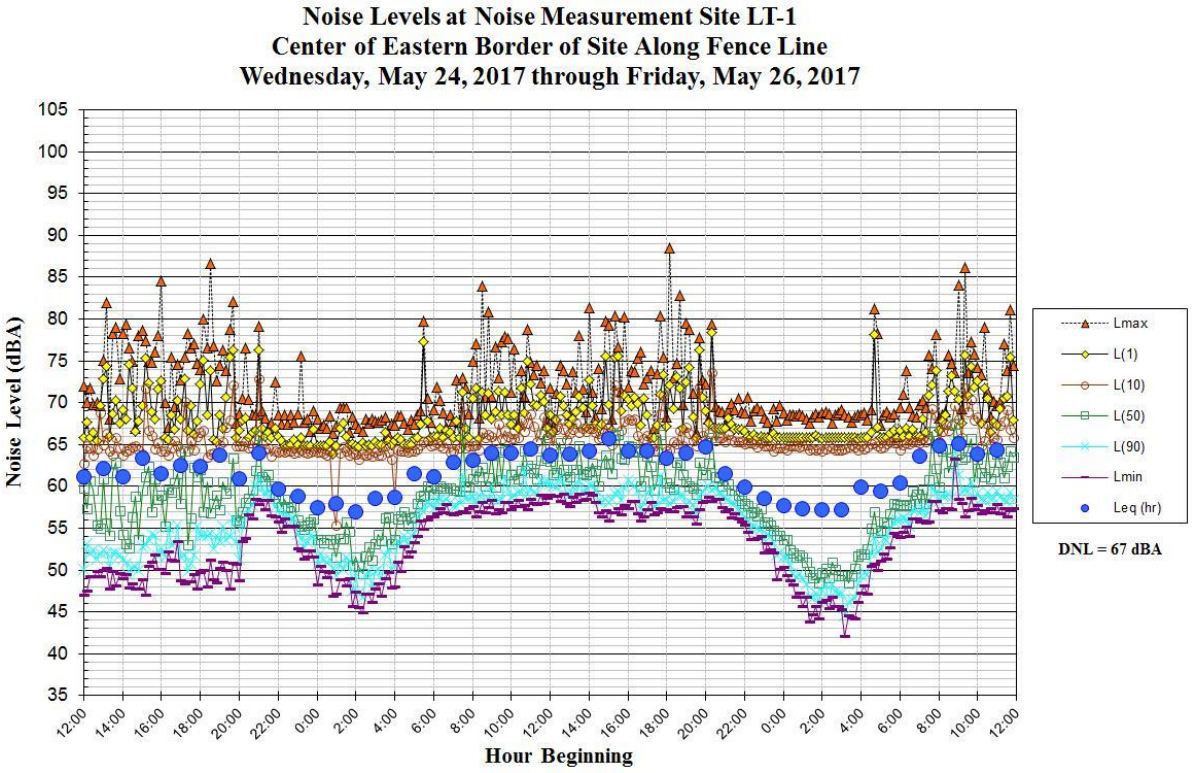


FIGURE 3 Daily Trend in Noise Levels at LT-2

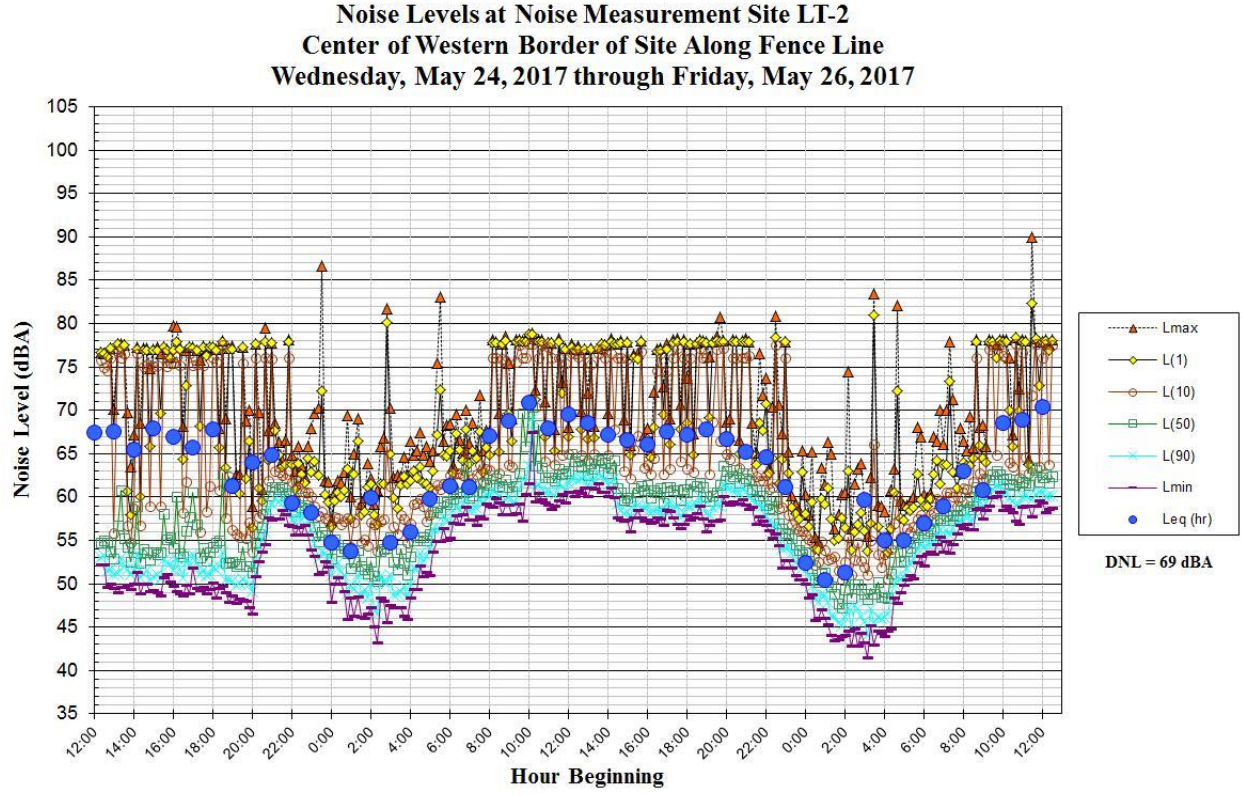


