

NOISE STUDY

Cleveland 29 Residential 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 μ Pa. 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. L_{eq} 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 Cleveland 29 Residential Development (Project) is located on an approximate 10.4-acre project site east of Interstate 15 at the northeast corner of Cleveland Avenue and Conway Drive in Escondido, California 92026. The Cleveland 29 Residential project proposes the development of 29 single-family residential lots.

Construction Noise

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.

Additionally, the project may require blasting which would also require the need for a rock drill. 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, mitigation would be required. It was determined that a 12-foot barrier would reduce noise levels between 18 and 20 dBA at the property lines. The barrier shall run the length of the property line within a radius of 160-feet of the location of the rock drill. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold.

Construction-related blasting would not result in a significant noise impact because blasting events are instantaneous and occur infrequently, resulting in very short-term noise exposure. In addition, all blasting activities would comply with the City of Escondido's Noise Ordinance and applicable blasting protocols, which include requirements for advance notification, use of controlled blasting techniques, and adherence to established maximum noise and vibration limits. Therefore, blasting noise would be minimized to the extent feasible and would not result in a significant impact.

Rock Crusher Noise

The rock crushing equipment will be located in the central portion of the site at the proposed building pads, and more than 250 feet from the nearest residences. The noise levels are anticipated to be below the City's 75 dBA Leq construction noise standard without mitigation. As a mitigation measure, the rock crusher should be located a minimum of 75 feet from any property line.

Construction Vibration

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.

Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 79 VdB and 0.03 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second.

Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided it can be minimized by following the City's blasting procedures.

Onsite Transportation Related Noise Levels

It was determined that the outdoor noise levels are expected to be as high as 56 dBA CNEL at the proposed private yards and would comply with the City's noise standard and no additional mitigation is required. Additionally, a final noise assessment is not required prior to the issuance of the first building permit since the building facades are below 60 dBA CNEL.

Offsite Transportation Noise

The Project does not create a direct and cumulative noise increase of more than 3 dBA CNEL on any nearby roadways. 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.

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 to be significant, 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 Cleveland 29 Residential Development is located on an approximate 10.4-acre Project site located east of Interstate 15 at the northeast corner of Cleveland Avenue and Conway Drive in the City of Escondido. A general project vicinity map is shown in Figure 1-1.

