Appendix L

Noise Study

NOISE STUDY

Iris Lane Multi-Family Development
Escondido CA

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GLOSSARY OF COMMON TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 µPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (LDN): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for nighttime noise. Typically, LDN's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F, S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise impacts to and from the proposed residential project. The proposed N Iris Lane Residential Development is located on an approximate 7.7-acre project site along N Iris Lane, east of Interstate 15 (I-15), between Centre City Parkway and W Country Club Lane in Escondido, California 92025. The N Iris Lane Residential project proposes the development of 102 multi-family townhomes.

Construction Noise and Vibration Levels

The construction equipment will be spread out over the project site from distances near the occupied property to distances of over 300 feet away. Based upon the proposed site plan construction activities are not anticipated to exceed the City's 75-dBA standard and would not require any mitigation measures. The anticipated rock drilling, demolition and material haulage are also anticipated to comply with the City's thresholds. The construction activities would generate levels of vibration that would not exceed the City/FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Onsite Transportation Related Noise Levels

It was determined that the outdoor noise levels are expected to be as high as 59 dBA CNEL at the proposed outdoor uses and would comply with the City's noise standard and no additional mitigation is required. Additionally, a final noise assessment is required prior to the issuance of the first building permit since the building facades are above 60 dBA CNEL. This final report would identify noise requirements based upon architectural and building plans. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g., air conditioning) and upgraded windows for all sensitive rooms (e.g., bedrooms and living spaces).

Offsite Transportation Noise

The Project does not create a direct and cumulative noise increase of more than 3 dBA CNEL on any segment of Centre City Parkway and N Iris Lane. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Operational Noise Levels

Based upon the property line noise levels determined for the Project, none of the proposed noise sources exceeds the property line standards with the proposed perimeter fencing.

Therefore, the proposed development- related operational noise levels comply with the City's daytime and evening noise standards. No impacts are anticipated and no mitigation is required.

1.0 PROJECT INTRODUCTION

1.1 Purpose of this Study

The purpose of this Noise study is to determine noise impacts, if any, to the Project from off-site sources (i.e., traffic) and from the project (i.e., construction) onto surrounding uses. Should impacts be determined, the intent of this study would be to recommend suitable mitigation measures to reduce impacts to below a level of significance.

1.2 Project Location

The proposed N Iris Lane Residential Development is located on an approximate 7.7-acre project site located at 2085 North Iris Lane, east of Interstate 15, between Centre City Parkway and W Country Club Lane in Escondido, California 92025. A general project vicinity map is shown in Figure 1-1.

1.3 Project Description

The Project proposes the development of 102 multi-family residential units with approximately 230 parking spaces within a 7.69 acre footprint. The proposed project would require demolishing the existing structures onsite (approximately 10,000 Square Feet (SF)). It is expected that the Project would begin work sometime in 2023 and be completed in 2025. The Project site plan is shown in Figure 1-2.