FIGURE 4 Daily Trend in Noise Levels at LT-3

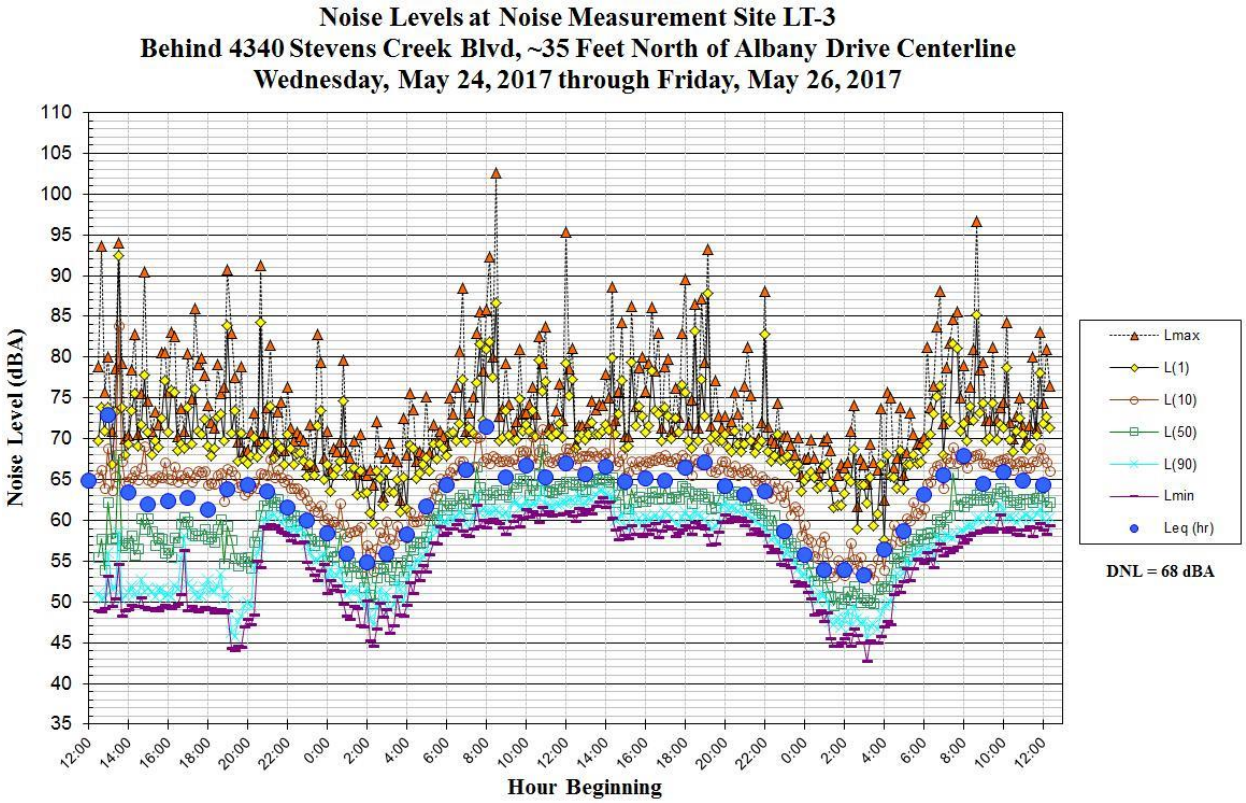
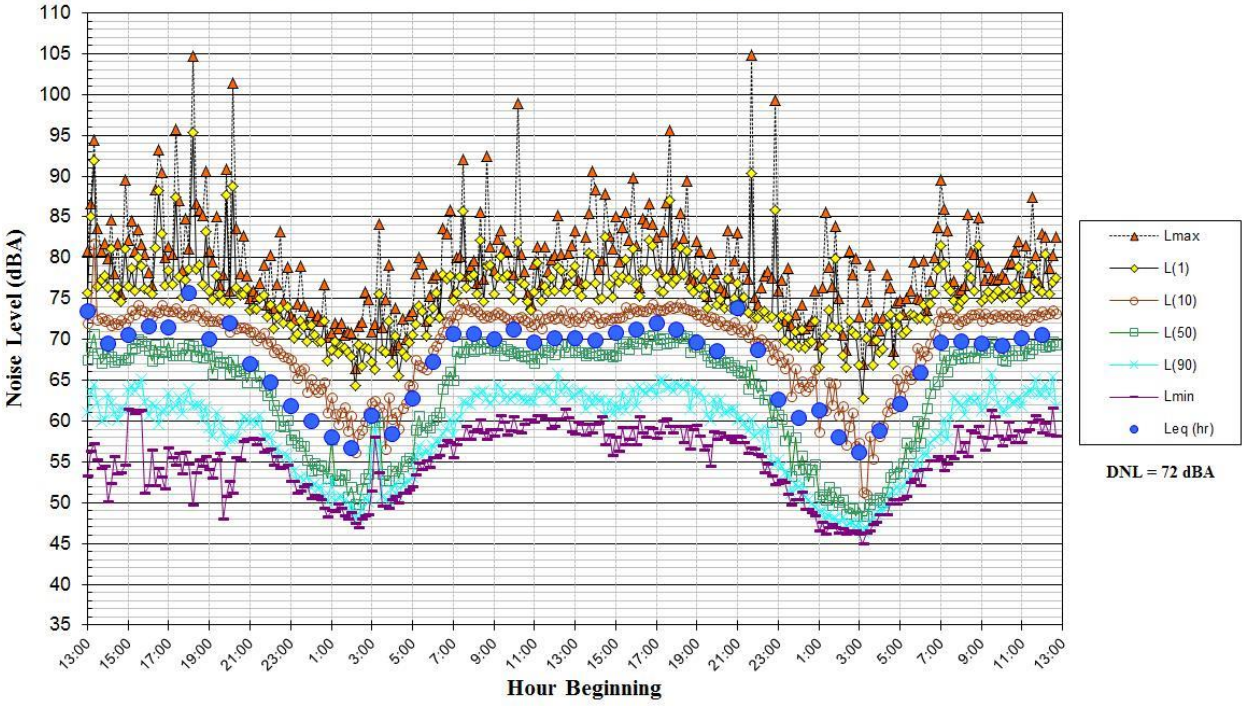


