# 4.7 NOISE

## INTRODUCTION

This section provides background information concerning the methods and noise and vibration data used to assess the noise and vibration impacts resulting from the East Weddell residential projects. A brief summary of noise and vibration concepts is presented to assist the reader in understanding the discussion. Existing noise and vibration conditions are documented through a site survey. The analysis of impacts focuses on the predominant sources of environmental noise or vibration that affect the compatibility of the sites for the proposed land uses, and the potential short-term and long-term noise and vibration impacts upon sensitive receivers in the vicinity of the projects that would result from the construction and operation of the projects. Measures are recommended to mitigate significant impacts that are identified.

## ENVIRONMENTAL SETTING

### NOISE BACKGROUND AND TERMINOLOGY

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 that are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that 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, and so on. 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 4.7-1.**

There are several methods of characterizing sound. The most common in California is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. 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 used. 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

**Table 4.7-1 Definitions of Acoustical Terms Used in this Report**

| Term | Definitions |
|---|---|
| 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. |
| 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. |
| Lmax, Lmin | The maximum and minimum A-weighted noise level during the measurement period. |
| L01, L10, L50, L90 | The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period. |
| Day/Night Noise Level, $L_{dn}$ or DNL | The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am. |
| 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.

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 Day/Night Average Sound Level, DNL, is one measure of the cumulative noise exposure in a community, with a 10 dB penalty added to nocturnal (10:00 PM - 7:00 AM) noise levels.

## GROUND-BORNE VIBRATION BACKGROUND AND TERMINOLOGY

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several methods are typically used to quantify the amplitude of vibration including Peak Particle Velocity (PPV) and Root Mean Square (RMS) velocity. PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. RMS velocity is defined as the average of the squared amplitude of the signal, usually measured in decibels referenced to 1micro-in/sec and reported in VdB. PPV and VdB vibration velocity amplitudes are used to evaluate human response to vibration.

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. In high noise environments, which are more prevalent where ground-borne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows. In urban environments, such as Sunnyvale, sources of ground-borne vibration include construction activities, light and heavy rail transit, and heavy trucks and buses.

### *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 ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the peak particle velocity descriptor (PPV) has been routinely used to measure and assess ground-borne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec, PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels such as people in an urban environment may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to a building. Construction-induced vibration that can be detrimental to a 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 (e.g., impact pile driving) occurs immediately adjacent to the structure.

**Table 4.7-2** displays continuous vibration impacts on human annoyance and on buildings. As discussed previously, annoyance is a subjective measure and vibrations may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying.

**Table 4.7-2 Reaction of People and Damage to Buildings from Construction Vibration Levels**

| Velocity Level, PPV (in/sec) | Human Reaction | Effect on Buildings |
|---|---|---|
| 0.01 | Barely perceptible | No effect |
| 0.04 | Distinctly perceptible | Vibration unlikely to cause damage of any type to any structure |
| 0.08 | Distinctly perceptible to strongly perceptible | Recommended upper level of the vibration to which ruins and ancient monuments should be subjected |
| 0.1 | Strongly perceptible | Virtually no risk of damage to normal buildings |
| 0.3 | Strongly perceptible to severe | Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings |
| 0.5 | Severe - Vibrations considered unpleasant | Threshold at which there is a risk of damage to newer residential structures |

Source: Transportation- and Construction-Induced Vibration Guidance Manual, California Department of Transportation, June 2004(a).

*Light-Rail/Heavy-Rail Vibration*

Rail operations are potential sources of substantial ground-borne vibration depending on distance, the type and the speed of trains, and the type of railroad track. People's response to ground-borne vibration has been correlated best with the velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1 x $10^{-6}$ in./sec. RMS, which equals 0 VdB, and 1 in. /sec. equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

One of the problems with developing suitable criteria for ground-borne vibration is the limited research into human response to vibration and more importantly human annoyance inside buildings. The U.S. Department of Transportation, Federal Transit Administration has developed rational vibration limits that can be used to evaluate human annoyance to ground-borne vibration. These criteria are primarily based on experience with passenger train operations, such as rapid transit and commuter rail systems. The main difference between passenger and freight operations

is the time duration of individual events; a passenger train lasts a few seconds whereas a long freight train may last several minutes, depending on speed and length.

*Vibration from Heavy Trucks and Buses*

Ground-borne vibration levels from heavy trucks and buses are not normally perceptible, especially if roadway surfaces are smooth. Buses and trucks typically generate ground-borne vibration levels of about 63 VdB at a distance of 25 feet when traveling at a speed of 30 miles per hour (mph). Higher vibration levels can occur when buses or trucks travel at higher rates of speed or when the pavement is in poor condition. Vibration levels below 65 VdB are below the threshold for human perception.

## EXISTING NOISE CONDITIONS IN THE PROJECT SITE VICINITY

*Ambient Noise Monitoring Survey*

A noise monitoring survey was performed at the site between Friday, April 5, 2013 and Monday, April 8, 2013, which included long-term noise measurements at four locations and short-term noise measurements at three additional locations (**Figure 4.7-1**). Observations and data collected during the noise monitoring survey identified that the primary noise sources at the site and in surrounding areas are vehicular traffic along U.S. Highway 101, N. Fair Oaks Avenue, and E. Weddell Drive.

Long-term noise measurement LT-1 was made at the north property line of the Sares Regis site near the John W. Christian Greenbelt, the City of Sunnyvale Fair Oaks Substation, and the El Dorado Mobile Home Park. The noise data collected at Site LT-1 revealed that hourly average noise levels typically range from 49 to 63 dBA $L_{eq}$. The day-night average noise level measured over the weekend ranged from 59 to 60 dBA DNL at Site LT-1. The data collected on Friday and Monday revealed that weekday day-night average noise levels are approximately 65 dBA DNL at Site LT-1 due to higher traffic volumes on area roadways. The daily trends in noise levels measured at Site LT-1 are summarized graphically in Appendix B, Figures B-1 to B-4.

The second long-term noise measurement (LT-2) was made at a distance of 180 feet from the center of U.S. Highway 101 on the Sares-Regis site to document the noise exposure along the southernmost boundaries of both sites. Noise levels measured at Site LT-2 were primarily the result of U.S. Highway 101 traffic with hourly average noise levels typically ranging from 62 to 73 dBA $L_{eq}$. The weekday day-night average noise level was estimated to be 75 dBA DNL. The daily trends in noise levels measured at Site LT-2 are summarized graphically in Appendix B, Figures B-5 to B-8.

Long-term noise measurement LT-3 was made at the northeast corner of the Raintree site, approximately 130 feet from the center of N. Fair Oaks Avenue. Hourly average noise levels, resulting primarily from local traffic, typically ranged from 51 to 66 dBA $L_{eq}$. The day-night average noise level was estimated to be 67 dBA DNL on weekdays and 64 to 66 dBA DNL on weekend days. The daily trends in noise levels measured at Site LT-3 are summarized graphically in Appendix B, Figures B-9 to B-12.

Figure 4.7-1

**NOISE MONITORING LOCATIONS**

SOURCE: Amy Skewes-Cox

AMY SKEWES~COX
ENVIRONMENTAL PLANNING

The final long-term noise measurement (LT-4) was made at the northwest corner of the Raintree site, approximately 30 feet from the center of East Weddell Drive. The noise measurement location documented the existing noise exposure at the site and also represented the existing noise exposure at residential land uses opposite East Weddell Drive. Noise levels measured at Site LT-4 typically ranged from 52 to 67 dBA $L_{eq}$, and day-night average noise levels ranged from 65 to 67 dBA DNL. The daily trends in noise levels measured at Site LT-4 are summarized graphically in Appendix B, Figures B-13 to B-16.

