1020 &1040 TERRA BELLA AVENUE CEQA NOISE ASSESSMENT

Mountain View, California

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INTRODUCTION

This report presents the results of the noise assessment completed for the 1020 and 1040 Terra Bella Avenue projects proposed in Mountain View, California. The project includes a property transfer between the project site owners, Alta Housing and Public Storage, to develop an updated personal storage facility and affordable, multi-family housing development. The personal storage facility development by Public Storage would be located behind the affordable housing development by Alta Housing and adjacent to the freeway, with the storage facility development creating a buffer between the freeway and the future residents. The project would ultimately require the demolition of all existing structures on-site.

This report evaluates the project's potential to result in significant noise and vibration impacts, with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and vibration, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the Plan Consistency Section discusses noise and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

SETTING

Fundamentals of Environmental Noise

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

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

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which

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

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

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA 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 the percentage of the population highly annoyed by about 3 percent. 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 or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

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

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

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

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

TABLE 1 Definition of Acoustical Terms Used in this Report

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

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

TABLE 2 Typical Noise Levels in the Environment

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

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

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

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

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

Regulatory Background - Noise

The State of California, Santa Clara County, and the City of Mountain View have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, California Building Code, Santa Clara County Land Airport Land Use Commission Comprehensive Land Use Plan, the City of Mountain View General Plan, and Mountain View City Code are used to assess the potential significance of impacts. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines.

CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels; or

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

Pursuant to recent court decisions, the impacts of site constraints, such as exposure of the proposed project to excessive levels of noise and vibration, are not included in the Impacts and Mitigation Section of this report. These items are discussed in a separate section addressing the project's consistency with the policies set forth in the City's General Plan.

2019 California Building Code, Title 24, Part 2.
The current version of the California Building Code (CBC) requires interior noise levels 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.

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan.
The Comprehensive Land Use Plan adopted by the Santa Clara County Airport Land Use Commission contains standards for projects within the vicinity of Moffett Federal Airfield, which are relevant to this project:

4.3.2 Noise Compatibility Policies

Policy N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (2022 Aircraft Noise Contours).

Policy N-4 No residential or transient lodging construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL and there are no outdoor patios or outdoor activity areas associated with the residential portion of a mixed use residential project or a multi-unit residential project. (Sound wall noise mitigation measures are not effective in reducing noise generated by aircraft flying overhead.)

City of Mountain View 2030 General Plan.
Chapter 7 of the City of Mountain View's 2030 General Plan provides noise contours for the year 2030, which is shown in Figure 7.3, and establishes the following goals and policies that would be applicable to the proposed project:

Goal NOI-1: Noise levels that support a high quality of life in Mountain View.

POLICY NOI 1.1: Land use compatibility. Use the Outdoor Noise Acceptability Guidelines as a guide for planning and development decisions (Table 7.1).

POLICY NOI 1.2: Noise-sensitive land uses. Require new development of noise-sensitive land uses to incorporate measures into the project design to reduce interior and exterior noise levels to the following acceptable levels:

- New multi-family residential developments shall maintain a standard of 65 dBA DNL for private and community outdoor recreation use areas. Noise standards do not apply to private decks and balconies in multi-family residential developments.

- Interior noise levels shall not exceed 45 dBA DNL in all new single-family and multi-family residential units.

- Where new single-family and multi-family residential units would be exposed to intermittent noise from major transportation sources, such as train or airport operations, new construction shall achieve an interior noise level of 65 dBA (L_{max}) through measures such as site design or special construction materials. This standard shall apply to areas exposed to four or more major transportation noise events, such as passing trains or aircraft flyovers per day.

POLICY NOI 1.3: Exceeding acceptable noise thresholds. If noise levels in the area of a proposed project would exceed normally acceptable thresholds, the City shall require a detailed analysis of proposed noise reduction requirements to determine whether the proposed use is compatible. As needed, noise insulation features shall be included in the design of such projects to reduce exterior noise levels to meet acceptable thresholds, or for uses with no active outdoor use areas, to ensure acceptable interior noise levels.

> Note: Table 7.1 from the General Plan (Chart 2) provides general guidance, and establishes acceptable noise thresholds, for siting new land uses given future noise exposure levels. Policies NOI 1.1 and NOI 1.2 contain specific standards for noise levels in residential developments.

POLICY NOI 1.4: Site planning. Use site planning and project design strategies to achieve the noise level standards in NOI 1.1 (Land use compatibility) and in NOI 1.2 (Noise-sensitive land uses). The use of noise barriers shall be considered after all practical design-related noise measures have been integrated into the project design.

POLICY NOI 1.5: Reduce the noise impacts from major arterials and freeways.

POLICY NOI 1.6: Sensitive uses. Minimize noise impacts on noise-sensitive land uses, such as residential uses, schools, hospitals, and child-care facilities.

POLICY NOI 1.7: Stationary sources. Restrict noise levels from stationary sources through enforcement of the Noise Ordinance.

POLICY NOI 1.8: Moffett Federal Airfield. Support efforts to minimize noise impacts from Moffett Federal Airfield in coordination with Santa Clara County's Comprehensive Land Use Plan.

Table 7.1 Outdoor Noise Environment Guidelines

Land Use Category	Community Noise Exposure in Decibels (CNEL) Day/Night Average Noise Level in Decibels (Ldn)						
	55	60	65	70	75	80	85
Residential–Single-Family, Duplex, Mobile Homes							
Residential–Multi-Family Transient Lodging–Motels, Hotels							
Schools, Libraries, Churches, Hospitals, Nursing Homes							
Auditoriums, Concert Halls, Amphitheaters, Sports Arenas, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							
Golf Courses, Riding Stables, Water Recreation, Cemeteries							
Office Buildings, Business Commercial and Professional							
Industrial, Manufacturing, Utilities, Agriculture							

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.

NORMALLY UNACCEPTABLE
New construction or development should 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 clearly should not be undertaken.

Source: State of California General Plan Guidelines, 2003.

Mountain View City Code.
The City's Code provides provisions for construction hours and allowable noise levels for stationary equipment. The portions of the Code that are relevant for this project are as follows:

Section 8.70.1 Construction noise.

a. **Hours of construction**. No construction activity shall commence prior to 7:00 a.m. nor continue later than 6:00 p.m., Monday through Friday, nor shall any work be permitted on Saturday or Sunday or holidays unless prior written approval is granted by the building official. The term "construction activity" shall include any physical activity on the construction site or in the staging area, including the delivery of materials. In approving modified hours, the building official may specifically designate and/or limit the activities permitted during the modified hours.

b. **Modification.** At any time before commencement of or during construction activity, the building official may modify the permitted hours of construction upon twenty-four (24) hours written notice to the contractor, applicant, developer or owner. The building official can reduce the hours of construction activity below the 7:00 a.m. to 6:00 p.m. time frame or increase the allowable hours.

c. **Sign required.** If the hours of construction activity are modified, then the general contractor, applicant, developer or owner shall erect a sign at a prominent location on the construction site to advise subcontractors and material suppliers of the working hours. The contractor, owner or applicant shall immediately produce upon request any written order or permit from the building official pursuant to this section upon the request of any member of the public, the police or city staff.

d. **Violation.** Violation of the allowed hours of construction activity, the building official's order, required signage or this section shall be a violation of this code. (Ord. No. 13.10, § 15, 10/26/10)

Section 21.26 Stationary equipment noise.

a. No person shall own or operate on any property any stationary equipment, such as, but not limited to, air compressors, equipment for swimming pools, spas, or air conditioners, which produces a sound level exceeding 55 dBA (50 dBA during the night, 10 p.m. to 7 a.m.) when measured at any location on any receiving residentially used property, said measurement to utilize a sound level meter equal to or better than an ANSI Standard S 1.4-1971 Type 2 noise level meter.

b. Any plans submitted for building, plumbing, electrical or mechanical/heating permit for any stationary equipment shall be accompanied by documentation of the equipment noise level when available and by noise mitigating devices or buffers appropriate to achieve the above noise limit. Initial granting of a permit for such equipment shall not affect the obligation of each person owning or operating such equipment for continued compliance with these noise level requirements.