FIGURE 5 Daily Trend in Noise Levels at LT-4



PLAN CONSISTENCY ANALYSIS – NOISE AND LAND USE COMPATIBILITY

Noise and Land Use Compatibility Thresholds

The Environmental Leadership Chapter in the Envision San José 2040 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 San José. The applicable 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 is 60 dBA DNL or less for the proposed residential uses, 65 dBA DNL or less for the proposed neighborhood parks or playgrounds, and 70 dBA DNL for the proposed commercial and office uses (Table EC-1).

- The City's standard for interior noise levels in residences is 45 dBA DNL.

- The California Green Building Code limits interior noise levels within new non-residential land uses to an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

Future Exterior Noise Environment

The primary roadways affecting the noise environment at the project site are currently, and would remain, Stevens Creek Boulevard and Albany Drive. The traffic study prepared *Hexagon Transportation Consultants, Inc.*[1] for the proposed project included traffic data that were used to calculate the future noise levels expected along roadways. Increased traffic volumes resulting from the project and from cumulative development in the project vicinity was calculated to increase existing noise levels by up to 1 dBA DNL along Stevens Creek Boulevard and Albany Drive. Noise from the auto dealerships is expected to remain similar to existing conditions. Therefore, the future noise levels at the project site would be approximately 67 dBA DNL along the eastern site boundary (LT-1), approximately 69 dBA DNL along the western site boundary (LT-2), approximately 69 dBA DNL along Albany Drive (LT-3), and approximately 73 dBA DNL along Stevens Creek Boulevard (LT-4).

Noise levels are anticipated to be 1 to 2 dBA higher at second through fourth floor exposures than at ground level due to less ground absorption. Above the fourth floor, noise levels would be similar to the ground floor as the noise levels would decrease with the additional distance from the ground level noise sources.

<u>Residential Land Uses</u>
Common outdoor use areas proposed by the project would include pool decks and terraces on the third floors of Buildings C and D. Typically, the exterior noise standards established by the City are evaluated at the center of each space.

