Appendix G:
Noise Impact Analysis

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Noise Impact Analysis Report
211-281 River Oaks Parkway Residential Project
City of San José, Santa Clara County, California

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Report Date: October 14, 2024

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ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
Caltrans	California Department of Transportation
CBC	California Building Standards Code
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
dBA/DD	decibels per each doubling of the distance
DNL	Day-Night Level
EPA	United States Environmental Protection Agency
FCS	FirstCarbon Solutions
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
L_{dn}	day/night average sound level
L_{eq}	equivalent sound level
L_{max}	maximum noise level
L_{min}	minimum noise level
MM	Mitigation Measure
PPV	peak particle velocity
rms	root mean square
USGS	United States Geological Survey
VdB	vibration in decibels

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SECTION 1: INTRODUCTION

1.1 - Purpose of Analysis and Study Objectives

This Noise Impact Analysis has been prepared by FirstCarbon Solutions (FCS) to determine the off-site and on-site noise impacts associated with the proposed 211-281 River Oaks Parkway Residential Project (proposed project). The following is provided in this report:

- A description of the study area, project site, and proposed project.
- Information regarding the fundamentals of noise and vibration.
- A description of the local noise and vibration guidelines and standards.
- A description of the existing noise environment.
- An analysis of the potential short-term construction-related noise and vibration impacts from the proposed project.
- An analysis of long-term operations-related noise and vibration impacts from the proposed project.

1.2 - Project Summary

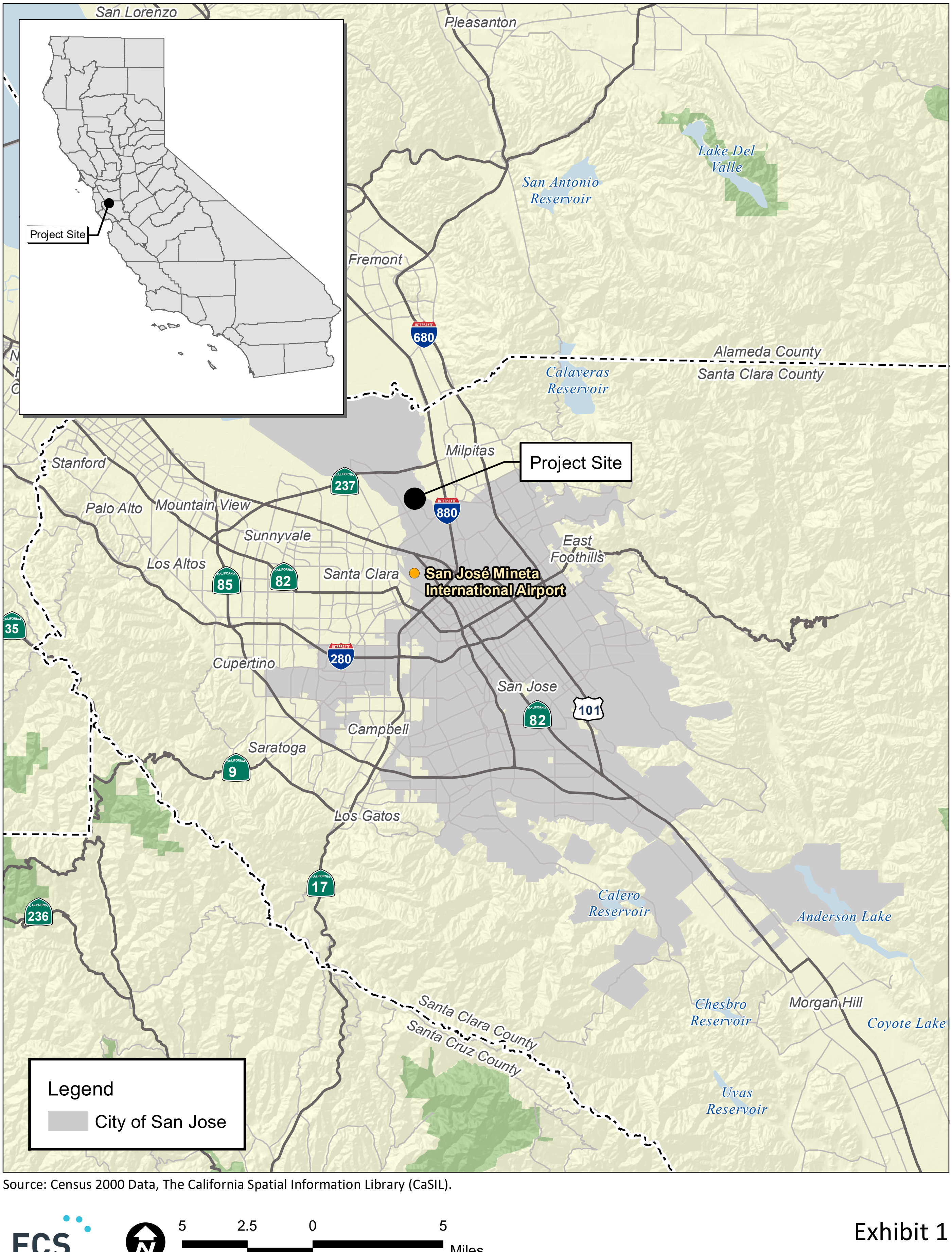
1.2.1 - Site Location

The proposed project is located in the City of San José (City), the largest city in Northern California by both population and area. With a 2024 population of 969,491, it is the most populous city in the San José-San Francisco-Oakland Combined Statistical Area—which in 2024 has a population of 9 million—the third-most populous city in California after Los Angeles and San Diego, and the thirteenth-most populous in the United States.[1] Located in the center of the Santa Clara Valley on the southern shore of San Francisco Bay, San José covers an area of 179.97 square miles (466.1 square kilometers). San José is the county seat of Santa Clara County (County).

1.2.2 - Project Description

The development is situated at 211, 251, and 281 River Oaks Parkway in the City of San José, California (Exhibit 1). The approximately 9.82-acre site is located on Assessor's Parcel Numbers (APNs) 097-33-034 and 097-33-033 (Exhibit 2). Of this area, 9.67 acres would be allocated for the development, with approximately 0.15 acres reserved for widening Iron Point Drive. The project site has a General Plan Land Use Designation of Industrial Park (IP). The proposed project site is located within the Transit Employment Residential Overlay (TERO). This overlay identifies sites within the North San José Employment Center that may be appropriate for residential development and supports residential development as an alternate use at a minimum average net density of 75 units per acre. Sites with this overlay may also be developed with uses consistent with the underlying designation.

