RGD ACOUSTICS

Acoustical & Audiovisual Consultants

SITE NOISE ASSESSMENT FOR:

The Neighborhood at Los Gamos

RGD Project: 20-054

PREPARED FOR:

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1. Introduction

The proposed project is the development of 192 multi-family residential units located on an existing vacant site on the west side of Los Gamos Road and the US 101 freeway. The proposed project would include five multi-family residential buildings with a retail building and a community building. In addition, the project would also include common outdoor use spaces.

This site noise assessment report quantifies the noise environment of the project site and provides preliminary analysis with respect to the interior and exterior noise requirement of the State of California Building Code and the City of San Rafael General Plan/Zoning Ordinance.

2. Environmental Noise Fundamentals

Noise can be defined as unwanted sound. It is commonly measured with an instrument called a sound level meter. The sound level meter captures the sound with a microphone and converts it into a number called a sound level. Sound levels are expressed in units of decibels. To correlate the microphone signal to a level that corresponds to the way humans perceive noise, the A-weighting filter is used. A weighting de-emphasizes low-frequency and very high-frequency sound in a manner similar to human hearing. The use of A-weighting is required by most local General Plans as well as federal and state noise regulations (e.g. Caltrans, EPA, OSHA and HUD). The abbreviation dBA is sometimes used when the A weighted sound level is reported.

Because of the time-varying nature of environmental sound, there are many descriptors that are used to quantify the sound level. One individual descriptor alone does not fully describe a particular noise environment. However, multiple descriptors taken together can more accurately represent the noise environment. The maximum instantaneous noise level (L_{max}) is often used to identify the loudness of a single event such as a car passby or airplane flyover. To express the average noise level the Leq (equivalent noise level) is used. The L_{eq} can be measured over any length of time but is typically reported for periods of 15 minutes to 1 hour. The background noise level (or residual noise level) is the sound level during the quietest moments. It is usually generated by steady sources such as distant freeway traffic. It can be quantified with a descriptor called the L_{90} which is the sound level exceeded 90 percent of the time.

To quantify the noise level over a 24-hour period, the Day/Night Average Sound Level (DNL or L_{dn}) or Community Noise Equivalent Level (CNEL) is used. These descriptors are averages like the L_{eq} except they include a 10 dB penalty during nighttime hours (and a 5 dB penalty during evening hours in the CNEL) to account for peoples increased sensitivity during these hours. The CNEL and L_{dn} are typically within one decibel of each other.

In environmental noise, a change in noise level of 3 dB is considered a just noticeable difference. A 5 dB change is clearly noticeable, but not dramatic. A 10 dB change is perceived as a halving or doubling in loudness.

3. Acoustical Criteria

3.1. State of California

Section 1206.4 of the 2019 California Building Code has exterior noise transmission requirements for multi-family residential dwelling. The code states that allowable interior noise levels attributable to exterior sources shall not exceed an L_{dn} of 45 dB in any habitable room.

Section 5.507 of the State of California Green Building Standards Code has exterior noise transmission requirements for new nonresidential buildings. If the building will be exposed to an hourly L_{eq} of 65 dB or more, the building envelope shall be constructed to achieve an interior hourly equivalent noise level (L_{eq}) of 50 dBA in the occupied areas during any hour of operation. The aforementioned performance standard is an alternative to use of the prescriptive standard which tends to be much more restrictive for buildings exposed to normal exterior noise levels.