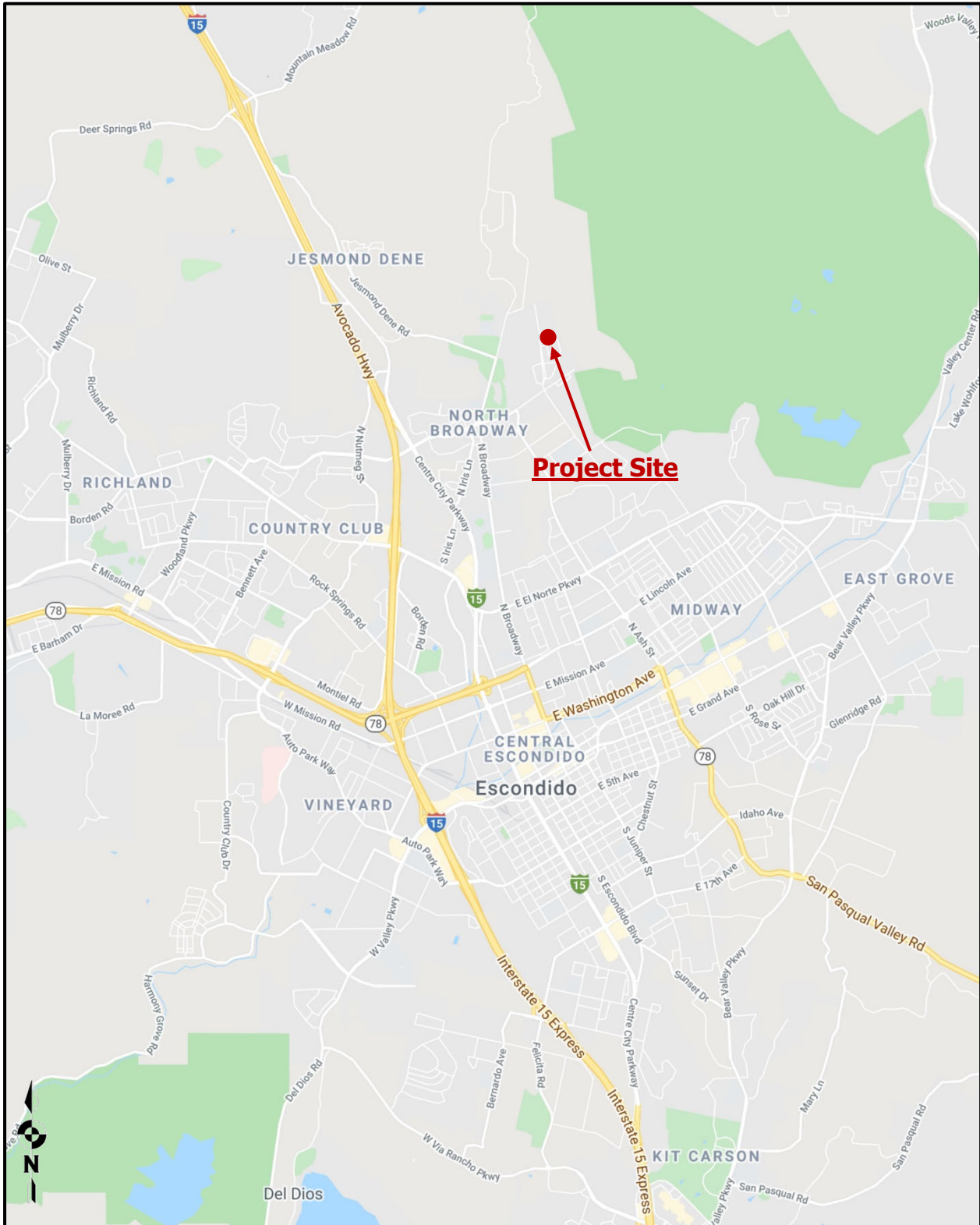
1.3 Project Description

The project applicant is requesting approval of a Tentative Map to subdivide a 10.3-acre site into 29 residential lots (Lots 1 through 29), two water quality lots (Lot A and Lot B), a utility lot (Lot C) and a public street lot (Lot D). The residential lots would range in size from 5,760 square feet (s.f.) to 19,089 s.f. with an average residential lot size of 11,425 s.f. Under the maximum permitted density, the project would be allowed to construct up to 21 units. A density bonus is requested to allow for a total of 29 units. The project's proposed density would be consistent with State Density Bonus law. Additionally, two lots are proposed for water quality treatment. The site is currently vacant with no existing structures. The Project site plan is shown in Figure 1-2.

1.4 Blasting and Rock Crushing Operations

Additionally, some of the extracted material will need to be crushed onsite prior to placement at the site. The crusher would be located over 250 feet from the nearest residence. It is anticipated that the project will utilize a Thunderbird Hazemag Impact Crushing Plan #CP300 or equivalent. The rock crushing equipment will be located in the central portion of the site, more than 250 feet from the nearest residence. If blasting is required, the contractor will be required to follow the City's blasting protocols per the City Fire Department.

Figure 1-1: Project Vicinity Map



Source: (Google, 2025)

Figure 1-2: Project Site Plan



Source: (Kevin L. Crook Architect, Inc., 2025)

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).

Blasting

The Escondido General Plan and Municipal Code do not identify specific construction noise level limits for blasting activities. According to the Municipal Code, blasting is considered part of grading activities and thus would be subject to the same requirements identified above. Additionally, blasting within the City of Escondido is strictly regulated under the California Fire Code and the City's Fire Department permitting process. A Blasting Permit is required for all operations, and applicants must provide a current San Diego County Sheriff's Explosives Permit, a City of Escondido Business License, and evidence of insurance with coverage of at least \$1,000,000 for property damage and bodily injury, naming the City as an additional insured. The designated blaster must be qualified and approved by the Fire Department, and a pre-blast inspection of the site is mandatory. Each permit is site-specific, valid for up to one year, and requires the use of an approved seismograph to monitor vibration at the nearest structure. These requirements are intended to control the intensity and frequency of blasting-related noise and vibration, thereby protecting surrounding residents, businesses, and infrastructure while allowing necessary rock excavation to proceed safely.

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 single-family uses, the exterior noise compatibility standard is 60 CNEL.