Figure 1-1: Project Vicinity Map

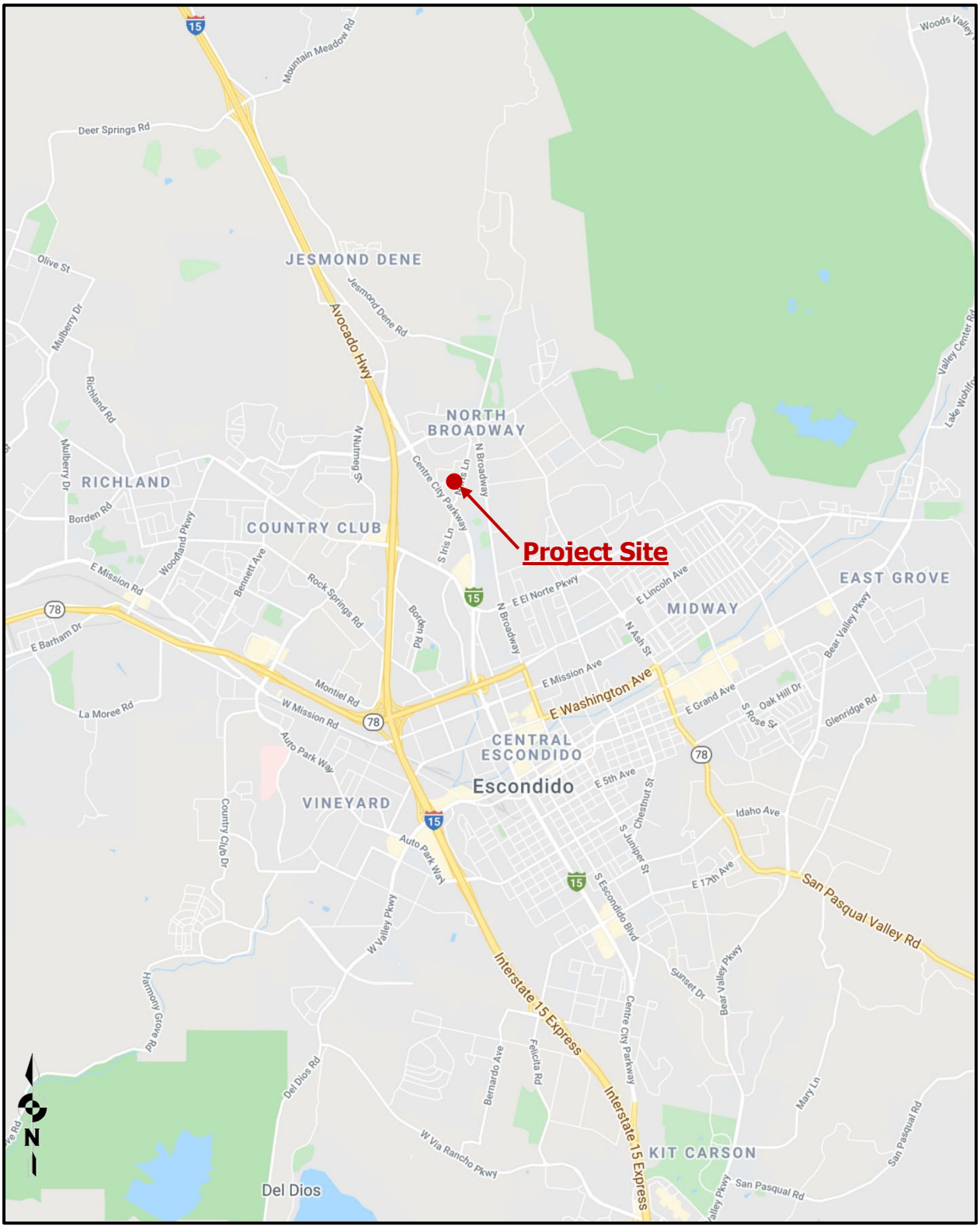

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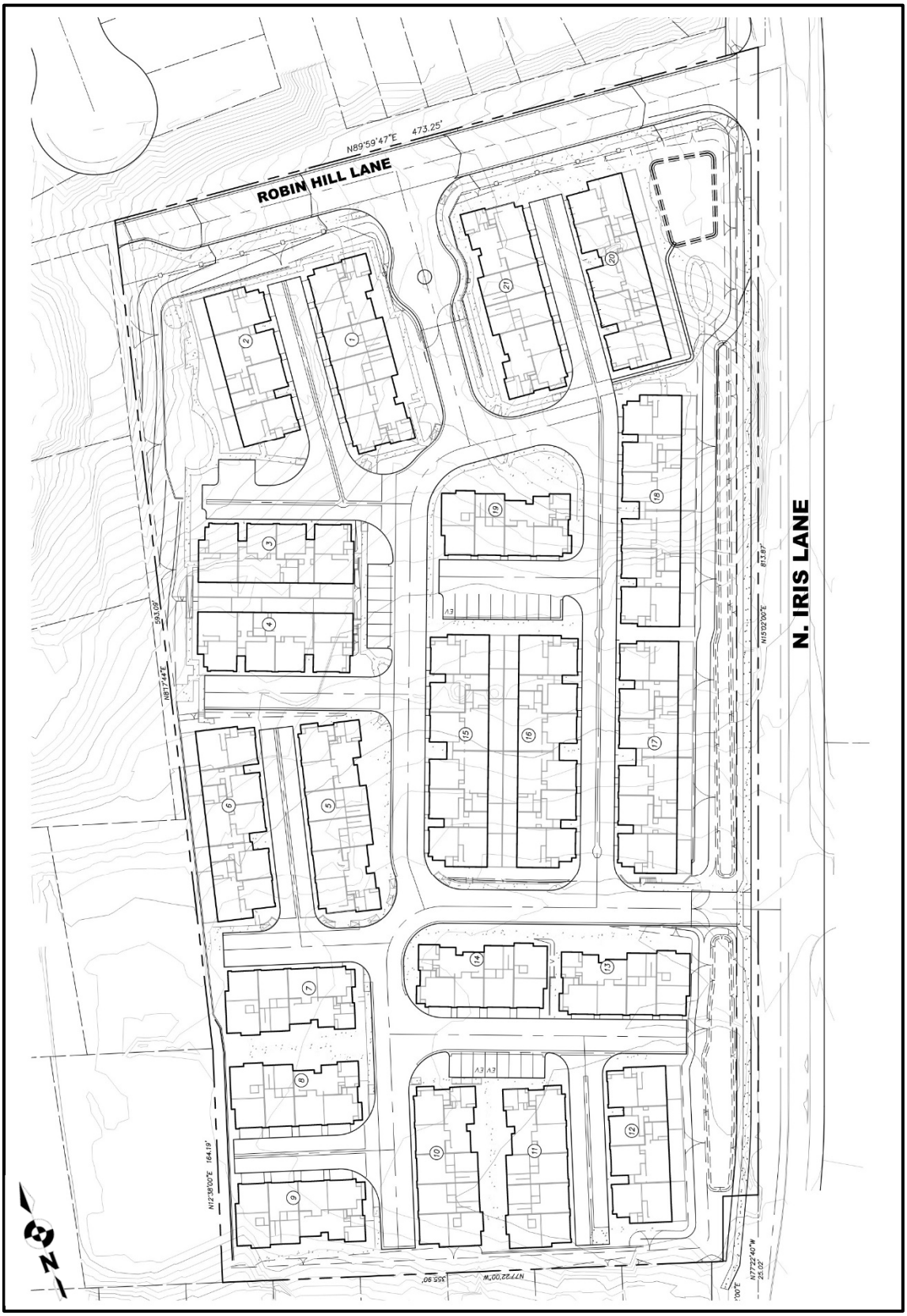
Figure 1-2: Project Site Plan



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2.0 REGULATORY FRAMEWORK

2.1 Municipal Code

Construction Noise

Sections 17-234 and 17-240 of the City of Escondido Municipal Code regulate construction noise. Any piece of construction equipment or any combination of construction equipment cannot be operated so as to cause an average noise level excess of 75 dBA Leq during the allowable hours of operation. Per City regulations, construction equipment can only be operated from 7:00 AM to 6:00 PM, Monday through Friday, and on Saturday from 9:00 AM to 5:00 PM. Construction equipment cannot be operated on Sundays or holidays. Operation of any construction equipment during non-allowable hours is permitted only by a variance from the City Manager. Except for emergency work, the provisions of this article shall not apply to any emergency work as defined in Section 17-227, provided that (1) a variance has been obtained from the City Manager, and (2) any vehicle device, apparatus, or equipment used, related to or connected with emergency work is designed, modified, or equipped to reduce sounds produced to the lowest possible level consistent with effective operation of such vehicle, device, apparatus, or equipment (City of Escondido Municipal Code, 2004).

2.2 Onsite Transportation Noise (Land Use Compatibility)

The goal of the Community Protection Element of the City General Plan (City of Escondido General Plan, 2012) is to minimize the impact of noise on the community by identifying existing and potential noise sources and providing the policies and standards needed to keep noise from reducing the quality of life in the City. The Community Protection Element establishes guidelines to evaluate the compatibility of land uses and noise exposure levels. A "Normally Acceptable" land use indicates that standard construction methods will attenuate exterior noise to an acceptable indoor noise level and people can carry out outdoor activities with minimal noise interference. Evaluation of land use that falls into the "Conditionally Acceptable" noise environment should have an acoustical study prepared. The acoustical study should include, with consideration of the type of noise source, the sensitivity of the noise receptor, and the degree to which the noise source may interfere with speech, sleep, or other activities characteristic of the land use.