3.2. City of San Rafael

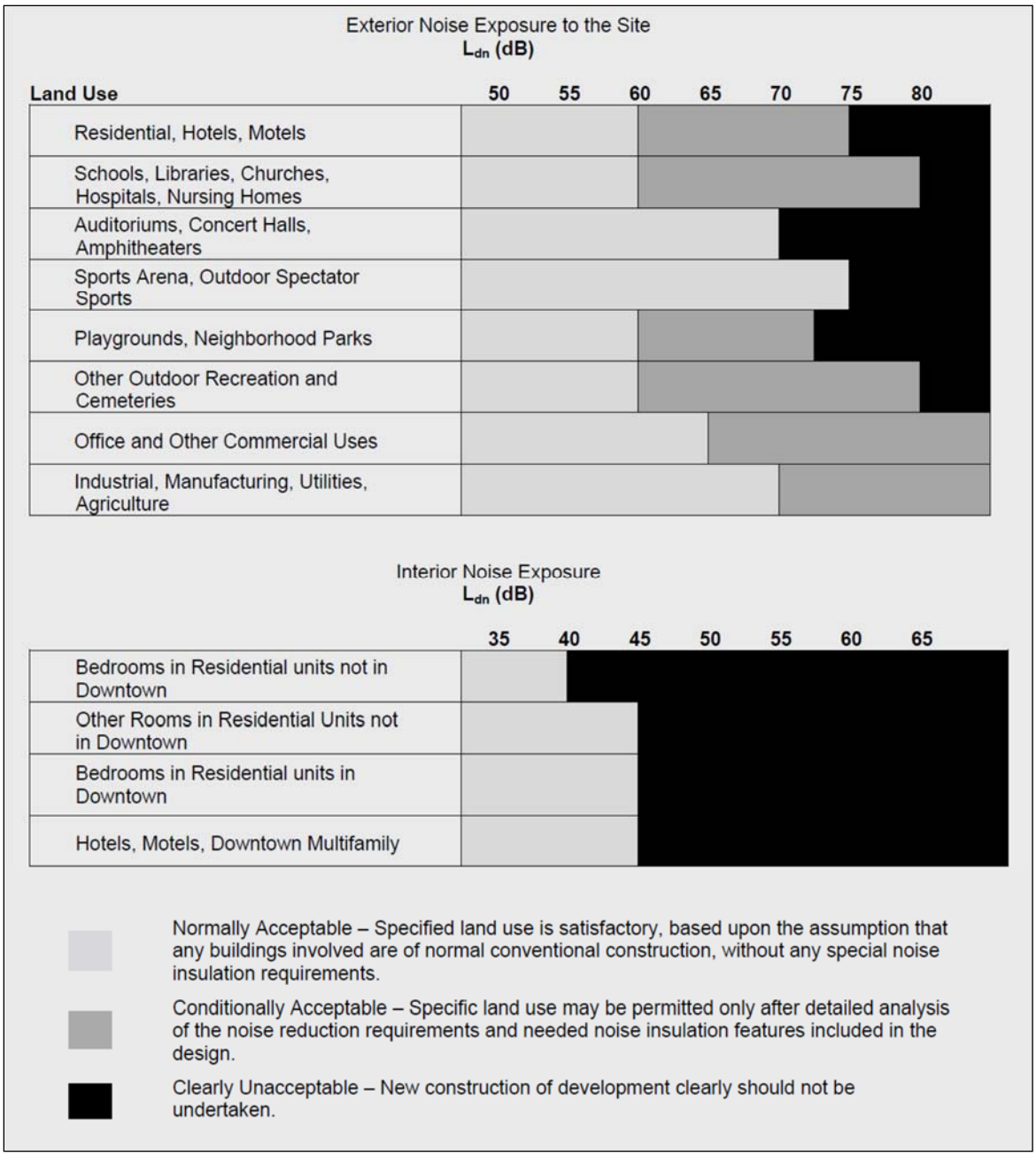
The Noise Element of the San Rafael 2020 General Plan contains goals and policies related to noise and land use compatibility. Figure 1 presents the city's Land Use Compatibility Standards for new development. The city's policies identify an interior noise exposure limit of L_{dn} 40 dBA for bedrooms and L_{dn} 45 dBA for other rooms in residential units that are not in Downtown.

General Plan Policy N-2 has standards for exterior noise in residential land use.

> *The exterior noise standard for backyards and/or common usable outdoor areas in new residential development is up to L_{dn} of 60 dB. In common usable outdoor areas in Downtown, mixed-use residential, and high density residential districts, up to Ldn of 65 dB may be allowed if determined acceptable through development review.*

According to the project description on the City of San Rafael website, the project would require General Plan and Zoning Amendment to allow a change in density from Hillside Residential to a high-density residential designation.

Figure 1: Land Use Compatibility Standards for New Development



The City of San Rafael Municipal Code (Title 14 – Zoning Division IV) has noise standards that apply to the project.

14.16.260 - Noise standards.