[1] Hexagon Transportation Consultants, Inc., "4300 Stevens Creek Boulevard Mixed-Use Development Draft Traffic Impact Analysis," January 12, 2018.

The third-floor common outdoor use area of Building C would be located in the center and southern portions of the building, and would be shielded from transportation and mechanical related noise sources by both Buildings C and D. These buildings would provide at least 10 dBA of acoustical shielding at receptors within these common outdoor use areas, and along with the setbacks from the nearest roadways and neighboring mechanical equipment, the height of the outdoor areas relative to the adjacent roadways and mechanical equipment, and the shielding from solid parapet barriers that are assumed to be along the edge of the southern outdoor area, the future exterior noise levels at these outdoor areas would be less than the 60 dBA DNL threshold.

The third-floor common outdoor use areas of Building D would be located in the eastern and western portions of the building, and would be partially shielded from transportation and mechanical related noise sources. The proposed residential buildings would provide at least 10 dBA of acoustical shielding at receptors within these common outdoor use areas. When considering the setbacks of these areas from the nearest roadways and neighboring mechanical equipment, the height of the outdoor areas relative to the adjacent roadways and mechanical equipment, and the shielding from solid parapet barriers that are assumed to be along the edge of the two southern outdoor areas, the future exterior noise levels would be less than the 60 dBA DNL threshold. Receptors near the edge of the outdoor use areas closest to Albany Drive would also experience future exterior noise levels less than the 60 dBA DNL threshold when considering the distance and shielding from Albany Drive traffic.

Exterior noise levels at the acoustically shielded residential outdoor use areas would not exceed the City's 60 dBA DNL exterior noise standard and would be considered compatible with the proposed land use.

Neighborhood Parks and Playgrounds

Two common outdoor use areas are proposed on the ground floor between the project residential buildings. These outdoor use areas are not exclusive to the project's occupants, and because they are open to the public, they are considered to be neighborhood park and playground. The northernmost park is proposed between Buildings A and C along Stevens Creek Boulevard and the southernmost park is proposed between Buildings B and D along Albany Drive.

The center of the northernmost proposed park would be approximately 200 feet south of the Stevens Creek Boulevard centerline. Proposed Buildings A and C would provide partial shielding from transportation noise along Stevens Creek Boulevard resulting in future exterior noise levels less than 65 dBA DNL. While noise levels at the northern edge of the park would exceed the 65 dBA DNL normally acceptable threshold, noise levels would fall within the conditionally acceptable range for neighborhood parks and playgrounds. Noise mitigation measures, such as noise barriers, would be unreasonable because they would block access from Stevens Creek Boulevard. The conditionally acceptable noise level experienced at the north end of the park would be adequate recognizing that the noise levels in the remaining portion of the park would be considered normally acceptable for the proposed use.

The center of the southernmost park would be approximately 120 feet north of the Albany Drive centerline and proposed Buildings B and D would partially shield receptors from transportation

noise along Albany Drive. Future exterior noise levels at the center of the park would be less than the 65 dBA DNL. As noted above, noise levels at the southern edge of the park would exceed the 65 dBA DNL normally acceptable threshold, but noise levels would fall within the conditionally acceptable range for neighborhood parks and playgrounds. The conditionally acceptable noise level experienced at the south end of the park would be adequate recognizing that the noise levels in the remaining portion of the park would be considered normally acceptable for the proposed use and that noise barriers would be unreasonable.

Exterior noise levels at the centers of the proposed parks outdoor use areas would not exceed 65 dBA DNL and would be considered compatible with the proposed land use.

Commercial and Office Land Uses

Outdoor use areas for the proposed project's commercial and office uses include courtyards on the second and fifth floors of the west side of Buildings A, a terrace on the fifth floor of the east side of Building A, and a retail courtyard on the ground floor of the north side of Building C along Stevens Creek Boulevard.

The center of Building A's second floor outdoor courtyard would be approximately 140 feet south of the Stevens Creek Boulevard centerline and the center of the fifth floor outdoor courtyard would be approximately 260 feet south of the Stevens Creek Boulevard centerline. Building A would provide partial shielding to these courtyards from Stevens Creek Boulevard and mechanical equipment noise from the adjacent auto dealership, resulting in future exterior noise levels less than 70 dBA DNL.

The fifth-floor terrace of Building A would be approximately 250 feet south of the Stevens Creek Boulevard centerline and 150 feet west of the mechanical equipment located at the adjacent auto dealership. Buildings A would provide partial shielding to the terrace from transportation noise along Stevens Creek Boulevard resulting in future exterior noise levels less than 70 dBA DNL.