Short-term noise measurements were made at three additional locations to quantify the variation in noise levels across the Sares-Regis and Raintree sites. The locations of the short-term noise measurements are also indicated in Figure 4.7-1. Site ST-1 was on the Raintree site adjacent to North Fair Oaks Avenue and the northbound U.S. Highway 101 on-ramp from North Fair Oaks Avenue. The mid-day measured noise level at this location was 62 dBA $L_{eq}$. Site ST-2 was approximately 50 feet north of the northbound U.S. Highway 101 right-of-way, at the southwest corner of the Raintree site. The mid-day measured noise level was 71 dBA $L_{eq}$. Short-term noise measurement site ST-3 was located at the westernmost portion of the Sares-Regis site near the U.S. Highway 101 off-ramp to N. Fair Oaks Avenue. The mid-day measured noise level at ST-3 was 66 dBA $L_{eq}$.

*Moffett Federal Airfield*

The Santa Clara County Airport Land Use Plan recently completed a Comprehensive Land Use Plan for Moffett Federal Airfield (Windus, 2012). Prior to preparation of this document, Moffett Federal Airfield was not included in the Comprehensive Land Use Plan for Santa County Clara airports. Moffett Federal Airfield was a U.S. Naval Air Station until it was transferred to NASA in 1994. The California Air National Guard is based at and operating from the airport. The remainder of airport operation includes NASA test flights and U.S. government personnel and air cargo flights. There are a limited number of civilian operations at the airport, which are anticipated to remain the same throughout the study period. Because Moffett Federal Airfield is a U.S. government airport, it is not included in many of the other FAA regulations.

The noise contours for Moffett Federal Airfield (Figure 5 from the Plan) are shown in **Figure 4.7-2**. The project sites are located outside the 60 dBA CNEL noise contour so the noise exposure of the project sites is less than 60 dBA CNEL.

*Existing Vibration Conditions*

During the site survey, the area was examined for potential sources of vibration that could affect the project sites. There are no heavy rail or rail transit systems in the vicinity. U.S. Highway 101 adjoins the project sites. Baseline vibration levels on the project sites resulting from heavy truck traffic on U.S. Highway 101 were established using data developed by Caltrans (Caltrans, 2004). The ambient Peak Particle Velocity (PPV) resulting from heavy truck traffic in the near travel lane is projected to be about 0.04 inches per second (in/sec) PPV at the adjacent project boundaries, and about 0.02 in/sec PPV at a distance of about 90 feet from the near travel lane (the approximate distance to the nearest proposed vibration sensitive location outside the building). According to Caltrans, automobile traffic normally generates vibration levels of one-fifth to one-tenth of truck

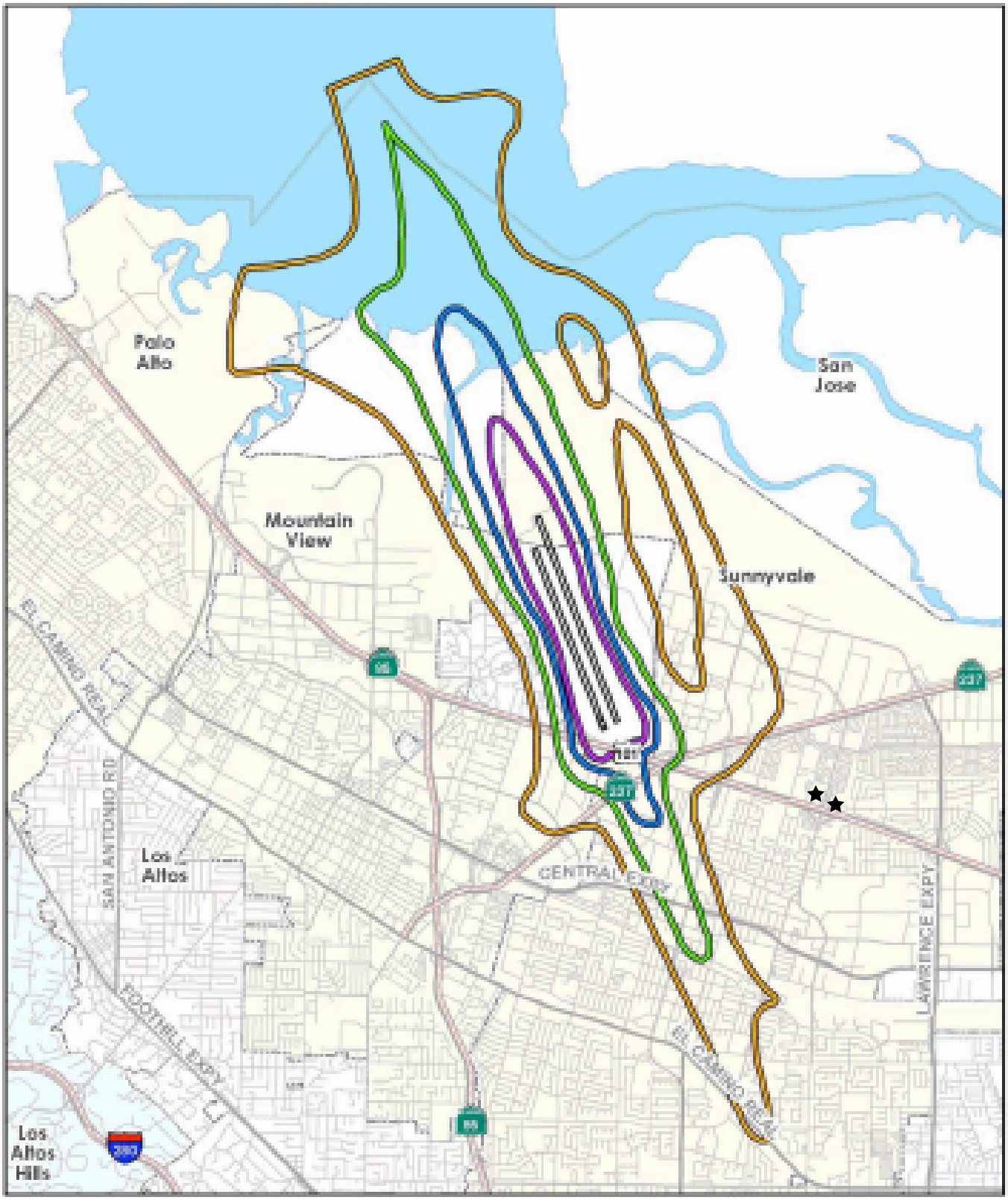


Figure 4.7-2

**MOFFETT FEDERAL AIRFIELD NOISE CONTOURS**

SOURCE: Windus, 2012

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vibrations and is therefore an insignificant source of vibration given that levels are typically below the threshold of perceptibility at the highway right-of-way.