Valley Oak Partners, LLC (applicant), proposes a comprehensive development plan, which includes 100 townhome units, a 100 percent affordable apartment building featuring 132 units, and a market-rate apartment building comprising 505 units, resulting in a total of 737 dwelling units (Exhibit 3). This equates to a density of 76.2 dwelling units per acre across the entire project site. Affordable housing units would range in size from 360 to 1,037 square feet; market-rate from 536 to 1,290 square feet; and townhomes from 1,230 to 1,790 square feet. Affordable and market-rate housing would include a mix of studio, 1-bedroom, 2-bedroom, and 3-bedroom units, while townhomes would be a composition of 2- and 3-bedroom units. Approval of a Vesting Tentative Map will be sought to allow the subdivision of two lots into 31 lots (16 residential, 10 open space lots, and five private streets).



Source: Census 2000 Data, The California Spatial Information Library (CaSIL).

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Exhibit 1
Regional Location Map

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VALLEY OAK PARTNERS, LLC
RIVER OAKS PARKWAY RESIDENTIAL PROJECT
NOISE IMPACT ANALYSIS REPORT

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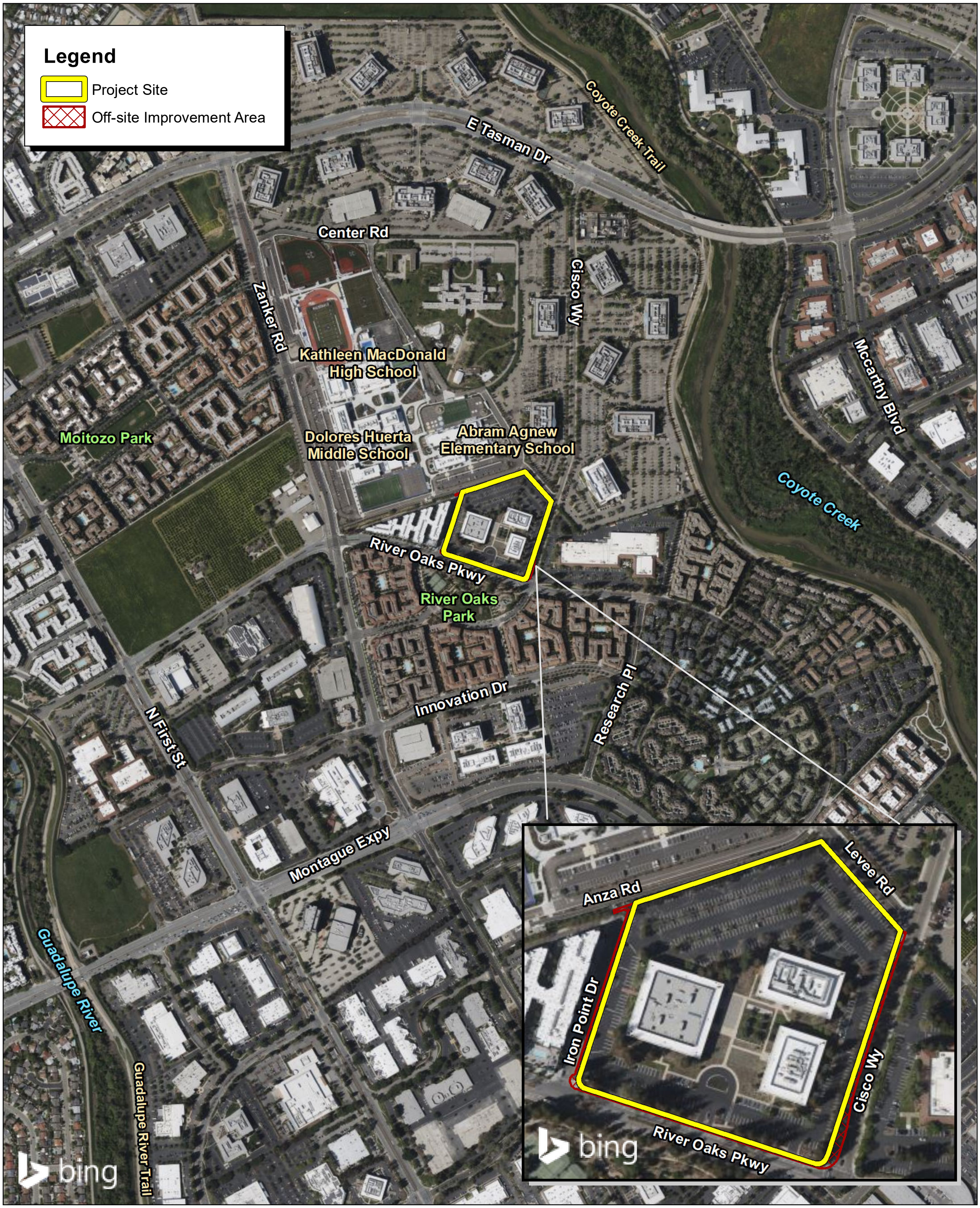

Source: Bing Aerial Imagery. Civil Engineering Associates, 05/17/2024.

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Exhibit 2
Local Vicinity Map

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Source: STUDIO T SQUARE, 05/20/2024.

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Exhibit 3
Site Plan

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VALLEY OAK PARTNERS, LLC
RIVER OAKS PARKWAY RESIDENTIAL PROJECT
NOISE IMPACT ANALYSIS REPORT

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SECTION 2: NOISE AND VIBRATION FUNDAMENTALS

2.1 - Characteristics of Noise

Noise is generally defined as unwanted or objectionable sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in the extreme, hearing impairment. Noise effects can be caused by pitch or loudness. *Pitch* is the number of complete vibrations or cycles per second of a wave that result in the range of tone from high to low; higher-pitched sounds are louder to humans than lower-pitched sounds. *Loudness* is the intensity or amplitude of sound.

Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit, which expresses the ratio of the sound pressure level being measured to a standard reference level. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Only audible changes in existing ambient or background noise levels are considered potentially significant.

The human ear is not equally sensitive to all frequencies within the audible sound spectrum, so sound pressure level measurements can be weighted to better represent frequency-based sensitivity of average healthy human hearing. One such specific "filtering" of sound is called "A-weighting." A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies that are audible to the human ear. Because decibels are logarithmic units, they cannot be added or subtracted by ordinary arithmetic means. For example, if one noise source produces a noise level of 70 dB, the addition of another noise source with the same noise level would not produce 140 dB; rather, they would combine to produce a noise level of 73 dB.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level. Noise levels diminish or attenuate as distance from the source increases based on an inverse square rule, depending on how the noise source is physically configured. Noise levels from a single-point source, such as a single piece of construction equipment at ground level, attenuate at a rate of 6 dB for each doubling of distance (between the single-point source of noise and the noise-sensitive receptor of concern). Heavily traveled roads with few gaps in traffic behave as continuous line sources and attenuate roughly at a rate of 3 dB per doubling of distance.

2.1.1 - Noise Descriptors

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day/night average sound level (L_{dn}) based on dBA. CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

2.1.2 - Noise Propagation

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source, as well as ground absorption, atmospheric conditions (wind, temperature gradients, and humidity) and refraction, and shielding by natural and manufactured features. Sound from point sources, such as an air conditioning condenser, a piece of construction equipment, or an idling truck, radiates uniformly outward as it travels away from the source in a spherical pattern.