Any new development located in a "conditionally acceptable" or "normally unacceptable" noise exposure area, based on the land use compatibility chart standards in the general plan, shall require an acoustical analysis. Noise mitigation features shall be incorporated where needed to assure consistency with general plan standards. New construction is prohibited in noise exposure areas where the land use compatibility chart indicates the noise exposure is "clearly unacceptable."

A. Residential Development. The following standards apply to residential development:

1. Acoustical studies shall be required for all new residential development within projected sixty (60) dBA (Ldn) noise contours so that noise mitigation measures can be incorporated into project designs.

2. Usable outdoor area in low and medium density districts shall be sixty (60) dBA (Ldn) or less.

3. In high density and mixed use districts, residential interior standards shall be met and common, usable outdoor areas shall be designed to minimize noise impacts. Where possible, a sixty (60) dBA (Ldn) standard shall be applied to usable outdoor areas.

4. Interior noise standards for new single-family residential and residential health care development shall be forty (40) dBA (Ldn) for bedrooms and forty-five (45) dBA (Ldn) for other rooms. New hotels and motels shall meet a forty-five (45) dBA (Ldn) standard. For new multifamily development, hotels and motels, interior noise standards shall be described by State Administrative Code standards, Title 25, Part 2.

4. Noise Environment

4.1. Noise Measurements

Two long-term, 4-day, noise monitors and four short-term, 10 to 20-minute, noise measurements were used to quantify the existing ambient sound environment at the proposed project site. The monitors operated between Wednesday, 16 and 20 October 2020. The locations of the long-term measurements (A and B) and short-term measurements (ST-1 to ST-5) are shown in Figure 2.

Monitor A was located on a tree near the proposed community building at a height of 6-feet above ground. Monitor B was located on a tree near the proposed Building 5 at a height of 6 feet above ground. The measured hourly noise levels were typically L_{eq} 65 dBA during the daytime (7 a.m. to 10 p.m.) hours and between L_{eq} 55 to 63 dBA during the nighttime hours (10 p.m. to 7 a.m.). The measured Day/Night Average Sound Level was 68 dBA at both of the monitors.

The short-term noise monitor at ST-1 was made near the long-term Monitor A at a height of 24 feet above ground. The dominant noise source was US-101 traffic.

Location ST-2 was near the setback of the proposed Building 3, west of the existing commercial building at 1401 Los Gamos Drive. At this location, noise from rooftop mechanical equipment at the existing commercial building was a major contributor to the measured noise level. The noise contribution from the freeway tended to be reduced by the acoustical shielding provided by the intervening, existing commercial building.

Locations ST-3 and ST-4 were made to represent the noise levels in the open space and outdoor use areas in the southern portion of the site. The noise level at both locations was dominated by freeway noise. Location ST-3 was behind a ridge and the freeway noise was somewhat reduced by acoustical shielding from terrain. ST-4 was at one of the proposed Play Structure/Fitness locations and had a full view of the freeway and the noise was not shielded by the terrain.

Location ST-5 represented the noise exposure at a standing height for a person at the second row of proposed residential buildings. There was a minor noise contribution from the rooftop mechanical equipment at 1401 Los Gamos Drive.

The noise measurements were made with a Larson Davis Model 820 or Model 824 sound level meters meeting Type 1 specifications (ANSI S1.4). The sound level meter calibrations were checked with an acoustical calibrator (Larson-Davis Model Cal200). Figure 3 and 4 show the long-term measurement results. Table 1 shows the short-term measurement summary.