Table 2-1 summarizes the land use compatibility standards for evaluating land use noise compatibility when reviewing proposed land use development projects. The Community Protection Element also states that the exterior standard should not normally be applied to balconies or patios associated with residential uses. Impacts would be significant if the project would expose new development to noise levels in excess of the Noise Compatibility Standards. For multi-family uses, the exterior noise compatibility standard is 65 CNEL.

Table 2-1: Land Use - Noise Compatibility Guidelines

Land Use Category	CNEL 55	60	65	70	75	80	85
Residential – Single Family, Duplex, Mobile Home							
Residential – Multi-Family, Residential Mixed Use							
Transient Lodging, Motels, Hotels							
Schools, Libraries, Churches, Hospitals, Nursing Home							
Auditoriums, Concert Halls, Amphitheaters							
Sports Arena, Outdoor Spectator Sports							
Playgrounds, Parks							
Golf Courses, Riding Stables, Water Recreation, Cemeteries							
Office Buildings, Business Commercial, Professional							
Industrial, Manufacturing, Utilities, Agriculture							

	Normally Acceptable	Specified land use is satisfactory, based upon the assumption that buildings involved are of normal conventional construction, without any special noise insulation requirements.
	Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will usually suffice.
	Normally Unacceptable	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with noise insulation features included in the design.
	Clearly Unacceptable	New construction or development should generally not be undertaken.

The Community Protection Element of the City General Plan also has a Noise Policy 5.4 that require noise attenuation for new noise-sensitive uses. This includes residential, daycare facilities, schools, churches, transient lodging, hotels, motels, hospitals, health care facilities, and libraries if the projected interior noise standard of 45 dBA CNEL is exceeded.

Noise Policy 5.5 of the Community Protection Element requires that construction projects and new development ensure acceptable vibration levels at nearby noise sensitive land uses based on the United States Department of Transportation Federal Transit Administration (FTA) criteria. These criteria are outlined in the Escondido General Plan Update (City of Escondido General Plan, 2012) and shown in Table 2-2 per the *City of Escondido Ground-borne Vibration Impact Criteria*. The General Plan EIR states that the category of infrequent events is applicable to construction activities.

The United States Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration. For purposes of identifying potential project-related vibration impacts, the FTA criteria will be used. The human reaction to various levels of vibration is highly subjective. The upper end of the range shown for the threshold of perception, or roughly 65 VdB, may be considered annoying by some people. Vibration below 65 VdB may also cause secondary audible effects, such as a slight rattling of doors, suspended ceilings/fixtures, windows, and dishes, any of which may result in additional annoyance. Table 2.2 shows the FTA groundborne vibration and noise impact criteria for human annoyance.

In addition to the vibration annoyance standards presented above, the FTA also applies the following standards for construction vibration damage. Table 2-3, structural damage is possible for typical residential construction when the peak particle velocity (PPV) exceeds 0.2 inch per second (in/sec). This criterion is the threshold at which there is a risk of damage to normal dwellings.

In the context of this analysis, the noise and vibration impacts associated with the construction operations and any blasting operations will be conditioned to comply with the thresholds stated above. The potential noise and vibration impacts are analyzed separately below.

Table 2-2: Groundborne Vibration and Noise Impact Criteria (Human Annoyance)

	Groundborne Vibration Impact Levels (VdB re 1 microinch/second)			Groundborne Noise Impact Levels (dB re 20 micropascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* 2018 (FTA, 2018).

[1] "Frequent Events" are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

[2] "Occasional Events" are defined as between 30 and 70 vibration events of the same source per day. Most commuter truck lines have this many operations.

[3] "Infrequent Events" are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[5] Vibration-sensitive equipment is not sensitive to groundborne noise.

Table 2-3: Groundborne Vibration Impact Criteria (Structural Damage)

Building Category	PPV (in/sec)	VdB
I. Reinforced-concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* 2018 (FTA, 2018).

Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

2.3 Operational Noise

The Noise Ordinance establishes prohibitions for disturbing, excessive or offensive noise, and provisions such as sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet for its citizens. Table 2-4, City of Escondido Exterior Sound Limit Levels, shows the allowable noise levels at any point on or beyond the boundaries of the property on which the sound is produced, and corresponding times of day for each zoning designation equipment (City of Escondido Municipal Code, 2004). The noise standards

apply to each property or portion of property substantially used for a particular type of land use reasonably similar to the land use types shown in Table 2-4, City of Escondido Exterior Sound Limit Levels. Where two or more dissimilar land uses occur on a single property, the more restrictive noise limits apply. Environmental noise is measured by the Leq for the hours as specified in Table 2-4. If the noise is continuous, the Leq for any hour will be represented by any lesser time period within that hour. If the noise is intermittent, the Leq for any hour may be represented by a time period typical of the operating cycle, but the measurement period must be 15 minutes or longer. If the measured ambient level exceeds the permissible noise level, the allowable noise exposure standard is the ambient noise level. Noise restrictions are listed in Sections 17-230 through 17-241 of the Noise Ordinance, such as specific regulations pertaining to motor vehicles and burglar alarms. Additional sections of the Noise Ordinance applicable to this analysis are listed below.

Table 2-4: City of Escondido Exterior Sound Limit Levels

Zone	Time	Applicable Limit One-hour Average Sound Level (A-weighted Decibels)
Residential zones	7:00 a.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	45
Multi-residential zones	7:00 a.m. to 10:00 p.m.	55
	10:00 p.m. to 7:00 a.m.	50
Commercial zones	7:00 a.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	55
Light industrial/Industrial park zones	Anytime	70
General Industrial zones	Anytime	75
Source: City of Escondido Municipal Code Section 17-229, Sound Level Limits		

Section 17-229(c)(5) (Corrections to Exterior Noise Level Limits)

Section 17-229 (c)(5) of the Noise Ordinance, Corrections to Exterior Noise Level Limits, includes the following regulations:

a) If the noise is continuous, the Leq for any hour will be represented by any lesser time period within that hour. Noise measurements of a few minutes only will thus suffice to define the noise level.

b) If the noise is intermittent, the Leq for any hour may be represented by a time period typical of the operating cycle. Measurement should be made of a representative number of noisy/quiet periods. A measurement period of not less than 15 minutes is, however, strongly recommended when dealing with intermittent noise.

c) In the event the alleged offensive noise, as judged by the enforcement officer, contains a steady, audible sound such as a whine, screech or hum, or contains a repetitive impulsive noise such as hammering or riveting, the standard limits set forth in Table 4.12-5, City of Escondido Exterior Sound Limit Levels, shall be reduced by 10 dB or to the ambient noise level when such noises are not occurring.

d) If the measured ambient level exceeds that permissible in Table 4.12-5, City of Escondido Exterior Sound Limit Levels, the allowable noise exposure standard shall be the ambient noise level. The ambient level shall be measured when the alleged noise violations source is not operating.

e) The sound level limit at a location on a boundary between two land use classifications is the limit applicable to the receiving land use; provided, however, that the one-hour average sound level limit applicable to extractive industries including, but not limited to, borrow pits and mines, shall be 75 dB at the property line regardless of the zone where the extractive industry is actually located.

