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Acoustical and Audiovisual Consultants

1F-Exhibit 3

DRAFT #2 SITE NOISE ASSESSMENT:

Milpitas Senior Housing
South Main Senior Lifestyles Phase 1
1504-1620 South Main Street

Milpitas, CA

RGDL Project #: 13-014

PREPARED FOR:

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DATE:

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1. Introduction

The proposed project is a 199 unit rental, congregate and assisted living residential project. The site is located west of South Main Street, east of the Union Pacific railroad tracks and north of an existing multifamily residential development and various commercial land uses. This project represents Phase I of a proposed two phase senior housing development. The second phase development would occur on the parcel directly north of the project site. Existing noise sources include traffic on South Main Street, freight train activity, aircraft, and activities at the adjacent residential and commercial uses. This study addresses the noise affecting the project site with respect to the requirements of the State of California Building Code, the City Milpitas General Plan and the U.S. Department of Housing and Urban Development's (HUD) noise guidelines.

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. Although one individual descriptor alone does not fully describe a particular noise environment, taken together, they 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 L_{eq} (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 less that one decibel from 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 and Vibration Criteria

3.1. State of California

The 2010 State of California Building Code has a section on exterior sound transmission control that requires indoor noise levels in new multi-family housing and hotels be controlled to a DNL of 45 dBA if outdoor levels are in excess of a DNL of 60 dBA (2010 CBC 1207.11). Furthermore, if windows must be in the closed position to meet the requirement, then the building design must also specify a ventilation or air-conditioning system to provide a habitable interior environment. The ventilation system must not compromise the noise reduction provided by the façade.

The 2013 California Building Code that went into effect in January 2014 does not contain any exterior sound transmission control requirement for the first time since 1974. The reason stated by the California Department of Housing and Community Development (HCD) for not continuing the exterior sound transmission control requirement is that the regulations of federal, state and local agencies already cover this requirement. In fact, other regulations do not consistently address exterior sound transmission control and often fail to require that new multifamily housing and hotels be designed to meet any interior noise level requirement. As an example, the General Plans of many cities and counties in California recognize the need to control exterior noise intrusion and directly reference the State's indoor noise level requirement from 2010 yet few specify a noise standard of their own.

The requirement to control exterior sound transmission to meet a DNL of 45 dBA indoors has been part of the State Code for the past 40 years. HCD is now aware that it mistakenly omitted this requirement from the 2013 building code and is taking steps to reinstate the requirement as part of the current 18-month intervening code cycle review. Therefore, for the purposes of this report we are providing an analysis and recommendations to meet the exterior noise transmission control requirement of the 2010 Building code (CBC 1207.11).

The 2013 California Building Code retains the pre-2013 requirements for air-borne and structure-borne sound transmission control between dwelling units. Although this report does not address the project's compliance with these architectural acoustics requirements they are presented here for completeness. Specifically the code requires that:

- Walls, partitions and floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 (45 if field tested).
- Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 50 (45 if field tested).