c. Operation of any equipment, as specified in this section, above the 55 dBA limit (50 dBA nighttime), may occur only if the owner or operator has obtained a conditional use permit. A permit to operate equipment which exceeds the limit may be granted by the zoning administrator only if it has been demonstrated that such operation will not be detrimental to the health, safety, peace, morals, comfort or general welfare of residents subjected to such noise. The manner of obtaining said permit and the rules governing its issuance and revocation shall be as specified in Mountain View City Code Sec. 36.43 and following, all relating to the issuance of conditional use permits. (Ord. No. 11.81, 8/31/81)

Regulatory Background - Vibration

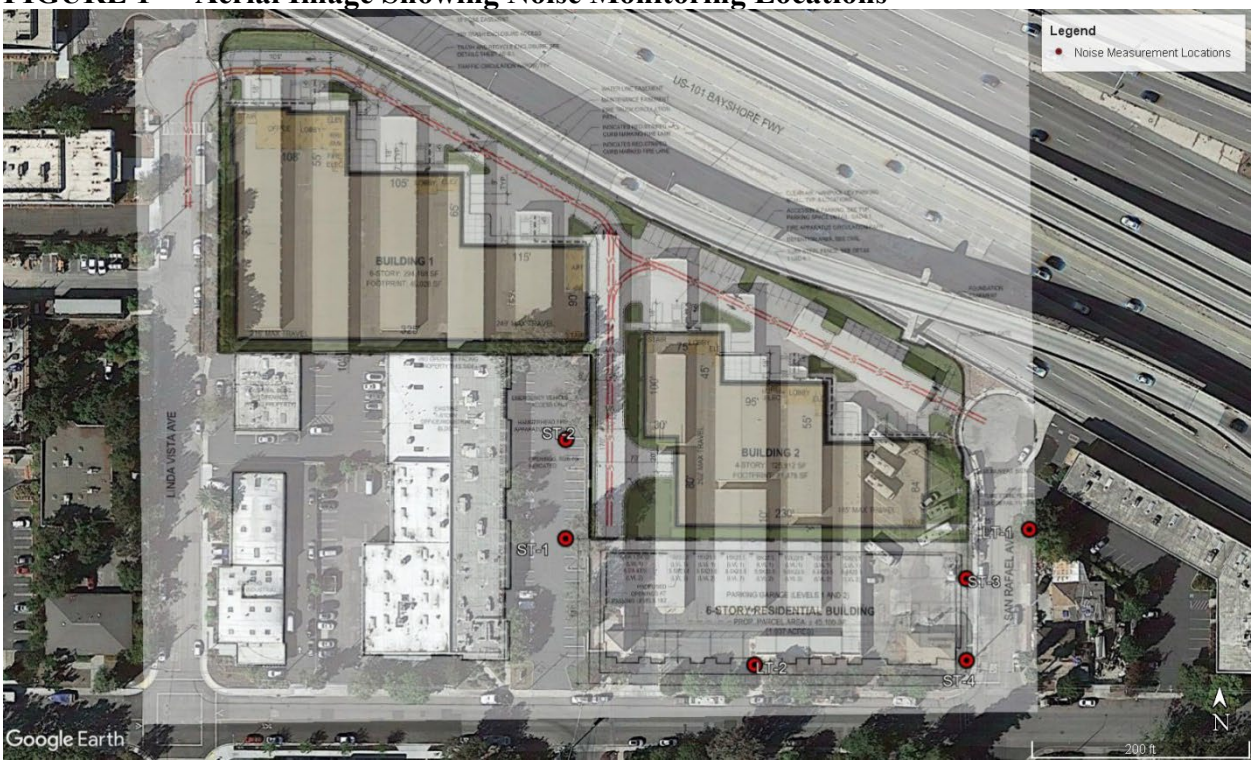
While the State of California and the City of Mountain View do not have specific vibration regulations, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, which typically consist of buildings constructed since the 1990s. A conservative vibration limit of 0.3 in/sec PPV has been used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 3 above for further explanation). For historical buildings or buildings that are documented to be structurally weakened, a conservative limit of 0.08 in/sec PPV is often used to provide the highest level of protection.

Existing Noise Environment

Figure 1 shows the site, adjacent land uses, and transportation noise sources in the project vicinity. The site is bordered by US 101 to the northeast, Linda Vista Avenue to the west, Terra Bella Avenue to the south, and San Rafael Avenue to the east. Industrial buildings surround the site, and a church is to the west. Some of the project site is shielded from traffic noise sources by the existing buildings on site as well as from buildings in the vicinity. Traffic noise from US 101 is the main noise source in the area, with local traffic along Terra Bella Avenue also contributing to the noise environment at the project site. Moffett Federal Airfield is located approximately one mile east of the site, while the Palo Alto Airport is located about three-and-a-half miles northwest of the site. The Norman Y. Mineta San Jose International Airport is approximately seven-and-a-half miles southeast of the site.

A noise monitoring survey was completed by Illingworth & Rodkin, Inc. (I&R) between Tuesday, August 2, 2022, and Thursday, August 4, 2022, to establish existing noise levels at the site. The noise survey consisted of two long-term (LT-1 and LT-2) and four short-term (ST-1 through ST-4) noise measurements. All measurement locations are shown in Figure 1. The noise measurements were conducted with Larson Davis Laboratories (LDL) Model LxT1 Type I Sound Level Meters fitted with ½-inch pre-polarized condenser microphones and windscreens. The meters were calibrated with a Larson Davis precision acoustic calibrator prior to and following the measurement survey. Weather conditions were good for conducting noise measurements during the survey.

FIGURE 1 Aerial Image Showing Noise Monitoring Locations



Source: Google Earth, August 2022.

Long-term noise measurement LT-1 was conducted approximately 280 feet southwest of the centerline of US 101 for the purpose of quantifying typical noise levels at the worst-case noise exposure location at the northeast corner of the proposed residential building. Hourly average noise levels at LT-1 typically ranged from 69 to 72 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 61 to 70 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level was 74 dBA DNL on Wednesday, August 3, 2022.

Long-term noise measurement LT-2 was conducted approximately 505 feet southwest of the centerline of US 101 and 55 feet north of Terra Bella Avenue to document typical noise levels at the southern façade of the proposed residential building along Terra Bella Avenue. Abnormal noise levels due to localized activities near the sound level meter were considered when calculating the average noise levels at this location. Hourly average noise levels at LT-2 typically ranged from 61 to 66 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 54 to 65 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level was 64 dBA DNL on Wednesday, August 3, 2022.

Short-term noise measurement ST-1 was conducted on Tuesday, August 2, 2022, between 11:50 a.m. and 12:00 p.m. at the northwest corner of the proposed residential building. This location was approximately 485 feet from the centerline of US 101. Noise measurements were taken at two elevations simultaneously to note the difference in noise levels due to shielding from existing buildings. ST-1a was measured at a height of 5-feet above the ground and US 101 traffic noise was shielded by the existing buildings to the northeast. ST-1b was measured at a height of 24-feet above the ground and US 101 traffic noise was not shielded by the existing buildings. The 10-

minute L_{eq} measured at ST-1a and ST-1b were 60 dBA and 65 dBA, respectively, so the estimated shielding provided by the buildings is 5 dBA.

Short-term noise measurement ST-2 was conducted on Tuesday, August 2, 2022, between 12:10 p.m. and 12:20 p.m. to document typical noise levels at the center of the north façade of the proposed residential building. This location was approximately 400 feet from the centerline of US 101. Like ST-1, noise measurements were taken at two elevations simultaneously to note the shielding provided by the existing buildings. The 10-minute L_{eq} measured at ST-2a and ST-2b were 63 dBA and 69 dBA, respectively, so the estimated shielding provided by the buildings is 6 dBA.