The attenuation or sound drop-off rate is dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in noise models: soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA per each doubling of the distance (dBA/DD) is typically observed over soft ground with landscaping, as compared with a 6 dBA/DD drop-off rate over hard ground such as asphalt, concrete, stone, and very hard packed earth. For line sources, such as traffic noise on a roadway, a 4.5 dBA/DD is typically observed for soft-site conditions compared to the 3 dBA/DD drop-off rate for hard-site conditions. Table 1 briefly defines these measurement descriptors and other sound terminology used in this section.

Table 1: Sound Terminology

Term	Definition
Sound	A vibratory disturbance created by a vibrating object which, when transmitted by pressure waves through a medium such as air, can be detected by a receiving mechanism such as the human ear or a microphone.
Noise	Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
Ambient Noise	The composite of noise from all sources near and far in a given environment.
Decibel (dB)	A unitless measure of sound on a logarithmic scale, which represents the squared ratio of sound pressure amplitude to a reference sound pressure. The reference pressure is 20 micropascals, representing the threshold of human hearing (0 dB).
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level that approximates the frequency response of the human ear.
Equivalent Noise Level (L_{eq})	The average sound energy occurring over a specified time period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
Maximum and Minimum Noise Levels (L_{max} and L_{min})	The maximum or minimum instantaneous sound level measured during a measurement period.
Day-Night Level (DNL or L_{dn})	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m. (nighttime).
Community Noise Equivalent Level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m.
Source: Data compiled by FirstCarbon Solutions (FCS). 2024.	

2.1.3 - Traffic Noise

The level of traffic noise depends on the three primary factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and greater number of trucks. Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and truck mix do not change) results in a noise level increase of 3 dBA. Based on the Federal Highway Administration (FHWA) community noise assessment criteria, this change is "barely perceptible." For reference, a doubling of perceived noise levels would require an increase of approximately 10 dBA. The truck mix on a given roadway also has an effect on community noise levels. As the number of heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise levels increase.

2.1.4 - Stationary Noise

A stationary noise producer is any entity in a fixed location that emits noise. Examples of stationary noise sources include machinery, engines, energy production, and other mechanical or powered equipment and activities, such as loading and unloading or public assembly, that may occur at commercial, industrial, manufacturing, or institutional facilities. Furthermore, while noise generated by the use of motor vehicles over public roads is preempted from local regulation, the use of these vehicles is considered a stationary noise source when operated on private property such as at a construction site, a truck terminal, or warehousing facility.

The effects of stationary noise depend on factors such as characteristics of the equipment and operations, distance and pathway between the generator and receptor, and weather. Stationary noise sources may be regulated at the point of manufacture (e.g., equipment or engines), with limitations on the hours of operation, or with provision of intervening structures, barriers, or topography.

Construction activities are a common source of stationary noise. Construction-period noise levels are higher than background ambient noise levels but eventually cease once construction is complete. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on each construction site and, therefore, would change the noise levels as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 2 shows typical noise levels of construction equipment as measured at a distance of 50 feet from the operating equipment.

Table 2: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Impact Pile Driver	Yes	95
Auger Drill Rig	No	85
Vibratory Pile Driver	No	95
Jackhammers	Yes	85
Pneumatic Tools	No	85
Pumps	No	77
Scrapers	No	85
Cranes	No	85
Portable Generators	No	82
Rollers	No	85
Bulldozers	No	85
Tractors	No	84
Front-end Loaders	No	80

Type of Equipment	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Backhoe	No	80
Excavators	No	85
Graders	No	85
Air Compressors	No	80
Dump Truck	No	84
Concrete Mixer Truck	No	85
Pickup Truck	No	55

Notes:
dBA = A-weighted decibel
Source: Federal Highway Administration (FHWA). 2006. Highway Construction Noise Handbook.

2.1.5 - Noise from Multiple Sources

Because sound pressure levels in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. Therefore, sound pressure levels in decibels are logarithmically added on an energy summation basis. In other words, adding a new noise source to an existing noise source, both producing noise at the same level, will not double the noise level. Instead, if the difference between two noise sources is 10 dBA or more, the louder noise source will dominate and the resultant noise level will be equal to the noise level of the louder source. In general, if the difference between two noise sources is 0–1 dBA, the resultant noise level will be 3 dBA higher than the louder noise source, or both sources if they are equal. If the difference between two noise sources is 2–3 dBA, the resultant noise level will be 2 dBA above the louder noise source. If the difference between two noise sources is 4–10 dBA, the resultant noise level will be 1 dBA higher than the louder noise source.

2.2 - Characteristics of Groundborne Vibration and Noise

Groundborne vibration consists of rapidly fluctuating motion through a solid medium, specifically the ground, which has an average motion of zero and in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The effects of groundborne vibration typically only cause a nuisance to people, but in extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Groundborne noise is an effect of groundborne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude such as the maximum instantaneous peak in the vibrations velocity, which is known as the peak particle velocity (PPV) or the root mean square (rms) amplitude of the vibration velocity. Because of the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels—denoted as LV—and is based on the reference quantity of 1 microinch per second. To distinguish these vibration levels referenced in decibels from noise levels referenced in decibels, the unit is written as "VdB."

Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. When assessing annoyance from groundborne vibration, vibration is typically expressed as rms velocity in units of decibels of 1 microinch per second, with the unit written in VdB. Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. Human perception of vibration starts at levels as low as 67 VdB. Annoyance due to vibration in residential settings starts at approximately 70 VdB.

Off-site sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible groundborne noise or vibration. Construction activities, such as blasting, pile driving and operating heavy earthmoving equipment, are common sources of groundborne vibration. Construction vibration impacts on building structures are generally assessed in terms of PPV. Typical vibration source levels from construction equipment are shown in Table 3.

Table 3: Vibration Levels of Construction Equipment

Construction Equipment	PPV at 25 feet (inches/second)	rms Velocity in Decibels (VdB) at 25 feet
Water Trucks	0.001	57
Scraper	0.002	58
Bulldozer—small	0.003	58
Jackhammer	0.035	79
Concrete Mixer	0.046	81
Concrete Pump	0.046	81
Paver	0.046	81
Pickup Truck	0.046	81
Auger Drill Rig	0.051	82
Backhoe	0.051	82
Crane (Mobile)	0.051	82
Excavator	0.051	82
Grader	0.051	82
Loader	0.051	82
Loaded Trucks	0.076	86
Bulldozer—large	0.089	87
Caisson drilling	0.089	87
Vibratory Roller–small	0.101	88

Construction Equipment	PPV at 25 feet (inches/second)	rms Velocity in Decibels (VdB) at 25 feet
Compactor	0.138	90
Clam shovel drop	0.202	94
Vibratory Roller–large	0.210	94
Pile Driver (impact-typical)	0.644	104
Pile Driver (impact-upper range)	1.518	112
Notes: PPV = peak particle velocity Source: Compilation of scientific and academic literature, generated by the Federal Transit Administration (FTA) and Federal Highway Administration (FHWA).		

