CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

MEMORANDUM

DATE: March 7, 2019

TO: Alyssa Helper, Project Manager

FROM: Amy Fischer, Principal

SUBJECT: Noise and Vibration Impact Analysis: Public Storage Redevelopment, San Jose

INTRODUCTION

The proposed Public Storage Redevelopment (Project) would consolidate two separate storage operations on two adjoining parcels in the City of San Jose (City), California. This Noise Analysis Memorandum has been prepared to satisfy the City's requirement for a project-specific noise and vibration impact analysis by examining the impacts of construction and operation of the proposed Project and determining if mitigation measures would be required.

PROJECT DESCRIPTION

Public Storage currently operates two storage facilities on adjoining parcels located at 231 West Capitol Expressway and 3911 Snell Avenue in the southern portion of the City of San Jose, California. The Public Storage facility at 231 West Capitol Expressway is located on Assessor's Parcel Number (APN) 462-19-013, and the facility at 3911 Snell Avenue is located on APN 462-19-014. The two storage facilities currently consist of 16 one-story self-storage buildings, two rental offices, parking areas, and two on-site attendant residences. The current buildings have a total 133,701 square feet (sf) of operational space. The existing rental offices are open Monday through Friday from 9:30 a.m. to 6:00 p.m., and on Saturday and Sunday from 9:30 a.m. to 5:00 p.m. Customers have access to their storage spaces from 6:00 a.m. to 9:00 p.m. everyday. Figure 1 (provided in Attachment A) shows the Project regional location.

The Project site is currently designated as Combined Industrial/Commercial (CIC) on the City's General Plan Land Use Map. The CIC designation is intended to be flexible to allow for a varied mix of compatible uses, including commercial, office, and industrial uses, as well as hospitals and private community gathering facilities. The Project site is zoned Light Industrial (LI), which allows for a wide variety of non-hazardous industrial uses. Typical uses in the LI zone include warehousing, wholesaling, light manufacturing, and associated service establishments that serve employees of businesses located in industrial areas. The LI zone conforms to the City's General Plan designation of CIC and allows for self-storage uses.

Residential land uses are located to the north, west, and south of the Project site. A mobile home development is located along the north property line, condominiums are located adjacent and west of the Project site. A multi-family residential development is located across West Capitol Expressway from the Project.

The Project would consolidate two separate storage operations on two adjoining parcels and includes demolition of existing self-storage buildings on the site and construction of new self-storage uses in their place. The proposed Project would consolidate eight existing one-story self-storage buildings on the site into two four-story buildings (referred to herein as Buildings 1 and 2). The Project would not include an on-site attendant residence. Figure 2 (Attachment A) shows the Project site and layout for Buildings 1 and 2.

The Project consists of two phases to consolidate storage operations, which would occur over the course of 24 months; construction would occur in two 12-month phases. Phase I would construct a 179,616 sf four-story climate-controlled building (Building 1) that would be located on the parcel at 231 West Capitol Expressway. Phase I construction would begin in April 2020 with a planned completion in April 2021. Phase II would construct another 179,616 sf four-story climate-controlled building (Building 2) that would be located on the parcel at 3911 Snell Avenue. Phase II construction would begin in October 2022 with a planned completion date of October 2023. The Phase I four-story building (Building 1) would include an office and a lobby area for customer access. The Phase II four-story building (Building 2) would include a loading/unloading access area.

The Project includes demolition of existing self-storage uses on the site to accommodate construction of Buildings 1 and 2. During Phase I of construction, four of the existing buildings (Buildings A, D, E, and F) on the west property would be demolished. The northwestern-most portion of Building AA would also be demolished to create two separate buildings (Buildings AA-1 and AA-2) and to provide access between the two properties. Buildings AA-1 and AA-2 would total 12,312 sf and 12,638 sf, respectively. Buildings B, C, G, H, I, and J would remain in place, and customer access would continue to be provided at the exterior of the buildings.

During Phase II of the Project, four buildings (Buildings BB, CC, DD, and EE) would be demolished and replaced with Building 2. Phase II would include the partial demolition of Building GG, resulting in a total square footage of 5,460 sf. Following completion of Phase II, customer access to Building GG would continue to be provided at the building exterior.

Although project-level details of Phase II implementation are unknown at this time, the design, scale, and features would be similar to Building 1 and the improvements included as part of Phase I.

Construction would take place between the hours of 7:00 a.m. and 5:00 p.m., Monday through Friday, and between 8:00 a.m. and 5:00 p.m. on Saturdays.

METHODOLOGY

Evaluation of noise impacts associated with the proposed Project includes the following:

- Determine the short-term construction noise and vibration levels at off-site noise-sensitive uses and compare those levels to the City’s Noise Ordinance requirements; and

- Determine the long-term noise levels at off-site noise-sensitive uses and compare those levels to the City's pertinent noise criteria and standards.

FUNDAMENTALS OF SOUND AND VIBRATION

Characteristics of Sound

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units, such as inches or pounds, decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) are 10 times more intense than 1 dB, 20 dB are 100 times more intense, and 30 dB are 1,000 times more intense. Thirty dB represents 1,000 times as much acoustic energy as one decibel. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel levels decrease as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source, such as highway traffic or railroad operations, the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source, noise in a relatively flat environment with absorptive vegetation, decreases 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and community noise equivalent level (CNEL) or the day-night average level (DNL or L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m.–7:00 a.m. (defined as sleeping hours). DNL is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and DNL are within 1 dBA of each other and are normally exchangeable. The City uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time, the noise level exceeds this level, and half the time, it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first is audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater because this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise levels of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160–165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas. Table 1, below, lists definitions of these acoustical terms.