Figure 2: Noise Measurement Locations

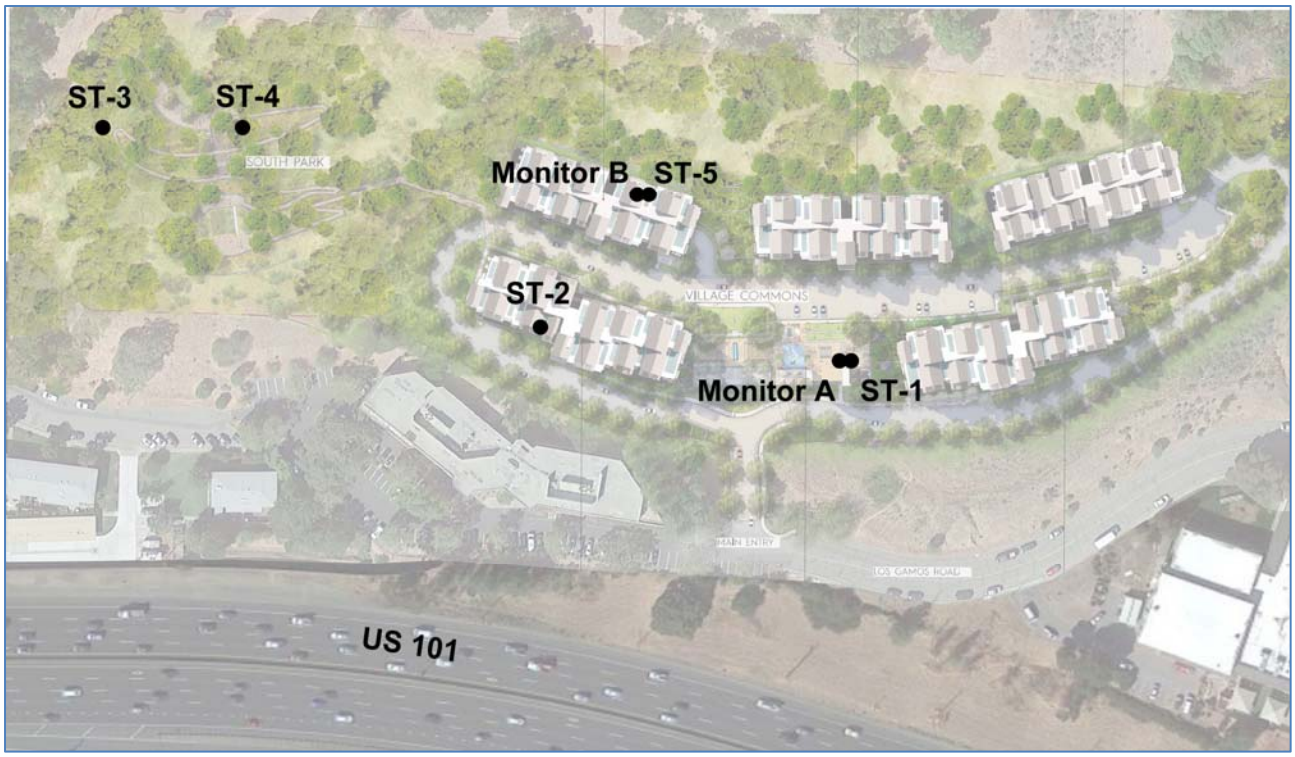


Figure 3: Long-Term Noise Measurement Results - Location LT-A

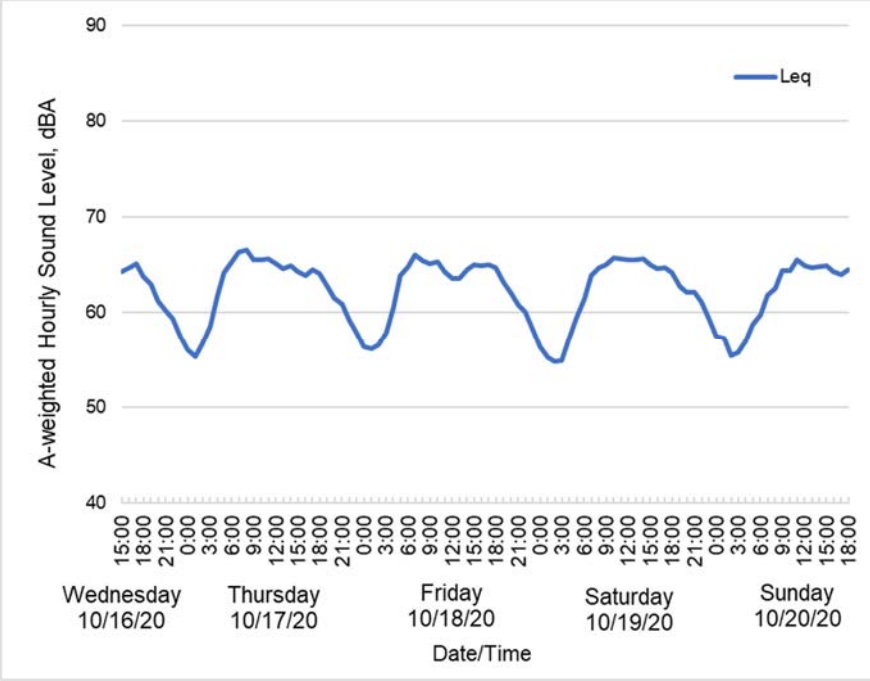