   Fixed-location public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise level limits of this section, measured at or beyond six feet from the boundary of the easement upon which the equipment is located.

3.0 FUNDAMENTALS

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs, and when the noise occurs.

Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24-hour A-weighted average for sound, with corrections for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sound appears louder.

A vehicles noise level is a combination of the noise produced by a vehicle's engine, exhaust, and tires. The cumulative traffic noise levels along a roadway segment are based on three primary factors: the amount of traffic, the travel speed of the traffic, and the vehicle mix ratio or number of medium and heavy trucks. The intensity of traffic noise is increased by higher traffic volumes, greater speeds, and increased number of trucks.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiate in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt, and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas, and vegetation. Alternately, fixed/point sources radiate outward uniformly as it travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance.

The most effective noise reduction methods consist of controlling the noise at the source and blocking the noise transmission with barriers. Any or all of these methods may be required to reduce noise levels to an acceptable level. To be effective, a noise barrier must have enough mass to prevent significant noise transmission through it and high enough and long enough to shield the receiver from the noise source. A safe minimum surface weight for a noise barrier is 3.5 pounds/square foot (equivalent to 3/4-inch plywood), and the barrier must be carefully constructed so that there are no cracks or openings.

Barriers constructed of wood or as a wooden fence must have minimum design considerations as follows: the boards must be ¾ inch thick and free of any gaps or knot holes. The design must also incorporate either overlapping the boards at least 1 inch or utilizing a tongue-and-grove design for this to be achieved.

4.0 POTENTIAL IMPACTS

4.1 Construction Noise Levels

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction and demolition equipment includes haul trucks, water trucks, graders, dozers, loaders and pile drivers, which can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

The U.S. Environmental Protection Agency (U.S. EPA) and the U.S. Department of Transportation (U.S. DOT) have compiled data regarding the noise generating characteristics of specific types of construction equipment . Noise levels generated by heavy construction equipment can range from 60 dBA to in excess of 100 dBA when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 75 dBA measured at 50 feet from the noise source to the receptor would be reduced to 69 dBA at 100 feet from the source to the receptor and reduced to 63 dBA at 200 feet from the source.

4.1.1 Potential Noise Impact Identification

Using a point-source noise prediction model, calculations of the expected construction noise impacts were completed. The essential model input data for these performance equations include the source levels of each type of equipment, relative source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day, also referred to as the duty-cycle and any transmission loss from topography or barriers.

Based on empirical data and the amount of equipment needed, worst case noise impacts from this construction equipment would occur during the demolition and grading operations. In order to determine the worst case scenario for the grading activities, all the equipment was placed in a common location, which is not physically possible. As can be seen in Table 4-1, even if all the equipment were placed together, the cumulative noise levels would be 80.1 dBA and would attenuate 5.1 dBA at a distance of 90-feet from the point source noise and would be at or below the 75 dBA threshold.

Table 4-1: Construction Noise Levels

Construction Equipment	Quantity	Source Level @ 50-Feet (dBA)[1]	Duty Cycle (Hours/Day)	Cumulative Noise Level @ 50-Feet (dBA)
Dozer - D8	1	72	8	72.0
Tractor/Backhoe	1	74	8	74.0
Loader/Grader	1	73	8	73.0
Water Trucks	1	70	8	70.0
Paver/Blade	1	75	8	75.0
			Cumulative Levels @ 50 Feet	80.1
			Distance to Property Line (Feet)	90
			Noise Reduction Due to Distance	-5.1
			NEAREST PROPERTY LINE NOISE LEVEL	**75.0**

[1] Source: U.S. Environmental Protection Agency (U.S. EPA) and Empirical Data

Demolition Activities Noise Findings

Not all the equipment will operate continuously over an 8-hour period, the equipment will be utilized on an as-needed basis depending on the demolition activities are required. As an example: a saw will be used to weaken some of the structural components of the structure and then the excavator would be utilized to demo that section of the structure. The excavator or a loader will then be used to place the debris into the haul trucks. Noise levels from the demolition activities can reach short-term peak noise levels in excess of 90 dBA but will decay rapidly. This is due to the fact that once the equipment knocks down a portion of the building the debris needs to be removed, sorted and inspected. Based on empirical data gathered during the monitoring of a similar project, the worst-case hourly noise level was found to be up to 81 dBA Leq at an average distance of 25 feet for demolition activities (Source: Aztec Court Noise Monitoring – San Diego, Ldn Consulting, 2012). At an average distance of 50 feet, the noise level from the demolition activities would be roughly 75 dBA. The average distance from the demolition activates is anticipated to vary between 100 feet and 200 feet from the adjacent property lines. Given this, the noise levels will comply with the average 75 dBA threshold at the property lines.

Blasting

The project also may require some blasting-related activities and materials blasted would be exported offsite and clean soils would be brought in to replace. Areas of the project site that require deeper cuts and where the native material is not easily rippable (graded) may require blasting and the use of a rock drill. The rock drill would be moved around the site on an as needed basis dependent upon the site characteristics. The use of a rock drill would occur independently of all other proposed equipment. The drilling and blasting activities would occur in one area then the

grading equipment would relocate or remove the debris. To determine the worst-case noise levels from the drilling operations the noise level from the rock drill would be 85.0 dBA at 50 feet. Utilizing a 6 dBA reduction per doubling of distance, at an average distance of 160 feet from any property line, the noise levels will comply with the 75 dBA standard as shown in Table 4-2.