The propagation of groundborne vibration is not as simple to model as airborne noise. This is because noise in the air travels through a relatively uniform medium, while groundborne vibrations travel through the earth, which may contain significant geological differences. Factors that influence groundborne vibration include:

- **Vibration source:** Type of activity or equipment, such as impact or mobile, and depth of vibration source.
- **Vibration path:** Soil type, rock layers, soil layering, depth to water table, and frost depth.
- **Vibration receiver:** Foundation type, building construction, and acoustical absorption.

Among these factors that influence groundborne vibration, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth of bedrock. Vibration propagation is more efficient in stiff clay soils than in loose sandy soils, and shallow rock seems to concentrate the vibration energy close to the surface and can result in groundborne vibration problems at large distance from the source. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of groundborne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source.

As stated above, this drop-off rate can vary greatly depending on the soil type, but it has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests. The vibration level (calculated below as "PPV") at a distance from a point source can generally be calculated using the vibration reference equation:

$$PPV = PPV_{ref} * (25/D)^n \text{ (in/sec)}$$

Where:

PPV_{ref} = reference measurement at 25 feet from vibration source
D = distance from equipment to property line
n = vibration attenuation rate through ground

According to Section 7 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual, an "n" value of 1.5 is recommended to calculate vibration propagation through typical soil conditions.[1]

1 Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. Website: 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. Accessed October 10, 2024.

SECTION 3: REGULATORY SETTING

3.1 - Federal Regulations

3.1.1 - United States Environmental Protection Agency

In 1972, Congress enacted the Noise Control Act.[2] This act authorized the United States Environmental Protection Agency (EPA) to publish descriptive data on the effects of noise and establish levels of sound "requisite to protect the public welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels) categories, as shown in Table 4. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dBA. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

Table 4: Summary of EPA Recommended Noise Levels to Protect Public Welfare

Effect	Level	Area
Hearing loss	$L_{eq}(24) \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas, farms, and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq}(24) \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq}(24) \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Notes:
dB = decibel
L_{eq} = equivalent sound level
L_{dn} = day/night average sound level
(24) signifies an L_{eq} duration of 24 hours.
Source: United States Environmental Protection Agency (EPA). 1978. Protective Noise Levels, EPA 550/9-79-100.

2 GovInfo. 2024. Noise Control Act Of 1972. Website: https://www.govinfo.gov/content/pkg/COMPS-888/pdf/COMPS-888.pdf. Accessed October 10, 2024.

3.1.2 - Federal Transit Administration

The FTA has established industry-accepted standards for vibration impact criteria and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment Manual.[3] The FTA guidelines include thresholds for construction vibration impacts for various structural categories as shown in Table 5.

Table 5: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	PPV (in/sec)	Approximate VdB
I. Reinforced—Concrete, Steel, or Timber (no plaster)	0.5	102
II. Engineered Concrete and Masonry (no plaster)	0.3	98
III. Nonengineered Timber and Masonry Buildings	0.2	94
IV. Buildings Extremely Susceptible to Vibration Damage	0.12	90

Notes:
in/sec = inches per second
PPV = peak particle velocity
VdB = vibration measured as rms velocity in decibels of 1 microinch per second
Source: Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

In addition, FTA has identified construction noise thresholds in the Transit Noise and Vibration Impact Assessment Manual, which limit daytime construction noise to 80 dBA L_{eq} at residential land uses, 85 dBA L_{eq} at commercial uses, and to 90 dBA L_{eq} at industrial land uses.

3.2 - State Regulations

3.2.1 - California General Plan Guidelines

Established in 1973, the California Department of Health Services Office of Noise Control was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix," which allows the local jurisdiction to delineate compatibility of sensitive uses with various incremental levels of noise.[4]

Government Code Section 65302 mandates that the legislative body of each county and city in California adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise/land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable. The project is also subject to review under the State of California Environmental Quality Act (CEQA). Appendix G of the

[3] Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. Website: 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. Accessed March 26, 2024.

[4] California Department of Health Services Office of Noise Control. Land Use Compatibility for Community Noise Environments Matrix. 1976.

CEQA Guidelines provides impact thresholds for potential noise and vibration impacts. The City of San José has developed its own CEQA thresholds, which are listed in the Thresholds of Significance section below.

3.2.2 - California Building Standards Code

The State of California has established noise insulation standards for new hotels, motels, apartment houses, and dwellings (other than single-family detached housing). These requirements are provided in the 2022 California Building Standards Code (CBC) (California Code of Regulations [CCR] Title 24). As provided in the CBC, the noise insulation standards set forth an interior standard of 45 dBA CNEL as measured from within the structure's interior. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

3.2.3 - Assembly Bill 1307

Assembly Bill (AB) 1307 went into effect January 1, 2024. This bill clarifies that "for residential projects, the effects of noise generated by project occupants and their guests on human beings is not a significant effect on the environment." Therefore, this analysis does not address potential noise impacts from future occupants and their guests on sensitive receptors in the project vicinity.

3.3 - Local Regulations

The project site is located in the City of San José. The City addresses noise in the City of San José's Envision San José 2040 General Plan[5] and in the Municipal Code.[6]

3.3.1 - Envision San José 2040 General Plan

The project site is located within the City of San José and this analysis was performed using the City's noise regulations. The City of San José addresses noise in the Noise Element of the Envision San José 2040 General Plan (General Plan) and in the City of San José Municipal Code (Municipal Code).

Envision San José 2040 Relevant Noise and Vibration Policies	
Policies	**Description**
Policy ES-1.1	Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, State, and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include: **Interior Noise Levels** • The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction, and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base

5 City of San José. 2018. Envision San José General Plan 2040. Website: https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/citywide-planning/envision-san-jos-2040-general-plan. Accessed October 2, 2024.
6 Code of Ordinance. 2021. San José Municipal Code. Website: https://library.municode.com/ca/san_jose/codes/code_of_ordinances. Accessed October 2, 2024.

Envision San José 2040 Relevant Noise and Vibration Policies	
Policies	**Description**
	required noise attenuation techniques on expected Envision San José 2040 General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan. **Exterior Noise Levels** • The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (refer to Table EC-1 in the General Plan or Table 4.12-1 in this Initial Study). Residential uses are considered "normally acceptable" with exterior noise exposures of up to 60 dBA DNL and "conditionally compatible" where the exterior noise exposure is between 60 and 75 dBA DNL such that the specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features are included in the design.
Policy EC-1.2	Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Land Use Categories 1, 2, 3, and 6 in Table EC-1 in the General Plan or Table 4.12-1 in this Initial Study) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would: • Cause the DNL at noise-sensitive receptors to increase by 5 dBA DNL or more where the noise levels would remain "Normally Acceptable." • Cause the DNL at noise-sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.
Policy EC-1.7	Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would: • Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months. For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.
Policy EC-2.3	Require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec peak particle velocity (PPV) will be used to minimize the potential for cosmetic damage to a building. A vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

Notes:
dBA = A-weighted decibel
DNL = Day-Night Level
in/sec = inches per second
PPV = peak particle velocity
Source: City of San José. 2018. Envision San José General Plan 2040.

