Noise Impact Assessment

Ventura Springs Project

Ventura County, California

Prepared For:

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LIST OF ACRONYMS AND ABBREVIATIONS

City	City of Ventura
County	Ventura County
CNEL	Community Noise Equivalent Level
dB	Decibel
dBA	Decibel is A-weighted
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HDR	High Density Residential
HUD	Housing and Urban Development
Hz	Hertz
L_{dn}	Day/Night noise level
L_{eq}	Equivalent noise level
OSHA	Occupational Safety and Health Administration
PPV	Peak particle velocity
Project	Ventura Springs Project
RMS	Root mean square
WEAL	Western Electro-Acoustic Laboratory, Inc.

1.0 INTRODUCTION

This report documents the results of a Noise Impact Assessment completed for the Ventura Springs Project (Project), which includes the development of a 122-unit housing development and associated features in the City of Ventura, California. The purpose of this report is to estimate the noise exposure on the Project site and determine if noise levels fall within the acceptable noise zone as defined by the Housing and Urban Development (HUD) noise standards (Quiet Communities Act of 1978; 24 Code of Federal Regulations (CFR) Part 51 Subpart B).

1.1 Project Location and Description

Ventura Springs is a new construction, 122-unit development that includes 120 housing units for veterans experiencing homelessness and low-income veterans and their families plus two unrestricted managers' units. Ventura Springs will not have any market-rate units. The 122 units will be spread out around the 9.68-acre site in multiple buildings.

Fifty-four (54) units will be permanent supportive units designated for individuals experiencing homelessness. The remaining units include sixty-six (66) general affordable units that will be designated for low-income veterans and their families plus two (2) unrestricted manager units.

The site is designed to create the experience of a traditional, family-oriented neighborhood where sidewalks are activated by pedestrian pathways and residential front doors that face the street. The Project's 78 one-bedroom (~575 sq. ft.), 32 two-bedroom (~770 sq. ft.), and 12 three-bedroom (~1,225 sq. ft.) units would be dispersed throughout the site, with buildings forming clusters surrounding vibrant community courtyards with a variety of uses and activities.

Ventura Springs includes many on-site amenities for tenants. There will be a large community room with a community kitchen; a barbecue grill; tables and seating space; on-site laundry facilities; offices for case management and property management staff; 2 DIY/Workshop spaces; outdoor play areas for children, edible gardening beds; walking and bike paths; bicycle parking; computer room; private and secured entrances; and a security camera system.

2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS

2.1 Fundamentals of Noise and Environmental Sound

2.1.1 Addition of Decibels

The decibel (dB) scale is logarithmic, not linear; therefore, sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted (dBA), an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be three dB higher than one source under the same conditions (Federal Transit Administration [FTA] 2018). For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by three dB). Under the decibel scale, three sources of equal loudness together would produce an increase of five dB.

Typical noise levels associated with common noise sources are depicted on Figure 1. *Common Noise Levels*.

Figure 1. Common Noise Levels

2.1.2 Sound Propagation and Attenuation

Noise can be generated by a number of sources including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately six dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately three dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2011). No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of three dB per doubling of distance is assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures; generally, a single row of detached buildings between the receptor and the noise source reduces the noise level by about five dBA (FHWA 2006), while a solid wall or berm generally reduces noise levels by 10 to 20 dBA (FHWA 2011). However, noise barriers or enclosures specifically designed to reduce site-specific construction noise can provide a sound reduction of 35 dBA or greater (Western Electro-Acoustic Laboratory, Inc. [WEAL] 2000). To achieve the most potent noise-reducing effect, a noise enclosure/barrier must physically fit in the available space, must completely break the "line of sight" between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers must be sizable enough to cover the entire noise source and extend lengthwise and vertically as far as feasibly possible to be most effective. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. In general, barriers contribute to decreasing noise levels only when the structure breaks the line of sight between the source and the receiver.

The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002). The exterior-to-interior reduction of newer residential units is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. [HMMH] 2006). Generally, in exterior noise environments ranging from 60 dBA Community Noise Equivalent Level (CNEL) to 65 dBA CNEL, interior noise levels can typically be maintained below 45 dBA, a typically residential interior noise standard, with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. (STC is an integer rating of how well a building partition attenuates airborne sound. In the U.S., it is widely used to rate interior partitions, ceilings, floors, doors, windows, and exterior wall configurations.) In exterior noise environments of 65 dBA CNEL or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA CNEL with proper wall construction techniques following California Building Code methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

2.1.3 Noise Descriptors

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. For instance, the L_{eq} is a measure of ambient noise, while the Community Noise Equivalent Level (CNEL) is a measurement of community noise. Each is applicable to this analysis and defined in Table 2-1.

Table 2-1. Common Acoustical Descriptors

Descriptor	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where one pascal is the pressure resulting from a force of one newton exerted over an area of one square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded one percent, 10 percent, 50 percent, and 90 percent of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	A 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level, CNEL	A 24-hour average L_{eq} with a five dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.

The dBA sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about ± one dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source. Close to the noise source, the models are accurate to within about ± one to two dBA.

2.1.4 Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in dBA noise levels, the following relationships should be noted in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

2.1.5 Effects of Noise on People

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources.

3.0 REGULATORY FRAMEWORK

3.1 Federal

3.1.1 HUD Noise Standards

HUD's noise standards can be found in 24 CFR Part 51, Subpart B. It is the purpose of this subpart B to call attention to the threat of noise pollution and protect new construction of noise sensitive uses on sites having unacceptable noise exposure. Table 3-1 presents the acceptable, normally unacceptable and unacceptable HUD noise level standards.