Table 4-2: Construction Noise Levels from Rock Drill

Construction Equipment	Quantity	Source Level @ 50 Feet (dBA)	Duty Cycle (Hours/Day)	Noise Level @ 50 Feet (dBA)
Rock Drill	1	85	8	85.0
			Noise Reduction Needed to Comply	-10.0
			Distance Required to Reduce Noise Levels	160
			NEAREST PROPERTY LINE NOISE LEVEL	**74.9**

Rock drilling and blasting will occur on an as-needed basis on site. In the event that the rock drill is staged within 160 feet of any occupied noise sensitive land use, it is recommended that a specific noise mitigation plan based upon the location of the construction equipment, topography and construction schedule be identified by an acoustical engineer. A mitigation plan should be developed that may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height maybe needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold. The mitigation plan can also incorporate the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier if one is necessary. The project would not include rock crushing onsite. If material needs to be crushed it will be hauled off site..

Haulage

Grading of the Project site will consist of approximately 6,812 cubic yards (CY) export and 22,112 CY of import. Assuming there could be up to 8 trucks in an hour. Community noise level changes greater than 3 dBA are often identified as audible and considered potential significant, while changes less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change. There is no scientific evidence available to support the use of 3 dBA as the significance threshold. Community noise exposures are typically over a long time period rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely greater than 1 dBA and 3 dBA appears to be

appropriate for most people. For the purposes for this analysis a direct and cumulative roadway noise impacts would be considered significant if the project increases noise levels for a noise sensitive land use by 3 dBA CNEL and if the project increases noise levels above an unacceptable noise level per the City's General Plan in the area adjacent to the roadway segment.

Typically, it requires a project to double (or add 100%) to the traffic volumes to result in a 3 dBA CNEL which is considered a potential impact. Based on a current traffic volume of approximately 8,400 ADT or more on the roadways along the site and along the anticipated haul route, the additional trucks would add 0.5 dBA to the overall noise level. This is well below a 3 dBA increased that is considered a potential impact. No noise impacts are anticipated at the residential uses that are located along the roadway and the low volume of trucks.

4.1.2 Construction Noise Conclusions

The equipment will be spread out over the project site from distances near the occupied property to distances of over 300-feet away. Based upon the proposed site plan construction activities will average more than 90-feet away from the adjacent property lines. At average distances over 90-feet the construction activities are anticipated to not exceed the City's 75-dBA standard and would not require any mitigation measures. The anticipated rock drilling, demolition and material haulage are also anticipated to comply with the City's thresholds.

4.2 Construction Vibration Findings and Mitigation

The nearest vibration-sensitive uses are the residences located 100 feet or more from the proposed construction. Table 4-3 lists the average vibration levels that would be experienced at the nearest vibration sensitive land uses from the temporary construction activities.

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.20 in/sec for the peak particle velocity (PPV). Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, project construction activities would not result in vibration induced structural damage to residential buildings near the construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Table 4-3: Vibration Levels from Construction Activities (Residential Receptors)

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate RMS Velocity at 25 Feet (in/sec)	Approximate Velocity Level at 100 Feet (VdB)	Approximate RMS Velocity at 100 Feet (in/sec)
Small bulldozer	58	0.003	68.9	0.0111
Jackhammer	79	0.035	60.9	0.0044
Loaded trucks	86	0.076	67.9	0.0095
Large bulldozer	87	0.089	39.9	0.0004
		FTA Criteria	80	0.2
		Significant Impact?	**No**	**No**
[1] PPV at Distance D = PPVref x $(25/D)^{1.5}$				

4.3 Transportation Noise Levels

4.3.1 Existing Noise Environment Onsite

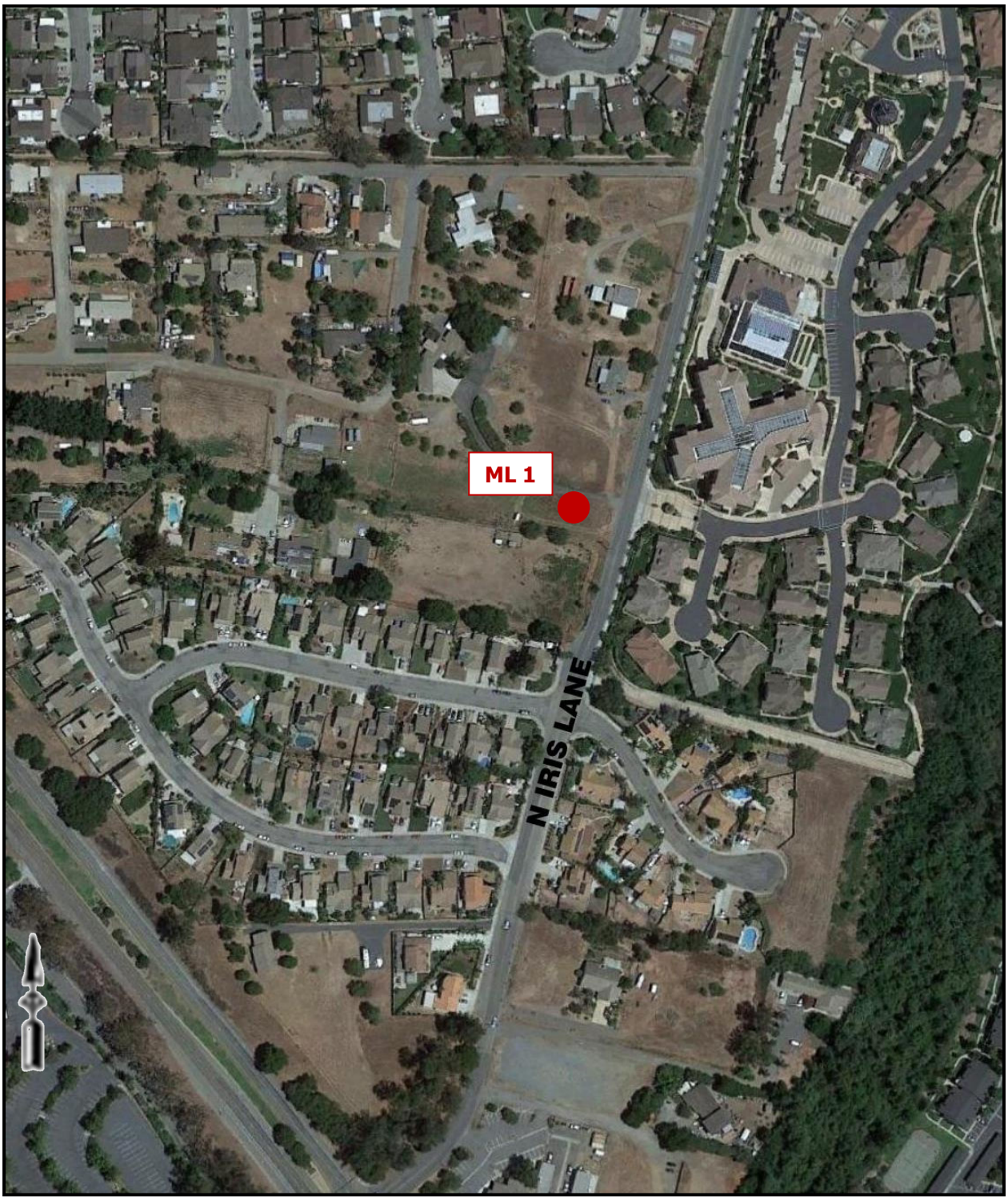
Noise measurements were taken using a Larson-Davis Model LxT Type 1 precision sound level meter, programmed, in "slow" mode, to record noise levels in "A" weighted form. The sound level meter and microphone were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200.