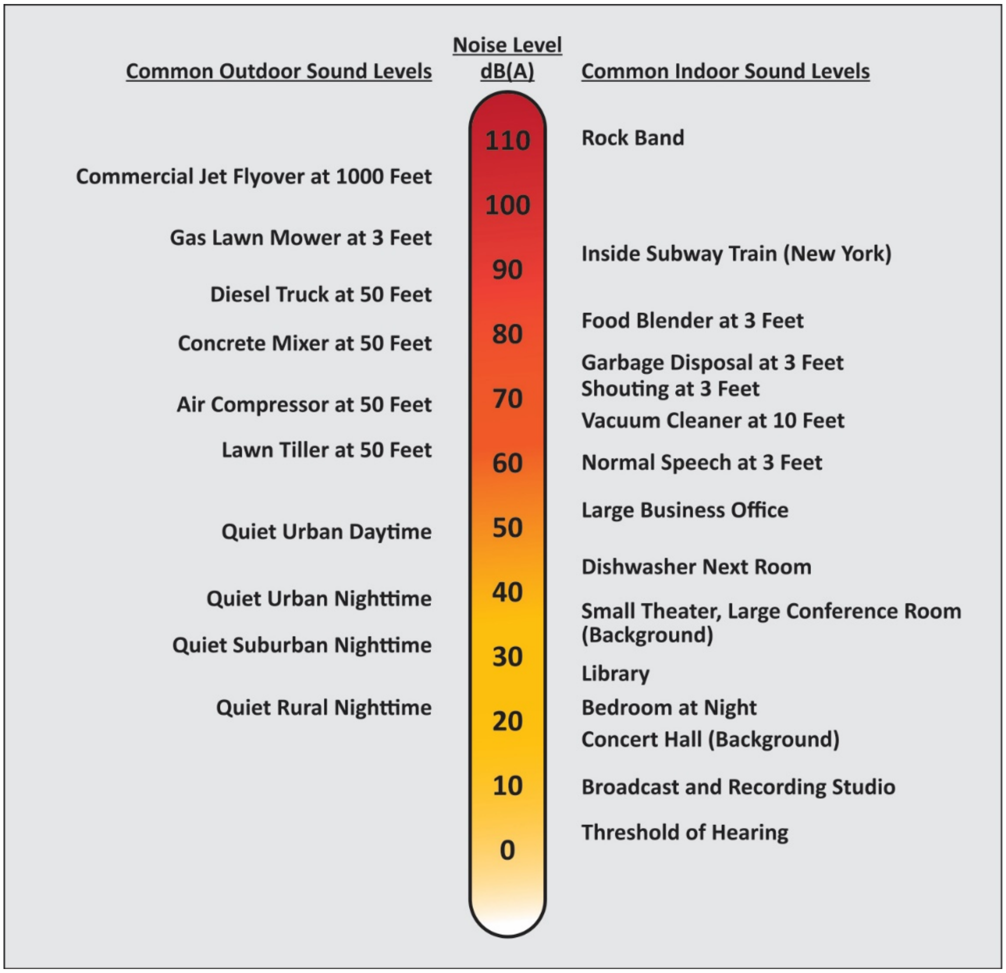
Table 1: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power, the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter deemphasizes the very low and very high frequency components of the sound in a manner similar to the 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. All sound levels in this assessment are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dB to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, DNL or DNL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that 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, Cyril M. 1991).

Table 2 shows common sound levels and their sources.

Table 2: Common Sound Levels and Noise Sources



Source: LSA, Associates, Inc. (2016).

Fundamental of Vibration

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible. Typically, there is more adverse reaction to effects associated with the shaking of a building. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items on shelves, or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with both ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet (ft) of the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft, as shown in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA Manual; September 2018). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed for most projects that the roadway surface will be smooth enough that ground-borne vibration from street traffic will not exceed the impact criteria; however, the construction of the Project could result in ground-borne vibration that may be perceptible and annoying.

Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for typical construction activities to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA Manual 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS is best for characterizing human response to building vibration, and PPV is used to characterize the potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

$$L_v = 20 \log_{10} [V/V_{ref}]$$

where Lv is the vibration velocity in decibels (VdB), "V" is the RMS velocity amplitude, and "Vref" is the reference velocity amplitude, or 1 x 10-6 inches/second (in/sec) used in the United States.

Factors that influence ground-borne vibration and noise include the following:

- **Vibration Source:** Vehicle suspension, wheel types and condition, railroad track/roadway surface, railroad track support system, speed, transit structure, and depth of vibration source
- **Vibration Path:** Soil type, rock layers, soil layering, depth to water table, and frost depth
- **Vibration Receiver:** Foundation type, building construction, and acoustical absorption

Among the factors listed above, there are significant differences in the vibration characteristics when the source is underground compared to when it is at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock.

Experience with ground-borne vibration indicates: (1) vibration propagation is more efficient in stiff clay soils than in loose sandy soils, and (2) shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from a railroad track. Factors such as layering of the soil and the depth to the water table can have significant effects on the propagation of ground-borne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

REGULATORY FRAMEWORK

The federal, State, and local framework for noise standards is outlined below. The City of San Jose has established standards in its General Plan (2011) and in its Municipal Code for land uses that could potentially expose sensitive receptors to excessive noise levels.

U.S. Environmental Protection Agency

In 1972, Congress enacted the Noise Control Act. This act authorized the U.S. Environmental Protection Agency (USEPA) to publish descriptive data on the effects of noise and establish levels of sound *requisite to protect the public welfare with an adequate margin of safety.* These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table 3, below. However, the USEPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

Table 3: Summary of USEPA Noise Levels

Effect	Level	Area
Hearing loss	$L_{eq}(24) \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	DNL $\leq$ 55 dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq}(24) \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq}(24) \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (March 1974).
dB = decibel(s)
DNL = day-night average level
L_{eq} = equivalent continuous sound level
USEPA = U.S. Environmental Protection Agency

For protection against hearing loss, 96 percent of the population would be protected if sound levels were less than or equal to an $L_{eq(24)}$ of 70 dBA. The "(24)" signifies an L_{eq} duration of 24 hours. The USEPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 ft in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor DNL of 55 dBA are summarized in Table 4, below. At 55 dBA DNL, 95 percent sentence clarity (intelligibility) may be expected at 11 ft, along with no community reaction. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

State of California

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses. The City has adopted and modified the State's land use compatibility guidelines, as discussed below.

Table 4: Summary of Human Effects in Areas Exposed to 55 dBA DNL

Type of Effect	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 0.35 meter. 99 percent sentence intelligibility (average) at 1.0 meter. 95 percent sentence intelligibility (average) at 3.5 meters.
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below "vigorous action."
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (March 1974).
dB = decibel(s)
DNL = day-night average level

Local Regulations

City of San Jose General Plan

The City of San Jose adopted its Envision San Jose 2040 General Plan on November 1, 2011. The Environmental Leadership Section of the General Plan provides Noise and Vibration Elements as guidelines to minimize the impact of noise and vibration on people, residences, and business operations. The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. 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 developments can meet this standard.

The City's acceptable DNL exterior noise level is 60 dBA or less for residential and most institutional land uses. Table 5, below, shows land uses compatibility guidelines for community noise in San Jose.

The City's Noise Element Section EC-12 provide guidelines to minimize 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 5 dBA DNL or more where the noise level would remain "Normally Acceptable"; or
- Cause the DNL at nose sensitive receptors to increase by 3 dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

Table 5: Land Use Compatibility for Community Noise Environments

Land Use Category	Exterior Noise Exposure (DNL, 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 design.

Unacceptable:

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

Source: City of San Jose, *Envision San Jose 2040 General Plan* (2011), Table EC-1.
dBA = A-weighted decibel(s)
DNL = day-night average level

The General Plan specifies noise generation of new nonresidential land uses to a 55 dBA maximum noise level at the property line when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land uses. This standard of new nonresidential noise generation is codified in the City's Municipal Code, Title 20, Section 20.50.300, Performance Standards. Table 6, below, shows the City Municipal Code Noise Standards for industrial land uses adjacent to residential and commercial zoned land uses.