The retail courtyard on the north side of Building C would be approximately 70 feet south of the Stevens Creek Boulevard centerline and would have future exterior noise levels greater than the 70 dBA DNL normally acceptable threshold. However, noise levels would fall within the conditionally acceptable range for commercial and office land uses. Noise mitigation measures, such as noise barriers, would be unreasonable because they would block access from Stevens Creek Boulevard to the outdoor retail courtyard. The conditionally acceptable noise level would be adequate at the retail courtyard recognizing that the noise levels in the center of the adjacent park would be considered normally acceptable for the proposed use.

Exterior noise levels at the acoustically shielded office outdoor use areas in Building A would not exceed the City's 70 dBA DNL exterior noise standard and would be considered compatible with the proposed land use. Although the commercial outdoor use area in Building C would be above the City's normally acceptable exterior noise threshold, it would fall within the conditionally acceptable range and would be considered compatible with the proposed land use.

Future Interior Noise Environment

Residential Land Uses

The City of San José requires that interior noise levels be maintained at 45 dBA DNL or less for residences. Residential Buildings C and D are proposed on the western portion of the project site, with one building fronting on Stevens Creek Boulevard and the other on Albany Drive. Residential units are proposed on floors three through seven of both buildings.

Interior noise levels would vary depending upon the design of the buildings (relative window area to wall area) and the selected construction materials and methods. 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 DNL, 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 DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound-rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

The future noise level at the residential building façade (floors three through seven) facing Stevens Creek Boulevard is projected to reach 75 dBA DNL. The future noise level at the residential building façade (floors three through seven) facing Albany Drive is projected to reach 71 dBA DNL. The future noise level at the residential building façade (floors three through seven) facing the mechanical noise from the auto dealership to the west is projected to be up to 71 dBA DNL. For the proposed project, the interior noise levels with standard construction and windows closed would range from 51 to 55 dBA DNL, which exceeds the City's threshold for interior noise.

Commercial and Office Land Uses

The State of California requires interior noise levels to be maintained at 50 dBA $L_{eq(1\text{-}hr)}$ or less during hours of operation at the proposed project's commercial and office uses. The proposed commercial use would be located on the ground floor of Building C, along the northern façade, and would be exposed to future exterior noise levels ranging from 67 to 76 dBA $L_{eq(1\text{-}hr)}$ during daytime hours. The proposed office use would be located on floors one through six of Buildings A and would be exposed to future exterior noise levels ranging from 61 to 76 dBA $L_{eq(1\text{-}hr)}$ during daytime hours. Standard commercial and office construction provides at least 30 dBA of outdoor to indoor noise reduction if the building includes adequate forced-air mechanical ventilation systems so that the windows and doors may remain closed to control noise. Assuming standard commercial and office construction methods with the windows and doors closed, interior noise levels are calculated to range from 37 to 46 dBA $L_{eq(1\text{-}hr)}$ during daytime hours at the commercial use and 31 to 46 dBA $L_{eq(1\text{-}hr)}$ during daytime hours, which would be below the Cal Green Code standard of 50 dBA $L_{eq(1\text{-}hr)}$.

Measures to Consider to Ensure General Plan Consistency

For consistency with the General Plan the following Condition of Approval is recommended for consideration by the City:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, so that windows can be kept closed to control noise.

- Provide sound rated windows to maintain interior noise levels at acceptable levels. Preliminary calculations show that sound-rated windows with minimum STC[2] Ratings of 31 would be satisfactory for units facing roadways to achieve acceptable interior noise levels. The specific determination of what noise insulation treatments are necessary shall be conducted during final design of the project.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the design phase pursuant to requirements set forth in the State Building Code. The study will also establish appropriate criteria for noise levels inside the commercial and office spaces affected by environmental noise. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce residential interior noise levels to 45 dBA DNL or lower and reduce levels to the established criteria for the business and commercial uses; and, address and adequately control the noise from adjacent rooftop equipment. Treatments would include, but are not limited to, sound-rated windows and doors, sound-rated wall and window constructions, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

[2] **Sound Transmission Class (STC)** A single figure rating designed to give an estimate of the sound insulation properties of a partition. Numerically, STC represents the number of decibels of speech sound reduction from one side of the partition to the other. The STC is intended for use when speech and office noise constitute the principal noise problem.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Paraphrasing from Appendix G of the CEQA Guidelines, a project would normally result in significant noise impacts if noise levels generated by the project conflict with adopted environmental standards or plans, if the project would generate excessive groundborne vibration levels, or if ambient noise levels at sensitive receivers would be substantially increased over a permanent, temporary, or periodic basis. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- **Noise Levels in Excess of Standards:** 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.

- **Groundborne Vibration from Construction:** A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings. Groundborne vibration levels exceeding 0.08 in/sec PPV would have the potential to result in cosmetic damage to sensitive historic structures.

- **Project-Generated Traffic Noise Increases:** A significant impact would be identified if traffic generated by the project would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

- **Construction Noise:** A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA L_{eq} at the property lines shared with residential land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase at adjacent residential land uses. Hourly average noise levels exceeding 70 dBA L_{eq} at the property lines shared with commercial land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would also constitute a significant temporary noise.