Short-term noise measurement ST-3 was conducted on Tuesday, August 2, 2022, between 12:30 p.m. and 12:40 p.m. to further quantify typical noise levels at the worst-case noise exposure location at the northeast corner of the proposed residential building. This location was approximately 375 feet from the centerline of US 101. Unshielded US 101 traffic typically produced noise levels ranging from 60 to 72 dBA. The 10-minute L_{eq} measured at ST-3 was 65 dBA.

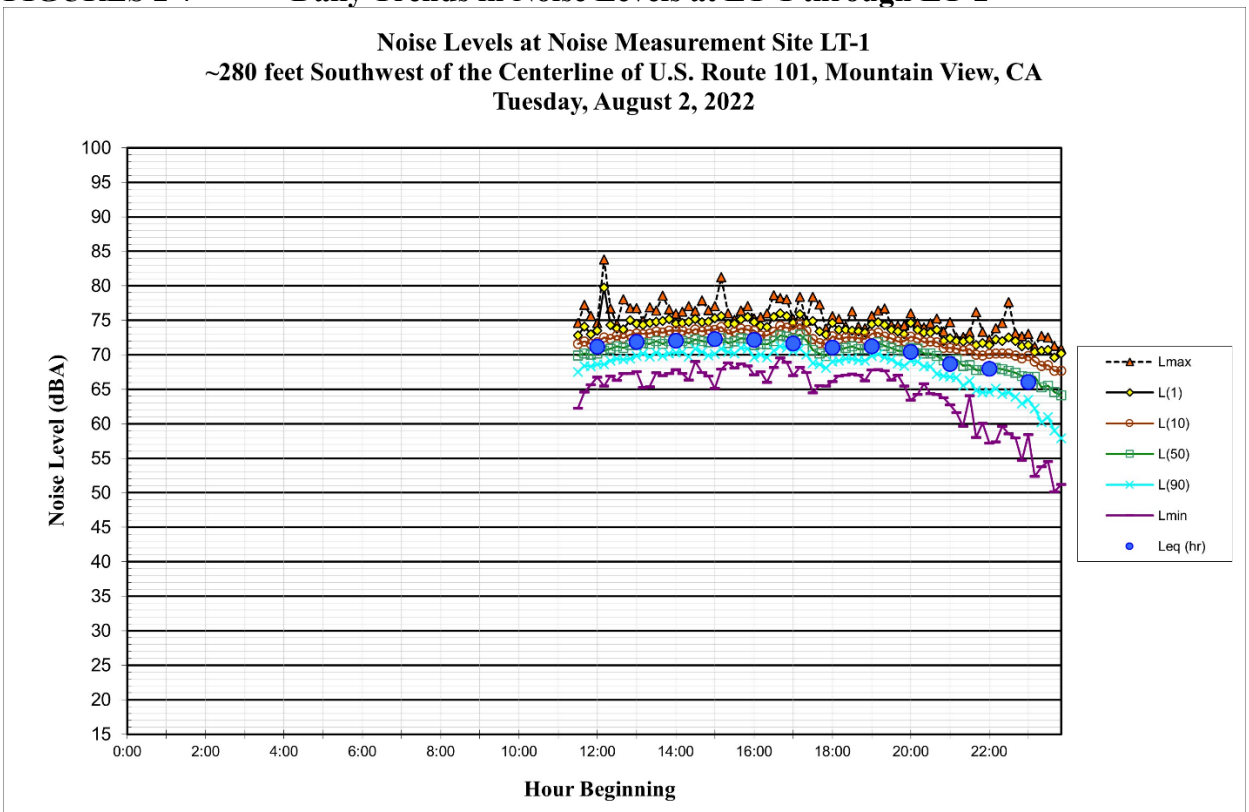
Short-term noise measurement ST-4 was conducted on Tuesday, August 2, 2022, between 12:40 p.m. and 12:50 p.m. at the southeast corner of the proposed residential building. This location was approximately 415 feet from the centerline of US 101. Unshielded US 101 traffic typically produced noise levels ranging from 59 to 69 dBA, and intermittent traffic on Terra Bella Avenue typically produced noise levels ranging from 65 to 72 dBA. The 10-minute L_{eq} measured at ST-4 was 64 dBA. The short-term noise measurement results for ST-1 through ST-4 are summarized below in Table 3.

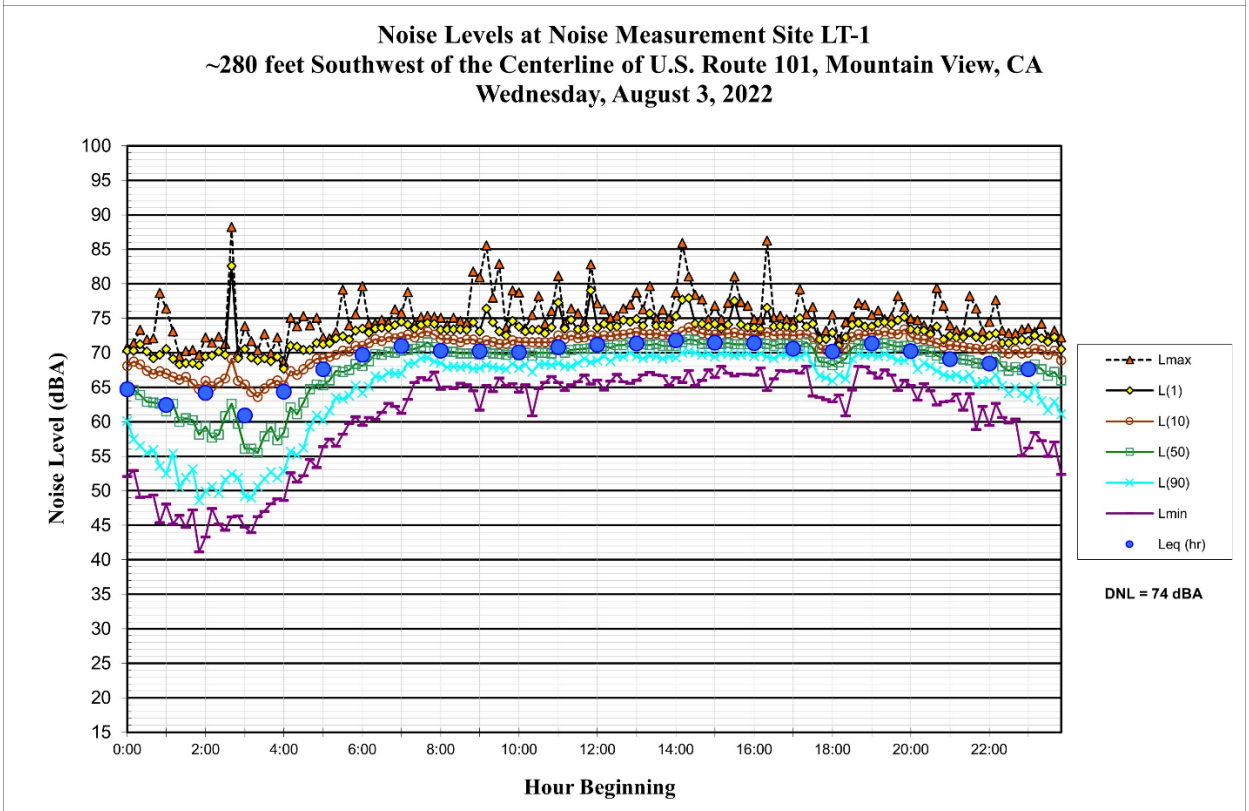
TABLE 3 Summary of Short-Term Noise Measurements (dBA) on August 2, 2022

Noise Measurement Location	Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1a: ~485 feet from the Centerline of US 101, at a height of 5 feet	11:50 a.m. -12:00 p.m.	63	62	61	59	58	60
ST-1b: ~485 feet from the Centerline of US 101, at a height of 24 feet	11:50 a.m. -12:00 p.m.	62	67	66	65	63	65
ST-2a: ~400 feet from the Centerline of US 101, at a height of 5 feet	12:10 p.m. -12:00 p.m.	71	68	65	62	61	63
ST-2b: ~400 feet from the Centerline of US 101, at a height of 24 feet	12:10 p.m. -12:00 p.m.	72	71	70	69	67	69
ST-3: ~375 feet from the Centerline of US 101, at a height of 5 feet	12:30 p.m. -12:40 p.m.	72	68	66	64	63	65
ST-4: ~415 feet from the Centerline of US 101, at a height of 5 feet	12:40 p.m. -12:50 p.m.	72	69	66	63	62	64