The Community Protection Element of the City General Plan also has a Noise Policy 5.4 that requires 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.

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 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. As shown in 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 and 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), <i>Transit Noise and Vibration Impact Assessment</i> , 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 L_{eq} 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 vehicle's 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 $\frac{3}{4}$ 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-groove 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 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 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				

Rock Drill Noise

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

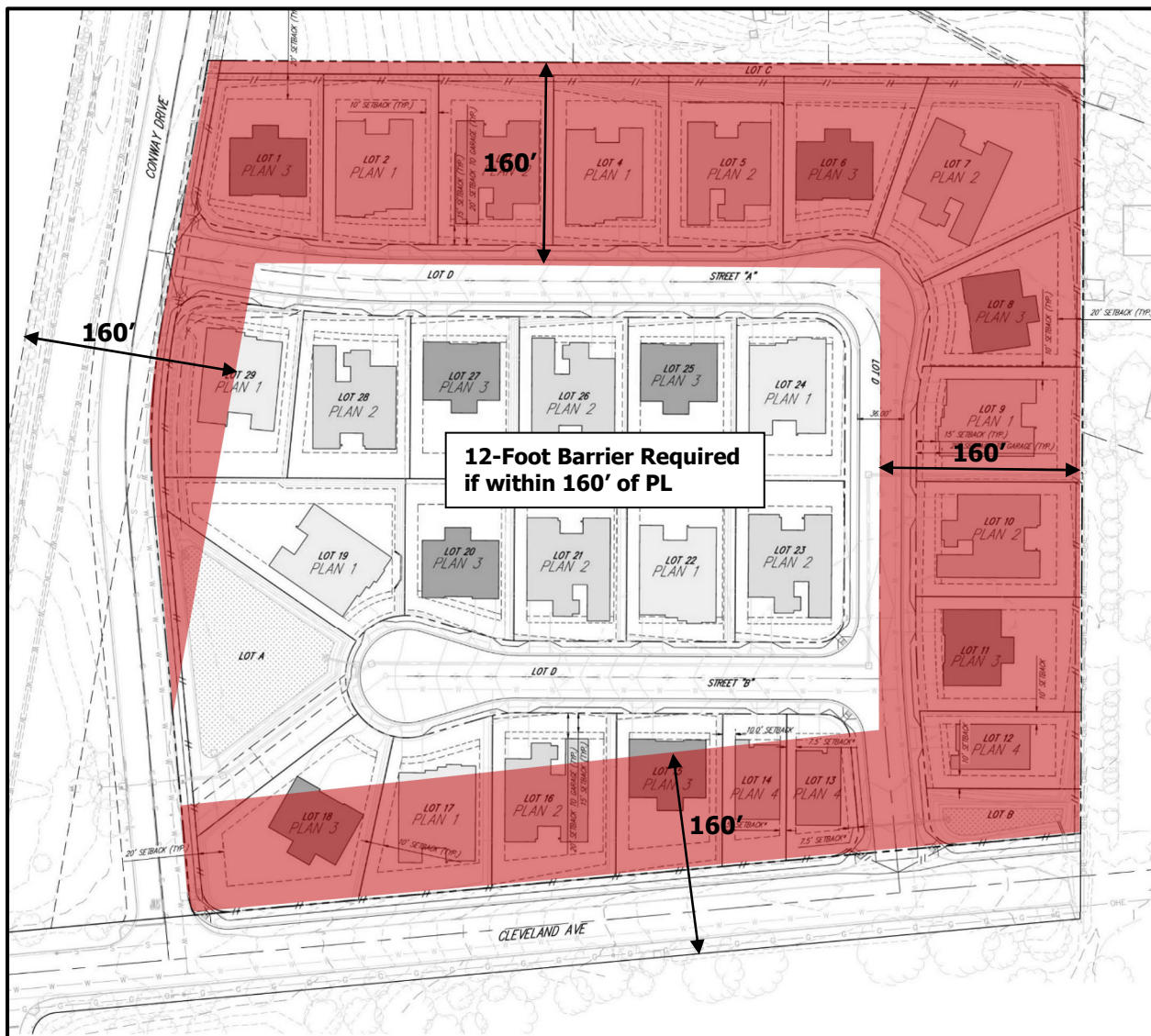
Construction Equipment	Quantity	Source Level @ 50 Feet (dBA)	Duty Cycle (Hours/Day)	Noise Level @ 50 Feet (dBA)
Rock Drill	1	85	8	85.0
Noise Reduction Needed to Comply				-10.0
Distance Required to Reduce Noise Levels				160
NEAREST PROPERTY LINE NOISE LEVEL				74.9