Impact 1: **Noise Levels in Excess of Standards.** The proposed project could generate noise levels in excess of standards established in the City's General Plan and Municipal Code at the nearby sensitive receptors. **This is a potentially significant impact.**

Mechanical Equipment Noise

Mixed-use, multi-family residential buildings and commercial office buildings typically require various mechanical equipment to meet the ventilation needs of the buildings. Building plans

indicate mechanical and electrical rooms would be located on multiple floors on the interior of the proposed building, as well as a mechanical courtyard surrounded by mechanical screening on the roof on the office Building A and mechanical units on the rooftops of the residential Buildings C and D.

Typical air conditioning units and heat pumps for multi-level residential buildings range from about 70 to 75 dBA L_{eq} at a distance of 3 feet. Rooftop mechanical equipment noise levels for commercial office buildings typically range from 80 to 85 dBA L_{eq} at a distance of 3 feet. The nearest noise-sensitive uses to the project site include the multi-family residences to the south of the project site opposite Albany Drive. At a distance of approximately 100 feet from the closest proposed rooftop mechanical equipment to the noise-sensitive uses property line, unmitigated mechanical equipment noise would range from 40 to 45 dBA L_{eq}, which would be below the San José's Municipal Codes limits of 55 dBA L_{eq}.

The commercial receptors potentially affected by the mechanical noise of the project site include the adjacent auto dealerships to the west and east of the project site and the commercial uses to the north opposite Stevens Creek Boulevard. At a distance of approximately 55 feet to the west, 110 feet to the east, and 160 to 200 feet to the north from the closest proposed rooftop mechanical equipment to the commercial uses' property line, unmitigated mechanical equipment noise would range from 45 to 50 dBA L_{eq} the west, 49 to 54 dBA L_{eq} the east, and 35 to 49 dBA L_{eq} the north. Mechanical noise at the auto dealerships to the west and east would be below the San José's Municipal Codes limits of 60 dBA L_{eq}. Mechanical noise at the commercial uses to the north opposite Stevens Creek Boulevard would be below the Santa Clara's Municipal Codes 65 dBA L_{eq} daytime threshold and 60 dBA L_{eq} nighttime threshold.

At the time of this analysis, the specific mechanical equipment had not been selected, nor were specific details such as manufacturer's noise data for such equipment available. Design planning should consider the noise criteria associated with such equipment and utilize site planning to locate equipment in less noise-sensitive areas. Other controls could include, but are not limited to fan silencers, enclosures, and screen walls. Due to the number of variables inherent in the mechanical equipment needs of the project (number and types of units, size, housing, specs, etc.), the impacts of mechanical equipment noise on nearby receptors should be assessed during the final project design stage, and are potentially significant.

Truck Loading and Unloading

Truck deliveries for the Building A office use and Building C ground-level retail use would generate noise. The site plan indicates a ground floor loading zone in Building A along the relocated Lopina Way and next to the Building C retail along Stevens Creek Boulevard. Additionally, the retail and residential trash areas would be located on the ground level within Buildings A, C, and D. While delivery and trash pickup times and the frequency of these events were not provided at the time of this study, it is assumed that these events would occur during daytime hours, at most 2 to 3 times a week. Typical noise levels generated by loading and unloading of truck deliveries would be similar to noise levels generated by truck movements on existing local roadways and by similar activities at surrounding uses. These infrequent deliveries are not anticipated to substantially increase ambient noise levels at the nearby noise-sensitive land

uses. Truck deliveries occurring at the proposed project site are not expected to generate levels exceeding 55 dBA L_{eq} or existing ambient conditions at the nearby residences. This would be a less-than-significant impact.

Parking Structure Noise

Intermittent noise from the parking structure must meet the noise thresholds established in the City's Municipal Code. According to the project plans, residential parking would be provided on-site within parking garages in both Building C and Building D. Both buildings would have two levels of above-grade parking and one level of below-grade parking. Building C would have approximately 330 parking spaces for residences and 50 parking spaces for retail. Building D would have approximately 368 parking spaces for residences. Building B would be a six-story, above-grade parking garage with approximately 897 parking spaces.

Surrounding land uses are currently exposed to parking lot noise and these types of noises will continue with the proposed project. The existing parking lots are at the ground level and can be accessed by the public at all times. Existing ambient average noise levels along Albany Drive range from 61 to 67 dBA L_{eq}, which exceeds San José's 55 dBA L_{eq} residential threshold. The existing ambient average noise levels at the west dealership range from 65 to 70 dBA L_{eq} and at the east dealership range from 61 to 66 dBA L_{eq}, which exceeds San José's 60 dBA L_{eq} commercial threshold. The existing ambient average noise levels along Stevens Creek Boulevard range from 67 to 76 dBA $L_{eq,}$ which exceeds Santa Clara's 65 dBA L_{eq} daytime commercial threshold. The new parking levels within the parking structures would be shielded by solid walls, and the upper parking levels would be at higher elevations than the existing parking lot. These factors would increase the distance between parking structure noise sources as well as shield receptors from the parking lot noise sources. Parking structure noise levels would be less than the noise levels produced by the existing parking lots, and remain below ambient noise levels which exceed the City's noise thresholds for residential and commercial uses. This is a less-than-significant impact.