The ambient measurements were conducted on April 15, 2021 between 9:15 am – 9:30 am. The results of the noise level measurements are presented in Table 4-4. The measurements were taken on site to establish a baseline of the vehicle noise from N Iris Lane. The measurements were free of obstruction and had a direct line of sight to the roadways. The overall sound level was found to be 59.0 dBA. The statistical indicators Lmax, Lmin, L10, L50 and L90, are also given for the monitoring location. The noise monitoring locations can be seen in Figure 4-1 on the following page.

Table 4-4: Measured Ambient Noise Levels

Measurement Identification	Description	Time	Noise Levels (dBA Leq)					
			Leq	Lmax	Lmin	L10	L50	L90
ML 1	North Iris Lake	9:15 a.m. – 9:30 a.m.	59.0	70.1	41.8	63.4	55.1	46.7
Source: Ldn Consulting April 15, 2021								

Figure 4-1: Ambient Monitoring Locations



4.3.2 Onsite Transportation Related Noise Levels

To determine the future noise environment and impact potentials the roadway segment noise levels projected in this report were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (Source: (FHWA, 1978)). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. The peak hour traffic volumes range between 6-12% of the average daily traffic (ADT) and 10% is generally acceptable for noise modeling.

Table 4-5 presents the roadway parameters used in the analysis including the peak traffic volumes, vehicle speeds and the hourly traffic flow distribution (vehicle mix). The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the Model. The Buildout conditions are provided in the Project traffic study (LOS Engineering, 2022). The modeled observer locations are represented in Figure 4-2.

Table 4-5: Future Traffic Parameters

Roadway	Average Daily Traffic (ADT)[1]	Peak Hour Volumes[1]	Modeled Speeds (MPH)	Vehicle Mix %[2]		
				Auto	Medium Trucks	Heavy Trucks
N Iris Lane	9,995	1,000	35	96	2	2

[1] Source: N Iris Lane Draft Traffic Study – LOS Engineering, Inc., 2022
[2] Source: City of Escondido General Plan Projected Buildout Noise Contours for Year 2035

A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections. Additionally, three decibels of attenuation is allowed for the first row of buildings when they block 40 to 65% of the line of sight to the noise source, and three to five decibels of attenuation is allowed when the buildings obstruct more than 65% of the line of sight (Source: (Caltrans, 2006). The line of sight to the roadways from the park/outdoor use areas are blocked by the existing and proposed structures by more than 40%, therefore a factor of 3 dBA was taken into account. Outdoor usable space would be provided by the proposed park/outdoor use areas located near Building 2 and Building 19. It was determined that the outdoor noise levels are expected to be as high as 59 dBA CNEL at the park/outdoor use area and would comply with the City's 65 dBA CNEL noise standard. Therefore, no impact is identified and no mitigation is required. The results of the specific noise modeling are provided below in Figure 4-3 and Table 4-6.

Figure 4-2: Modeled Receptor Locations

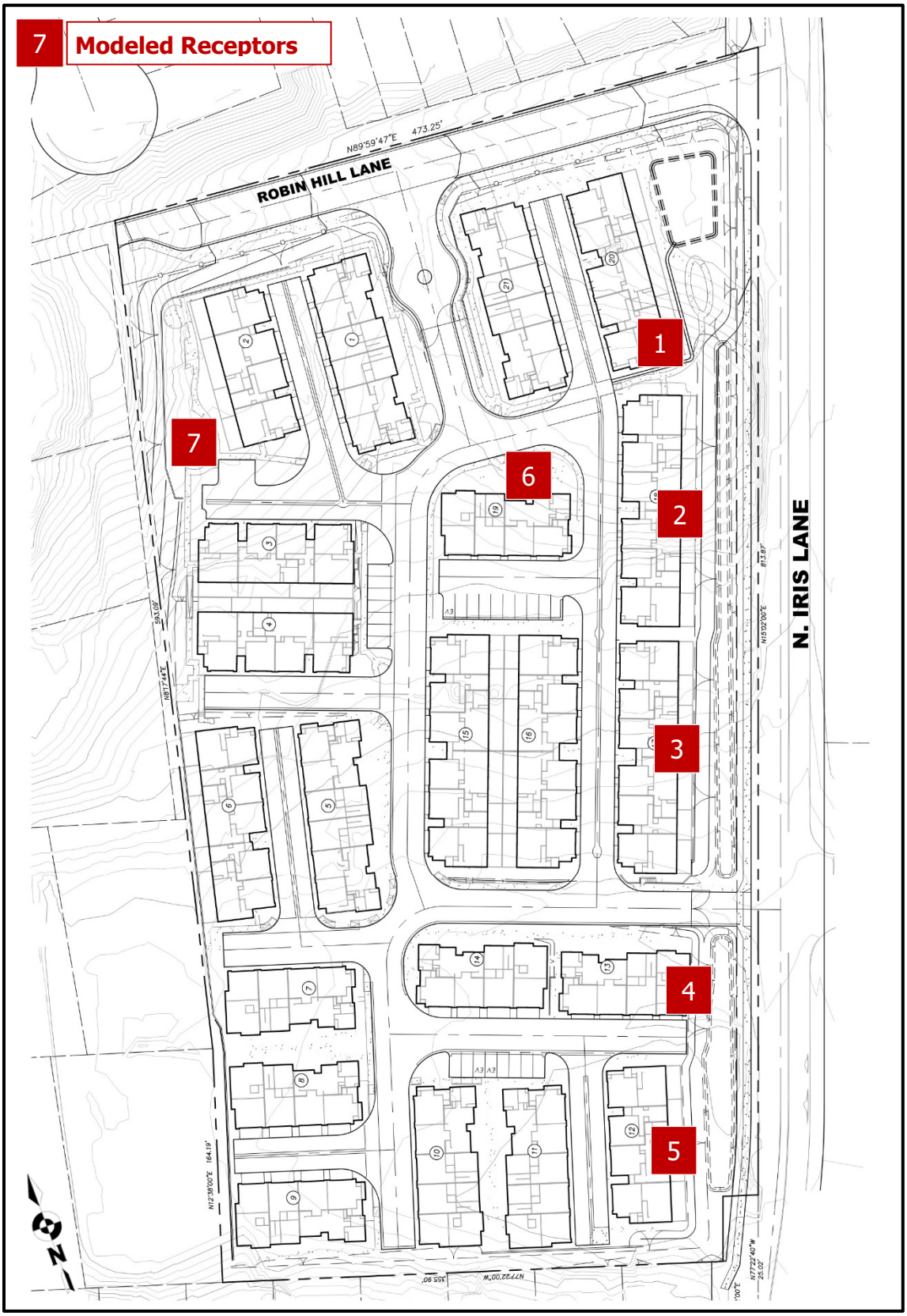


Figure 4-3: Future Exterior Noise Levels

Project Name:	N Iris Lane	Date:	1-Jul-21
Project Number:	20-56	Location:	Escondido

Traffic Volumes, Mix and Speeds

	Autos	Med. Trucks	Heavy Trucks
Mix Ratio by Percent	96.0	2.0	2.0
Propagation Rule	Hard		

Roadway	ADT	Speed MPH	CNEL @ 50 Feet	60 CNEL (Feet)
N Iris Lane	9,995	35	66.9	244

Noise Reduction due to Distance

	Distance	Reduction	Resultant Level
Building 20	78	-1.93	65.0
Building 18	70	-1.46	65.4
Building 17	72	-1.58	65.3
Building 13	70	-1.46	65.4
Building 12	72	-1.58	65.3
Park 1	170	-5.31	61.6
Park 2	420	-9.24	57.6

Table 4-6: Future Exterior Noise Levels

Receptor Number	Receptor Location	Noise Level @ Receptor (dBA CNEL)[1]	Reduction Due to Shielding (dBA CNEL)	Resultant Noise Level (dBA CNEL)
1	Building 20	65	-	65
2	Building 18	65	-	65
3	Building 17	65	-	65
4	Building 13	65	-	65
5	Building 12	65	-	65
6	Park/Outdoor Area	62	-3.0	59
7	Park/Outdoor Area	58	-3.0	55

[1] FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108

Additionally, a final noise assessment is required prior to the issuance of the first building permit for first, second and third floors of the units since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and

building plans to meet the City's established interior noise limit of 45 dBA CNEL. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g., air conditioning) for each building and upgraded windows for all sensitive rooms (e.g., bedrooms and living spaces).

4.3.3 Project Related Offsite Transportation Noise

The off-site Project related roadway segment noise levels projected in this report were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections. The noise contours are then established by iterating the equivalent noise level over many distances until the distance to the desired noise contour(s) are found.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiate in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. Hard site conditions, to be conservative, were used to develop the noise contours and analyze noise impacts along all roadway segments. The future traffic noise model utilizes a typical, conservative vehicle mix of 96% Autos, 2% Medium Trucks and 2% Heavy Trucks for all analyzed roadway segments. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA Model.

Community noise level changes greater than 3 dBA are often identified as audible and considered potentially significant, while changes less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change. There is no scientific evidence available to support the use of 3 dBA as the significance threshold. Community noise exposures are typically over a long time period rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely greater than 1 dBA and 3 dBA appears to be appropriate for most people. For the purposes for this analysis a direct and cumulative roadway noise impacts would be considered significant if the project increases noise levels for a noise sensitive land use

by 3 dBA CNEL and if the project increases noise levels above an unacceptable noise level per the City's General Plan in the area adjacent to the roadway segment.

Direct Noise Impacts

To determine if direct off-site noise level increases associated with the development of the Project will create noise impacts, the noise levels for the existing conditions were compared with the noise level increase from the Project. Utilizing the Project's traffic assessment trips (LOS Engineering, 2022) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.

Existing Plus Project: Current day noise conditions plus the completion of the project.

Existing vs. Existing Plus Project: Comparison of the direct project related noise level increases in the vicinity of the project site.

The noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 4-7 for the Existing Scenario and in Table 4-8 for the Existing Plus Project Scenario. Note that the values given do not take into account the effect of any noise barriers or topography that may affect ambient noise levels. Table 4-9 presents the comparison of the Existing Year with and without Project related noise levels. The overall roadway segment noise levels will increase from 0.1 to 0.4 dBA CNEL with the development of the Project. The Project does not create a direct noise increase of more than 3 dBA CNEL on any roadway segment. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Table 4-7: Existing Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Centre City Parkway	Iris Ln to El Norte Pkwy	17,018	55	73.6	402
N Iris Lane	Village Rd to Robin Hill Ln	8,466	35	66.2	129
	Robin Hill Ln to Centre City Pkwy	8,996	35	66.4	134
[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2022					

Table 4-8: Existing + Project Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Centre City Parkway	Iris Ln to El Norte Pkwy	17,614	55	73.7	411
N Iris Lane	Village Rd to Robin Hill Ln	8,775	35	66.3	132
	Robin Hill Ln to Centre City Pkwy	9,791	35	66.8	142
[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2022					

Table 4-9: Existing vs. Existing + Project Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Project Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Centre City Parkway	Iris Ln to El Norte Pkwy	73.6	73.7	0.1
N Iris Lane	Village Rd to Robin Hill Ln	66.2	66.3	0.1
	Robin Hill Ln to Centre City Pkwy	66.4	66.8	0.4

Cumulative Noise Impacts

To determine if cumulative off-site noise level increases associated with the development of the Project and other planned or permitted projects in the vicinity will create noise impacts. The noise levels for the near-term Project Buildout and other planned and permitted projects were compared with the existing conditions. Utilizing the Project's traffic assessment trips (LOS Engineering, 2022) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.