Table 6: Noise Performance Standards

Land Use	Maximum Noise Level at Property Line (dBA)
Industrial use adjacent to a property used or zoned for residential purposes	55
Industrial use adjacent to a property used or zoned for commercial purposes	60
Industrial use adjacent to a property used or zoned for industrial or use other than commercial or residential purposes	70

Source: City of San Jose Municipal Code, Title 20, Part 5, Section 20.50.300- Performance Standards, Table 20-135.
dBA = A-weighted decibel(s)

The City of San Jose applies the noise performance standards as shown in Table 6 to temporary construction-related noise and determines it to be significant when construction-related noise occurs for a period of more than 12 months and the noise levels would exceed ambient noise levels by 5 dBA L_{eq} or more and exceed the normally acceptable levels of 55 dBA L_{eq} at the nearest residential land uses and 60 dBA L_{eq} at the nearest commercial land uses. From the City's General Plan EC-1.7:

> *Requires construction operations to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code, Title 20. 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 more than 12 months.*
>
> *For such large or complex projects, a construction noise logistics plan that specifies hours of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints would be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts and neighboring residents and other uses.*

City of San Jose Municipal Code

The City's Municipal Code, Title 20, Part 3, Section 20.100.450 specifies hours of construction within 500 ft of a residential unit as follows:

A. Unless otherwise expressly allowed in a development permit or other planning approval, no applicant or agent of an applicant shall suffer or allow any construction activity on a site located within 500 feet of a residential unit before 7:00 a.m. or after 7:00 p.m., Monday through Friday, or at any time on weekends.

B. Without limiting the scope of Section 20.100.310, no applicant or agent of an applicant shall suffer or allow any construction activity on a site subject to a development permit or other planning approval located within 500 feet of a residential unit at any time when that activity is not allowed under the development permit or planning approval.

C. This section is applicable whenever a development permit or other planning approval is required for construction activity.

The City's Municipal Code, Title 20, Part 5, Section 20.50.300 specifies there shall be no activity that causes ground vibration, which is perceptible without instruments at the property line of a project site. The vibration section of the Environmental Considerations / Hazards Element of the City's Envision San Jose 2040 General Plan requires new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 inch-per-second (in/sec) peak particle velocity (PPV) 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.

THRESHOLDS OF SIGNIFICANCE

The *State CEQA Guidelines* indicate that a project would have a significant impact on noise if it would result in:

- 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;

- Generation of excessive ground-borne vibration or ground-borne noise levels; or

- 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, expose people residing or working in the project area to excessive noise levels.

EXISTING NOISE ENVIRONMENT

The proposed Project is located at the northwest quadrant of West Capitol Expressway and Snell Avenue. West Capitol Expressway is a six-lane arterial roadway, and Snell Avenue is a four-lane collector roadway. Roadway traffic is the predominant noise source in the vicinity of the Project site.

The Project site is approximately 6.5 miles south of Norman Y. Mineta San Jose International Airport (SJC) and approximately 4.1 miles southeast of Reid-Hillview Airport in Santa Clara County. The Project is outside of both airports' 60 dBA Community Noise Exposure Level (CNEL) contours. The Project vicinity is in SJC flight paths for both approaches and departures, and SJC operational aircraft is visible from the Project vicinity.

Existing Ambient Monitored Noise Levels

To assess existing noise levels, LSA conducted noise monitoring to establish the existing ambient noise environment at the Project site. Three short-term (15-minute) and one long-term (24-hour) noise measurements were conducted at the Project site from January 25, 2019, to January 29, 2019. Noise measurement data collected during the noise monitoring are summarized in Table 7, below. As shown in Table 7, the short-term noise measurements indicate that ambient noise in the Project vicinity ranges from approximately 61.3 dBA to 70.9 dBA L_{eq}. Vehicle traffic on West Capitol Expressway and Snell Avenue was reported as the primary noise source. The meteorological data conditions at the time of the noise monitoring are shown in Table 8, below. Noise measurement sheets are provided in Attachment B.

Table 7: Ambient Noise Monitoring Results (dBA)

Location Number	Location Description	Date, Start Time	L_{eq} [a]	L_{max} [b]	L_{min} [c]	Primary Noise Sources
ST-01	Apartment Building Entry Area, Sagemark Apartment Complex	1/25/19, 3:23 p.m.	61.6	73.4	43.0	Traffic on West Capitol Expressway
		1/28/19, 11:06 a.m.	61.3	70.1	44.3	
ST-02	Near North Entry Area 3911 Snell Avenue	1/25/19, 6:36 p.m.	70.9	92.5	50.4	Traffic on Snell Avenue
		1/28/19, 12:41 p.m.	68.9	83.6	52.4	

Source: LSA (January 2019).

[a] L_{eq} represents the average of the sound energy occurring over the measurement time period for the short-term noise measurements.

[b] L_{max} is the highest sound level measured during the measurement time period.

[c] L_{min} is the lowest sound level measured during the measurement time period.

dBA = A-weighted decibel(s)

Table 8: Meteorological Conditions During Ambient Noise Monitoring

Location Number	Date	Average Wind Speed (mph)	Maximum Wind Speed (mph)	Temperature (˚F)	Humidity (%)
ST-01	1/25/2019	0	1.0	65	54
	1/28/2019	0	1.5	65	51
ST-02	1/25/2019	0	1.1	55	60
	1/28/2019	0	1.0	62	52

Source: LSA (January 2019).

˚F = degrees Fahrenheit

mph = miles per hour

Table 9 shows a summary of the long-term noise level measurements.

Table 9: Long-Term Noise Level Measurement Summary

Site	Description	Date	Daytime Noise Levels (dBA L_{eq})	Nighttime Noise Levels (dBA L_{eq})	Daily Noise Levels (dBA DNL)	Average Daily Noise Levels (dBA DNL)
LT-01	West side is of the Project site Condominium Residences	1/26/2019	58.8-61.3	51.6-58.3	63.3	62.7
		1/27/2019	58.8-60.8	50.7-57.8	62.2	
LT-02	North side of the Project site Mobile Home Park	1/26/2019	54.1-57.9	48.0-54.1	59.4	59.0
		1/27/2019	54.0-57.9	45.9-55.9	58.5	
LT-03	South side of the Project site West Capitol Expressway	1/26/2019	69.0-73.0	60.9-69.0	73.8	73.5
		1/27/2019	68.6-73.2	61.3-67.4	73.1	

dBA = A-weighted decibel(s)

DNL = day-night average level

L_{eq} = equivalent continuous sound level

The long-term measurement resulted in a daily day-night-level (DNL) ranging from 58.5 dBA to 73.8 dBA. Roadway traffic was as the primary noise source.