Mitigation Measure 1:

The following mitigation measures shall be included in the project to reduce the impact to a less-than-significant level:

- Prior to the issuance of building permits, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's requirements. A qualified acoustical consultant shall be retained by the project applicant to review mechanical noise as the equipment systems are selected in order to determine specific noise reduction measures necessary to reduce noise to comply with the City's 55 dBA L_{eq} noise limit at the shared property line. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and/installation of noise barriers such as enclosures and parapet walls to block the line of sight between the noise source and the nearest receptors.

Impact 2: **Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels would exceed 0.2 in/sec PPV at residential land uses to the east. **This is potentially significant impact.**

The construction of the project would generate vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include the demolition of existing structures, site preparation work, excavation of the below-grade parking levels, foundation work, paving, and new building framing and finishing. This analysis assumes the proposed project would not require pile driving, which can cause excessive vibration.

According to Policy EC-2.3 of the City of San José General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.2 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction. With no known historical buildings near the project site, a significant impact would occur if nearby buildings were exposed to vibration levels in excess of 0.2 in/sec PPV.

Table 5 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

The nearest sensitive receptors would be the residences located approximately 80 feet south of the project construction area opposite Albany Drive. At this distance, vibration levels due to construction activities would be up to 0.06 in/sec PPV, which would be below the 0.2 in/sec PPV threshold. The nearest commercial building would be the adjacent auto dealership located approximately 25 feet west of the project construction area. At this distance, vibration levels due to construction activities would be up to 0.21 in/sec PPV, which would slightly exceed the 0.2 in/sec PPV threshold. Other commercial buildings near the project construction area include the other adjacent auto dealership located approximately 60 feet east and the auto dealerships opposite Steven Creek Boulevard approximately 180 feet north. At these distances, vibration levels due to construction activities would be up to 0.08 in/sec PPV, which would be below the 0.2 in/sec PPV threshold. Although construction vibration levels would be below the threshold for most of the nearby commercial buildings and sensitive receptors, construction vibration levels would be above the threshold at the nearest commercial building to the west. This is a potentially significant impact.

TABLE 5 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)
Pile Driver (Impact)	upper range	1.158
	typical	0.644
Pile Driver (Sonic)	upper range	0.734
	typical	0.170
Clam shovel drop		0.202
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller		0.210
Hoe Ram		0.089
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

Mitigation Measures 2:

The following measures are recommended to reduce vibration impacts from construction activities:

- Prohibit the use of heavy vibration-generating construction equipment, such as vibratory rollers or excavation using clam shell or chisel drops, within 30 feet of any adjacent building.

- Designate a person responsible for registering and investigating claims of excessive vibration. The contact information of such person shall be clearly posted on the construction site.

- The above vibration plan shall be submitted to the Supervising Planner at PBCE prior to issuance of a grading plan.

The implementation of these mitigation measures would reduce the impact to a less-than-significant level.

Impact 3: **Substantial Permanent Noise Increase due to Project-Generated Traffic.** Project-generated traffic would not cause a permanent noise level increase at existing noise-sensitive land uses in the project vicinity. **This is a less-than-significant impact.**

A significant noise impact would occur if traffic generated by the project would substantially increase noise levels at sensitive receptors in the project vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less

than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater. Lopina Way would be relocated from center of site to the east side of site, adjacent to a non-noise sensitive auto dealership. Traffic noise from this road would not impact the dealership. Noise-sensitive land uses along Albany Drive are exposed to noise levels greater than 60 dBA DNL; therefore, a significant impact would occur if project-generated traffic would permanently increase noise levels by 3 dBA DNL. For reference, traffic volumes would have to double for noise levels to increase by 3 dBA DNL.

The traffic report provided peak hour volumes for the project-generated traffic at local and major roadways in the immediate project vicinity. Traffic volume information was reviewed to calculate the permanent noise increase attributable to project-generated traffic. Traffic volumes under the Existing Plus Project scenario were compared to the Existing scenario to calculate the relative increase in the hourly average traffic noise level (L_{eq}) attributable to the proposed project. The change in the DNL would be the same as the change in the peak hour L_{eq}. The permanent noise level increase due to this project-generated traffic would be approximately 1 dBA DNL or less at noise-sensitive receptors in project vicinity. Therefore, the proposed project would not cause a substantial permanent noise level increase at the nearby noise-sensitive receptors. This is a less-than-significant impact.