3.2. City of Milpitas

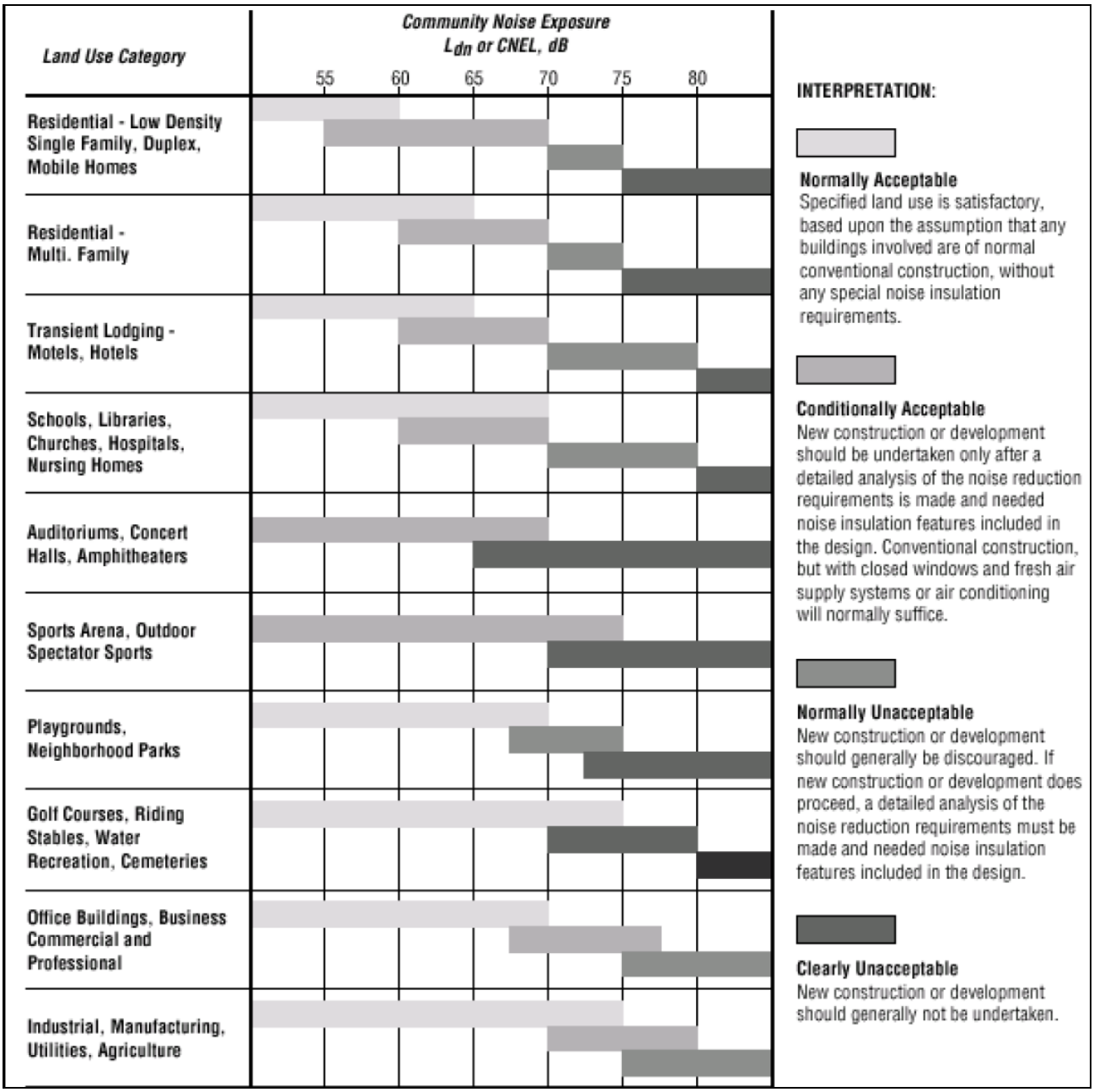
The Noise Element of the City of Milpitas' General Plan has policies to promote land uses that are compatible with the noise environment at a site. The City's land use compatibility guidelines are summarized in Figure 1.

The following General Plan Implementing Policies apply to this project:

6-I-4 *Where actual or projected rear yard and exterior common open space noise exposure exceeds the "normally acceptable" levels for new single-family and multifamily residential projects, use mitigation measures to reduce sound levels in those areas to acceptable levels.*

6-I-5 *All new residential development (single family and multifamily) and lodging facilities must have interior noise levels of 45 dB DNL or less. Mechanical ventilation will be required where use of windows for ventilation will result in higher than 45 dB DNL interior noise levels.*

Figure 1: City of Milpitas Noise Compatibility Standards (Figure 6-1 of Milpitas Noise Element)



3.3. U.S. Department of Housing and Urban Development (HUD)

The HUD Site Acceptability Standards are contained in 24CFR51 and are summarized below in Figure 3.

Table 1: HUD Site Acceptability Standards

	Day-night average sound level (L_{dn}) (in decibels)	Special approvals and requirements
Acceptable	Not exceeding 65 dB(1)	None.
Normally Unacceptable	Above 65 dB but not exceeding 75 dB	Special Approvals (2) Environmental Review (3). Attenuation (4).
Unacceptable	Above 75 dB	Special Approvals (2). Environmental Review (3). Attenuation (5).