Existing Sensitive Land Uses

Certain land uses are considered more sensitive to noise than others. Examples of these land uses include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. Sensitive receptors to noise levels at the Project site include a residential condominium complex located adjacent to the Project's west property line and a mobile home park located adjacent to the Project's north property line. The condominium units were constructed in the early 2000s, and the mobile home park was built in the 1970s.

IMPACTS AND MITIGATION MEASURES

The following section discusses the potential noise and vibration impacts associated with implementation of the proposed Project.

Land Use Compatibility

The proposed Project conforms to the City's General Plan designation of CIC and LI zoning, which allows for self-storage uses. In addition, the proposed Project does not include an on-site attendant residence unit. Therefore, the Project is not a noise-sensitive use specified in City of San Jose Land Use Categories 1 through 6, as shown previously in Table 5. Noise levels measured at the Project site range from 59.0 dBA DNL to 73.5 dBA DNL, which are acceptable levels for self-storage uses.

Exposure to Excessive Noise Levels

The following section describes how the short-term construction and long-term operational noise and vibration impacts of the proposed Project would be less than significant.

Short-Term (Construction) Noise Impacts

Project construction would result in short-term noise impacts on the nearby sensitive receptors. Maximum construction noise would be short-term, generally intermittent depending on the construction phase, and variable depending on receiver distance from the active construction zone. The levels and types of noise impacts that would occur during construction are described below.

Short-term noise impacts would occur during grading and site preparation activities. Table 9 lists typical construction equipment noise levels (L_{max}) recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor, obtained from the Federal Highway Administration (FHWA) Roadway Construction Noise Model. Construction-related short-term noise levels would be higher than existing ambient noise levels currently in the Project area but would no longer occur once construction of the Project is completed.

Two types of short-term noise impacts would occur during construction of the proposed Project. The first type involves construction crew commutes and the transport of construction equipment and materials to the site, which would incrementally increase noise levels on roads leading to the site. As shown in Table 9, there would be a relatively high single-event noise exposure potential at a maximum level of 84 dBA L_{max} with trucks passing at 50 ft.

The second type of short-term noise impact is related to noise generated during grading and construction on the Project site. Construction is performed in discrete steps, or phases, each with its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase.

Table 10, below, lists maximum noise levels recommended for noise impact assessments for typical construction equipment, based on a distance of 50 ft between the equipment and a noise receptor. Typical maximum noise levels range up to 85 dBA L_{max} at 50 ft during the noisiest construction phases. The site preparation phase, including excavation and grading of the site, tends to generate the highest noise levels because earthmoving machinery is the noisiest construction equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings.

Table 10: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Maximum Noise Level (L_{max}) at 50 Ft[1]
Backhoes	40	80
Compactor (ground)	20	80
Compressor	40	80
Cranes	16	85
Dozers	40	85
Dump Trucks	40	84
Excavators	40	85
Flat Bed Trucks	40	84
Forklift	20	85
Front-end Loaders	40	80
Graders	40	85
Jackhammers	20	85
Pick-up Truck	40	55
Pneumatic Tools	50	85
Pumps	50	77
Rock Drills	20	85
Rollers	20	85
Scrapers	40	85
Tractors	40	84
Welder	40	73

Source: Roadway Construction Noise Model (FHWA 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
[1] Maximum noise levels were developed based on Spec 721.560 from the Central Artery/Tunnel (CA/T) program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
FHWA = Federal Highway Administration
Ft = foot/feet
L_{max} = maximum instantaneous sound level

In addition to the referenced maximum noise levels, the usage factor provided in Table 10 is utilized to calculate the hourly noise level impact for each piece of equipment based on the following equation:

$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: *L_{eq} (equip)* = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period

E.L. = Noise emission level of the particular piece of equipment at a reference distance of 50 ft

U.F. = Usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time

D = Distance from the receiver to the piece of equipment

Each piece of construction equipment operates as an individual point source. Utilizing the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Utilizing the equations from the methodology above and the referenced information in Table 10, the composite noise level of the two loudest pieces of equipment, typically the grader and tractor, during construction would be 81 dBA L_{eq} at a distance of 50 ft from the construction area.

Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Leq\ (at\ distance\ X) = Leq\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance from the noise source would decrease noise levels by 6 dBA while halving the distance from the noise source would increase noise levels by 6 dBA.

Noise-sensitive residential receptors located both north and west of the Project site are approximately 50 and 300 ft, respectively, from the construction areas of Buildings 1 and 2. At these distances, noise levels would approach 81 dBA L_{eq} at the northern property line and 65 dBA L_{eq} at the western property line. While the noise levels would exceed the City's Municipal Code Noise Standards for residential uses and exceed the existing ambient noise by more than 5 dBA, the increased noise levels would cease once construction is complete. However, with implementation of General Plan Policy EC-1.7 (provided below), which requires construction operations to use the best available noise suppression devices and techniques and limit construction hours near residential uses, construction requirements in the City's Municipal Code Title 20, Chapter 20.100.450, and construction noise reduction practices, noise levels would be considered less than significant.

The City's General Plan EC-1.7 provides the following requirements:

- *Require construction operations to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code, Title 20.*

- *A construction noise logistics plan that specifies hours of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints would 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.*

The City's Municipal Code, Title 20, Part 3, Section 20.100.450 specifies the following:

- *Unless otherwise expressly allowed in a development permit or other planning approval, no applicant or agent of an applicant shall suffer or allow any construction activity on a site located within 500 feet of a residential unit before 7:00 a.m. or after 7:00 p.m., Monday through Friday, or at any time on weekends.*

The following are the proposed best available noise reduction practices:

- Ensure that the greatest distance between noise sources and sensitive receptors during construction activities has been achieved.

- Construction equipment, fixed or mobile, shall be equipped with properly operating and maintained noise mufflers consistent with manufacturers' standards.

- Construction staging areas shall be located away from off-site sensitive uses during the later phases of project development.

- The Construction Contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site whenever feasible.

- The Construction Contractor shall use on-site electrical sources to power equipment rather than diesel generators whenever feasible.

Long-Term Noise Impacts

The proposed Project would include public storage uses in a developed area of the City. Operational noise can be categorized as mobile source noise and stationary source noise. Mobile source noise would be attributable to the additional vehicle trips that would result from the proposed Project. Stationary source noise includes noise generated by the proposed Project, such as the heating, ventilation, and air conditioning (HVAC) equipment, loading/unloading activities, and parking lot activities.

Traffic Noise Impacts. Motor vehicles, with their distinctive noise characteristics, are the dominant noise source in the Project vicinity. The amount of noise varies according to many factors, such as volume of traffic, vehicle mix (percentage of cars and trucks), average traffic speed, and distance from the observer. Implementation of the proposed Project would result in new daily trips on local roadways in the Project site vicinity. A characteristic of sound is that a doubling of a noise source is required in order to result in a perceptible (3 dBA or greater) increase in the resulting noise level.