3.3.2 - City of San José Municipal Code

The Municipal Code restricts construction hours within 500 feet of a residential unit to between 7:00 a.m. and 7:00 p.m. Monday through Friday, unless otherwise expressly allowed in a Development Permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence.

The Zoning Ordinance limits noise levels to 55 dBA maximum (L_{max}) at any residential property line and 60 dBA L_{max} at commercial property lines, unless otherwise expressly allowed in a Development Permit or other planning approval. The Zoning Ordinance also limits noise emitted by stand-by/backup and emergency generators to 55 dBA at the property line of residential properties. The testing of generators is limited to between 7:00 a.m. and 7:00 p.m., Monday through Friday.

City of San José Standard Permit Conditions

The City has established the following Standard Permit Conditions that it imposes on projects and which would apply to construction of the proposed project:

NOI No. 1 **Construction-related Noise.** Noise minimization measures include, but are not limited to, the following:

i. Pile Driving is prohibited.
ii. Limit construction to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday for any on-site or off-site work within 500 feet of any residential unit. Construction outside of these hours may be approved through a Development Permit based on a site-specific “construction noise mitigation plan” and a finding by the Director of Planning, Building and Code Enforcement that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential use.
iii. Construct solid plywood fences around ground level construction sites adjacent to operational businesses, residences, or other noise-sensitive land uses.
iv. Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
v. Prohibit unnecessary idling of internal combustion engines.
vi. Locate stationary noise generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise generating equipment when located near adjoining sensitive land uses.
vii. Utilize “quiet” air compressors and other stationary noise sources where technology exists.
viii. Control noise from construction workers’ radios to a point where they are not audible at existing residences bordering the project site.
ix. Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of “noisy” construction activities to the adjacent land uses and nearby residences.

x. If complaints are received or excessive noise levels cannot be reduced using the measures above, erect a temporary noise control blanket barrier along surrounding building façades that face the construction sites.

xi. Designate a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

NOI No. 1 Operations-related Noise.

i. Interior Noise Standard for Residential Development. The project applicant shall prepare final design plans that incorporate building design and acoustical treatments to ensure compliance with State Building Codes and City noise standards. A project-specific acoustical analysis shall be prepared to ensure that the design incorporates controls to reduce interior noise levels to 45 dBA DNL or lower within the residential unit. The project applicant shall conform with any special building construction techniques requested by the City's Building Department, which may include sound-rated windows and doors, sound-rated wall constructions, and acoustical caulking.

SECTION 4: EXISTING NOISE CONDITIONS

4.1 - Ambient Noise

The project site is surrounded by Anza Road, Levee Road, Abram Agnew Elementary School, and commercial development to the north; River Oaks Parkway, River Oaks Park, and residential development to the south; Cisco Way and commercial development to the east; and Iron Point Drive and residential development to the west.

The dominant noise sources in the project vicinity include traffic on local roadways, primarily from traffic on River Oaks Parkway which runs along the southern boundary of the project site, Cisco Way which runs along the eastern boundary of the project site, and Anza Road which runs along the northern boundary of the project site. Existing stationary noise sources on the project site include mechanical ventilation system operations and parking lot activity.

An ambient noise monitoring effort was conducted to document daytime ambient noise levels on the project site. Short-term noise monitoring was conducted by FCS on May 8, 2024, between 1:27 p.m. and 2:50 p.m. The noise measurements were taken during the midday hours, as the midday hours typically have the highest daytime noise levels in urban environments. It should be noted that peak noise hours often vary slightly from peak traffic hours; peak noise hours more closely align with high volume traffic that is still free flowing, while peak traffic hours often result in slower vehicle speeds due to the volume of traffic on the roadway. The noise measurement data sheets are provided in Appendix A. The short-term existing noise measurement results are summarized in Table 6.

Table 6: Existing Ambient Noise Levels on the Project Site

Site ID #	Description	L_{eq}	L_{min}	L_{max}
ST-1	At the southwest corner of the project site, next to Iron Point Drive and River Oaks Parkway intersection. Approximately 15 feet off roadway.	59.6	47.9	77.7
ST-2	At the southeast corner of the project site, next to River Oaks Parkway and Cisco Way intersection. Approximately 15 feet off roadway.	60.1	49.0	77.0
ST-3	At the northeast corner of the project site, next to 3534 Zanker Road (Elementary School) entrance to Cisco Way. Approximately 15 feet from Cisco Way roadway.	63.7	46.6	83.6
ST-4	At the northwest corner of the project site, by the Elementary School and near Iron Point Drive terminal. Approximately 15 feet south of Anza Road roadway.	51.1	45.9	69.9

Notes:
L_{eq} = equivalent sound level
L_{min} = minimum noise/sound level
L_{max} = maximum noise level
Source: FirstCarbon Solutions (FCS). 2024.

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SECTION 5: THRESHOLDS OF SIGNIFICANCE AND IMPACT ANALYSIS

5.1 - Thresholds of Significance

According to CEQA Guidelines Appendix G, to determine whether impacts related to noise and vibration are significant environmental effects, the following questions are analyzed and evaluated.

Would the proposed plan:

a) Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Generate excessive groundborne vibration or groundborne noise levels?

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

5.2 - Substantial Noise Increase in Excess of Standards

5.2.1 - Construction Noise Impacts

A significant impact would occur if construction activities would result in a substantial temporary increase in ambient noise levels outside of the City's permissible hours for construction that would result in annoyance or sleep disturbance of nearby sensitive receptors. The City's permissible hours for construction activity are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. No construction is permitted on Saturdays, Sundays, or federal holidays. The City enforces the regulations through Municipal Code Section 20.100.450, Hours of Construction Within 500 Feet of a Residential Unit, as described in the regulatory discussion above.

Construction-related Traffic Noise

Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. One type of short-term noise impact that could occur during project construction would result from the increase in traffic flow on local streets associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers and construction equipment and materials to the project site would incrementally increase noise levels on access roads leading to the site. Because workers and construction equipment would use existing routes, noise from passing trucks would be similar to existing vehicle-generated noise on these local roadways. Typically, a doubling of the Average Daily Traffic (ADT) hourly volumes on a roadway segment is required in order to result in an increase of 3 dBA in traffic noise levels; which, as discussed in the characteristics of nose discussion above, is the lowest change that can be perceptible to the human ear in outdoor environments. Because the proposed project's average daily trips would represent a small fraction of daily traffic on access roadways, they would not be capable of doubling traffic volumes along surrounding roadways and causing 3 dBA noise increases. For this reason, short-term intermittent noise from construction trips would not be expected to result in a perceptible increase in hourly or daily average traffic noise levels in the project vicinity. Therefore, short-term construction-related noise impacts associated with the transportation of workers and equipment to the project site would be less than significant.