Notes: (1) Acceptable threshold may be shifted to 70 dB in special circumstances pursuant to § 51.105(a).
(2) See § 51.104(b) for requirements.
(3) See § 51.104(b) for requirements.
(4) 5 dB additional attenuation required for sites above 65 dB but not exceeding 70 dB and 10 dB additional attenuation requiredfor sites above 70 dB but not exceeding 75 dB. (See § 51.104(a).)
(5) Attenuation measures to be submitted to the Assistant Secretary for CPD for approval on a case-by-case basis.

According to the HUD regulations, development in Normally Unacceptable Noise Zones require a minimum of 5 decibels additional sound attenuation for buildings having noise-sensitive uses if the L_{dn} is greater than 65 dBA but does not exceed 70 dBA, or a minimum of 10 dBA additional sound attenuation if the L_{dn} is greater than 70 dBA but does not exceed 75 dBA. Noise attenuation measures in Unacceptable Noise Zones require the approval of the Assistant Secretary for Community Planning and Development, or the Certifying Officer for activities subject to 24 CFR part 58.

HUD's regulations do not contain standards for interior noise levels. Rather a goal of DNL 45 dBA is set forth and the attenuation requirements are geared towards achieving that goal. It is assumed that with standard construction any building will provide sufficient attenuation so that if the exterior level is 65 dBA or less, the interior DNL will be 45 dBA or less.

3.4. Ground Vibration

Ground vibration generated by train passbys can propagate into nearby buildings and cause perceptible vibration in the floors and walls of residential units. This perceptible vibration can cause annoyance to the residents. Neither the City's General Plan nor the State's Noise Insulation Standards set

standards for acceptable vibration levels in residences. For this project we have considered information from the Federal Transit Administration[1] (FTA).

The FTA has identified vibration impact criteria for assessing new transit systems near existing homes. The FTA considers an impact to occur when the vibration velocity level inside a residence from frequent events (70 or more events per day) exceeds 72 VdB[2]. For infrequent events (fewer than 30 trains per day) the FTA impact criterion is 80 VdB. The FTA also provides Table 2 to help understand the human response to different levels of ground-borne vibration.

Table 2: Human Response to Different Levels of Ground-borne Vibration

Vibration Level	Human Response
65 VdB	Approximate threshold of perception for many humans.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

4. Noise and Vibration Environment

The major noise sources affecting the site are vehicular traffic on South Main Street, freight train passbys on the adjacent Union Pacific Railroad tracks and airplane flyovers. Noise from the auto repair shops to the south affect the adjacent portion of the site. There was also noise from construction activities at the residential projects across the railroad tracks to the east.

4.1. Noise and Vibration Measurements

Figure 2 shows the location of the noise and vibration measurements. Noise monitor LT-1 was located on a street light at the proposed setback of the project building from the Union Pacific Railroad tracks. This monitor operated for a total of seven days consisting of one 5-day period and one 2-day period. Noise monitor LT-2 was located on a tree at the proposed setback of the project building from South Main Street and operated a total of five days. The average DNL at LT-1 was 58 dBA. The average DNL at LT-2 was 69 dBA. Figure 3 and 4 are charts showing the diurnal variation in hourly noise levels as measured at the long term monitoring locations and the dates of the measurements

[1] *Transit Noise and Vibration Impact Assessment*, Federal Transit Administration, April 2006.
[2] VdB – The vibration velocity level expressed in decibel re one micro-inch per second.

One short-term (one hour and 40 minutes) noise measurement was conducted at location ST-1 which is at the property line of the project site adjacent to the auto repair shops to the south. Table 3 shows the results of the short-term noise measurement.

Ground vibration measurements were made at location V-1 at the setback of the project building from the Union Pacific Railroad tracks. Table 4 shows the noise and vibration levels of the railroad train passbys.