Based on the Project's *Transportation Analysis* (LSA 2019), the existing average daily traffic (ADT) on West Capitol Expressway west of Snell Avenue is 38,090 vehicles and 12,890 vehicles for Snell Avenue north of West Capitol Expressway. The future ADT for West Capitol Expressway and Snell Avenue, without the proposed Project, is anticipated to be 39,700 and 22,280 vehicles, respectively. The proposed Project would generate a maximum ADT of approximately 443 vehicles on West Capitol Expressway and 22 vehicles on Snell Avenue. The changes in noise levels due to changes in traffic volumes are calculated using the following equation:

$$Change\ in\ (dBA) = 10 * \log_{10}\left(\frac{Current\ Volume}{\text{Future Volume}}\right)$$

Without the proposed Project, the future traffic noise levels of West Capitol Expressway and Snell Avenue are anticipated to increase by 0.2 dBA and 2.4 dBA, respectively. The Project would add a 0.05 dBA increase and a 0.004 dBA increase to the future traffic noise levels for West Capitol Expressway and Snell Avenue, respectively. The traffic noise increase would be less than 3 dBA; therefore, the Project daily trips would not result in a perceptible noise increase along any roadway segment in the Project vicinity.

Stationary Source Noise Impacts. As described in the regulatory framework discussion above, the City of San Jose has established maximum permissible noise levels that may be generated by sources on nonresidential land uses. The permissible maximum levels are 55 dBA at the property line. The operations of the proposed Project would not change from its existing operations that include occasional truck deliveries, loading/unloading activities, and typical parking lot activities. However, Buildings 1 and 2 would include rooftop HVAC units.

On-site stationary noise sources, noise generated by delivery truck activity, would generate the highest maximum noise levels. While parking activities, such as people conversing or doors slamming, would generate noise levels of approximately 60 dBA to 70 dBA L_{max} at 50 ft, delivery truck loading and unloading activities would result in maximum noise levels from 75 dBA to 85 dBA L_{max} at 50 ft. Operating functions of the proposed Project may increase due to the higher number of units; however, these operations would be internal to the new buildings and would not contribute to the exterior noise environment at the surrounding receptors. Therefore, noise levels due to truck deliveries, loading/unloading activities, and typical parking lot activities are anticipated to remain unchanged.

Buildings 1 and 2 have proposed rooftop HVAC units. Each building would have three bays of HVAC units, and each bay would house three (3) Daikin RXYQ-TATJU HVAC units. Each of the HVAC units has a reference noise level of 65 dBA at 3 ft. The nearest noise-sensitive receptor is located in the backyard of the mobile home park north of the Project site at a distance of 163 ft from the rooftop HVAC bays. At 163 ft, the noise attenuation due to distance 34 dBA, resulting in noise levels of 38 dBA, which is less than the allowable noise levels of 55 dBA. Furthermore, the perimeter of Buildings 1 and 2 include a parapet (rooftop perimeter wall) with a height of 4 ft that would also serve as a noise barrier to further reduce the HVAC noise.

Exposure to Excessive Ground-Borne Vibration

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors. Vibration energy propagates from a source, through intervening soil and rock layers, to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as the motion of building surfaces, the rattling of items on shelves or hanging on walls, or as a low-frequency rumbling noise. The rumbling noise is caused by the vibrating walls, floors, and ceilings radiating sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of ground-borne vibration are construction activities (e.g., pavement breaking and the operation of heavy-duty earthmoving equipment) and occasional traffic on rough roads. In general, ground-borne vibration from standard construction practices is only a potential issue when within 25 ft of sensitive uses. Ground-borne vibration levels from construction activities very rarely reach levels that can damage structures; however, these levels are perceptible near the active construction site. With the exception of old buildings built prior to the 1950s or buildings of historic significance, potential structural damage from heavy construction activities rarely occurs. When roadways are smooth, vibration from traffic (even heavy trucks) is rarely perceptible.

The streets surrounding the Project area are paved, smooth, and unlikely to cause significant ground-borne vibration. In addition, the rubber tires and suspension systems of buses and other on-road vehicles make it unusual for on-road vehicles to cause ground-borne noise or vibration problems. It is, therefore, assumed that no such vehicular vibration impacts would occur and, therefore, no vibration impact analysis of on-road vehicles is necessary. Additionally, once constructed, the proposed Project would not contain uses that would generate ground-borne vibration.

Construction Vibration

The construction vibration-sensitive locations include the mobile home park and the condominium units located north and west, respectively, of the Project site. Construction of the proposed Project could result in the generation of ground-borne vibration. This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and will assess the potential for building damages using vibration levels in PPV (in/sec) because vibration levels calculated in root-mean-square (RMS) are best for characterizing human response to building vibration, while vibration level in peak particle velocity (PPV) is best used to characterize potential for damage. The FTA Manual guidelines (2018) indicate that a vibration level up to 102 VdB (equivalent to 0.5 in/sec in PPV) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 in/sec in PPV).

Table 11 shows the PPV and VdB values at 25 ft from a construction vibration source. As shown in Table 11, bulldozers and other heavy-tracked construction equipment (except for pile drivers and vibratory rollers) generate approximately 87 VdB of ground-borne vibration when measured at 25 ft, based on the FTA Manual (2018). Outdoor site preparation for the proposed Project is expected to include the use of bulldozers and loaded trucks.

Table 11: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 Ft	
	PPV (in/sec)	L_V (VdB)[a]
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

[a] RMS vibration velocity in decibels (VdB) is 1 µin/sec.

µin/sec = micro-inches per second
Ft = foot/feet
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The greatest levels of vibration are anticipated to occur during the site preparation phase. All other phases are expected to result in lower vibration levels. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the Project boundary (assuming the construction equipment would be used at or near the Project boundary) as vibration impacts would normally occur within the buildings. The formula for vibration transmission is provided below.

$$L_v dB (D) = L_v dB (25 \text{ ft}) - 30 \text{ Log } (D/25)$$
$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Table 12, below, lists the projected vibration level from various construction equipment expected to be used on the Project site to the nearest buildings in the Project vicinity. For typical construction activity, the equipment with the highest vibration generation potential is the large bulldozer, which would generate 87 VdB at 25 ft. The closest buildings to the Project site include mobile home residences located approximately 50 ft north of the Project site. A condominium complex is located approximately 300 ft west of the Project site, and a fuel service station building is located approximately 150 ft southeast of the Project site.

Table 12: Summary of Construction Equipment and Activity Vibration

Land Use	Equipment/ Activity	Reference Vibration Level (VdB) at 25 Ft	Reference Vibration Level (PPV) at 25 Ft	Distance (ft)	Maximum Vibration Level (VdB)	Maximum Vibration Level (PPV)
Mobile Home Park	Large bulldozers	87	0.089	50	78.0	0.031
Condominium Complex	Large bulldozers	87	0.089	300	54.6	0.002
Fuel Service Station	Large bulldozers	87	0.089	150	63.7	0.006

Source: Compiled by LSA (January 2019).