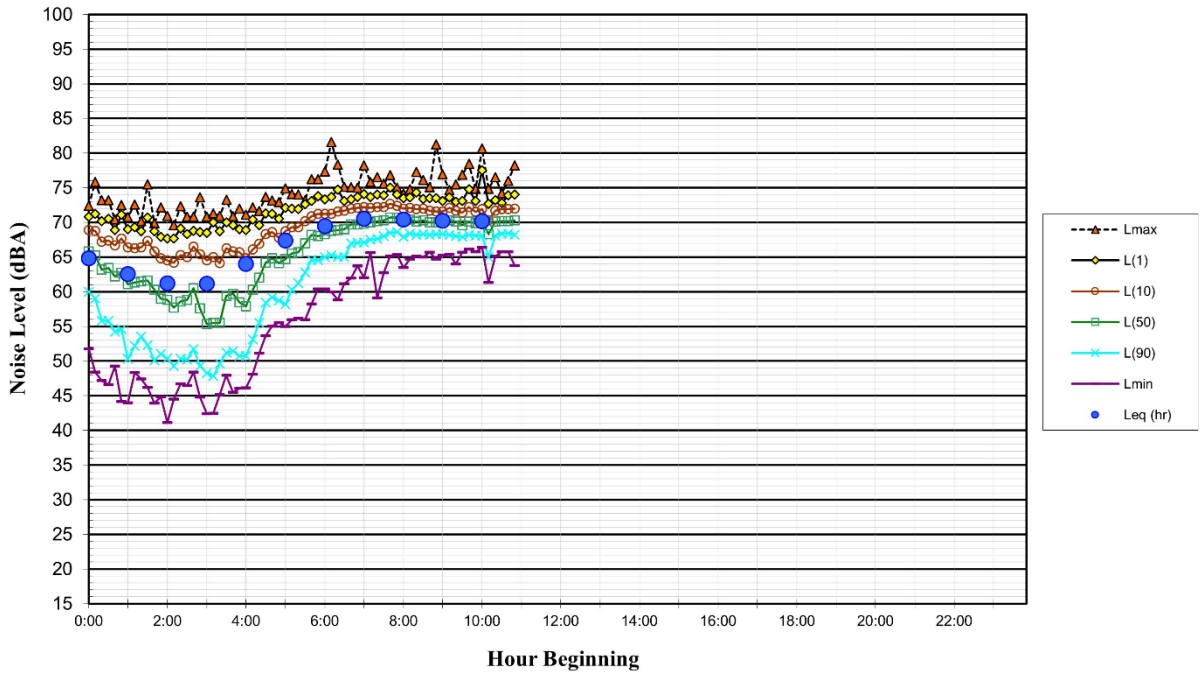
The existing worst-case noise exposure for the residential building is at unshielded north and east facades nearest to US 101, where the DNL is calculated to be 71 dBA. If constructed, the four-story storage facility just to the north would provide between 0 and 14 dBA of additional noise reduction on the north side of the residential building, dependent on residence location. The noise exposure at the south façade of the building is calculated to be 64 dBA DNL, accounting for partial shielding of traffic noise by the building itself. At the west side of the building, the noise exposure is calculated to be 69 dBA DNL. The noise exposure at the center of the proposed courtyard area along Terra Bella Avenue is calculated to be 64 dBA DNL, and the noise exposure at the center of the proposed third-floor courtyard area is calculated to be 50 dBA DNL, accounting for partial shielding by the building itself. The noise exposure at the storage facility manager's apartment is calculated to be 72 dBA DNL, accounting for partial shielding of US 101 traffic noise by an elevated freeway ramp.

FIGURES 2-7 Daily Trends in Noise Levels at LT-1 through LT-2

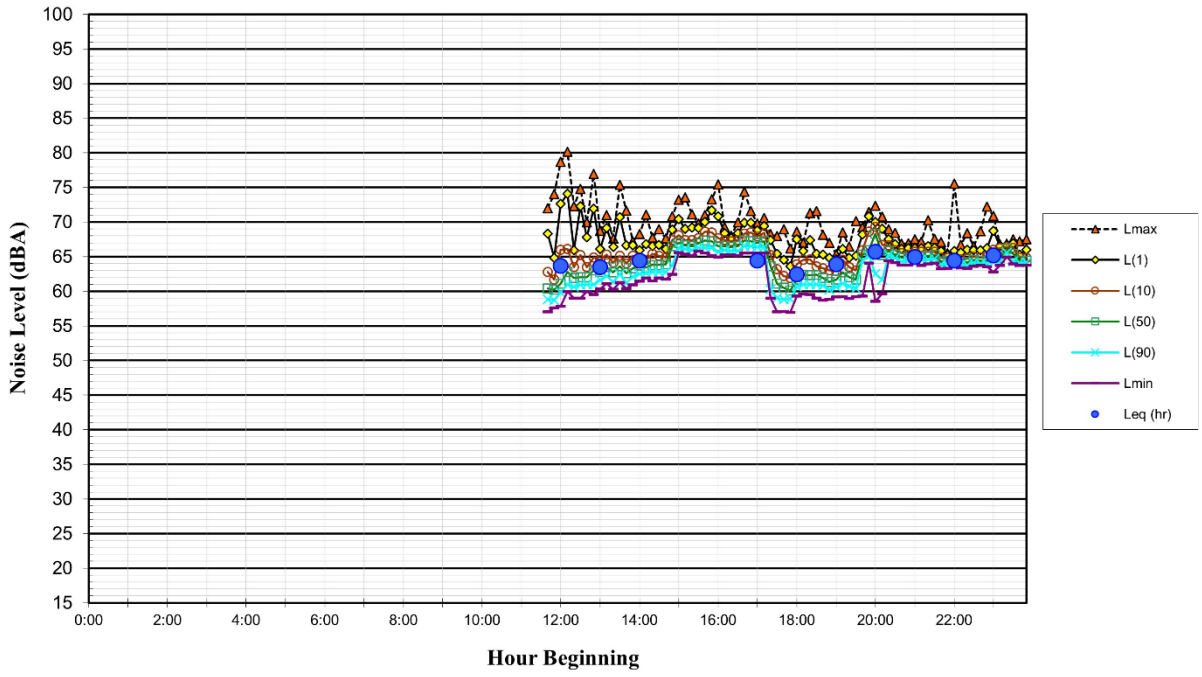




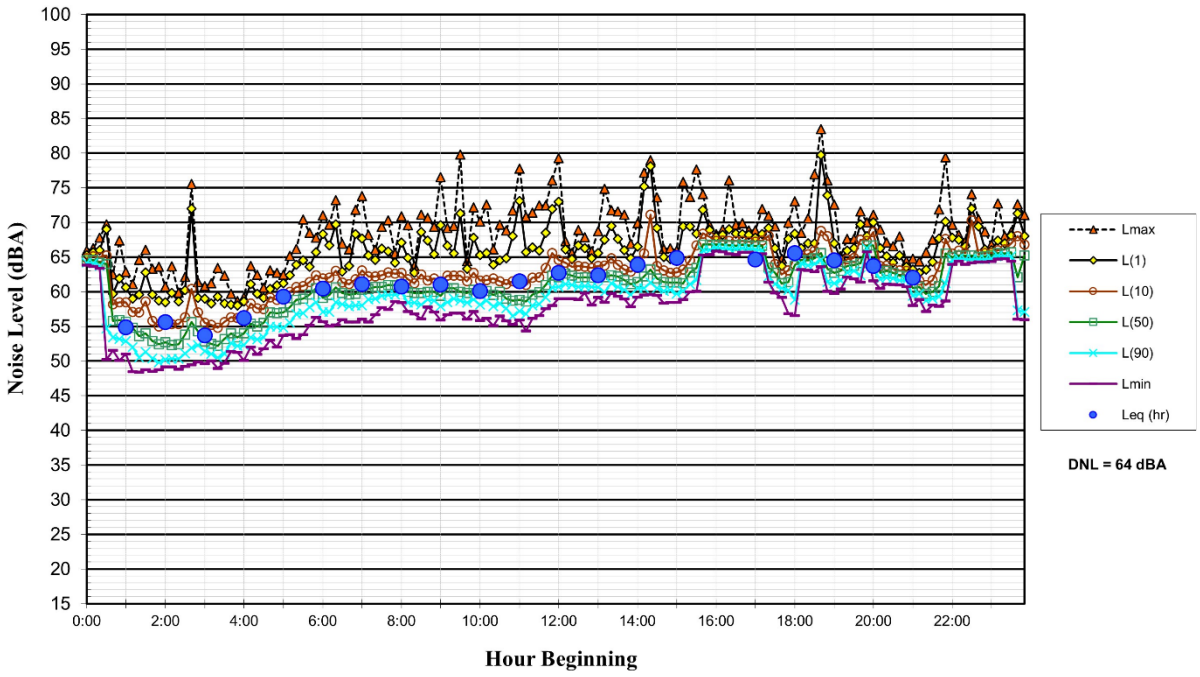
Noise Levels at Noise Measurement Site LT-1
~280 feet Southwest of the Centerline of U.S. Route 101, Mountain View, CA
Thursday, August 4, 2022



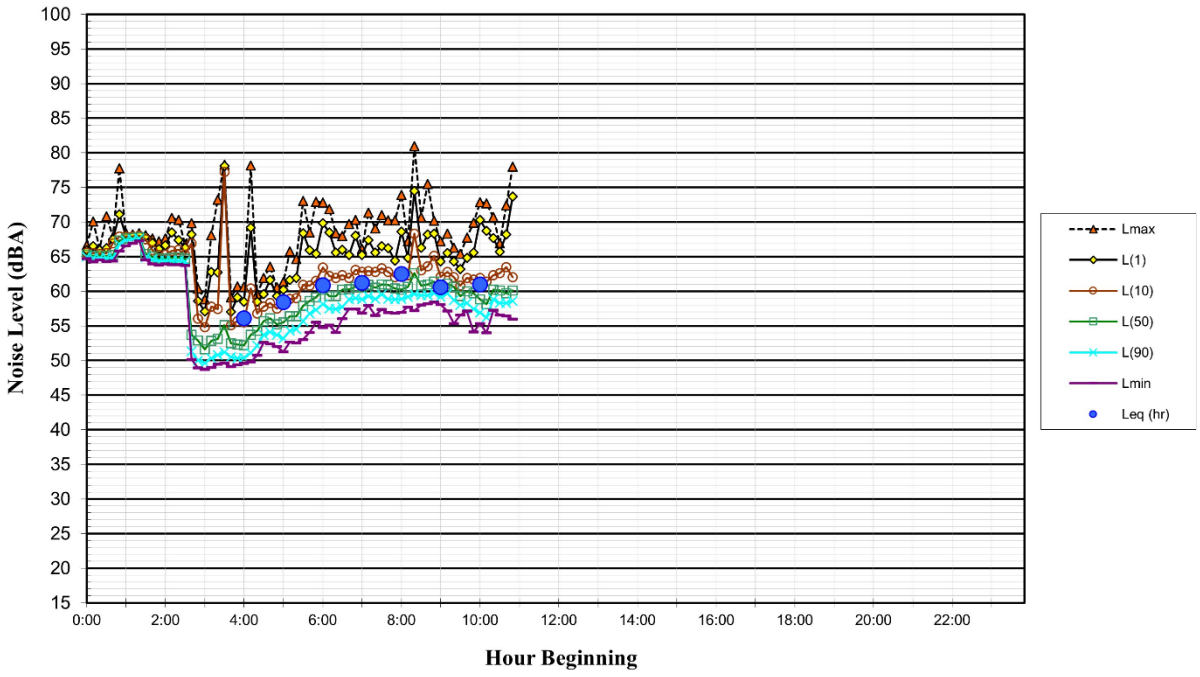
Noise Levels at Noise Measurement Site LT-2
~55 feet North of the Centerline of Terra Bella Avenue, Mountain View, CA
Tuesday, August 2, 2022



Noise Levels at Noise Measurement Site LT-2
~55 feet North of the Centerline of Terra Bella Avenue, Mountain View, CA
Wednesday, August 3, 2022



Noise Levels at Noise Measurement Site LT-2
~55 feet North of the Centerline of Terra Bella Avenue, Mountain View, CA
Thursday, August 4, 2022



GENERAL PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

According to Policy NOI 1.2 of the City's General Plan, new multi-family residential developments shall maintain an exterior noise level of 65 dBA DNL or less. This noise standard would apply to community outdoor recreational areas and not to private decks or balconies. This policy also provides an interior noise level standard of 45 dBA DNL for new multi-family residential units. Nonresidential land uses must meet the performance standard established in the State's Cal Green Code.

Future Exterior Noise Environment

Proposed Residential Land Uses

The future noise environment at the project site would continue to be dominated by vehicular traffic along US 101. Secondary noise sources would include vehicular traffic along Terra Bella Avenue.

The noise exposure 10 years in the future was considered in addition to the existing noise exposure. Under future conditions, US 101 traffic is expected to continue to be the dominant noise source at the project site. A one-percent increase in vehicle traffic each year was assumed in estimating future traffic volumes. Based on future traffic volume estimates, the future noise environment on the project site is expected to increase by up to than 2 dBA DNL throughout the site. The future worst-case noise exposure is calculated to be 72 dBA DNL at the east façade of the proposed residential building nearest US 101. The north façade of the building is to remain at 71 dBA DNL. The plaza area along Terra Bella Avenue and south façade of the building are to remain at 64 dBA DNL, while the third-floor courtyard is to increase from 50 to 51 dBA DNL. The west façade is to increase from 69 to 70 dBA DNL.

Proposed Commercial Land Uses

The worst-case noise exposure for the storage buildings along US 101 is to remain at 75 dBA DNL, with portions of building 1 being shielded by an elevated ramp that reduces noise levels to 72 dBA at some portions of the building. The noise exposure at the storage facility manager's apartment is calculated to remain at 72 dBA DNL. No outdoor-use areas are planned around the storage buildings. The site plan for the proposed project does not show outdoor use areas associated with the commercial component of the project.

Future Interior Noise Environment

Proposed Residential Land Uses

The residential units along the east façade of the proposed residential building nearest to US 101 would be exposed to future worst-case exterior noise levels reaching 72 dBA DNL. Twenty-seven (27) decibels of attenuation would be required to achieve acceptable interior noise levels. Based on the estimated transmission loss of the building partition, proposed construction materials provide 31 to 34 dBA of attenuation indoors. Additional noise insulation, in the form of resilient channels shall be added to the exterior wall system, and STC 30 rated windows are recommended

for the north and east sides of the building to maintain interior noise levels at or below 45 dBA DNL. All other residential building façades would be exposed to noise levels less than at the northeastern corner of the building. STC 26 or higher are recommended for the south and west sides. Interior noise levels in the building will be below the 45 dBA DNL threshold when doors and windows are closed.

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. Therefore, standard construction with the inclusion of adequate forced-air mechanical ventilation will allow residents in all units to control noise to less than 45 dBA DNL by closing windows as desired.

The storage facility includes a manager's apartment at the ground-floor northeast corner of the six-story storage building nearest to US 101, which would be exposed to future worst-case exterior noise levels reaching 72 dBA DNL. Twenty-seven (27) decibels of attenuation would be required to achieve acceptable interior noise levels. Based on the estimated transmission loss of the building partition, proposed construction materials provide 29 dBA of attenuation indoors. Interior noise levels in the unit will be below the 45 dBA DNL threshold when doors and windows are closed. Forced air mechanical ventilation systems are provided so that windows and doors can be kept closed at the occupant's discretion to control noise intrusion indoors. Therefore, the above-mentioned building construction provides the required attenuation such that future interior noise levels would be maintained below 45 dBA DNL, and no additional noise abatement is required.