Figure 4: Long-Term Noise Measurement Results - Location LT-B

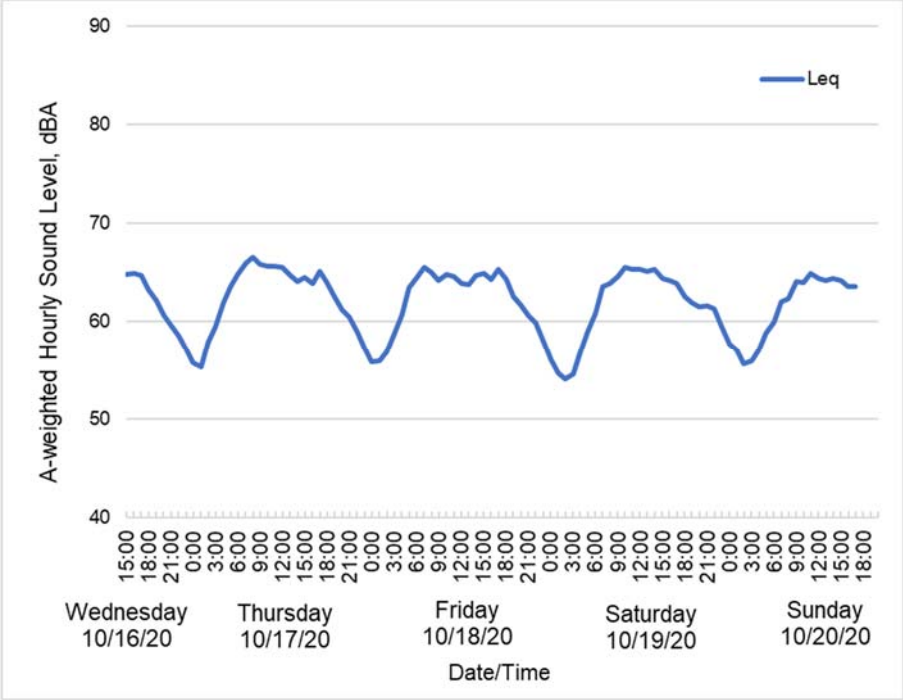
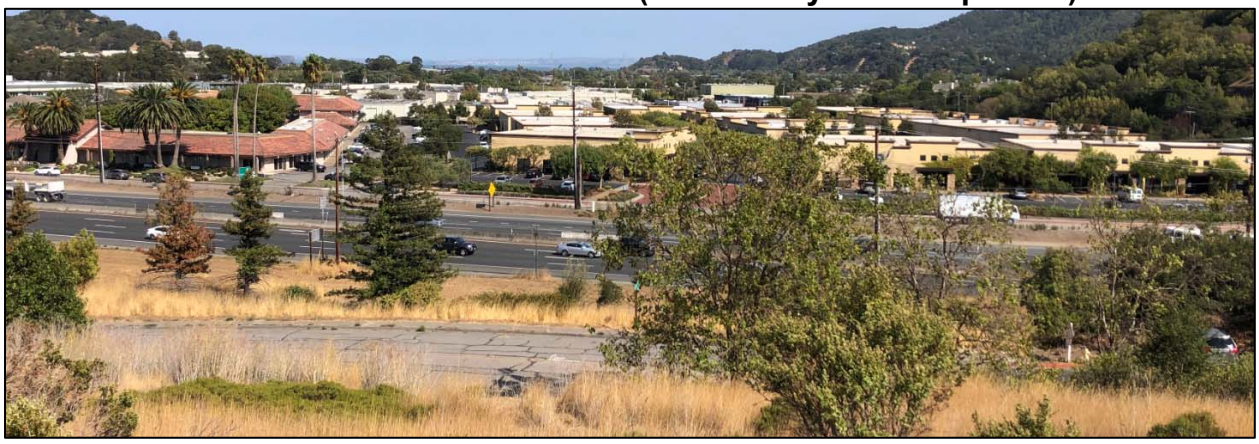