Existing Plus Cumulative Projects Plus Project: Current day noise conditions plus the completion of the project and the completion of other permitted, planned projects or approved ambient growth factors.

Existing vs. Existing Plus Cumulative Plus Project: Comparison of the existing noise levels and the related noise level increases from the combination of the project and all other planned or permitted projects in the vicinity of the site.

The existing noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 4-7 above for the Existing Scenario. The near-term cumulative noise conditions are provided in Table 4-10. No noise barriers or topography that may affect noise levels were incorporated in the calculations.

Table 4-11 presents the comparison of the Existing Year and the Near-Term Cumulative noise levels. The overall roadway segment noise levels will increase 0.2 to 0.4 dBA CNEL with the development of the Project and proposed cumulative projects. The cumulative noise increase is less than 3 dBA CNEL on any roadway segment and impacts would be less than significant.

Table 4-10: Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Centre City Parkway	Iris Ln to El Norte Pkwy	18,919	55	74.0	431
N Iris Lane	Village Rd to Robin Hill Ln	8,787	35	66.3	132
	Robin Hill Ln to Centre City Pkwy	9,803	35	66.8	142
[1] Source: Project Traffic study prepared by LOS Engineering, Inc., 2022					

Table 4-11: Existing vs. Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Project Plus Cumulative Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Centre City Parkway	Iris Ln to El Norte Pkwy	73.6	74.0	0.7
N Iris Lane	Village Rd to Robin Hill Ln	66.2	66.3	0.2
	Robin Hill Ln to Centre City Pkwy	66.4	66.8	0.4

4.3.4 Transportation Noise Conclusions

It was determined that the outdoor noise levels are expected to be as high as 59 dBA CNEL at the proposed park/outdoor use area and would comply with the City's noise standard and no additional mitigation is required. Exterior noise levels at the building facades were found to be above the Noise Element Standard of 60 dBA CNEL. Therefore, interior mitigation is required to obtain an interior level of 45 dBA CNEL.

The Project does not create a direct or cumulative noise increase of more than 3 dBA CNEL on any roadway segment along Centre City Parkway and N Iris Lane. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

4.4 Operational Noise

Fixed or point sources radiate outward uniformly as sound travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance. For example, a noise level of 75 dBA measured at 3 feet from the noise source to the receptor would be reduced to 69 dBA at 6 feet from the source to the receptor and 63 dBA at a distance of 12 feet.

Ground mechanical ventilation units (HVAC) will be installed at the proposed residential units. The project anticipates installing Carrier CA15NA (Series, 24-A) or equivalent HVAC units with a reference noise level of 71 dBA at 3-feet (Source: Carrier). The manufacturer's specifications and noise levels are provided in Attachment A. The HVAC units will cycle on and off throughout the day. Typically, HVAC units run for approximately 20 minutes each operating cycle to provide the necessary heating or cooling. It is anticipated that the HVAC units will operate twice in any given hour or run for 40 minutes in any given hour. Noise levels drop 3 decibels each time the duration of the source is reduced in half. Therefore, hourly HVAC noise level over a 40 minute period would be reduced approximately 2 decibels to 69 dBA based on operational time. To predict the property line noise level, a reference noise level of 69 dBA at 3-feet was used to represent the HVAC units.

The HVAC units are located a minimum of 30 feet from the property lines and are shielded by the proposed homes and perimeter fencing as shown in Figure 3-A. The solid fencing will be vinyl, ¾-inch or thicker consisting of solid panels on minimum 4x4-inch posts with no cracks or gaps through or below and all seams or cracks will be filled or caulked. The typical locations of the proposed HVAC units are also shown in Figure 3-A. Two HVAC units maybe located near each other with the proposed buildings separating them and would create the worst case cumulative noise level. The remainder of the units are separated by at least 30 feet and the proposed buildings shielding them. This separation of 30 feet would result in a 20 dBA difference between two separate HVAC units and would not cumulatively increase the noise levels. Therefore, the worst case combined noise from the HVAC would occur from two units.

Utilizing a 6 dBA decrease per doubling of distance, noise levels at the nearest property line as described above were calculated for the HVAC. The noise levels associated with the HVAC will be limited with the proposed perimeter fencing that will shield them both visually and acoustically. The HVAC units are located a minimum of 30 feet from the nearest property lines.

To determine the noise level reductions from the perimeter fencing, the Fresnel Barrier Reduction Calculations based on distance, source height, receiver elevation and the top of barrier were modeled. The adjacent receptor was located 5 feet behind the perimeter fencing. The noise level reductions due to distance and the fencing for the nearest property line is provided in Table 4-12 below. The Fresnel barrier reduction calculations for the fencing are provided in Attachment B of this report.

Table 4-12: Project HVAC Noise Levels (Nearest Property Line)

Distance to Observer (Feet)	Reference Noise Level (dBA)	Noise Source Reference Distance (Feet)	Noise Reduction due to distance (dBA)	Quantity	Noise Reduction from Fencing (dBA)	Resultant Noise Level @ Property Line (dBA)
35	69	3	-24.4	2	-8.6	42.1*
*Complies with the nighttime Noise Standard of 45 dBA.						

No impacts are anticipated at the property lines with the incorporation of the proposed 6-foot fencing as shown in Figure 4-4. All other property lines are located further from the proposed HVAC units and the resulting noise levels would also be below the 45 dBA threshold.

Figure 4-4: Locations of the proposed HVAC Units

5.0 REFERENCES

Caltrans. (2006). *Technical Noise Supplement Section N-5515.* Retrieved from https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf

City of Escondido General Plan. (2012). *Noise Element of the General Plan.*

City of Escondido Municipal Code. (2004). *City of Escondido Municipal Code.*

FHWA. (1978). *Highway Traffic Noise Prediction Model.* FHWA-RD-77-108.

FTA. (2018). *Transit Noise and Vibration Impact Assessment.* Retrieved from https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf

Google. (2021). Retrieved from maps.google.com

LOS Engineering. (2022). *Traffic Impact Assessment.*