Figure 2: Noise and Vibration Measurement Locations

Figure 3: Long-Term Noise Measurement Along Railroad Tracks: LT-1

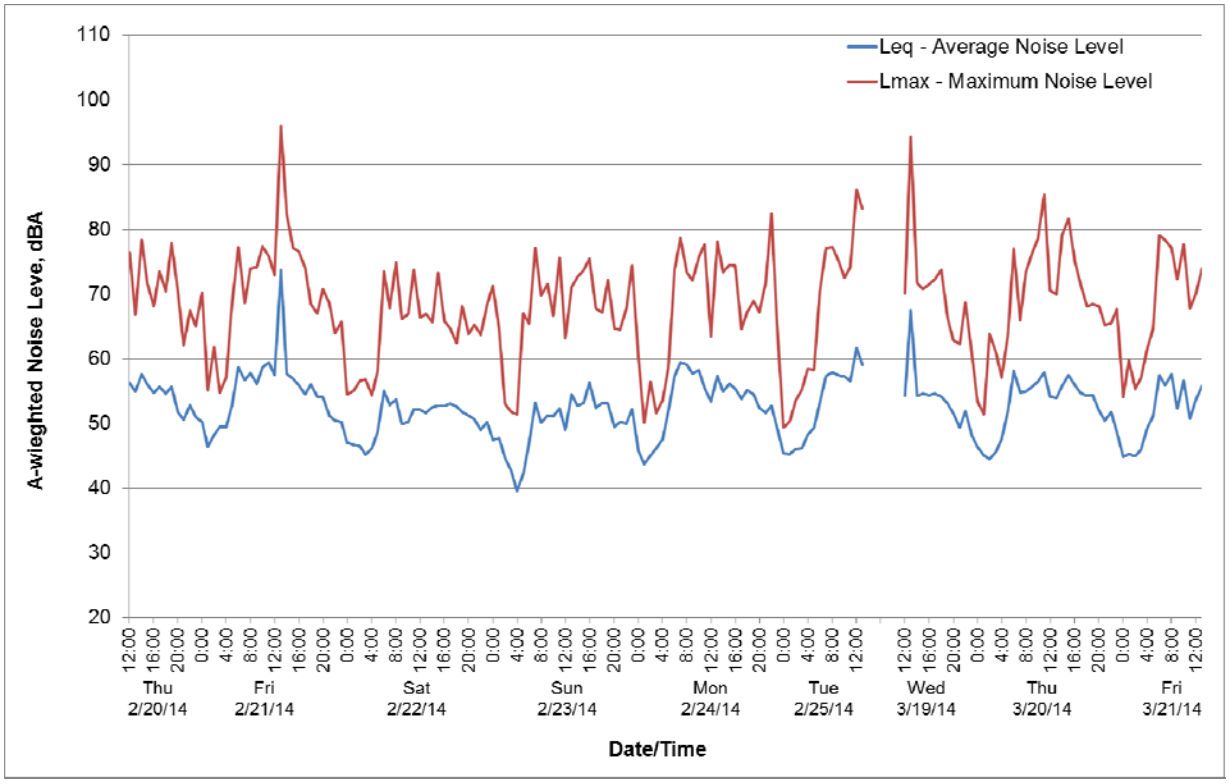


Figure 4: Long-Term Noise Measurement along South Main Street: LT-2

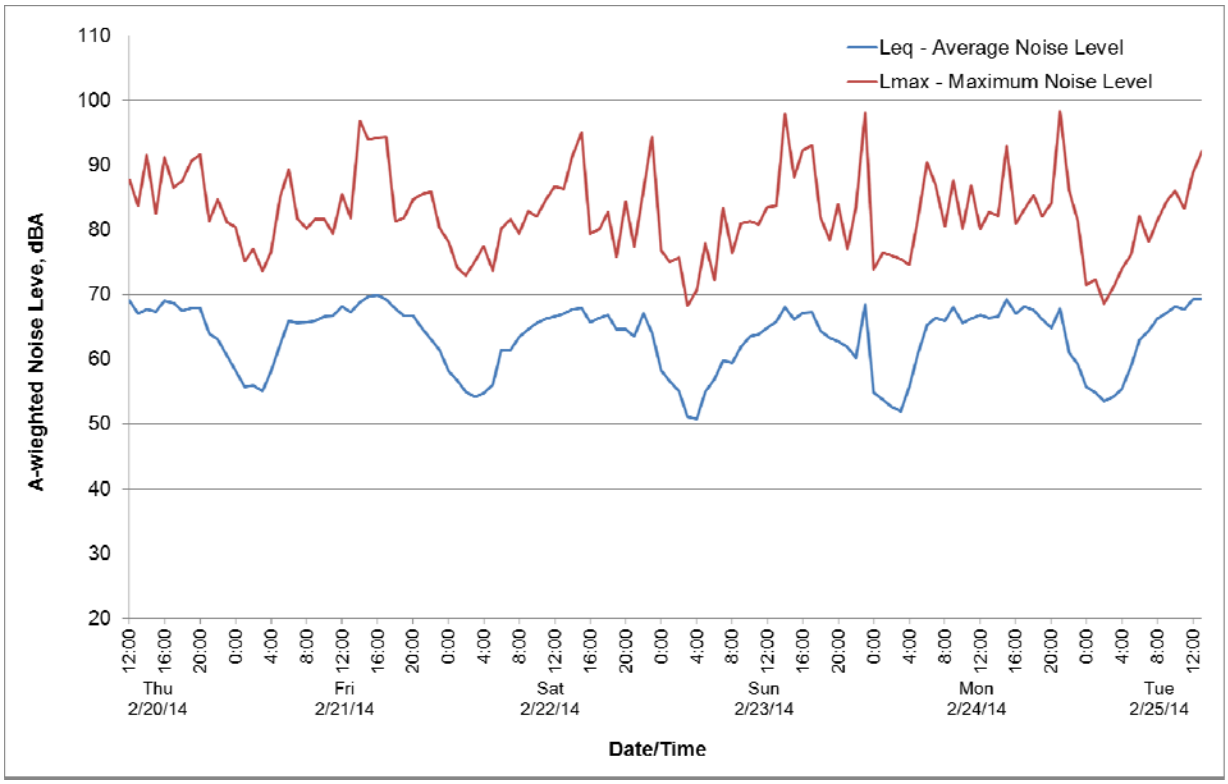


Table 3: Short-Term Noise Measurement Results – 25 February 2014

Location		Time	A-weighted Sound Level, dBA					
			L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{dn}*
ST-1	South property line adjacent to auto repair shops.	12:25 - 2:05 P.M.	59	85	59	55	51	57

*Estimate of L_{dn} based on comparison of short-term measurements with results of long-term measurements and consideration that auto repair shops are daytime only uses.

Table 4: Railroad Noise and Ground Vibration Levels

Date	Time	Maximum Noise Level (Lmax), dBA		Vibration Level, VdB*
		Locomotive	Horn	
Thursday, 2/20/2014	12:22 PM	75	--	64
Thursday, 2/20/2014, 1:00 PM – Friday, 2/21/2014, 2:00 PM		Recordings not available – trains unknown		
Friday, 2/21/2014, 2:00 PM – Sunday, 2/23/2014		No trains		
Monday, 2/24/2014	7:44 AM	79	77	NM**
	10:17 AM	76	--	NM**
Tuesday, 2/25/2014	7:22 AM	75	77	NM**
	11:29 AM	74	--	NM**
	12:01 PM	73	81	65
Thursday, 3/20/2014	6:47 AM	77	75	NM**
	10:41 AM	79	--	NM**
	11:27 AM	75	85	NM**
	3:02 PM	73	82	NM**
Friday, 3/21/2014	6:54 AM	79	--	NM**
	10:27 AM	76	--	NM**

*VdB – Unit of vibration velocity level, decibels re 1 micro-inch per second.
**NM – Not Measured

4.2. Railroad Trains

Noise

Audio recordings made at monitor LT-1 were used to identify railroad train passbys. In general, there were 2 to 4 train passbys per weekday which occurred during daytime hours. There were no passbys on the weekend days. Trains observed at the project site were slow moving (roughly 10 mph) and were short, 1 or 2 engines and 0 or 1 railcar. As a result, the noise levels were relatively low compared to higher speed trains with many railcars. Also, the project site is not adjacent to an at-grade roadway crossing and, therefore, the trains do not sound their whistle as they pass. The southbound trains sound their whistles as they approach the crossing at Montague Expressway. Although the horn is audible, at this point, the trains are well past the project site.