## REGULATORY FRAMEWORK

### FEDERAL REGULATIONS

The Federal Aviation Administration (FAA) has established the Federal Aviation Regulations (FAR) Part 150 (Airport Noise Compatibility and Land Use Planning) to address noise at civilian airports. FAR Part 150 specifically addresses airport noise compatibility planning. These regulations prescribe the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving projects related to those programs. FAR Part 150 directs that noise contours for airports be developed using the FAA's Integrated Noise Model (INM) for developing standardized noise exposure maps and predicting noise impacts. The agency must identify incompatible land uses within the noise contours. FAR Part 150 review often leads to operational changes in a project to minimize or mitigate impacts.

### STATE OF CALIFORNIA REGULATIONS

*California Noise Insulation Standards*

The State of California establishes minimum noise insulation performance standards for hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family dwellings as set forth in the 2010 California Building Code (Chapter 12, Appendix Section 1207.11). The noise limit is a maximum interior noise level of 45 dBA DNL. Where exterior noise levels exceed 60 dBA DNL, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the noise limit. The local jurisdiction General Plan facilitates the implementation of the Building Code noise insulation standards.

*Division of Aeronautic Noise Standards*

Title 21 of the California Code of Regulations (Caltrans, 1990) sets forth the State of California's airport noise standards. In the findings described in Section 5006, the standard states the following: "A level of noise acceptable to a reasonable person residing in the vicinity of an airport is established as a community noise equivalent level (CNEL) value of 65 dB for purposes of these regulations. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep, and community reaction." Based on this finding, the airport noise standard as defined in Section 5012 is set at a CNEL of 65 dB.

## LOCAL REGULATIONS

*Santa Clara County Airport Land Use Commission*

The Santa Clara County Airport Land Use Commission (ALUC) prepares an ALUC plan that provides for orderly growth of the area surrounding each public airport in Santa Clara County (Moffett Federal Airfield, San Jose International Airport, Palo Alto Airport, Reid-Hillview Airport, South County Airport). The plan is intended to minimize the public's exposure to excessive noise and safety hazards. The ALUC has established provisions for regulating land use, building height, safety and noise insulation within these areas that are adjacent to each of the airports ("referral boundaries").

The ALUC also reviews the general and specific plans prepared by local agencies (including Sunnyvale) for consistency with the ALUC plan. Recommendations made by the ALUC are advisory in nature to the local jurisdictions, not mandatory.

*City of Sunnyvale*

**Safety and Noise Element of the General Plan**

The Safety and Noise Element of the Sunnyvale General Plan (City of Sunnyvale, 2011) identifies noise and land use compatibility standards for various land uses. The Safety and Noise Element establishes goals, policies, and standards for evaluating the compatibility of proposed land uses with the noise environment. Relevant goals and policies of the element are as follows:

**GOAL SN-8 – Maintain or achieve a compatible noise environment for all land uses in the community.**

Policy SN-8.1: Enforce and supplement state laws regarding interior noise levels of residential units.

Policy SN-8.2: Apply Title 24 noise insulation requirements to all new single-family detached homes.

Policy SN-8.3: Attempt to achieve a maximum instantaneous noise level of 50 dBA in bedrooms and 55 dBA in other areas of residential units exposed to train or aircraft noise, where the exterior $L_{dn}$ exceeds 55 dBA.

Policy SN-8.4: Prevent significant noise impacts from new development by applying state noise guidelines and Sunnyvale Municipal Code noise regulations in the evaluation of land use issues and proposals.

Policy SN-8.5: Comply with "State of California Noise Guidelines for Land Use Planning" (Figure 6-5 of the Safety-Noise Element) for the compatibility of land uses with their noise environments, except where the City determines that there are prevailing circumstances of a unique or special nature.

Policy SN-8.6: Use Figure 6-6 (of the Safety-Noise Element), "Significant Noise Impacts from New Development on Existing Land Use" to determine if proposed development results in a "significant noise impact" on existing development.

Policy SN-8.7: Supplement Figure 6-5, "State of California Noise Guidelines for Land Use Planning" for residential uses by attempting to achieve an outdoor Ldn of noise greater than 60 dBA for common recreational areas, backyards, patios and medium and large-size balconies. These guidelines should not apply where the noise source is a railroad or an airport. If the noise source is a railroad, then an Ldn of no greater than 70 dBA should be achieved in common areas, backyards, patios and medium and large-size balconies. If the noise source is from aircraft, then preventing new residential land uses within areas of high Ldn from aircraft noise is recommended.

Policy SN-8.8: Avoid construction of new residential uses where the outdoor Ldn is greater than 70 dBA as a result from train noise.

Policy SN-8.9: Consider techniques that block the path of noise and insulate people from noise.

**GOAL SN-9 – Maintain or achieve acceptable limits for the levels of noise generated by land use operations and single-events.**

Policy SN-9.1: Regulate land use operation noise.

Policy SN-9.2: Regulate select single-event noises and periodically monitor the effectiveness of the regulations.

Policy SN-9.3: Apply conditions to discretionary land use permits which limit hours of operation, hours of delivery, and other factors which affect noise.

**GOAL SN-10 – Preserve and enhance the quality of neighborhoods by maintaining or reducing the levels of noise generated by transportation facilities.**

Policy SN-10.1: Refrain from increasing or reduce the noise impacts of major roadways.

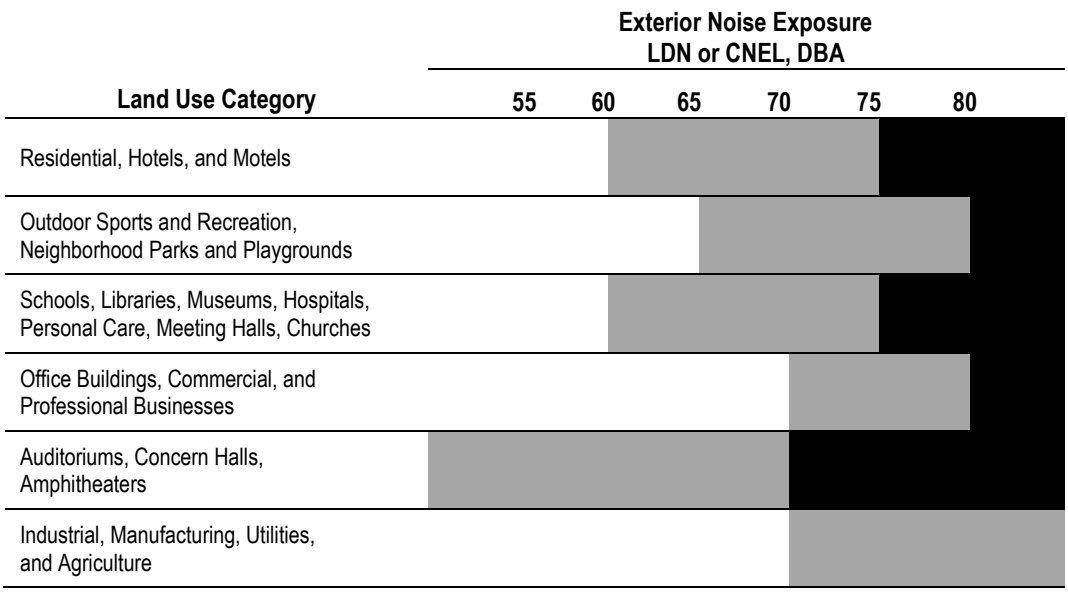
Policy SN-10.2: Support efforts to reduce or mitigate airport noise, including noise impacts of Moffett Federal Airfield, San Jose international Airport and helicopters.

Policy SN-10.3: Oppose any effort and /or expenditure of public funds to promote Moffett Federal Airfield for non-Federal purposes.