Table 3: Short Term Noise Measurements

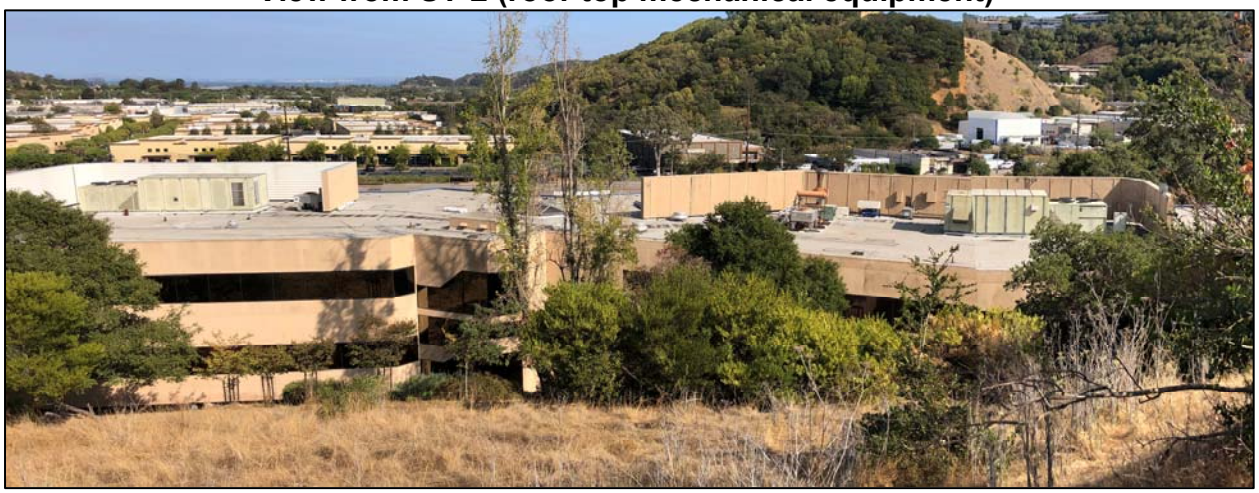
Location		Date/Time	A-weighted Sound Level, dBA		
			L_{eq}	L_{max}	L_{dn}*
ST-1	Setback of Buildings Closest to US 101 24 feet above ground	16 Sep 2020 3:36 PM – 3:57 PM	65	70	68
ST-2	Behind Existing Commercial Building 5 feet above ground	16 Sep 2020 3:35 PM – 3:49 PM	63	67	67
ST-3	Open Space Area South End of Site 5 feet above ground	16 Sep 2020 3:59 PM – 4:10 PM	57	61	60
ST-4	Near Proposed Tot Lot 5 feet above ground	16 Sep 2020 4:11 PM – 4:25 PM	61	64	65
ST-5	Setback of Second Row of Buildings 5 feet above ground	20 Sep 2020 6:30 PM – 6:45 PM	62	67	67

*L_{dn} calculated based on correlation between simultaneous long-term and short-term measurements.

View from Monitor A and ST-1 (full freeway noise exposure)



View from ST-2 (roof-top mechanical equipment)



To quantify any potential difference in traffic noise due to the reduced traffic volumes that could be occurring due to the on-going coronavirus pandemic, we compared the US-101 hourly traffic volumes counted by Caltrans before the coronavirus (October 2019) with those counted by Caltrans during the measurement period. Compared to the 2019 traffic volumes, those during the measurement period were between 5 to 10% less during the early hours of 4 a.m. to 9 a.m. but were generally 5 to 9% more during the 8 p.m. to 2 a.m., with an overall daily traffic volume difference of 0.2%. The hourly traffic volume data was used to calculate an adjustment factor for the measured hourly noise levels. The result is that the measured noise levels should be adjusted upwards by 0.1 dBA to account for reduced traffic volumes.

4.2. Future Traffic Noise

To account for the potential increase in traffic noise due to future traffic, we included a 1 dBA factor in the L_{dn} for an increase of 25% traffic volumes in the future. Therefore, at the setback of the buildings, the noise levels would be up to L_{dn} 68 dBA in the future.