Note: The FTA-recommended building damage threshold is 0.2 PPV (in/sec) or approximately 94 VdB at the receiving property structure or building.

Ft = foot/feet
FTA = Federal Transit Administration
in/sec = inch(es) per second
PPV = peak particle velocity
VdB = vibration velocity decibel(s)

As shown in Table 12, the residences north of the Project site would experience vibration levels of up to 78 VdB or 0.031 in/sec PPV. The vibration levels, due to construction equipment, at nearby receptors are not anticipated to exceed the City of San Jose vibration threshold of 0.2 in/sec PPV for building damage. As stated above, the City's Municipal Code, Title 20, Part 5, Section 20.50.300 specifies there shall be no activity that causes ground vibration, which is perceptible without instruments at the property line of the site. The FTA Manual (2018) identifies a level of 0.035 in/sec PPV as 'barely perceptible.' The levels projected in Table 12 reach a maximum of 0.031 in/sec PPV, resulting in a less than significant impact. In addition, these vibration levels would no longer occur once construction of the Project is completed. Therefore, ground-borne vibration impacts from construction activities associated with the proposed Project would not be considered significant.

Aircraft Noise Impacts

The site is approximately 6.5 miles south of Norman Y. Mineta San Jose International Airport (SJC) and approximately 4.1 miles southeast of Reid-Hillview Airport in Santa Clara County. While the Project site is in SJC flight paths for both approaches and departures and SJC operational aircraft is visible and audible, the Project site is outside of the 60 dBA CNEL contours of both airports. Therefore, the proposed Project would not result in the exposure of on-site workers and customers to excessive aircraft noise levels.

CONCLUSIONS

The Public Storage Redevelopment Project in San Jose would consolidate the self-storage operations that currently operate on the parcels at 321 West Capitol Expressway and 3911 Snell Avenue. The long-term operations of the Project would remain the same; however, the proposed Buildings 1 and 2 would include rooftop HVAC units to offer customers climate-controlled storage. This analysis demonstrates that the noise levels from the HVAC units would be 38 dBA at the nearest noise-sensitive receptor located north of the Project site at nearby receptor locations. The rooftop HVAC noise levels would be 17 dBA less than the allowable 55 dBA maximum noise level.

Short-term construction activities are anticipated to exceed the City's noise level standards. With the implementation of the following, noise impacts would be reduced to less than significant levels:

- Require construction operations to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code, Title 20.
- A construction noise logistics plan that specifies hours of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints would 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 sensitive uses.
- Unless otherwise expressly allowed in a development permit or other planning approval, no applicant or agent of an applicant shall suffer or allow any construction activity on a site located within 500 ft of a residential unit before 7:00 a.m. or after 7:00 p.m., Monday through Friday, or at any time on weekends.
- Ensure that the greatest distance between noise sources and sensitive receptors during construction activities has been achieved.

- Construction equipment, fixed or mobile, shall be equipped with properly operating and maintained noise mufflers consistent with manufacturers' standards.

- Construction staging areas shall be located away from off-site sensitive uses during the later phases of project development.

- The Construction Contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site whenever feasible.

- The Construction Contractor shall use on-site electrical sources to power equipment rather than diesel generators whenever feasible.

REFERENCES

City of San Jose. 2011. *Envision San Jose 2040 General Plan*. November.

_____. 2019. Municipal Code, Noise Ordinance.

Federal Highway Administration (FHWA). 1977. Highway Traffic Noise Prediction Model, FHWA RD-77-108.

_____. 2006. *Highway Construction Noise Handbook*. Roadway Construction Noise Model, FHWA-HEP-06-015. DOT-VNTSC-FHWA-06-02, NTIS No. PB2006-109012. August.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual* (FTA Manual). September.

Harris, Cyril M., editor. 1991. *Handbook of Acoustical Measurements and Noise Control*, Third Edition.

Harris, David A. 1997. *Noise Control Manual for Residential Buildings*. July.

LSA Associates, Inc. (LSA). 2019. *Transportation Analysis, 231 West Capitol Expressway Public Storage, San Jose, California, February 2019*.

U.S. Environmental Protection Agency (USEPA). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. March.