Policy SN-10.4: Mitigate and avoid the noise impacts from trains and light rail facilities.

**Table 4.7-3** shows Sunnyvale General Plan standards for the compatibility of various land use categories with varying noise levels.

**Table 4.7-3 Land Use Compatibility Guidelines for Community Noise in Sunnyvale**




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

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

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

Source: Illingworth & Rodkin, Inc., 2013.

## Municipal Code

Sunnyvale Municipal Code Title 19, Chapter 19.42 presents operational noise standards that would be enforced on residentially zoned property. Section 19.42.030 (a) states that, "Operational noise shall not exceed 75 dBA at any point on the property line of the premises upon which the noise or sound is generated or produced; provided, however, that the noise or sound level shall not exceed 50 dBA during nighttime or 60 dBA during daytime hours at any point on adjacent residentially zoned property. If the noise occurs during nighttime hours and the enforcing officer has determined that the noise involves a steady, audible tone such as a whine, screech or hum, or is a staccato or intermittent noise (e.g., hammering) or includes music or speech, the allowable noise or sound level shall not exceed 45 dBA."

Section 19.42.030 (b) states that, "Powered equipment used on a temporary, occasional, or infrequent basis that produces a noise greater than the applicable operational noise limit set forth in subsection (19.42.030 (a) shall be used only during daytime hours when used adjacent to a property with a residential zoning district. Powered equipment used on other than a temporary, occasional, or infrequent basis shall comply with the operational noise requirements. For the purpose of this section, powered equipment does not include leaf blowers. Construction activity regulated by Title 16 of this code shall not be governed by this section."

Section 19.42.030 (c) states that, "It is unlawful for any person to make or allow to be made a nighttime delivery to a commercial or industrial establishment when the loading/unloading area of the establishment is adjacent to a property in a residential zoning district. Businesses legally operating at a specific location as of February 1, 1995, are exempt from this requirement."

Section 19.42.030 (d) defines a leaf-blower. "A "leaf blower" is a small, combustion engine-powered device used for property or landscape maintenance that can be hand-held or carried on the operator's back and which operates by propelling air under pressure through a cylindrical tube. It is unlawful for any person to operate a leaf blower on private property in or adjacent to a residential area except between the hours of 8:00 AM and 8:00 PM effective January 1, 2000, all leaf blowers operated in or adjacent to a residential area shall operate at or below a noise level of 65 dBA at a distance of 50 feet, as determined by a test conducted by the American National Standards Institute or an equivalent. The dBA rating shall be prominently displayed on the leaf blower (Ord. 2623-99 § 1 (part): prior zoning code § 19.24.020(b)-(d))."

Title 16, Chapter 16.08 presents construction noise regulations.

Construction activity is permitted between the hours of 7:00 AM and 6:00 PM daily Mondays through Fridays. Saturday hours of operation are between 8:00 AM and 5:00 PM. No construction activity is allowed on Sundays or national holidays when city offices are closed.

No loud environmentally disruptive noises, such as air compressors without mufflers, continuously running motors or generators, loud playing musical instruments, or radios, will be allowed where such noises may be a nuisance to adjacent residential neighborhoods. Exceptions are as follows:

(a) Construction activity is permitted for detached single-family residential properties when the work is being performed by the owner of the property, provided no construction activity is conducted prior to 7:00 AM or after 7:00 PM Mondays through Fridays, prior to 8:00 AM or after 7:00 PM on Saturdays and prior to 9:00 AM or after 6:00 PM on Sundays and national holidays when city offices are closed. It is permissible for up to two persons to assist the owner of the property so long as they are not hired by the owner to perform the work. For purposes of this section, "detached single-family residential property" refers only to housing that stands completely alone with no adjoining roof, foundation, or sides.

(b) Where emergency conditions exist, construction activity may be permitted at any hour or day of the week. Such emergencies shall be completed as rapidly as possible to prevent any disruption to the residential neighborhoods (Ord. 2774-05 § 1; Ord. 2756-04 § 1: Ord. 2704-02 § 2).

# ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

## SIGNIFICANCE CRITERIA

For the purposes of this Draft EIR, development of the projects would present a significant impact if the projects would:

- Expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Expose people to or generate excessive ground-borne vibration or ground-borne noise levels;
- Create a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Create a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

## METHODOLOGY

The goals and policies contained in the Safety and Noise Element of the Sunnyvale General Plan and regulations set forth in the Sunnyvale Municipal Code, as summarized under "Regulatory Framework" above, establish local noise standards. Vibration guidelines established by state agencies address vibration issues. Future noise levels resulting from development of the projects and cumulative growth in the area were modeled and the modeled results were used to evaluate the significance of impacts when assessed with respect to the applicable regulatory criteria. The compatibility of new development is evaluated with respect to the future (2035) noise environment assuming cumulative development occurs because this corresponds to the highest expected noise environment. The impact of increased traffic noise is assessed for the project under the various development scenarios and the future condition assuming cumulative development with the Applicant Proposed Scenario and the Full Buildout Scenario.

## PROJECT IMPACTS

**<u>Impact NOISE-1</u>: Existing and future noise levels at the project sites would exceed the City's noise thresholds of acceptability. (S)**

Residential development is sensitive to community noise both outdoors and indoors during the daytime and nighttime. High-density/mixed-use residential, commercial, and office development is less noise-sensitive because uses are primarily indoors, and noise levels are mitigated with building design and construction. Where exterior noise levels exceed 60 dBA DNL in new residential development areas, interior noise levels may exceed 45 dBA DNL. Interior noise levels are a function of the use of the space but should generally be limited to 45 dBA DNL or less. Interior noise levels are about 15 dBA lower than exterior levels within residential units with the windows partially open and approximately 20 to 25 decibels lower than exterior noise levels with

the windows closed, assuming typical California construction methods. Where exterior day-night average noise levels are 60 to 70 dBA DNL, interior noise levels can typically be maintained below 45 dBA DNL with the incorporation of an adequate forced air mechanical ventilation system in the residential units to allow residents the option of controlling noise by keeping the windows closed. The need for noise attenuation measures in building construction and project design will be determined at the time development is proposed. In all areas exceeding 70 dBA DNL, the inclusion of windows and doors with high Sound Transmission Class (STC) ratings, and the incorporation of forced-air mechanical ventilation systems, may be necessary to reduce the interior noise level to 45 dBA DNL or lower inside residences.

Future traffic noise levels were modeled using the Federal Highway Administration's Traffic Noise Model (TNM) based on the traffic volumes anticipated in 2035 to determine the future noise level resulting from U.S. Highway 101 and local roadways adjoining the project sites. The evaluation of noise and land use compatibility is the same for the Applicant Proposed Scenarios and Full Buildout Scenarios on both sites because the buildings would be exposed to the same noise exposure under both development scenarios.

*Sares Regis Applicant Proposed Scenario.* The existing noise environment at the project site exceeds the City's noise level goal for exterior noise at residential uses (60 dBA DNL) as a result of transportation noise sources in the site vicinity. Residential units facing U.S. Highway 101 would be exposed to noise levels ranging from 69 to 78 dBA DNL, as shown in **Figure 4.7-3**. The proposed project also includes three courtyards for outdoor recreation or activities. The noise level in common outdoor recreation areas would be 55 dBA DNL or less (compatible with the use) due to the shielding provided by the intervening structures.