Proposed Commercial Land Uses

The performance method enforced in the Cal Green Code requires that interior noise levels be maintained at 50 dBA $L_{eq(1\text{-}hr)}$ or less during hours of operation at the proposed commercial buildings. The proposed commercial uses would be located as close as 240-feet from the centerline of US 101. At these distances, the commercial uses would be exposed to future exterior noise levels between 72 and 75 dBA DNL along US 101. The worst-case hourly L_{eq} would be 73 dBA at this location.

Standard construction materials for commercial uses would provide about 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so that windows may be kept closed at the occupant's discretion and would provide an additional 5 dBA reduction. The standard construction materials in combination with forced-air mechanical ventilation would satisfy the daytime threshold of 50 dBA $L_{eq(1\text{-}hr)}$.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise control measures shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA DNL or less in residential units and 50 dBA DNL or less in commercial units:

- Preliminary calculations indicate that all exterior-facing residential and commercial retail units would satisfy the City's interior noise requirements with standard construction and the incorporation of adequate forced-air mechanical ventilation. The incorporation of forced-air mechanical ventilation with standard construction materials would be adequate for all exterior-facing units in the proposed buildings.

The above noise insulation features would adequately reduce interior noise levels in all units to 45 dBA DNL or less, satisfying the interior noise level requirements of Policy NOI 1.2 of the City's General Plan.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

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

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

    - A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Large or complex projects involving substantial noise-generating activities and lasting more than 12 months would be considered significant when within 500 feet of residential land uses or within 200 feet of commercial land uses or offices. After a period of 12 months, a significant temporary noise impact would occur if construction noise levels would exceed 80 dBA L_{eq} at residential land uses near the site or 90 dBA L_{eq} at commercial land uses near the site.

    - A significant permanent noise level increase would occur if project-generated traffic would result in: a) a noise level increase of 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) a noise level increase of 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

    - 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.

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.5 in/sec PPV would have the potential to result in cosmetic damage to modern commercial/industrial structures, and groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal residential buildings.

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

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. This is a potentially **significant** temporary noise impact.

Construction of the entire project is expected to take approximately 30 months and will be split into two main phases. Phase 1 will focus on the residential building at 1020 Terra Bella Avenue and storage building 1 at 1040 Terra Bella Avenue, and will take approximately 22 months, with 7 of those months having overlapping construction at both sites. Phase 2 will focus on storage building 2 at 1040 Terra Bella Avenue, and will take approximately 12 months.

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 near noise-sensitive land uses, or when construction lasts over extended periods of time.

The Municipal Code establishes allowable construction hours, which are between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday. Construction work shall not be permitted on Saturday or Sunday or holidays unless prior written approval is granted by the building official. A significant construction noise impact would occur if a project is located within 500 feet of residential uses or 200 feet of commercial or office uses and 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.

However, the City of Mountain View does not establish noise level thresholds for construction activities. As an alternative, this analysis uses the noise limits established by the Federal Transit Administration (FTA) to identify the potential for impacts due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*.[1] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be enforced at residential land uses and 90 dBA L_{eq} shall be enforced at commercial and industrial land uses.

Typically, construction activities would be carried out in stages. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 4 and 5. Table 4 shows the average noise level ranges, by construction phase, and Table 5 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise falls in the range of 80 to 90 dBA at 50 feet from the source. Construction-

[1] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

generated noise levels drop off/increase at a rate of about 6 dBA per doubling/halving 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.

TABLE 4 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 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.

Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming every piece of equipment would operate simultaneously, which would represent the worst-case scenario. This construction noise model includes representative sound levels for the most common types of

construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig").

For each phase, the worst-case hourly average noise level, as estimated at the property line of each surrounding land use, is shown in Table 6a through 6c. Construction would occur throughout the site, and therefore, hourly average noise levels at each of the receiving land uses would vary depending on the location of the active construction site. For the purposes of estimating the worst-case scenario, noise levels in Table 6a through 6c were calculated assuming the majority of construction would take place near the center of the proposed project site.

The nearest existing residences are located approximately 445 feet east and 700 feet southeast of the center of the project site. Additional residences are located approximately 715 feet to the southwest, and 1,000 feet to the south. A new residential building is currently being constructed approximately 515 feet west of the center of the project site, and a church is located approximately 575 feet northwest. A neighboring office building is approximately 80 feet southwest of the center of the project site. As shown in Tables 6a though 6c, construction noise levels would potentially reach 74 dBA L_{eq} occasionally at the nearest existing residential land use, and 80 dBA L_{eq} at the nearest existing commercial land use, as calculated from the center of the project site phases.

It is assumed that the proposed project would limit construction activity to daytime hours between 7:00 a.m. and 6:00 p.m., Monday through Friday. However, it is also assumed that construction of the project will take more than one year. Under these assumptions, the proposed project noise levels would comply with the City's Municipal Code, but the length of the project construction would result in a significant temporary impact. Due to the proximity of the proposed building to existing land uses, construction best management practices are included to reduce noise levels at the nearest receptors. The enforcement of the Municipal Code, implementation of construction noise controls, and adequate disclosures would result in a **less-than-significant** impact.

TABLE 6a Phase 1 – 1020 Terra Bella Avenue - Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Time Duration (no. of days)	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
			Office West & Residential East (250 ft)	Residential Southeast (410 ft)	Residential Southwest (605 ft)	Residential West (700 ft)	Church Northwest (745 feet)
Demolition	22	Excavator (2) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	69	64	61	60	59
Site Preparation	10	Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	69	65	62	60	60
Grading & Excavation	19	Excavator (2) Grader (1) Rubber-Tired Dozer (1) Concrete/Industrial Saw (1) Tractor/Loader/Backhoe (1)	73	69	65	64	63
Trenching & Foundation	152	Excavator (1) Concrete Pump (1)	65	61	57	56	55
Building Exterior	214	Crane (1) Forklift (2) Tractor/Loader/Backhoe (1) Welder (1)	64	60	56	55	55
Building Interior & Architectural Coating	212	Aerial Lift (2)	57	52	49	48	47
Paving	61	Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (1)	63	59	56	55	54

TABLE 6b Phase 1 – 1040 Terra Bella Avenue - Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Time Duration (no. of days)	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
			Office South (125 ft)	Residence West & Church West (330 ft)	Residence East (620 ft)	Residence South (745 ft)	Residence Southeast (865 feet)
Demolition	19	Concrete/Industrial Saw (1) Excavator (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	77	69	63	62	60
Site Preparation	24	Grader (1) Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)	77	68	63	61	60
Grading & Excavation	25	Excavator (1) Grader (2) Rubber-Tired Dozer (1) Concrete/Industrial Saw (1) Tractor/Loader/Backhoe (1)	80	71	66	64	63
Utilities Trenching	6	Tractor/Loader/Backhoe (2) Excavator (1)	72	63	58	56	55
Building Exterior	178	Crane (1) Forklift (2) Generator Set (1) Tractor/Loader/Backhoe (1) Welder (1)	73	64	59	57	56
Building Interior & Architectural Coating	47	Air Compressor (1) Aerial Lift (4)	69	60	55	53	52
Paving	10	Cement and Mortar Mixers (2) Paver (1) Paving Equipment (2) Roller (2) Tractor/Loader/Backhoe (1)	75	66	61	60	58

TABLE 6c Phase 2 – 1040 Terra Bella Avenue - Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Time Duration (no. of days)	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
			Office West & Residential East (250 ft)	Residential Southeast (530 ft)	Residence West (680 ft)	Church Northwest (670 ft)	Residential Southwest (720 ft)
Demolition	15	Concrete/Industrial Saw (1) Excavator (2) Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)	73	66	64	64	64
Site Preparation	10	Grader (2) Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)	72	66	64	64	63
Grading & Excavation	22	Excavator (1) Grader (2) Rubber-Tired Dozer (1) Concrete/Industrial Saw (1) Tractor/Loader/Backhoe (2)	74	67	65	65	65
Trenching & Foundation	3	Tractor/Loader/Backhoe (2) Excavator (1)	66	59	57	57	57
Building Exterior	165	Crane (1) Forklift (4) Tractor/Loader/Backhoe (2) Welder (2)	66	60	58	58	57
Building Interior & Architectural Coating	30	Air Compressor (2) Aerial Lift (5)	65	58	56	56	56
Paving	27	Cement and Mortar Mixers (1) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (1)	67	61	59	59	58