_____. 1978. *Protective Noise Levels, Condensed Version of EPA Levels Document, EPA 550/9-79-100*. November.

ATTACHMENT A

PROJECT FIGURES

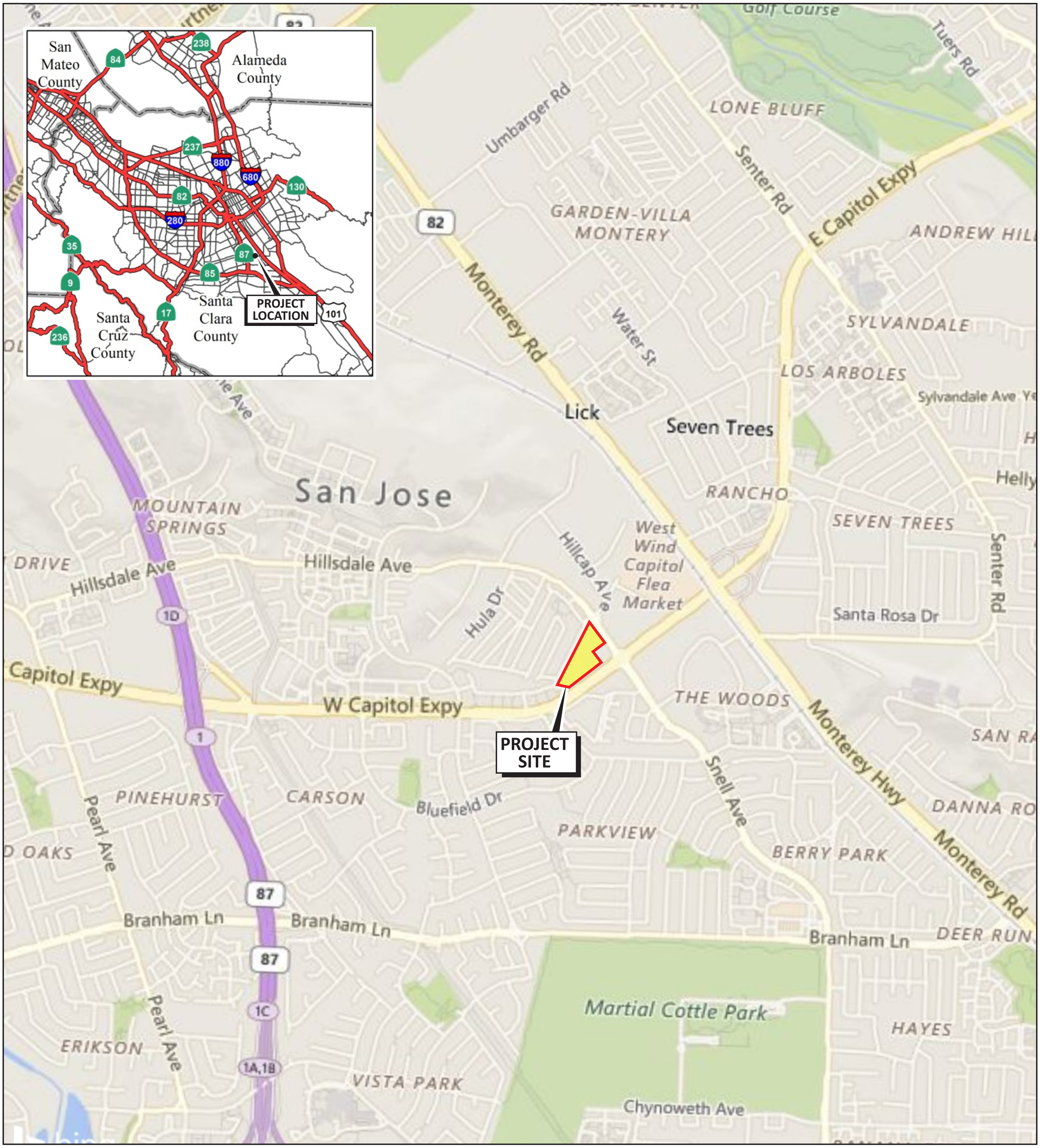


FIGURE 1

LSA

SOURCE: Bing Maps

Public Storage San Jose

Regional Location and Project Site

P:\PUB1702.02\Noise\G\Regional Location and Project Site.cdr (2/5/2019)