Where exterior day-night average noise levels are less than 65 to 70 dBA DNL, interior noise levels can typically be maintained below City and State of California standards (45 dBA DNL) with the incorporation of forced air mechanical ventilation systems in residential units. Where noise levels exceed 65 to 70 dBA DNL, such as residences proposed on the U.S. Highway 101 and North Fair Oaks Avenue facades, forced-air mechanical ventilation systems and sound-rated construction would be required. Specifications of window and wall systems can be determined during the final design stage of the project when building elevations and floor plans are available, but would likely include a forced air mechanical ventilation system, standard to improved wall construction methods, and windows and doors with Sound Transmission Class (STC) ratings of 30 to 40. This is a significant impact.

*Sares Regis Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Raintree Applicant Proposed Scenario.* The existing noise environment at the project site exceeds the City's noise level goal for exterior noise at residential uses (60 dBA DNL) as a result of transportation noise sources in the site vicinity. Residential units facing U.S. Highway 101 would be exposed to noise levels ranging from 63 to 79 dBA DNL as showing in **Figure 4.7-4**. The proposed project also includes several courtyards or partially shielded areas for outdoor recreation where noise levels would be less than 55 dBA DNL and compatible with the use.

As discussed above, forced-air mechanical ventilation systems and sound-rated construction would be required. This is a significant impact.