Construction Equipment Operational Noise

The second type of short-term noise impact is related to noise generated during construction on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation, followed by 3 or 4 minutes at lower power settings. Impact equipment, such as impact pile drivers, are not expected to be used during construction of the proposed project. This noise impact analysis focuses on analyzing the loudest phase of construction and demonstrates that, with implementation of the City's Standard Permit Conditions, impacts would be reduced to less than significant.

The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery and compacting equipment, such as bulldozers, draglines, backhoes, front loaders, roller compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Construction of the project is expected to require the use of a variety of equipment, the loudest being a grader, excavator, and bulldozer, all of which generate maximum reference noise levels of 85 dBA L_{max} at 50 feet.

A conservative but reasonable assumption is that this equipment would operate simultaneously and continuously over at least a 1-hour period in the vicinity of the closest existing residential receptors but would move linearly over the project site as they perform their earthmoving operations, spending a relatively short amount of time adjacent to any one receptor. A characteristic of sound is that each doubling of sound sources with equal strength increases a sound level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, a reasonable worst-case combined noise level during this phase of construction would be 90 dBA L_{max} at a distance of 50 feet from the acoustic center of a construction area. The acoustical center reference is used because construction equipment must operate at some distance from one another on a project site, and the combined noise level as measured at a point equidistant from the sources (acoustic center) would be the worst-case maximum noise level. These operations would be expected to result in a conservative worst-case hourly average of 86 dBA L_{eq} at a distance of 50 feet from the acoustic center of a construction area. These worst-case construction noise levels would only occur during the site preparation phase of development.

The closest noise-sensitive receptors to the project site is the multi-family residence located along the western border of the project site. This closest receptor would be located approximately 90 feet from the nearest acoustic center of construction activity where multiple pieces of heavy construction equipment would potentially operate simultaneously at the project site. At this distance, conservative worst-case construction noise levels could range up to approximately 80 dBA L_{max}, intermittently, and could have an hourly average of up to 75 dBA L_{eq} at the façade of the nearest multi-family residential home. The noise calculation sheets are provided in Appendix B.

Conservative worst-case calculated construction noise levels would not exceed existing ambient noise levels documented in the project vicinity. Although there could be a relatively high single-event noise exposure potential causing an intermittent noise nuisance, the effect of construction activities on longer-term (hourly or daily) ambient noise levels would be small. In addition, the City restricts hours for construction activities to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. This would preclude noise impacts during nighttime hours. Furthermore, the proposed project would adhere to Standard Permit Condition NOI No. 1. With implementation of the Municipal Code hours of construction and adherence to Standard Permit Condition NOI No. 1, the proposed project would not result in substantial temporary increases at the off-site sensitive receptors above standards established in the General Plan, and construction noise impacts on sensitive receptors in the project vicinity would be **less than significant**.

5.2.2 - Mobile Source Operational Noise Impacts

A significant impact would occur if project-generated traffic would result in a substantial increase in ambient noise levels compared with those that would exist without the proposed project. The City considers a significant noise impact to occur if a project would cause the DNL at noise-sensitive receptors to increase by 5 dBA DNL or more where the noise levels would remain “normally acceptable,” or where it would cause the DNL at noise-sensitive receptors to increase by 3 dBA DNL or more where noise levels would equal or exceed the “normally acceptable” level.

Typically, a doubling of the ADT hourly volumes on a roadway segment is required in order to result in an increase of 3 dBA in traffic noise levels, which, as discussed in the characteristics of noise discussion above, is the lowest change that can be perceptible to the human ear in outdoor environments. Therefore, for the purposes of this analysis, a doubling of the existing ADT volumes would result in a substantial permanent increase in traffic noise levels.

Based on the traffic analysis prepared for the project by Hexagon Transportation Consultants, Inc.,[7] existing traffic conditions on River Oaks Parkway is 764 AM peak-hour trips and 883 PM peak-hour trips. The proposed project is calculated to generate 238 new AM peak-hour trips (61 inbound and 177 outbound) and 249 new PM peak-hour trips (148 inbound and 101 outbound). These net new trips would not double existing traffic trips on River Oaks Parkway or any access roadway segment in

[7] Hexagon Transportation Consultants, Inc. 2024. 211-251-281 River Oaks Parkway Residential Development Draft Local Transportation Analysis. June 24.

the project vicinity. Furthermore, this increase in trips would result in a less than 1 dBA increase in traffic noise levels along any roadway segment in the project vicinity. This increase is below a level that would be a perceptible increase and well below a level that would be considered a substantial increase in traffic noise levels. Therefore, the proposed project would not result in a substantial permanent increase in ambient noise levels from project-generated traffic trips, and mobile source operational noise impacts would be **less than significant.**

5.2.3 - Stationary Source Operational Noise Impacts

A significant impact would occur if operational noise levels generated by stationary noise sources at the proposed project site would result in a substantial permanent increase in ambient noise levels in excess of any of the noise performance thresholds established by the City of San José. The Zoning Ordinance limits operational noise levels to 55 dBA L_{max} as measured at any receiving residential property.

The primary new stationary noise source associated with implementation of the proposed project would be the new mechanical ventilation system operations associated with the proposed residential uses. Potential impacts associated with this new noise source are analyzed below.

Mechanical Ventilation Equipment

Implementation of the proposed project would include operation of new mechanical ventilation equipment. Noise levels for residential-grade mechanical ventilation equipment systems range up to approximately 70 dBA L_{eq} at a distance of 3 feet.

The proposed project would have residential-grade mechanical ventilation equipment for each proposed residential unit. Proposed mechanical ventilation equipment could be located as close as approximately 110 from the nearest off-site receptor, the multi-family residence located along the west border of the project site. At this distance and with minimal shielding assumed by the building parapet, noise generated by rooftop mechanical ventilation equipment would attenuate to below 36 dBA L_{max} at the nearest off-site residential receptors. As a conservative worst-case scenario, if these operations were to occur every hour over a 24-hour period, the resulting noise level would be 30 dBA DNL as measured at this nearest receptor. The noise calculation sheets are provided in Appendix B.

These operational noise levels would not exceed the City's noise performance thresholds of 55 dBA L_{max} or 55 dBA DNL as measured at the nearest residential property. Therefore, rooftop mechanical ventilation system operational noise levels would not result in a substantial permanent increase in noise levels in excess of established standards. The impact of mechanical ventilation equipment operational noise levels on sensitive off-site receptors would be **less than significant**.