Mitigation Measure 1a: A Construction Noise Management Plan will be prepared by the construction contractor and implemented prior to the start of and throughout construction to reduce noise impacts on the nearby existing land uses. The plan will establish the procedures the contractor will take to reasonably minimize construction noise at the nearby existing land uses. The plan would include, but not be limited to, the following measures to reduce construction noise levels as low as practical:

- Construction equipment shall be well-maintained and used judiciously to be as quiet as practical;

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

- Utilize "quiet" models of air compressors and other stationary noise sources where technology exists;

- Locate all stationary noise-generating equipment, such as air compressors and portable power generators, away from noise-sensitive receptors;

- Locate staging areas and construction material areas away from noise-sensitive receptors;

- Prohibit all unnecessary idling of internal combustion engines;

- Consider temporary noise barriers during construction phases involving earth moving equipment (e.g., grading operations) where they would be effective in reducing the construction noise impact, when directly adjoining sensitive receptors. An eight-foot plywood noise barrier could reduce noise levels by at least 5 dBA.

- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem be implemented. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

With the implementation of the above measures, the temporary construction noise impact would be **less-than-significant**.

Impact 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. This is a **less-than-significant impact.**

A significant permanent noise increase would occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA DNL or greater where future ambient noise levels exceed the "normally acceptable" noise level standard. Where future ambient noise levels are at or below the

"normally acceptable" noise level standard, noise level increases of 5 dBA DNL or greater would be considered significant. According to the City's 2030 General Plan, the "normally acceptable" outdoor noise level standard for the nearby single-family residences would be 55 dBA DNL. Future noise levels at the nearby residences in the area would exceed 60 dBA DNL; therefore, a significant impact would occur if traffic due to the proposed project would permanently increase ambient levels by 3 dBA DNL. For reference, a 3 dBA DNL noise increase would be expected if the project would double existing traffic volumes along a roadway. The project will generate a very small amount of traffic in comparison to traffic volumes on US 101, which is the main noise source in the vicinity. Project-generated traffic will not contribute substantially to the noise environment, and will result in a noise increase of 1 dBA or less in the project vicinity.

To determine the permanent traffic noise level increase, local traffic count data provided by the traffic consultant was compared with existing on-site traffic levels from US 101.[2] Based on this comparison, the permanent noise level increase was estimated to be 1 dBA DNL or less along local roadways in the project vicinity. Since the permanent noise level increase due to this project-generated traffic at the surrounding noise-sensitive receptors would be less than 3 dBA DNL, the proposed project would not cause a substantial permanent noise level increase. This is a less-than-significant impact.

Mitigation Measure 1b: None required.

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

Mechanical Equipment Noise

Section 21.26 of the Mountain View City Code limits noise levels due to stationary mechanical equipment to 55 dBA during daytime hours between 7:00 a.m. and 10:00 p.m. and to 50 dBA during nighttime hours between 10:00 p.m. and 7:00 a.m.

Residential and commercial buildings such as those proposed for this project typically include various mechanical equipment, such as air conditioning, heating systems, exhaust fans, etc. It is assumed the HVAC units will be located on the building rooftops, or located within a separate enclosure elsewhere in the building, and out of the line-of-site of nearby noise-sensitive receptors. Therefore, it is not anticipated that noise from the mechanical equipment would be in violation of the City Code. However, due to the number of variables inherent in the mechanical equipment needs of the project, the impacts of mechanical equipment noise on nearby noise-sensitive uses should be assessed during the final project design stage. 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 shall not be limited to, fan silencers, enclosures, and mechanical screening. The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts.

[2] Hexagon Transportation Consultants, Inc., *1020-1040 Terra Bella Avenue Transportation Analysis,* August 26, 2022.

Mitigation Measure 1c:

Mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's 55 dBA daytime threshold and 50 dBA nighttime threshold at the property line of the adjacent residences. A qualified acoustical consultant shall be retained to review mechanical noise as these systems are selected to determine specific noise reduction measures necessary to reduce noise to comply with the City's noise level requirements. 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. Alternate measures may include locating equipment in less noise-sensitive areas, such as the rooftop of the buildings away from the building's edge nearest the noise-sensitive receptors, where feasible.

Impact 2: **Generation of Excessive Groundborne Vibration.** Construction-related vibration levels may exceed the thresholds where cosmetic damage may occur at adjacent buildings. This is a **potentially significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include site demolition, preparation work, foundation work, and new building framing and finishing. The proposed project is not expected to require pile driving, which can cause excessive vibration.

No historical buildings or buildings that are documented to be structurally weakened adjoin the project site. For the purposes of this study, a significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.5 in/sec PPV would have the potential to result in cosmetic damage to modern commercial/industrial structures, and groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal residential buildings.

Table 7 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.

Worst-case scenario vibration levels were calculated at the nearest building façades surrounding the site, as measured from the project's boundaries. The potential vibration levels for each piece of equipment at the surrounding receptors is also summarized in Table 7. Commercial and industrial buildings are located at the south property line. The use of a vibratory roller, or the dropping of heavy equipment, within 10 feet of the adjacent buildings could result in vibration levels exceeding the 0.5 in/sec PPV limit recommended by the California Department of Transportation. At 10-feet from this property line, vibration levels resulting from medium equipment use (e.g., loaded trucks, large bulldozers) would be expected to be about 0.208 to 0.244

in/sec PPV, which would be below the 0.5 in/sec PPV limit. The next nearest existing building to the project site is a single-family residence located approximately 60 feet to the east. The worst-case vibration levels at the residential structure to the east would be 0.080 in/sec PPV, well below the 0.3 in/sec PPV limit. All other buildings in the vicinity would be further from the site and are expected to have lower levels of vibration during construction activities.

TABLE 7 Vibration Source Levels for Construction Equipment

Equipment		Reference PPV at 25 ft. (in/sec)	Vibration Levels at Nearest Buildings (in/sec PPV)			
			Commercial South (10 feet)	Residence East (60 feet)	Church West (95 feet)	Residence West (175 feet)
Clam shovel drop		0.202	**0.553**	0.077	0.047	0.024
Hydromill (slurry wall)	In soil	0.008	0.003	0.002	0.001	0.001
	In rock	0.017	0.006	0.004	0.003	0.002
Vibratory Roller		0.210	**0.575**	0.080	0.048	0.025
Hoe Ram		0.089	0.244	0.034	0.020	0.010
Large bulldozer		0.089	0.244	0.034	0.020	0.010
Caisson drilling		0.089	0.244	0.034	0.020	0.010
Loaded trucks		0.076	0.208	0.029	0.018	0.009
Jackhammer		0.035	0.096	0.013	0.008	0.004
Small bulldozer		0.003	0.008	0.001	0.001	0.000
Small Vibratory Roller (CAT CP433E 8-ton vibratory compactor)		0.087	0.238	0.033	0.020	0.010
Pavement Grinder		0.089	0.244	0.034	0.020	0.010

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., September 2022.

Mitigation Measure 2:

The following measures shall be implemented during construction to reduce vibration levels to 0.5 in/sec PPV or less at adjacent commercial/industrial buildings south of the site.

- Place operating equipment on the construction site as far as possible from vibration-sensitive receptors.
- Use smaller vibratory rolling equipment, for example the Caterpillar model CP433E vibratory compactor, within 15 feet of the adjacent commercial/industrial buildings south of the site to reduce vibration levels to 0.5 in/sec PPV or less.
- Select demolition methods not involving impact tools.
- Avoid dropping heavy equipment, such as a clam shovel drop, within 15 feet of the adjacent commercial/industrial buildings south of the site, and use alternative methods for breaking up existing pavement, such as a pavement grinder.
- 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 implementation of these mitigation measures would reduce a potential impact to a less-than-significant level.