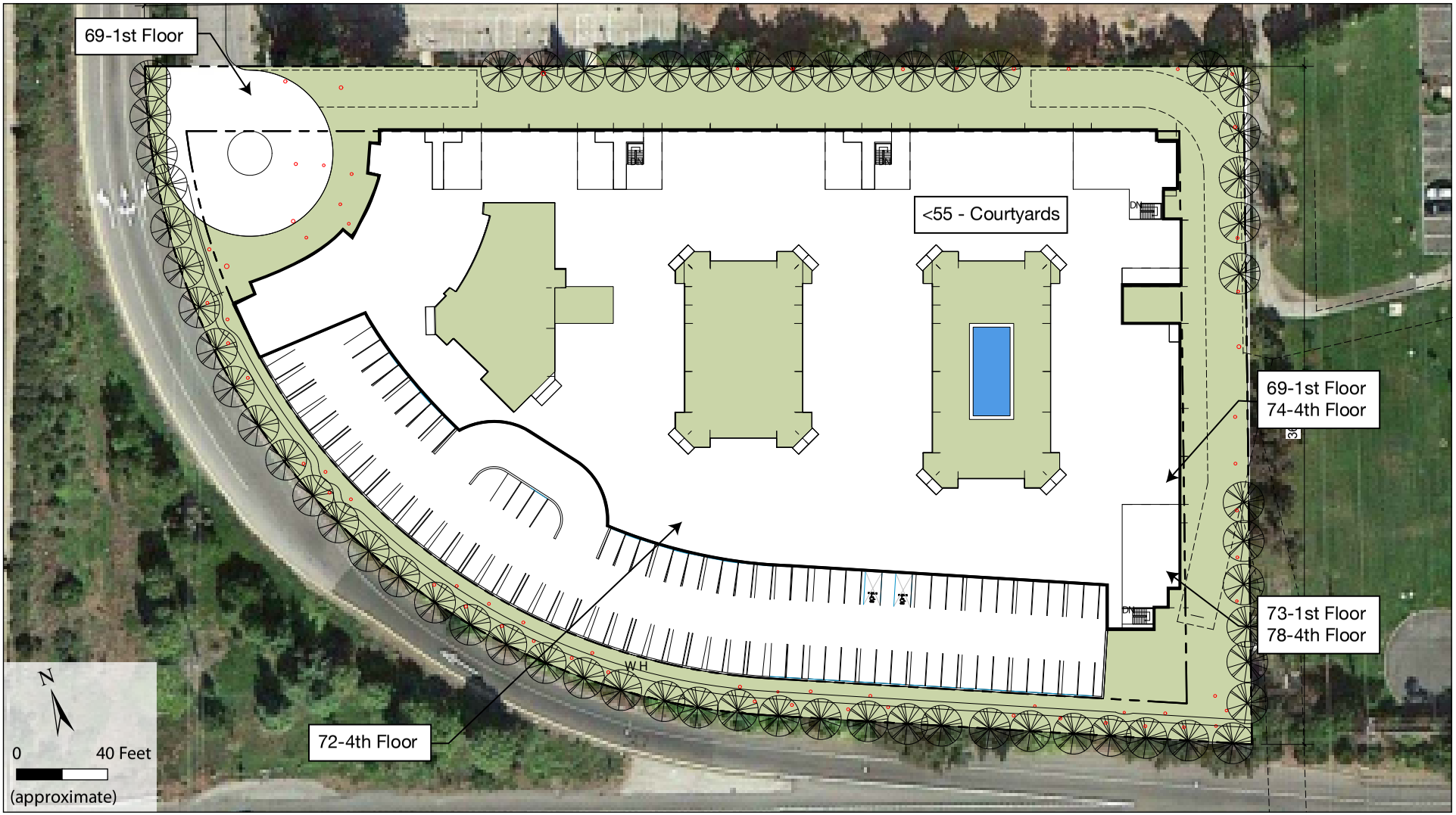



Figure 4.7-3

SOURCE: Steinberg Architects, 2013

**SARES REGIS FUTURE NOISE EXPOSURE (dBA, DNL)**

AMY SKEWES~COX
ENVIRONMENTAL PLANNING

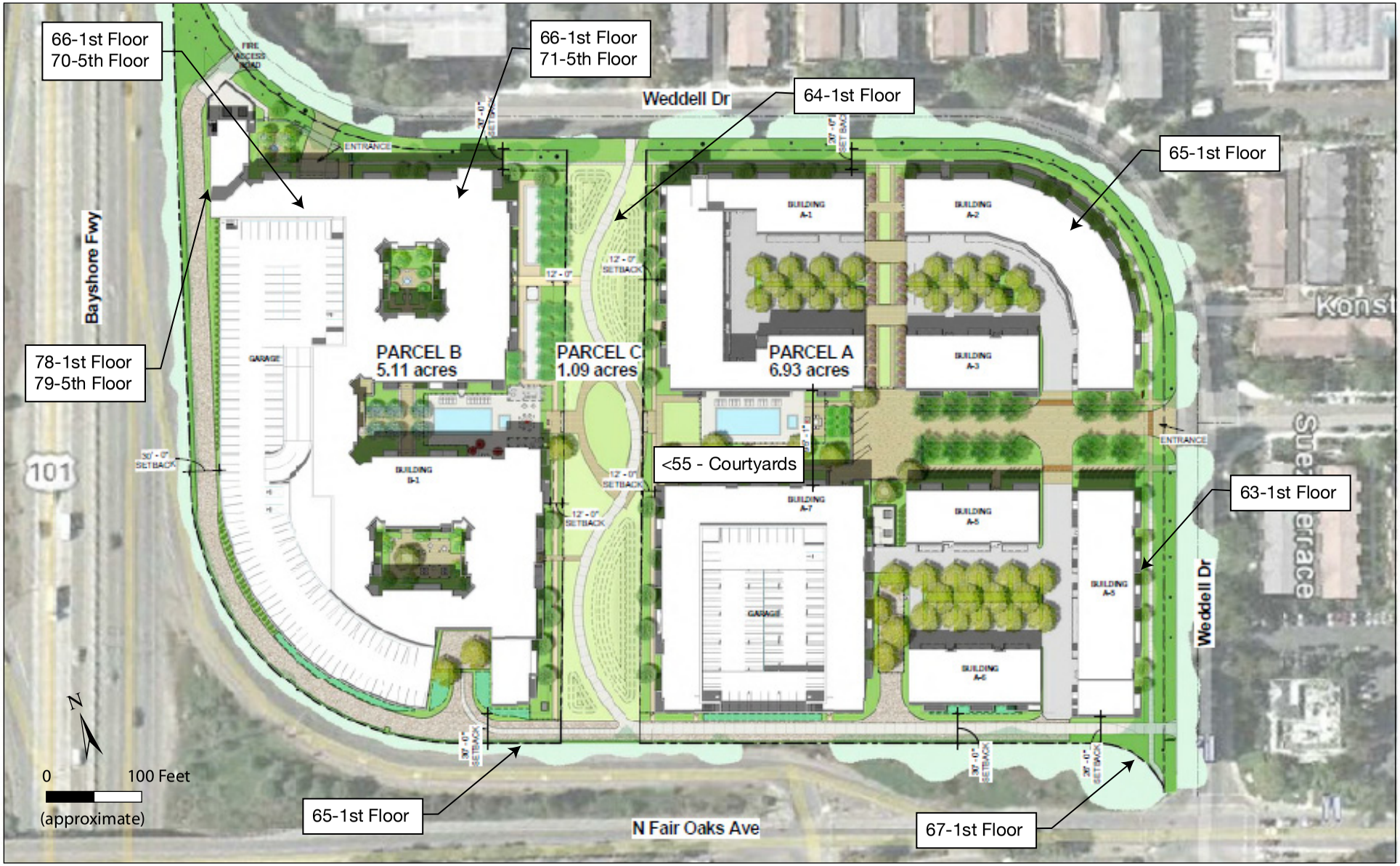



Figure 4.7-4

SOURCE: Steinberg Architects, 2013

**RAINTREE FUTURE NOISE EXPOSURE (dBA, DNL)**

AMY SKEWES~COX
ENVIRONMENTAL PLANNING

*Raintree Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Mitigation Measure NOISE-1: The following mitigation measures shall be included in each project to reduce the impact to a less-than-significant level:*

- *When refining the project's site plan, continue to locate common outdoor use areas away from roadways and shield noise-sensitive outdoor spaces with buildings whenever possible.*
- *Incorporate building design and treatments to ensure compliance with State of California and City of Sunnyvale noise standards. A project-specific acoustical analysis shall be required by the City of Sunnyvale to ensure that the design of the project incorporates controls so that interior noise levels would be reduced to 45 dBA DNL or lower. Building sound insulation requirements shall include the provision of forced-air mechanical ventilation for all residential units, so that windows could be kept closed at the occupant's discretion to control noise. Special building construction techniques (e.g., sound-rated windows and doors and building facade treatments) may be required for many residential units facing adjacent roadways. These treatments may include sound-rated windows and doors, sound rated wall constructions, and acoustical caulking. Pursuant to the State Building Code, the results of the analysis, including a description of the necessary noise control measures, shall be submitted to the City along with the building plans and approved prior to issuance of a building permit. Feasible construction techniques such as these would adequately reduce interior noise levels to 45 dBA DNL or lower.*
- *A qualified acoustical consultant shall review final site plans, building elevations, and floor plans prior to construction to calculate expected interior and exterior noise levels and ensure compliance with City of Sunnyvale policies and State of California noise regulations.*

*The above measures would reduce the potential noise impact to a less-than-significant level. (LTS)*

- Applies to Sares Regis Applicant Proposed Scenario: ☒
- Applies to Sares Regis Full Buildout Scenario: ☒
- Applies to Raintree Applicant Proposed Scenario: ☒
- Applies to Raintree Full Buildout Scenario: ☒

**Impact NOISE-2: Heavy truck traffic on U.S. Highway 101 would not expose the projects to excessive ground-borne vibration. (LTS)**

*Sares Regis Full Buildout Scenario.* The responses of people and buildings to ground-borne vibration were shown in Table 4.7-2. As discussed under "Environmental Setting" above, the ambient Peak Particle Velocity (PPV) resulting from heavy truck traffic in the near travel lane of U.S. Highway 101 is projected to be about 0.04 inches per second (in/sec) PPV at the adjacent project boundaries, and about 0.02 in/sec PPV at a distance of about 90 feet from the near travel lane outside the proposed building (the approximate distance to the nearest proposed vibration sensitive location). According to Caltrans, automobile traffic normally generates vibration levels of one-fifth to one-tenth of truck vibrations and is therefore an insignificant source of vibration, given that levels are typically below the threshold of perceptibility at the highway right-of-way. Received

vibration would be substantially below the building damage threshold for new structures of 0.5 in/sec PPV, and would be below the perception threshold of 0.01 in/sec PPV within the building when accounting for foundation coupling losses and amplification due to resonances of building surfaces.

*Sares Regis Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Raintree Applicant Proposed Scenario.* The ambient Peak Particle Velocity (PPV) resulting from heavy truck traffic in the near travel lane of U.S. Highway 101 is projected to be about 0.01 in/sec PPV at a distance of about 130 feet from the near travel lane outside the proposed building (the approximate distance to the nearest proposed vibration-sensitive location). Received vibration would be substantially below the building damage threshold for new structures of 0.5 in/sec PPV, and would be below the perception threshold of 0.01 in/sec PPV within the building when accounting for foundation coupling losses and amplification due to resonances of building surfaces.

*Raintree Full Buildout Scenario.* See above discussion of the Raintree Applicant Proposed Scenario.

*Mitigation Measure NOISE-2: No mitigation would be necessary. (LTS)*

- Applies to Sares Regis Applicant Proposed Scenario: ☒
- Applies to Sares Regis Full Buildout Scenario: ☒
- Applies to Raintree Applicant Proposed Scenario: ☒
- Applies to Raintree Full Buildout Scenario: ☒

**Impact NOISE-3: Vibration resulting from construction activities would not cause excessive vibration in the vicinity of the project sites. (LTS)**

Activities necessary to implement the projects would include the demolition and removal of existing structures and pavement, site preparation work, foundation work, and new building erection. Perceptible vibration may be generated when heavy equipment or impact tools (e.g., jackhammers) are used near the project site boundaries. Pile driving, which can cause excessive vibration, would not be required to construct building foundations.

**Table 4.7-4** 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. Erection of building structures is not anticipated to be a source of substantial vibration with the exception of sporadic events such as dropping of heavy objects, which should be avoided to the extent possible. Jackhammers typically generate vibration levels of 0.035 inches/sec PPV and drilling typically generates vibration levels of 0.09 inches/sec PPV at a distance of 25 feet. Again, vibration levels would vary depending on project conditions such as soil conditions, construction methods, and equipment used.

The evaluation of ground-borne vibration is the same for the Applicant Proposed Scenarios and Full Buildout Scenarios because the potential locations of vibration-generating activities would be the same distance from receptors in the project vicinity under both development scenarios.