Rock drilling and blasting will occur on an as-needed basis on site and could be located as close as 20 feet from an occupied noise sensitive land use. Therefore, noise levels could range from 75 dBA to 93 dBA. In the event that the rock drill is staged within 160 feet of any occupied noise sensitive

land use, noise mitigation would be required to reduce noise levels below the City's 75 dBA standard. To determine the required noise barrier height, 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 temporary noise barrier.

It was determined that a 12-foot barrier would reduce noise levels between 18 and 20 dBA at the property lines. The barrier shall run the length of the property line within a radius of 160-feet of the location of the rock drill. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold. The location of the proposed temporary noise barriers, if required, are shown in Figure 4-1.

Figure 4-1: Rock Drill Mitigation



Construction-related blasting would not result in a significant noise impact because blasting events are instantaneous and occur infrequently, resulting in very short-term noise exposure. In addition, all blasting activities would comply with the City of Escondido’s Noise Ordinance and applicable blasting protocols, which include requirements for advance notification, use of controlled blasting techniques, and adherence to established maximum noise and vibration limits. Therefore, blasting noise would be minimized to the extent feasible and would not result in a significant impact.

Rock Crushing Noise

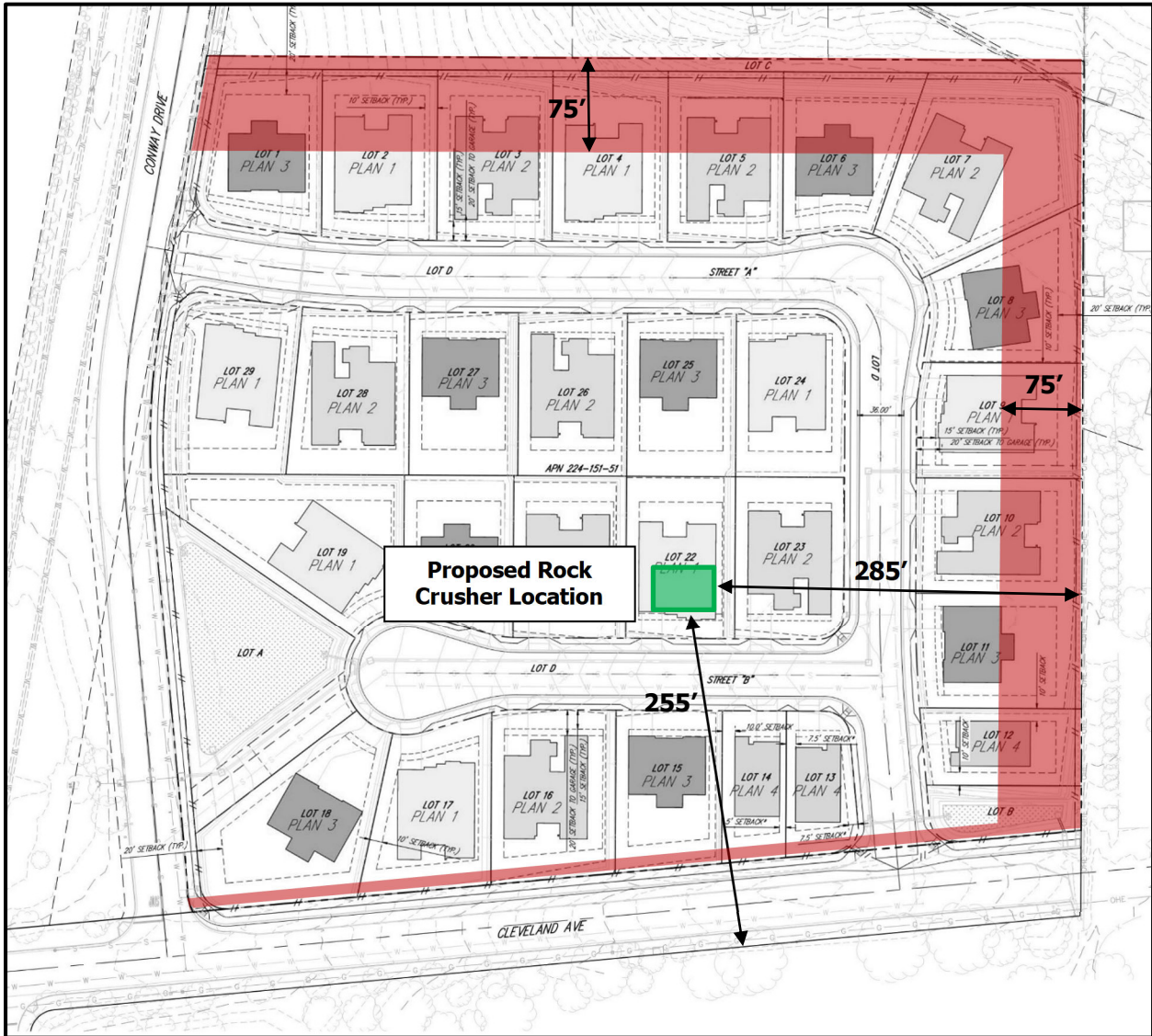
This section examines the potential noise source impacts associated with the operation of the proposed temporary rock crushing facility. Based on empirical data collected at the existing Mission 316 residential development from a similar rock crusher, noise levels ranged between 70-72 dBA at 100 feet (Ldn, 2021). A worst-case noise level of 72 dBA at 100 feet will be utilized for the analysis. As can be seen in Table 4-3, when the rock crusher is located a minimum of 75 feet from any residential property line, the anticipated noise levels would be below the City’s 75 dBA Leq construction noise standard without mitigation. Therefore, as a mitigation measure, the rock crusher should be located a minimum of 75 feet from any property line.