Impact 3: Excessive Aircraft Noise.
The project site is located approximately 1 miles from a public airport or public use airport and would not expose people residing in the project area to excessive aircraft noise. **This is a less-than-significant impact.**

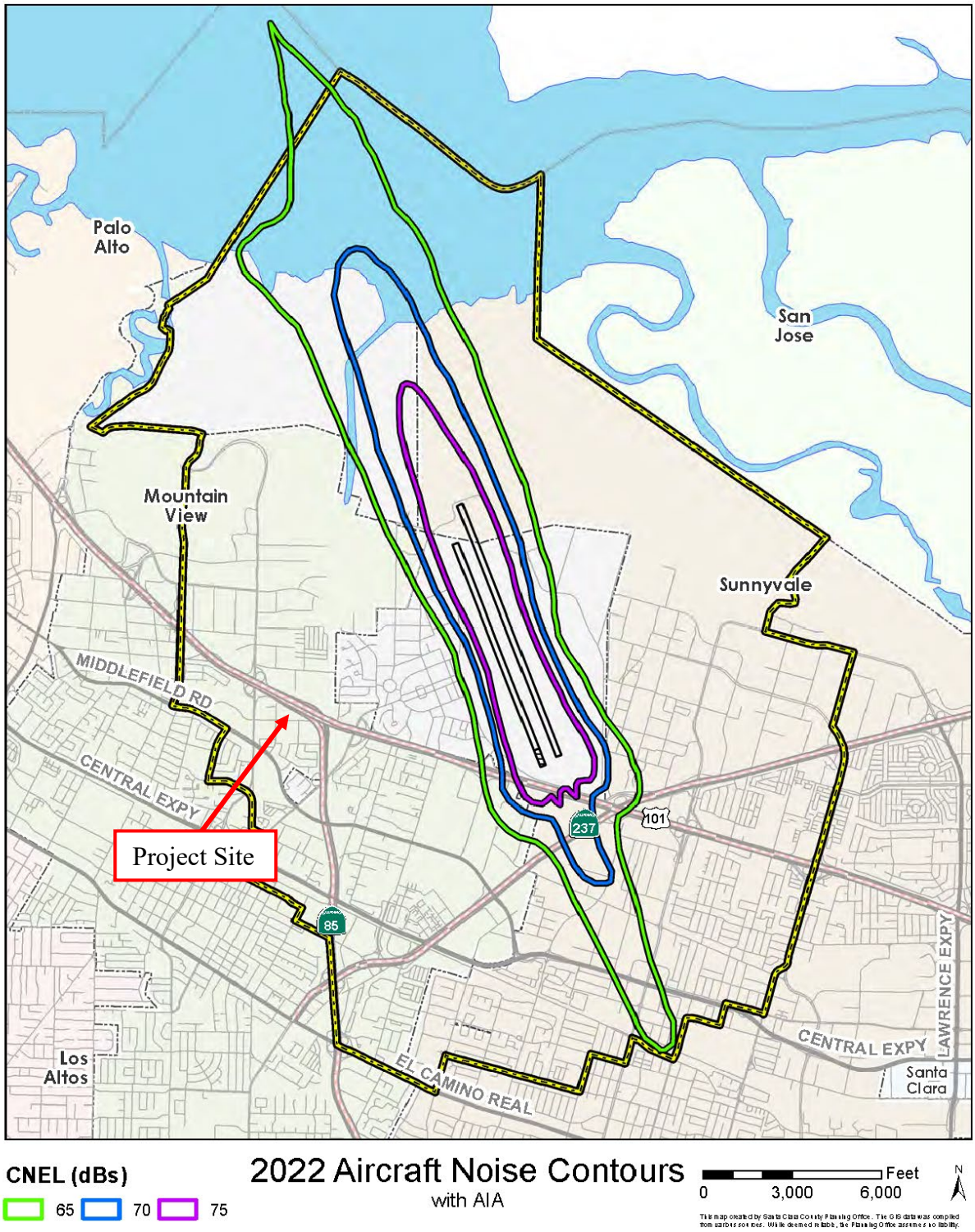
Moffett Federal Airfield is a joint civil-military airport located about 1 mile east of the project site, as shown in Figure 9. Based on the position of the runways and direction of flights, the project site falls outside the 65 dBA CNEL/DNL noise contour, according to the 2022 Aircraft Noise Contours figure provided in the Comprehensive Land Use Plan for Moffett Federal Airfield.[3] While aircraft flyovers would at times be audible at the outdoor use areas on the project site, noise levels due to aircraft would not result in future exterior noise levels of 65 dBA DNL/CNEL or more, and therefore, both the exterior and interior noise levels resulting from aircraft would be compatible with the proposed project.

Other nearby airports include Norman Y. Mineta San Jose International Airport, which is 7.5 miles southeast, and Palo Alto Airport, which is 3.5 miles northwest. The project site lies outside the 60 dBA CNEL noise contour lines for both of these airports. Therefore, the proposed project would be compatible with the aircraft noise generated from the nearest airports.

Mitigation Measure 3: None required.

[3] Santa Clara County Airport Land Use Commission, "Comprehensive Land Use Plan Santa Clara County: Moffett Federal Airfield," November 2, 2012 and amended November 18, 2016.

FIGURE 9 2022 Noise Contours for Moffett Federal Airfield



Cumulative Impacts

Cumulative construction noise impacts could result from the simultaneous construction of the proposed project and other nearby projects. Based on a review of the City's project website,[4] the following projects are located within 1,000 feet of the project site:

- **1001 N. Shoreline Boulevard** – This residential project site is located at 1001 N. Shoreline Boulevard and is approximately 150 feet west of the proposed project site. The project consists of two residential buildings totaling 303 dwelling units and a parking structure.

- **1155 & 1185 Terra Bella Avenue** – This office project site is located at 1155 & 1185 Terra Bella Avenue and is approximately 400 feet southwest of the proposed project site. The project consists of a 3-story, 20,000 square foot office building with a surface parking lot.

The 1001 North Shoreline Boulevard project site is developing two residential buildings. The first building is currently under construction approximately 515 feet west of the center of the 1020 and 1040 Terra Bella Avenue projects, and is scheduled to be completed before construction at 1020 and 1040 Terra Bella Avenue begins. Construction of the second building at 1001 North Shoreline Boulevard is to begin in early 2024, with construction overlapping with construction at 1020 and 1040 Terra Bella Avenue. During this overlapping construction period, temporary combined construction noise levels at nearby receptors may be up to 2 dBA higher than if only one project was under construction. Construction at nearby 1155 and 1185 Terra Bella Avenue is scheduled to begin early 2024, with construction possibly overlapping with construction at 1020 and 1040 Terra Bella Avenue and with 1001 North Shoreline Boulevard. During this overlapping construction period, temporary combined construction noise levels at nearby receptors may be up to 3 dBA higher than if only one project was under construction. However, in no case would construction noise levels exceed the 80 dBA noise limit at existing nearby residential properties or the 90 dBA noise limit at existing nearby commercial properties. Therefore, cumulative construction noise would be considered **less-than-significant**.

Cumulative traffic noise could also result from the traffic generated by the project when added to the traffic generated by other reasonably foreseeable projects. Cumulative traffic conditions were reviewed to determine if the proposed project would make a cumulatively considerable contribution to significant traffic noise increases expected in the area. A significant cumulative traffic noise increase would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA DNL or greater for future levels exceeding 60 dBA DNL or was 5 dBA DNL or greater for future levels at or below 60 dBA DNL; and 2) if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan. Cumulative traffic noise levels were calculated to increase by less than 2 dBA DNL in the project vicinity. This is a **less-than-significant** cumulative impact.

[4] City of Mountain View, *Current Project List*, August 2022. Web: https://www.mountainview.gov/depts/comdev/planning/activeprojects/list.asp