**Table 4.7-4 Vibration Source Levels for Construction Equipment**

| Equipment | | PPV at 25 Feet (in/sec) | Approximate Lv at 25 Feet (VdB) |
|---|---|---|---|
| Pile Driver (Impact) | upper range | 1.158 | 112 |
| | typical | 0.644 | 104 |
| Pile Driver (Sonic) | upper range | 0.734 | 105 |
| | typical | 0.170 | 93 |
| Clam shovel drop | | 0.202 | 94 |
| Hydromill (slurry wall) | in soil | 0.008 | 66 |
| | in rock | 0.017 | 75 |
| Vibratory Roller | | 0.210 | 94 |
| 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, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

*Sares Regis Applicant Proposed Scenario.* Demolition and construction are anticipated to last approximately 21 months at the Sares Regis site, but construction vibration would not be substantial for most of this time period. Vibration-generating events would occur no closer than 140 feet from the nearest residences and, at this distance, would be well below the 0.2 in/sec PPV significance threshold at the nearest building located off-site. Vibration generated by construction activities near the site boundaries would not result in “cosmetic” damage to the nearest off-site buildings. In areas where vibration would not be expected to cause damage to buildings, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and it would not be considered significant given the intermittent and short duration of the phases that have the highest potential of producing vibration (demolition and use of jackhammers and other high power tools at the project perimeter). This is a less-than-significant impact.

*Sares Regis Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Raintree Applicant Proposed Scenario.* Demolition and construction are anticipated to last approximately 24 months at the Raintree site. Vibration-generating events would occur no closer than 70 feet from the nearest residences and, at this distance, would be below the 0.2 in/sec PPV significance threshold at the nearest building located off-site. Vibration generated by construction activities near the site boundaries would not result in “cosmetic” damage to the nearest off-site buildings. In areas where vibration would not be expected to cause damage to buildings, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated

and it would not be considered significant given the intermittent and short duration of the phases that have the highest potential of producing vibration (demolition and use of jackhammers and other high power tools at the project perimeter). This is a less-than-significant impact.

*Raintree Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Mitigation Measure NOISE-3: No mitigation would be necessary. (LTS)*

- Applies to Sares Regis Applicant Proposed Scenario: ☒
- Applies to Sares Regis Full Buildout Scenario: ☒
- Applies to Raintree Applicant Proposed Scenario: ☒
- Applies to Raintree Full Buildout Scenario: ☒

**Impact NOISE-4: Project-generated traffic noise would not cause a permanent increase in noise exposure above ambient noise levels. (LTS)**

The impact of increased traffic noise attributable to the projects is assessed for the Applicant Proposed Scenario and the Full Buildout Scenario for both projects as compared to existing conditions. A significant impact would be identified if traffic generated by the projects would substantially increase noise levels at sensitive receptors in the vicinity of the project sites. Because the impact of the projects combined would be less than significant, the impact of the individual projects would also be less than significant. For this reason, the analysis focused on the Full Buildout Scenario of the combined projects.

A substantial increase would occur if the noise level increase is 3 dBA DNL or greater, as existing and future noise levels are projected to exceed 60 dBA DNL. Traffic volume information at the 16 study area intersections was reviewed to calculate the permanent noise increase attributable to project-generated traffic. Traffic volumes under the worst-case Existing-plus-Project (full buildout of Raintree and Sares Regis sites) scenario was compared to the Existing scenario to calculate the relative increase in traffic noise attributable to the proposed projects, combined. The comparison of the traffic volumes under these scenarios indicates that the combined projects under the Full Buildout Scenarios would increase traffic noise levels by 0 to 1 dBA DNL. The permanent noise increase attributable to the combined projects would not be considered substantial, and the impact would be less than significant.

*Sares Regis Applicant Proposed Scenario.* See above discussion.

*Sares Regis Full Buildout Scenario***.** See above discussion.

*Raintree Applicant Proposed Scenario.* See above discussion.

*Raintree Full Buildout Scenario.* See above discussion.

*Mitigation Measure NOISE-4: No mitigation would be necessary. (LTS)*

- Applies to Sares Regis Applicant Proposed Scenario: ☒
- Applies to Sares Regis Full Buildout Scenario: ☒

- Applies to Raintree Applicant Proposed Scenario: ☒
- Applies to Raintree Full Buildout Scenario: ☒

**<u>Impact NOISE-5</u>: Construction noise would cause a temporary or periodic increase in noise exposure above ambient noise levels. (S)**

Noise impacts resulting from construction depend on 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 receptors. The City considers significant construction noise impacts to occur if a project 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.

Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), when construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction durations last over extended periods of time. For the purposes of this assessment, noise levels exceeding 60 dBA $L_{eq}$ and the ambient noise environment by 5 dBA $L_{eq}$ or more at nearby noise-sensitive land uses (e.g., residential land uses) for a period of more than one construction season would be considered significant. Where noise from construction activities exceeds 70 dBA $L_{eq}$ and the ambient noise environment by 5 dBA $L_{eq}$ or more at sensitive industrial, office, or commercial land uses for a period of more than one construction season, the impact would also be considered significant.

Major noise-generating construction activities associated with new projects would include removal of existing pavement and structures, site grading and excavation, installation of utilities, the construction of building foundations, cores, and shells, paving, and landscaping. The highest noise levels would be generated during the demolition of existing structures when impact tools are used (e.g., jackhammers, hoe rams) and during the construction of building foundations when impact pile driving is required to support the structure. Site grading and excavation activities would also generate high noise levels as these phases often require the simultaneous use of multiple pieces of heavy equipment such as dozers, excavators, scrapers, and loaders. Lower noise levels result from building construction activities when these activities move indoors and less heavy equipment is required to complete the tasks. Construction equipment would typically include, but would not be limited to, earth-moving equipment and trucks, pile driving rigs, mobile cranes, compressors, pumps, generators, paving equipment, and pneumatic, hydraulic, and electric tools. For the East Weddell Residential Projects, no pile driving would be necessary.

**Table 4.7-5** presents the typical range of hourly average noise levels generated by different phases of construction measured at a distance of 50 feet from a busy construction site. Typical hourly average construction-generated noise levels are about 77 to 89 dBA $L_{eq}$ measured at a distance of 50 feet from the site during busy construction periods. Large pieces of earth-moving equipment, such as graders, scrapers, and dozers, generate maximum noise levels of 85 to 90 dBA $L_{max}$ at a distance of 50 feet. During each stage of construction, there would be a different mix of equipment operating and noise levels would vary based on the amount of equipment on-site and the location of the activity. Construction noise levels drop off at a rate of about 6 dBA per doubling of distance between the noise source and receptor. Intervening structures or terrain would result in lower noise levels at distant receivers.

**Table 4.7-5 Typical Ranges of Noise Levels at 50 Feet from Construction Sites (dBA $L_{eq}$)**

| | Domestic Housing | | Office Building, Hotel, Hospital, School, Public Works | | Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station | |
|---|---|---|---|---|---|---|
| **Phase** | **I** | **II** | **I** | **II** | **I** | **II** |
| Ground Clearing | 83 | 83 | 84 | 84 | 84 | 83 |
| Excavation | 88 | 75 | 89 | 79 | 89 | 71 |
| Foundations | 81 | 81 | 78 | 78 | 77 | 77 |
| Erection | 81 | 65 | 87 | 75 | 84 | 72 |
| Finishing | 88 | 72 | 89 | 75 | 89 | 74 |

Notes: I - All pertinent equipment present at site.
II - Minimum required equipment present at site.
Source: United States Environmental Protection Agency, 1973, Legal Compilation on Noise, Vol. 1, page 2-104.