On the day with the most passbys, the DNL contribution from trains at LT-1 was 51 dBA. Since, the overall DNL at this location is 58 dBA, the trains represent a relatively minor contributor to the overall noise exposure.

Vibration

The ground vibration level from two train passbys was measured and the maximum levels during the passbys were 64 VdB and 65 VdB. Calculations using the FTA methodology indicate that the indoor floor vibration levels will be approximately 3 VdB less after accounting for foundation coupling and floor resonance effects. This vibration level is expected to be just below the threshold of perception for most humans of 65 VdB, and well below the FTA impact criteria for infrequent events of 80 VdB.

4.3. Roadway Traffic

The major source of traffic noise at the project site is South Main Street. The project building would be located as close as 40 feet from the center of the near lane. The measured DNL at this setback is 69 dBA. Maximum noise levels (L_{max}) as shown in Figure 4 are range from 80 to 98 dBA and are due to trucks, motorcycles and occasional sirens.

4.4. Aircraft

Although the project site is more than two miles from San Jose International Airport, it is exposed to relatively frequent aircraft noise since the site is near some departure flight tracks for the airport. Most of the aircraft noise events generate an L_{max} of 70 dBA or less. Some of the aircraft L_{max}'s are in the range of 75 to 80 dBA which is similar to the noise levels from train passbys. The

airport noise contours indicate that the project site is well outside the CNEL 65 dBA noise contour.

4.5. Future Noise Levels

Traffic volumes will along South Main Street will increase to a level of up to 4,000 vehicles per hour[3]. Based on calculations using the Federal Highway Administrations Traffic Noise Model (TNM 2.5), the future noise exposure at the western edge of the project will be up to a DNL of 73 dBA.

It is unknown whether freight train activity on the adjacent tracks will increase or decrease in the future. If the train activity were to double, this would increase the train DNL contribution by 3 dBA. Since train noise is a relatively minor overall noise contributor, this would increase the overall DNL by 1 dBA (from 58 dBA to 59 dBA at LT-1).

5. Analysis/Recommendations

5.1. Outdoor Noise

The city's noise and land use compatibility guidelines consider a DNL of up to 65 dBA as "normally acceptable" for multi-family residential development. This is also the goal for noise in common outdoor use areas of multifamily residential developments. This is also the HUD outdoor noise standard. The only portion of the project site that will exceed this level is the area directly adjacent to South Main Street. Since the project's common outdoor use areas would be located toward the rear and interior of the project site, the additional distance to the road and the acoustical shielding from the building will reduce the noise exposure to meet the "normally acceptable" outdoor sound levels. Therefore, no additional measures are required.

5.2. Indoor Noise

The City and State require that interior noise levels must be reduced to an DNL of 45 dBA or less in habitable rooms. This standard is also consistent with the City and HUD requirements. Based on our analysis of existing and future noise levels, combined with a review of the planning submittal drawings dated 3-10-2014 the project can meet the interior noise requirements through the use of sound rated windows on the facades nearest South Main Street. The exterior walls will be constructed with metal studs, stucco on the exterior, gypsum board interior and batt insulation in the stud cavities (resilient channels are not required on the exterior walls for noise control). All windows and sliding glass doors of the four dwelling units (on each level) directly adjacent to South Main

[3] Draft EIR, Milpitas Transit Area Specific Plan, October 2007.

Street should have a minimum Sound Transmission Class (STC) rating of 36. Swinging patio doors of these units should have a minimum STC rating of 32. The next units to the east (four units on each level) should have windows and sliding glass doors with minimum STC ratings of 30.

Some dwelling units will need to have closed windows to meet the indoor standard and will require an air conditioning or ventilation system in order to provide a habitable environment. These units include those with sound-rated windows as well as the units along the north and south facades which are within 210 feet of the west end of the buildings, and also units along the courtyard on the west side of the project which is open to South Main Street.

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