Stationary Source Operational Noise Impact Conclusion

As shown in the analysis above, the project stationary operational noise sources would not individually result in a substantial permanent increase in noise levels in excess of established standards as measured at the nearest receptors. Therefore, noise impacts from individual stationary operational noise sources would be **less than significant.**

Mitigation Measures

None. However, the proposed project is required to comply with the following Standard Permit Conditions.

City of San José Standard Permit Conditions

Construction-related Noise

Noise minimization measures include, but are not limited to, the following:

i. Pile Driving is prohibited.

ii. Limit construction to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday for any on-site or off-site work within 500 feet of any residential unit. Construction outside of these hours may be approved through a Development Permit based on a site-specific “construction noise mitigation plan” and a finding by the Director of Planning, Building and Code Enforcement that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential use.

iii. Construct solid plywood fences around ground level construction sites adjacent to operational businesses, residences, or other noise-sensitive land uses.

iv. Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

v. Prohibit unnecessary idling of internal combustion engines.

vi. Locate stationary noise generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise generating equipment when located near adjoining sensitive land uses.

vii. Utilize “quiet” air compressors and other stationary noise sources where technology exists.

viii. Control noise from construction workers’ radios to a point where they are not audible at existing residences bordering the project site.

ix. Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of “noisy” construction activities to the adjacent land uses and nearby residences.

x. If complaints are received or excessive noise levels cannot be reduced using the measures above, erect a temporary noise control blanket barrier along surrounding building façades that face the construction sites.

xi. Designate a “disturbance coordinator” who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

5.3 - Groundborne Vibration/Noise Levels

This section analyzes both construction and operational groundborne vibration and noise impacts. Groundborne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. Groundborne noise is generated when vibrating building components radiate sound, or noise generated by groundborne vibration. In general, if groundborne vibration levels do not exceed levels considered to be perceptible, then groundborne noise levels would not be perceptible in most interior environments. Therefore, this analysis focuses on determining exceedances of groundborne vibration levels.

A significant impact would occur if the proposed project would generate excessive groundborne vibration or groundborne noise levels. According to Policy EC-2.3 of the General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction.

5.3.1 - Short-term Construction Vibration Impacts

Of the variety of equipment used during construction, the small vibratory rollers anticipated to be used in the site preparation phase of construction would produce the greatest groundborne vibration levels. Small vibratory rollers produce groundborne vibration levels ranging up to 0.101 in/sec PPV at 25 feet from the operating equipment.

The nearest off-site structure is a multi-family residential structure located along the western border of the project site, approximately 60 feet from the nearest construction footprint where a small vibratory roller would potentially operate. At this distance, groundborne vibration levels could range up to 0.027 in/sec PPV from operation of a small vibratory roller. This is well below the City's construction vibration impact criteria of 0.2 in/sec PPV for buildings of normal conventional construction and even below the City's threshold of 0.08 in/sec PPV for sensitive historic structures.

Therefore, construction-related groundborne vibration would not exceed the City's construction vibration impact criteria as measured at the nearest receiving structures in the project vicinity. Project construction-related groundborne vibration impacts would be **less than significant.**

5.3.2 - Operational Vibration Impacts

Implementation of the proposed project would not include any permanent sources that would expose persons in the project vicinity to groundborne vibration levels that could be noticeable without instruments at the lot line of the proposed project. In addition, there are no existing significant permanent sources of groundborne vibration in the project vicinity. Therefore, project operations would not generate excessive groundborne vibration levels or expose proposed uses to excessive groundborne vibration levels, and groundborne vibration impacts would be **less than significant.**

5.4 - Noise Levels from Airport Activity

A significant impact would occur if the proposed project would expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an Airport Land Use Compatibility Plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport.

The nearest airport to the project site is the San José Airport, located approximately 2.02 miles south of the project site. Because of the distance from and orientation of the airport runways, the project site is located well outside of the 65 dBA CNEL airport noise contours. While aircraft noise is occasionally audible on the project site from aircraft flyovers, aircraft noise associated with nearby airport activity would not expose people residing or working near the project site to excessive noise levels. Therefore, implementation of the proposed project would not expose persons residing or working in the project vicinity to noise levels from airport activity that would be in excess of normally acceptable standards for residential land use development, and there would be **no project impact** associated with airport noise.

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Appendix A:
Noise Measurement Data

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FIRSTCARBON SOLUTIONS
FCS INTERNATIONAL, INC.

Project Number: 4645.0007 Sheet ___of ___

Project Name: River Oaks Parkway Residential Project

Test Personnel: Henrique Zhu

NOISE MEASUREMENT SURVEY

Site Number: ST1 Date: 05/08/2024 Time: From 13:27 To 13:42

Site Location: At the southwest corner of the project site, next to Iron Point Drive and River Oaks Parkway intersection. 15 feet off of roadway.

Primary Noise Sources: River Oaks Parkway traffic, Iron Point Drive traffic, elementary school operation, River Oaks Park operation/recreation noise, pedestrian traffic, overhead planes from SJC airport.

Measurement Results

	dBA
L_{eq}	59.6
L_{max}	77.7
L_{min}	47.9
L_{peak}	103.8
L_5	65.3
L_{10}	63.4
L_{50}	54.1
L_{90}	50.1
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA

Comments:

Equipment: LxT 2 Measured Difference: -0.02 dBA

Settings: A-Weighted ☐ Other☐ Slow☐ Fast☐ Windscreen■

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
Comments:	Moderate breeze, 81 F			

Photos Taken:

Photo Number	Location/Description
1	Facing North
2	Facing East
3	Facing South
4	Facing West

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts
Iron Point Drive	2	25	25	7	5
River Oaks Parkway	2	30	25	39	34

Diagram/Further Comments:

Project Number: 4645.0007 Sheet ___of ___
Project Name: River Oaks Parkway Residential Project
Test Personnel: Henrique Zhu

NOISE MEASUREMENT SURVEY

Site Number: ST2 Date: 05/08/2024 Time: From 13:52 To 14:07

Site Location: At the southeast corner of the project site, next to River Oaks Parkway and Cisco Way intersection. 15 feet off of roadway.

Primary Noise Sources: River Oaks Parkway traffic, Cisco Way traffic, Crescent Village Circle traffic, pedestrian traffic, River Oaks Park recreational sounds.

Measurement Results

	dBA
L_{eq}	60.1
L_{max}	77.0
L_{min}	49.0
L_{peak}	101.0
L_5	65.8
L_{10}	63.3
L_{50}	56.3
L_{90}	51.1
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA
14:07	Overhead plane and school-bus idling	65

Comments:

Equipment: LxT 2 Measured Difference: -0.02 dBA
Settings: A-Weighted ☐ Other☐ Slow☐ Fast☐ Windscreen■

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
Comments:	Light-Moderate breeze, 81 F			

Photos Taken:

Photo Number	Location/Description
1	Facing North
2	Facing East
3	Facing South
4	Facing West

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts
Cisco Way	2	25	10	21	33
River Oaks Parkway	2	30	20	See ST1	See ST1
Crescent Village Circle	2	25	10	11	8

Diagram/Further Comments:

FIRSTCARBON SOLUTIONS
FCS INTERNATIONAL, INC.