The City of Sunnyvale does not establish quantitative noise limits for demolition or construction activities occurring in the city. According to the Municipal Code discussed under "Regulatory Framework" above, the legal hours of construction are between the hours of 7:00 AM to 6:00 PM Monday through Friday, and between 8:00 am and 5:00 pm Saturday. No construction activity is allowed on Sundays or national holidays.

Noise generated by small infill projects would likely have relatively short overall construction durations, with the noisiest phases of construction (e.g., demolition, foundations, project infrastructure, building core, and shell) limited to a timeframe of one year or less. These phases of construction are not anticipated to generate noise levels in excess of 60 dBA $L_{eq}$ and the ambient noise environment by 5 dBA $L_{eq}$ or more at sensitive land uses in the area over extended periods of time (beyond one construction season). Interior construction, landscaping, and finishing activities would not be expected to result in noise levels in excess of 60 dBA $L_{eq}$. Large construction projects may result in a substantial temporary noise increase at adjacent noise-sensitive land uses. As a result, noise levels from these projects could exceed 60 dBA $L_{eq}$ and the ambient noise environment by 5 dBA $L_{eq}$ or more, and last over one year in duration.

The evaluation of construction noise is the same for the Applicant Proposed Scenarios and Full Buildout Scenarios because the potential locations of noise-generating activities would be same distance from receptors in the project vicinity under both development scenarios.

*Sares Regis Applicant Proposed Scenario.* Demolition and construction are anticipated to last approximately 21 months at the Sares Regis site, beginning in January 2014 and ending in October 2015. The noisiest phases of construction (e.g., demolition, grading, excavation, trenching, site preparation, and the construction of the building core and shell) would primarily occur between January 2014 and June 2015. Paving would occur between August and October 2015. Interior construction activities and application of architectural coatings are planned between June 2015 and October 2015.

Average noise levels at the nearest sensitive receptors 140 feet from the site would range from 68 to 80 dBA during busy construction periods. During construction, noise levels would be elevated by 10 to 20 dBA above ambient traffic noise levels at these nearby noise-sensitive uses. These construction noise levels would have a significant impact, since they would exceed 60 dBA $L_{eq}$ and the ambient noise environment by 5 dBA $L_{eq}$ or more at nearby noise-sensitive land uses (e.g., residential land uses) for a period of more than one construction season.

*Sares Regis Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Raintree Applicant Proposed Scenario.* Demolition and construction are anticipated to last approximately 24 months at the Raintree site, beginning in September 2014 and ending in September 2015. The noisiest phases of construction (e.g., demolition, grading, excavation, trenching, site preparation, and the construction of the building core and shell) would primarily occur between September 2014 and July 2016. Paving would occur between August and September 2016. Interior construction activities and application of architectural coatings are planned between August 2015 and September 2016.

Average noise levels at the nearest sensitive receptors 70 feet from the site would range from 76 to 86 dBA during busy construction periods. During construction, noise levels would be elevated by up to 20 dBA above ambient traffic noise levels at these nearby noise-sensitive uses. These construction noise levels would have a significant impact, since they would exceed 60 dBA $L_{eq}$ and the ambient noise environment by 5 dBA $L_{eq}$ or more at nearby noise-sensitive land uses (e.g., residential land uses) for a period of more than one construction season.

*Raintree Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

> *<u>Mitigation Measure NOISE-5</u>: To mitigate potential short-term construction noise impacts, each project shall be required to comply with the following:*
>
> 1. *Project construction operations shall be required to use available noise suppression devices and techniques and to limit construction hours per the Sunnyvale Municipal Code.*
>
> 2. *A construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints shall 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 construction noise logistics plan shall include, but not be limited to, the following measures to reduce construction noise levels as low as practical:*
>
>  - *Use "quiet" models of air compressors and other stationary noise sources where technology exists.*
>  - *Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment.*
>  - *Locate all stationary noise-generating equipment, such as air compressors, portable power generators, and crushing/recycling operations, near U.S. Highway 101 and as far away as possible from adjacent land uses.*

- *Locate staging areas and construction material areas as far away as possible from adjacent land uses.*
- *Prohibit all unnecessary idling of internal combustion engines.*
- *Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and would 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.*

*The potential short-term noise impacts associated with construction would be mitigated by the above measures implemented during all phases of construction activity to minimize the exposure of neighboring properties, and in combination with the limitations on hours set forth in the Sunnyvale Municipal Code. The impact would be mitigated to a less-than-significant level with the implementation of the above measures. (LTS)*

- Applies to Sares Regis Applicant Proposed Scenario: ☒
- Applies to Sares Regis Full Buildout Scenario: ☒
- Applies to Raintree Applicant Proposed Scenario: ☒
- Applies to Raintree Full Buildout Scenario: ☒

**Impact NOISE-6: Aircraft noise over proposed noise-sensitive land uses would not exceed Santa Clara County Airport Land Use Commission (ALUC) noise thresholds. (LTS)**

The Santa Clara County ALUC has jurisdiction over new land uses in the vicinity of airports and establishes 65 dBA CNEL as the maximum allowable noise level considered compatible with residential uses. The noise contours for Moffett Federal Airfield (Figure 5 from the ALUC Plan) are shown in Figure 4.7-2.

*Sares Regis Applicant Proposed Scenario.* The Sares Regis site is located outside the 60 dBA CNEL noise contour, and the impact from aircraft noise exposure is therefore considered less than significant.

*Sares Regis Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Raintree Applicant Proposed Scenario.* The Raintree site is located outside the 60 dBA CNEL noise contour, and the impact from aircraft noise exposure is therefore considered less than significant.

*Raintree Full Buildout Scenario.* See above discussion of the Applicant Proposed Scenario.

*Mitigation Measure NOISE-6: No mitigation would be necessary. (LTS)*

- Applies to Sares Regis Applicant Proposed Scenario: ☒
- Applies to Sares Regis Full Buildout Scenario: ☒

- Applies to Raintree Applicant Proposed Scenario: ☒
- Applies to Raintree Full Buildout Scenario: ☒

## CUMULATIVE IMPACTS

Significant cumulative traffic noise impacts are not anticipated in the project site vicinity and the projects would not make a "cumulatively considerable" contribution to cumulative traffic noise increases.

The projects would result in a significant cumulative traffic noise impact if existing sensitive receptors would be exposed to cumulative traffic noise level increases greater than 3 dBA DNL above existing traffic noise levels and if the projects would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of 1 dBA DNL or more attributable solely to the proposed projects.

Cumulative traffic noise level increases were calculated by comparing the conservative Cumulative-plus-Project (full buildout of Raintree and Sares Regis sites) and Cumulative Without Project traffic volumes to Existing traffic volumes. Cumulative traffic noise levels, with or without the proposed projects, are not anticipated to increase substantially (3 dBA DNL or more) along roadways serving the project sites, and the projects' maximum contribution to cumulative traffic noise level increases is calculated to be 0.7 dBA DNL or less. This cumulative traffic noise increase would not be considered substantial, and the projects would not make a cumulatively considerable contribution to increased noise levels.

*Sares Regis Applicant Proposed Scenario.* See above discussion.

*Sares Regis Full Buildout Scenario.* See above discussion.

*Raintree Applicant Proposed Scenario.* See above discussion.

*Raintree Full Buildout Scenario.* See above discussion.

## REFERENCES

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