5. Analysis/Findings

The following analysis is based on the latest site plan and building plans and elevations available to date.

Based on the analysis, the proposed project site is a future L_{dn} of 61 dBA to 69 dBA. According to the San Rafael General Plan's Land Use Compatibility Standards for New Development, this level of noise exposure is considered "conditionally acceptable" for new residential land uses. New residential land use may be permitted after analysis of the noise reduction requirements and needed noise insulation features included in the design.

5.1. Residential Outdoor Use Noise Analysis

The San Rafael General Plan Policy N-2 states that an L_{dn} of up to 65 dBA may be allowed in common usable outdoor areas in high-density residential districts if determined acceptable through development review. The San Rafael Zoning Ordinance states that in high density and mixed use districts, residential interior standards shall be met and common, usable outdoor areas shall be designed to minimize noise impacts. Where possible, an Ldn 60 dBA standard shall be applied to usable outdoor areas. The noise exposure in the common outdoor areas are discussed below.

Village Commons – There are several outdoor use areas in the proposed village commons. The noise exposure at village commons areas closest to the freeway be exposed to a future Ldn of up to 69 dBA. This is greater than the City's standard of Ldn 65 dBA for common outdoor use areas in high-density residential districts. Reducing noise in the village commons using barriers or berms may not be practical unless the areas are regraded to be flat instead of the natural slope. This is because the people in areas uphill from the barrier would tend to look over it and be exposed to the unshielded freeway noise.

Community Building Plaza – The proposed plaza on top of the community building will be exposed to a future Ldn of 69 dBA. This exceeds the outdoor noise standard of Ldn 65 dBA. If the building incorporates a solid railing (e.g. 5-foot high glass/concrete wall), the noise can be reduced to an Ldn of 65 dBA or less. This treatment might not achieve an Ldn of 60 dBA.

South Park – The noise exposure at the common outdoor use areas in the open space area south of the residential buildings will depend on the presence of acoustical shielding provided by the local terrain. In areas with a full view of the freeway the Ldn will slightly exceed the Ldn 65 dBA standard (by approximately 1 dBA). If the area is just behind a ridge the acoustical shielding can reduce the noise exposure to 65 dBA or less. If the shielding is significant, the Ldn could be reduced to 60 dBA or less.

Private Residential Balconies – The residential units will have balconies. The balconies that face away from the freeway would be exposed to an Ldn of 60 dBA or less. The balconies in the first row of buildings that face the freeway would be exposed to an Ldn greater than Ldn 65 dBA. Most balconies in the second row of buildings would be exposed to an Ldn of less than 65 dBA, although some at the upper levels facing the freeway may also exceed Ldn 65 dBA. Since the city's the general plan exterior noise standard addresses *common* outdoor use area and does not specifically identify a standard for *private* balconies, this report does not apply the Ldn 65 dBA standard to the private balconies. A solid railing could slightly reduce the noise exposure for seated people. However, achieving an Ldn of 60 dBA would not be practical because it would require complete enclosure for some balconies.

5.2. Indoor Noise Analysis

For residential units, the State of California Building Code, the City General Plan, to an L_{dn} of 45 dBA or less. The City's general plan also limits the interior noise in bedrooms to an L_{dn} of 40 dBA. For occupied non-residential spaces, the California Green Building Standard Code (CALGreen) requires interior noise levels to be attenuated to an hourly L_{eq} of 50 dBA or less.

To achieve the interior noise level requirements, the project would need the use of sound-rated windows at some units. The recommended sound ratings (STC) should be determined as the site plan and floor plans are finalized. Preliminary calculations indicate that STC rating of up to 41 would be necessary for some bedroom windows.

The sound-rated windows would need to be in the closed position to meet the interior noise standard. This closed window condition will need to be considered by the Mechanical Engineer in their determination of the outdoor air ventilation requirements for the dwelling units. Specifically, if the Mechanical Engineer determines that the ventilation code for these dwelling units requires outdoor air, then natural ventilation via open windows should not be relied upon and an alternate means of achieving outdoor air should be provided such as through mechanical ventilation. The alternate means for achieving outdoor air must be reviewed by the Acoustical Consultant to confirm that it does not otherwise compromise the noise reduction provided by the window and wall assembly.