Table 3-1. HUD Site Acceptability Standards

Noise Zone	Day/Night (L_{dn}) Average Sound Level (in decibels)	Special Approvals and Requirements
Acceptable	Not exceeding 65 dB	None
Normally Acceptable	Above 65 dB but not exceeding 75 dB	• Environmental assessment and attenuation required for new construction • Attenuation strongly encouraged for major rehabilitation Note: An environmental impact statement is required if the project site is largely undeveloped or will encourage incompatible development.
Unacceptable	Above 75 dB	• Environmental impact statement required • Attenuation required for new construction with approval by the Assistant Secretary of Certifying Officer.

Source: CFR Part 51 Subpart B 2013

4.0 IMPACT ASSESSMENT

4.1 Thresholds of Significance

The impact analysis provided below focuses on the three main sources of noise that will impact the Project site; aircraft, roadways and railways, and is compared to the specific noise standards established by HUD that are presented in Table 3-1.

4.2 Impact Analysis

Are There Potential Noise Generators in the Vicinity of the Project Site?

Aircraft Noise

There are two airports within 15 miles of the Project site and are as follows:

- Oxnard Airport located approximately 6.25 miles southwest of the Project site
- Santa Paula Airport located approximately 6.57 miles northeast of the Project site

The Oxnard Airport is the nearest airport to the Project site, approximately 6.25 miles distant. According to the Airport Comprehensive Land Use Plan for Ventura County (2000), the Project site is located outside of any of the noise contours for all airports within 15 miles. Implementation of the proposed Project would not result in increased exposure of people working at or residing on the Project site to aircraft noise beyond the acceptable noise standard.

Roadway Noise

The Project site is accessible from Telephone Road, via Cosmos Road, a proposed access road. Telephone Road is considered an Arterial Roadway within the City as it acts as a primary mechanism for crosstown travel, serves the major centers of activity, and carries a high proportion of the area travel (City of Ventura 2005a). According to the City's General Plan EIR Future Noise Contours (2005b; Figure 4.10-4), the Project site is located within the 65 dBA CNEL noise contour as a result of roadway noise. Furthermore, Figure 4.10-2 of the City's General Plan EIR displays locations in the City where previous noise measurements were taken. Location 1, at the intersection of Telegraph Road/ Nevada Avenue, approximately 1.3 miles west of the Project area and Location 2, at the intersection of Henderson Road/ Jasper Avenue, approximately 1.3 miles north of the Project area are the noise measurement locations closest to the Project site. Noise levels of 69.9 L_{eq} and 69.7 L_{eq} were recorded at these locations respectively.

Additionally, the Project site's eastern boundary is located approximately 540 feet distant from State Route (SR) 118. Per the California Department of Transportation (Caltrans) traffic counts, the roadway segment on SR 118 between Telephone Road and SR 232 that encompasses the Project area has an annual average daily traffic count of 37,750 vehicles. According to the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108) (Attachment A), which calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions; the Project area, as a result of roadway traffic on SR 118, experiences an ambient noise level of 62.5 L_{dn} at 540 feet from the centerline. Thus, roadway noise in the Project vicinity would not exceed noise levels beyond the HUD acceptable noise standard (see Table 3-1). Furthermore, noise levels experienced at the Project site would be within the normally acceptable noise levels for the location of multi-family residences (60 L_{dn} – 70 L_{dn}) presented in Table 7-2, Acceptable Noise Levels, of the City of Ventura General Plan.

Railway Noise

A Southern Pacific Railroad line runs north-south through the City. According to the City's General Plan EIR, the rail line runs parallel to Highway 101 crossing over the highway in the northern portion of the City. The eastern spur of the railroad line that diverges near Highway 101, which a portion of traverses the southern boundary of the Project site, is no longer actively used for freight or passenger transport. Implementation of the proposed Project would not result in exposure of people working at or residing on the Project site to railroad noise beyond the acceptable noise standard.

Conclusion

As described above, aircraft, roadway and railway noise levels in the vicinity of the Project site would not exceed 65 dBA L_{dn}. Additionally, as previously stated the exterior-to-interior reduction of newer residential units is generally 30 dBA or more and therefore the resulting interior noise would be less than 45 dBA for all noise sources evaluated. Therefore, the Project site has an acceptable noise environment for the location of the proposed 122-unit housing development and associated features.

5.0 REFERENCES

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LIST OF ATTACHMENTS

ATTACHMENT A

Federal Highway Administration Highway Noise Prediction Model (FHWA-RD-77-108) Outputs – Existing Traffic Noise

AFFIC NOISE LEVELS

Project Number: 2021-061
Project Name: Ventura Springs

:kground Information

ɗel Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
ılysis Scenario(s):	Existing
ırce of Traffic Volumes:	Caltrans
nmunity Noise Descriptor:	L_{dn}: X CNEL:

umed 24-Hour Traffic Distribution:	Day	Evening	Night
al ADT Volumes	77.70%	12.70%	9.60%
ɗium-Duty Trucks	87.43%	5.05%	7.52%
ıvy-Duty Trucks	89.10%	2.84%	8.06%

ffic Noise Levels

ılysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Peak Hour dB(A) L_{eq}	24-Hour dB(A) Ldn
ılysis Condition													
Roadway, Segment	Residential	4	0		37,750	45	540	0	0	1.8%	0.7%	0.0	62.5