Project Number: 4645.0007 Sheet ___of ___
Project Name: River Oaks Parkway Residential Project
Test Personnel: Henrique Zhu

NOISE MEASUREMENT SURVEY

Site Number: ST3 Date: 05/08/2024 Time: From 14:14 To 14:29

Site Location: At the northeast corner of the project site, next to 3534 Zanker Road (Elementary School) entrace to Cisco Way, approximately 15 feet from Cisco Way roadway.

Primary Noise Sources: Elementary School driveway traffic, Cisco Way traffic, Elementary School operational noise, Cisco building parking traffic.

Measurement Results

	dBA
L_{eq}	63.7
L_{max}	83.6
L_{min}	46.6
L_{peak}	111.3
L_5	67.7
L_{10}	65.3
L_{50}	53.0
L_{90}	48.8
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA
14:23	Multiple school buses leaving Elementary School	80

Comments: ______

Equipment: LxT 2 Measured Difference: -0.02 dBA
Settings: A-Weighted ☐ Other☐______ Slow☐ Fast☐ Windscreen■

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
Comments:	Light breeze, 81 F			

Photos Taken:

Photo Number	Location/Description
1	Facing North
2	Facing East
3	Facing South
4	Facing West

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts
Cisco Way	2	25	25	See ST2	See ST2

Diagram/Further Comments:

FIRSTCARBON SOLUTIONS
FCS INTERNATIONAL, INC.

Project Number: 4645.0007 Sheet ___of ___

Project Name: River Oaks Parkway Residential Project

Test Personnel: Henrique Zhu

NOISE MEASUREMENT SURVEY

Site Number: ST4 Date: 05/08/2024 Time: From 14:35 To 14:50

Site Location: At the northwest corner of the project site, by the Elementary School and near Iron Point Drive terminal. 15 feet south of Anza Road roadway.

Primary Noise Sources: Elementary School parking traffic, Elementary School operations / playground noise, Anza Road traffic, overhead planes, pedestrian traffic.

Measurement Results

	dBA
L_{eq}	51.1
L_{max}	69.9
L_{min}	45.9
L_{peak}	102.7
L_5	55.4
L_{10}	53.4
L_{50}	49.4
L_{90}	47.2
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA

Comments:

Equipment: LxT 2 Measured Difference: -0.02 dBA

Settings: A-Weighted ☐ Other☐ Slow☐ Fast☐ Windscreen■

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
Comments:	Moderate Breeze, 79 F			

Photos Taken:

Photo Number	Location/Description
1	Facing North
2	Facing East
3	Facing South
4	Facing West

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts
Anza Road	2	15	15	1	1

Diagram/Further Comments:

Appendix B:
Noise Modeling Data

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Mobile Construction Activity Noise Calculation

Receptor:	Receiving residential property line	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
		Reference (dBA) 50 ft		Usage	Distance to	Ground	Shielding	Calculated (dBA)		
No.	Equipment Description	Lmax	Quantity	factor[1]	Receptor	Effect[2]	(dBA)[3]	Lmax	Leq	Energy
1	Grader	85	1	40	90	1	0	79.9	73.4	21689147.19
2	Excavator	85	1	40	140	1	0	76.1	67.6	5762167.748
3	Dozer	85	1	40	190	1	0	73.4	63.6	2305203.135
4	Front End Loader	80	1	40	240	1	0	66.4	55.6	361689.8148
5	Backhoe	80	1	40	290	1	0	64.7	53.1	205010.4555
6										
7										
8										
9										
10										
							Lmax[4]	80	Leq	75

Notes:

[1] Percentage of time activity occurs each hour

[2] Soft ground terrain between project site and receptor.

[3] Shielding due to terrain or structures

[4] Calculated Lmax is the Loudest value.

Residential Grade Mechanical Equipment

Receptor:	Nearest Residential Receptor	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
		Reference (dBA) 3 ft		Usage	Distance to	Ground	Shielding	Calculated (dBA)		
No.	Equipment Description	Lmax	Quantity	factor[1]	Receptor	Effect[2]	(dBA)[3]	Lmax	Leq	Energy
1	Residential grade mechanical ventilation equipment	70	1	80	110	1	3	35.7	19.1	81.33466752
2	Residential grade mechanical ventilation equipment	70	1	80	120	1	3	35.0	18.0	62.6484042
3	Residential grade mechanical ventilation equipment	70	1	80	130	1	3	34.3	16.9	49.27466657
4	Residential grade mechanical ventilation equipment	70	1	80	140	1	3	33.6	16.0	39.45205629
5										
6										
7										
8										
9										
10										
Notes:							Lmax[4]	36	Leq	24

[1] Percentage of time activity occurs each hour
[2] Soft ground terrain between project site and receptor.
[3] Shielding due to rooftop parapet/structural shielding
[4] Calculated Lmax is the Loudest value.

DNL Calculations					
	Time	Hourly Leq	Leq'	0.1*Leq	antiLog
Night	12:00 AM	23.7	33.7	3.3668147	2327.0979
	1:00 AM	23.7	33.7	3.3668147	2327.0979
	2:00 AM	23.7	33.7	3.3668147	2327.0979
	3:00 AM	23.7	33.7	3.3668147	2327.0979
	4:00 AM	23.7	33.7	3.3668147	2327.0979
	5:00 AM	23.7	33.7	3.3668147	2327.0979
	6:00 AM	23.7	33.7	3.3668147	2327.0979
Day	7:00 AM	23.7	23.7	2.3668147	232.70979
	8:00 AM	23.7	23.7	2.3668147	232.70979
	9:00 AM	23.7	23.7	2.3668147	232.70979
	10:00 AM	23.7	23.7	2.3668147	232.70979
	11:00 AM	23.7	23.7	2.3668147	232.70979
	12:00 PM	23.7	23.7	2.3668147	232.70979
	1:00 PM	23.7	23.7	2.3668147	232.70979
	2:00 PM	23.7	23.7	2.3668147	232.70979
	3:00 PM	23.7	23.7	2.3668147	232.70979
	4:00 PM	23.7	23.7	2.3668147	232.70979
	5:00 PM	23.7	23.7	2.3668147	232.70979
	6:00 PM	23.7	23.7	2.3668147	232.70979
	7:00 PM	23.7	23.7	2.3668147	232.70979
	8:00 PM	23.7	23.7	2.3668147	232.70979
	9:00 PM	23.7	23.7	2.3668147	232.70979
Night	10:00 PM	23.7	33.7	3.3668147	2327.0979
	11:00 PM	23.7	33.7	3.3668147	2327.0979
			Sum		24434.528
			Sum/24		1018.1054
			Log10(Sum/24)		3.0077927
			10*Log10(Sum/24)		30.077927
			24 Hour DNL		30