Table 4-3: Rock Crushing Noise Levels

Equipment Type	Quantity Used	Source @ 100 Feet (dBA)	Duty Cycle (hrs/day)	Cumulative Noise Level @ 100 Feet (dBA)
Thunderbird Hazemag #CP300	1	72	8	72.0
Distance to Sensitive Use				75
Noise Increase due to Distance				+2.5
Property Line Noise Level				74.5

According to the project proponent, the rock crushing equipment will be located in the central portion of the site at the proposed building pads, over 250 feet from the nearest residences, as shown in Figure 4-2. Therefore, the rock crushing activities would comply with the City’s 75 dBA Leq construction noise standard and no additional mitigation is required.

Figure 4-2: Proposed Rock Crusher Location



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.

Additionally, the project may require blasting which would also require the need for a rock drill. 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, mitigation would be required. It

was determined that a 12-foot barrier would reduce noise levels between 18 and 20 dBA at the property lines. The barrier shall run the length of the property line within a radius of 160-feet of the location of the rock drill. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold.

Construction-related blasting would not result in a significant noise impact because blasting events are instantaneous and occur infrequently, resulting in very short-term noise exposure. In addition, all blasting activities would comply with the City of Escondido’s Noise Ordinance and applicable blasting protocols, which include requirements for advance notification, use of controlled blasting techniques, and adherence to established maximum noise and vibration limits. Therefore, blasting noise would be minimized to the extent feasible and would not result in a significant impact.

The rock crushing equipment will be located in the central portion of the site at the proposed building pads, and more than 250 feet from the nearest residences. The noise levels are anticipated to be below the City’s 75 dBA Leq construction noise standard without mitigation. As a mitigation measure, the rock crusher should be located a minimum of 75 feet from any property line.

4.2 Construction Vibration

The nearest vibration-sensitive uses are the existing single-family residences along the northern and eastern property lines, located 50 feet or more from the proposed construction. Table 4-4 lists the average vibration levels that would be experienced at the nearest vibration sensitive land uses from the temporary construction activities.

Table 4-4: 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 50 Feet (VdB)	Approximate RMS Velocity at 50 Feet (in/sec)
Small bulldozer	58	0.003	49.0	0.0011
Jackhammer	79	0.035	70.0	0.0124
Loaded trucks	86	0.076	77.0	0.0269
Large bulldozer	87	0.089	78.0	0.0315
FTA Criteria			80	0.2
Significant Impact?			No	No
¹ PPV at Distance D = PPVref x (25/D) ^{1.5}				

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.

Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. The smallest distance between an existing residence and the blasting activity could be as close as 100 feet. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 91 VdB and 0.14 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second.

Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided. However, it can be minimized by following the City's blasting procedures as stated above in Section 2.1 and by providing proper notice. No mitigation would be required.

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 16, 2025 between 10:15 am – 10:30 am.

The results of the noise level measurements are presented in Table 4-5. The measurements were taken on site to establish a baseline of the vehicle noise from Cleveland Avenue and Conway Drive. The measurements were free of obstruction and had a direct line of sight to the roadways. The overall sound level was found to be 49.9 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 4-3 on the following page.

Table 4-5: Measured Ambient Noise Levels

Measurement Identification	Description	Time	Noise Levels (dBA Leq)					
			Leq	Lmax	Lmin	L10	L50	L90
ML 1	Southwest Corner	10:15 a.m. – 10:30 a.m.	49.9	58.4	38.9	53.9	46.6	41.5
Source: Ldn Consulting April 16, 2025								

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.

Figure 4-3: Ambient Monitoring Locations



Table 4-6 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 include the SANDAG 2035 traffic volumes as shown in Table 4-6 (Source: SANDAG Series ABM2+/2021 RP, Forecast Year 2035).

Table 4-6: Future Traffic Parameters

Roadway	Average Daily Traffic (ADT) ¹	Peak Hour Volumes ¹	Modeled Speeds (MPH)	Vehicle Mix % ²		
				Auto	Medium Trucks	Heavy Trucks
Cleveland Avenue	500	50	30	97	2	1
Conway Drive	600	60	30	97	2	1

¹ Source: SANDAG Series ABM2+/2021 RP, Forecast Year 2035
² Source: Typical Vehicle Mix observed in the City of Escondido

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 results of the specific noise modeling are provided in Figure 4-4. It was determined that the noise levels from Cleveland Avenue and Conway Drive would be below 60 dBA CNEL at the Project site. Therefore, the proposed Project would comply with the City’s exterior noise level goal of 60 dBA CNEL without additional mitigation. Additionally, a final noise assessment is not required prior to the issuance of the first building permit since the building facades are below 60 dBA CNEL.

Figure 4-4: Future Exterior Noise Levels

Traffic Volumes, Mix and Speeds					
Mix Ratio by Percent	Autos	Med. Trucks	Heavy Trucks		
	97.0	2.0	1.0		
Propagation Rule	Hard				
Roadway	ADT	Speed MPH	CNEL @ 50 Feet	60 CNEL (Feet)	
Cleveland Avenue	500	30	52.0	8	
Conway Drive	600	30	52.8	10	
Noise Reduction due to Distance					
	Distance	Reduction	Resultant Level		
Cleveland Avenue	40	0.97	53.0		
Conway Drive	40	0.97	53.8		
Cumulative Noise Level			56.4	dBA CNEL	

4.3.3 Project Related Offsite Transportation Noise

To determine if direct off-site noise level increases associated with the development of the proposed Project would create noise impacts. The traffic volumes for the existing conditions were compared with the traffic volume increase of existing plus the proposed Project. The Project is estimated to only generate 290 daily trips with a peak hour volume of 29 trips. The existing average daily traffic (ADT) volumes on Cleveland Avenue and Conway Drive are 400 ADT according to the SANDAG Series ABM2+/2021 RP, Existing Year 2025. Typically, it requires a project to double (or add 100%) the traffic volumes to have a direct impact of 3 dBA CNEL or be a major contributor to the cumulative traffic volumes. The Project will add a 72.5% increase to the exiting roadway volumes and no direct impacts are anticipated.

4.3.4 Transportation Noise Conclusions

It was determined that the outdoor noise levels are expected to be as high as 56 dBA CNEL at the private yards and would comply with the City's noise standard of 60 dBA CNEL and no additional mitigation is required. Exterior noise levels at the building facades were found to be below the Noise Element Standard of 60 dBA CNEL. Therefore, interior mitigation is not required to obtain an interior level of 45 dBA CNEL.

The Project does not create a direct noise increase of more than 3 dBA CNEL on any roadway

segment along Cleveland Avenue and Conway Drive. 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.

5.0 REFERENCES

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