Mitigation Measures 3: None required.

Impact 4: Substantial Temporary Noise Increase due to Construction. Existing noise-sensitive and commercial land uses would be exposed to construction noise levels in excess of the significance thresholds for a period of more than one year. **This is a potentially significant 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. Project construction is anticipated to occur over an approximate period of 25 months.

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and none on weekends when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

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 a 25 dBA exterior-to-interior reduction for standard commercial construction, 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 exceeded 60 dBA L_{eq} at nearby residences or exceeded 70 dBA L_{eq} at nearby commercial land uses and exceeded the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year.

The noise-sensitive receptors (residences) to the south of the project site would have existing daytime ambient noise levels similar to the noise levels recorded at LT-3. Based on these data, the average hourly noise level during construction hours would range from 61 to 73 dBA L_{eq}. The commercial receptors to the east, west, and north of the project site would have existing daytime ambient noise levels similar to the data collected at LT-1, LT-2, and LT-4, respectively. Average hourly noise levels during construction hours range from 61 to 66 dBA L_{eq} at commercial receptors to the east, from 59 to 71 dBA L_{eq} at commercial receptors to the west, and from 67 to 76 dBA L_{eq} at commercial receptors to the north, respectively.

Construction activities generate considerable amounts of noise, especially during earth-moving activities and during the construction of the building's foundation when heavy equipment is used. Typical hourly average construction-generated noise levels for mixed-used project are about 71 to 89 dBA L_{eq} measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.), as shown in Table 6. The typical range of maximum instantaneous noise levels would be 70 to 90 dBA L_{max} at a distance of 50 feet, as shown in Table 7.

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.

TABLE 7 Construction Equipment 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)1,2	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
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.

Source: Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances, National Cooperative Highway Research Program, 1999.

The proposed project is expected to take over two years to complete. Construction activities would include demolition of existing structures, site preparation, substantial excavating to create the below-grade parking garage and to lay foundations, trenching, building construction and finishing, and paving. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. The hauling of excavated materials and construction materials would generate truck trips on local roadways as well.

A list of equipment expected to be used for the proposed project construction period and phasing information for the project was available at the time of this study. The calculated construction equipment noise data were used to estimate the range of construction noise levels expected at the nearby existing land uses. The estimates were calculated by measuring from the nearby receptors to the center of the closest proposed building.

Hourly average noise levels due to construction activities during busy construction periods outdoors would range from about 75 to 91 dBA L_{eq} at a distance of 50 feet. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. The nearest noise-sensitive receptors are approximately 180 feet from the center of the closest project building. At this distance, hourly average noise levels during busy construction periods would range from 64 to 80 dBA L_{eq} at the residences to the south opposite Albany Drive. Construction noise levels at these noise-sensitive receptors would be expected to exceed 60 dBA L_{eq} and exceed the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive residential uses in the project vicinity for a period exceeding one year. Nearby commercial land uses would be exposed to construction noise levels ranging from 64 to 80 dBA L_{eq} at the adjacent auto dealership 180 feet east of the closest project building, from 63 to 79 dBA L_{eq} at the adjacent auto dealership 200 feet west of the closest project building, and from 61 to 77 dBA L_{eq} at the dealerships 250 feet north of the closest project building opposite Stevens Creek Boulevard. Construction noise levels at commercial land uses would at times exceed 70 dBA L_{eq} and would at times exceed the ambient noise environment by at least 5 dBA L_{eq} for a period exceeding one year.

Construction noise levels from the project site would be expected to exceed thresholds at nearby noise-sensitive and commercial receptors. In addition, assuming project construction would last for a period of more than one year and considering that the project site is within 500 feet of existing residences and within 200 feet of existing commercial uses, Policy EC-1.7 of the City's General Plan would consider this temporary construction impact to be potentially significant.

Mitigation Measures 4:

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 within 500 feet of residential land uses to between the hours of 7:00 a.m. and 7:00 p.m. Monday

through Friday. Construction is prohibited on weekends at sites located within 500 feet of residential units. 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 available controls:

- In accordance with Policy EC-1.7 of the City's General Plan, utilize the best available noise suppression devices and techniques during construction activities.

- 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 receiver and if the barrier is constructed in a manner that eliminates any cracks or gaps.

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

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

- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- 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.

- A temporary noise control blanket barrier could be erected, if necessary, along building facades facing construction sites. This mitigation would only be necessary if conflicts occurred which were irresolvable by proper scheduling. Noise control blanket barriers can be rented and quickly erected.

- 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.

- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities and notify in writing all adjacent business, residences, and other noise-sensitive land uses of the construction schedule. 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.

Implementation of the above measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. With the implementation of these measures, and recognizing that noise generated by construction activities would occur over a short-term period, the temporary increase in ambient noise levels would be less-than-significant.