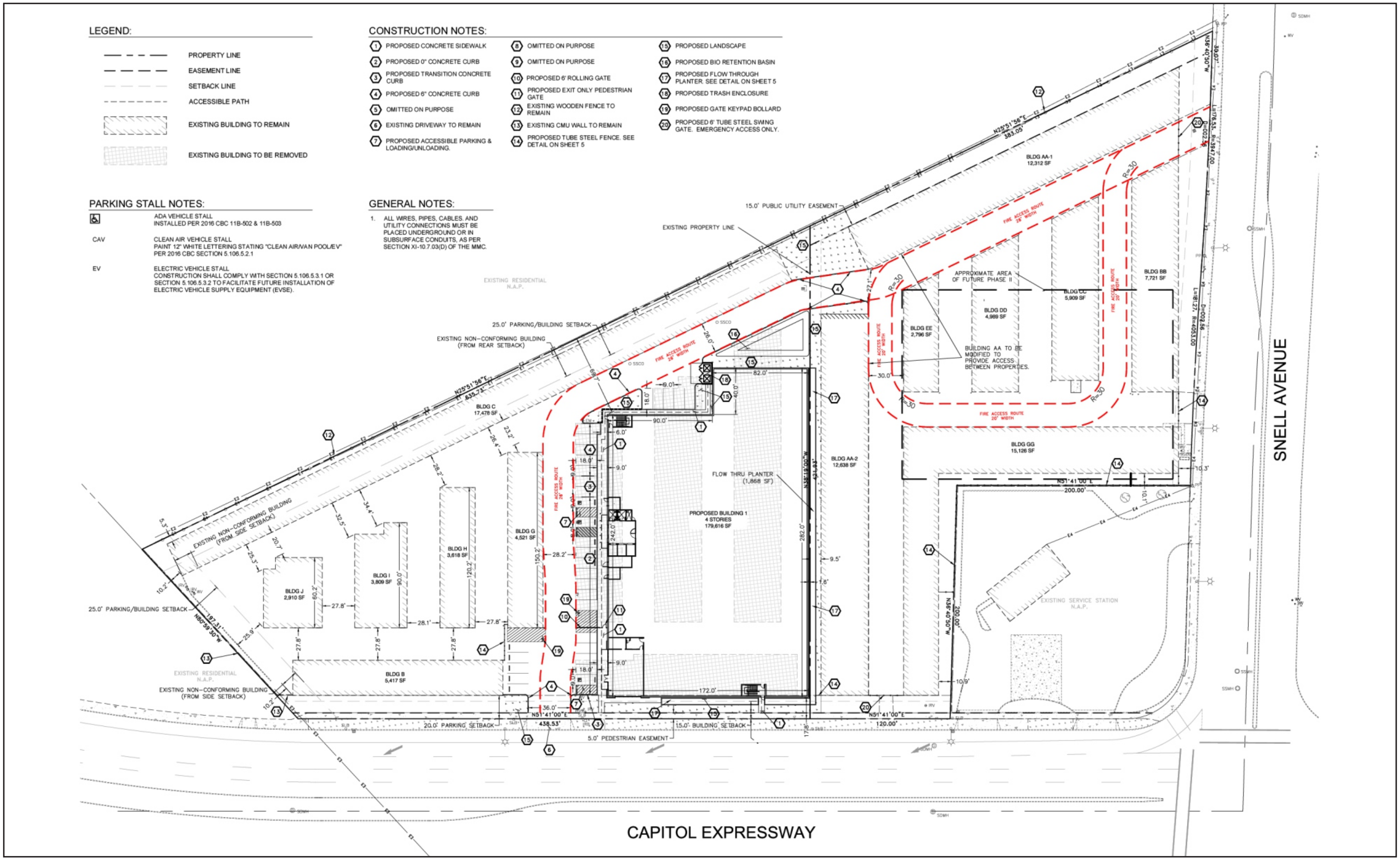


FIGURE 2

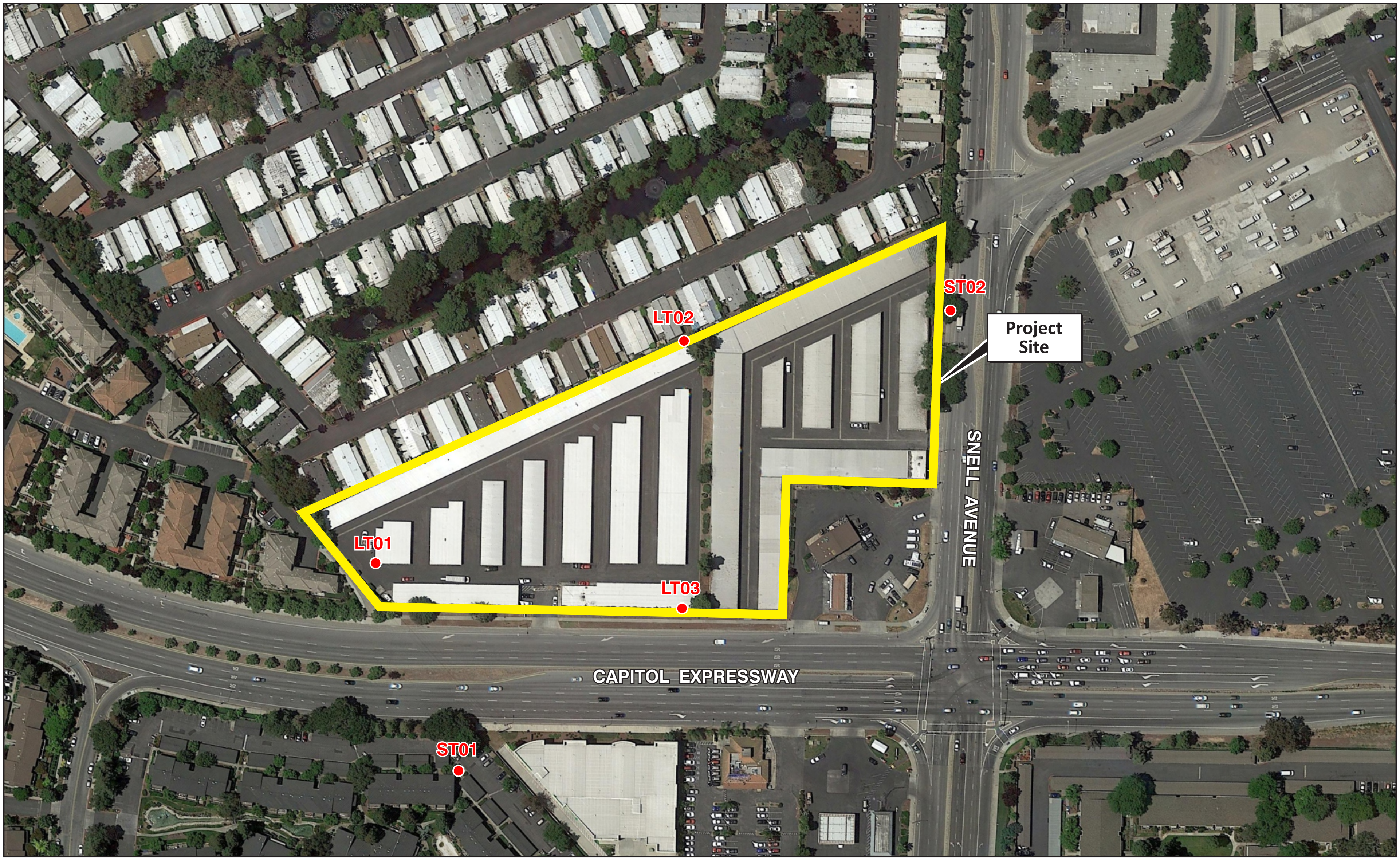
N

0 60 120
FEET

SOURCE: Lars Andersen and Associates, Inc. (9/21/2018)

Public Storage San Jose
Conceptual Site Plan

I:\PUB1705.02\Noise\G\Figure 2_Conceptual Site Plan.cdr (2/5/2019)



LSA

FIGURE 3

SOURCE: Google Earth, 5/2018

Public Storage San Jose

Noise Level Measurement Locations

ATTACHMENT B

NOISE MONITORING SURVEY SHEETS

Noise Measurement Survey

Project Number: PUB1705.02 Test Personnel: Chet Monh
Project Name: Public Storage- San Jose Equipment: LD SoundTrack LXT0004025

Site Number: 01A Date: January 25, 2019 Time: From 3:23pm To 3:38pm

Site Location: Sagemark Apartment Complex

Primary Noise Sources: Traffic on Capitol Expressway
Comments: parking lot noise, San Jose Airport overflights noise

Adjacent Roadways: Baroni Avenue (not contributing noise source, cul-de-sac)

File:	PUB1705_2_STNLM_01_Sagemark_A.xlsx
L_{eq}	61.6
L_{max}	73.4
L_{min}	43.0
L_5	66.9
L_{10}	64.3
L_{33}	61.6
L_{50}	60.0
L_{66}	58.2
L_{90}	52.9

Atmospheric Conditions	
Average Wind Velocity (mph)	0
Maximum Wind Velocity (mph)	1.0
Temperature (F)	65
Relative Humidity (%)	54

Noise Measurement Survey

Project Number: PUB1705.02
Project Name: Public Storage- San Jose

Test Personnel: Chet Monh
Equipment: LD SoundTrack LXT0004025

Site Number: 01B Date: January 28, 2019

Time: From 12:41pm To 12:56pm

Site Location: Sagemark Apartment Complex

Primary Noise Sources: Traffic on Capitol Expressway
Comments: parking lot noise, San Jose Airport overflights noise

Adjacent Roadways: Baroni Avenue (not contributing noise source, cul-de-sac)

File:	PUB1705_2_STNLM_01_Sagemark_B.xlsx
L_{eq}	61.3
L_{max}	70.1
L_{min}	44.3
L_5	65.8
L_{10}	63.9
L_{33}	62.0
L_{50}	59.8
L_{66}	57.3
L_{90}	51.7

Atmospheric Conditions	
Average Wind Velocity (mph)	0
Maximum Wind Velocity (mph)	1.5
Temperature (F)	65
Relative Humidity (%)	51

Noise Measurement Survey

Project Number: PUB1705.02
Test Personnel: Chet Monh
Project Name: Public Storage- San Jose
Equipment: LD SoundTrack LXT0004025

Site Number: 02A Date: January 25, 2019
Time: From 6:36pm To 18:51pm

Site Location: On Project site, near Snell Avenue

Primary Noise Sources: Traffic on Snell Avenue
Comments: Near Hillcap Avenue T-intersection, San Jose Airport overflights noise

Adjacent Roadways: Hillcap Avenue

File:	PUB1705.02_STNLM_S01.xlsx
L_{eq}	70.9
L_{max}	92.5
L_{min}	50.4
L_5	72.3
L_{10}	70.7
L_{33}	67.1
L_{50}	65.3
L_{66}	63.1
L_{90}	58.5

Atmospheric Conditions	
Average Wind Velocity (mph)	0
Maximum Wind Velocity (mph)	1.1
Temperature (F)	55
Relative Humidity (%)	60

Noise Measurement Survey

Project Number: PUB1705.02
Test Personnel: Chet Monh
Project Name: Public Storage- San Jose
Equipment: LD SoundTrack LXT0004025

Site Number: 02B Date: January 28, 2019
Time: From 11:06am To 11:21am

Site Location: On Project site, near Snell Avenue

Primary Noise Sources: Traffic on Snell Avenue
Comments: Near Hillcap Avenue T-intersection, San Jose Airport overflights noise

Adjacent Roadways: Hillcap Avenue

File:	PUB1705.02_STNLM_S01.xlsx
L_{eq}	68.9
L_{max}	83.6
L_{min}	52.3
L_5	74.5
L_{10}	71.7
L_{33}	67.0
L_{50}	65.6
L_{66}	62.6
L_{90}	58.8

Atmospheric Conditions	
Average Wind Velocity (mph)	0
Maximum Wind Velocity (mph)	1.0
Temperature (F)	62
Relative Humidity (%)	52

Location Photo: