Appendix J
Noise and Vibration Impact Study

WILEY CANYON MIXED USE PROJECT

Noise and Vibration Impact Study

Prepared for
City of Santa Clarita
23920 Valencia Boulevard, Suite 300
Santa Clarita, CA 91355

October 2022

ESA

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Prepared for
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WILEY CANYON MIXED USE PROJECT

Noise and Vibration Impact Study

Executive Summary

The proposed project is located on an approximately 31-acre site located at 24924 Hawkbryn Avenue, Santa Clarita, County of Los Angeles (project site). The project site is located immediately east of Interstate Highway 5 (I-5), north of Calgrove Boulevard, and with access from Wiley Canyon Road on the east. The project site consists of two parcels (APNs 2825-012-010 and 2825-012-011) that currently used for agricultural uses. A portion of the South Fork of the Santa Clara River runs along the eastern boundary of the property with the north end of the drainage being channelized.

Surrounding land uses include I-5 on the west, a small commercial area to the south, and residential uses on the north and east. Regional access to the project site is provided by I-5 and Calgrove Boulevard to the southwest of the project site.

The proposed project consists of 596 multifamily residential units, 379 multi-family residential units, 8,914 square feet of retail commercial development and a 217-unit Senior Living Facility. Approximately 16 acres of the site would be developed with the remaining 15.2 acres retained as open space, recreation areas, and drainage areas. The project site is zoned Mixed Use Neighborhood (MX-N) and with the same land use category. In addition, the southern end of the project site will include a neighborhood park including field space. The site is surrounded by development and has been highly disturbed by past agricultural activities and limited commercial use. Amenities recommended for the multifamily residential units and senior living structures include a combined berm and wall of no less than 10 feet in height along the western property boundary adjacent to I-5, the building design for residential units directly exposed to I-5 traffic along the western property boundary will use STC-28 windows for noise attenuation, and the recreational courtyard area within the center of the multifamily residential units will use solid gates on the west entry to provide noise attenuation. The purpose of this Noise and Vibration Impact Study is to assess and discuss the impacts of potential noise and vibration impacts that may occur with the implementation of the proposed project. The analysis describes the existing noise environment in the project area, assess project-related noise and vibration impacts on off-site uses, and identifies the potential for significant noise and vibration impacts. Feasible mitigation measures are identified.

Project Design Features for Noise Abatement

The following Project Design Features measures apply to the proposed project and will help to reduce and avoid potential impacts related to noise:

Pursuant to the City of Santa Clarita's Municipal Code Section 11.44.080, no person may engage in any construction work that requires a building permit from the City on sites within 300 feet of a residentially zoned property, except between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday. No work may be performed on the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day. The City of Santa Clarita Public Works Department may issue a permit for work to be done "after hours" provided that containment of construction noises is provided.

PDF Noise-1: **Control of Construction Hours.** Construction activities occurring as part of the project shall be subject to the limitations which states that construction activities may occur between 7:00 a.m. and 7:00 p.m. Mondays through Fridays, and between 8:00 a.m. and 6:00 p.m. on Saturdays. No work may be performed on the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day. The City of Santa Clarita Public Works Department may issue a permit for work to be done "after hours" provided that containment of construction noises is provided.

PDF Noise-2: Prior to issuance of grading permits, the City/project applicant shall incorporate the following measures as a note on the grading plan cover sheet to ensure that the greatest distance between noise sources and sensitive receptors during construction activities have been achieved.

- Construction equipment, fixed or mobile, shall be equipped with properly operating and maintained noise mufflers consistent with manufacturers' standards.
- Construction staging areas shall be located away from off-site sensitive uses during project construction.
- The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site, whenever feasible.

Mitigation Measures for Project Construction

The following mitigation measure would be necessary for the proposed project during construction at adjacent off-site sensitive receiver locations, and for the Senior Living building during the later phases of construction on-site after the Senior Living building has been constructed and occupied:

NO-1: Temporary mitigation measure shall limit construction equipment within 200 feet of the northern and eastern boundary of the project site to small, reduced-noise equipment that has a maximum noise generation level of 77 dBA Leq at 50 feet. This measure also applies to construction equipment during the later phases of construction for residential buildings within 200 feet of the Senior Living Building after it is occupied.

NO-2: Temporary construction noise barriers with sufficient height to block the line-of-sight between the project construction area and adjacent sensitive receivers, including proposed on-site residential uses that are completed and occupied while construction in other parts of the Project Site continues, are recommended during project construction. No vibration mitigation measures would be necessary for project construction.

Mitigation Measures for Project Operations

No mitigation measures would be required for project operations.

1.0 Introduction

This Noise and Vibration Impact Study is prepared by ESA to support a proposal for The Wiley Canyon (Smiser Ranch) Mixed Use project, in the City of Santa Clarita, Los Angeles County, California.

The project-specific analysis provided in this report assesses whether the implementation of the proposed project would have potentially significant noise and vibration impacts on existing residential uses adjacent to the project site. In addition, due to the overall construction schedule, some proposed on-site dwelling units may be completed and occupied while other construction activity continues to occur, analysis of potential noise impacts for the future on-site residences and feasible mitigation measures are also included.

1.1 Project Location

The proposed project is located on an approximately 31-acre site located at 24924 Hawkbryn Avenue, Santa Clarita, County of Los Angeles (project site). The project site is located immediately east of Interstate Highway 5 (I-5), north of Calgrove Boulevard, and with access from Wiley Canyon Road on the east; refer to **Figure 1**, *Regional Project Location Map* and **Figure 2**, *Project Layout Plan*.

1.2 Existing Conditions and Project Site Background

The project site consists of two parcels (APNs 2825-012-010 and 2825-012-011) that are currently used for agricultural uses. A portion of the South Fork of the Santa Clara River runs along the eastern boundary of the property with the north end of the drainage being channelized.

Existing land uses on the project site and in the immediate vicinity include:

- On-site: predominantly vacant with no known on-site structures, but includes fencing, an abandoned water tank, water wells, irrigation lines, Southern California Edison (SCE) electrical distribution lines, and dirt roads
- To the north: residential uses
- To the south: a small commercial area
- To the west: I-5 on the west
- To the east: residential uses on the east

1.3 Surrounding Land Uses and Setting

Surrounding land uses include I-5 on the west, a small commercial area to the south, and residential uses on the north and east. Regional access to the project site is provided by I-5 and Calgrove Boulevard to the southwest of the project site.

1.4 Project Description

The Project is the development of a mixed-use facility on an approximately 32-acre site located on Wiley Canyon Road between Lyons Avenue and Calgrove, Boulevard, immediately adjacent to Interstate-5 (I-5) on the west. The Project would consist of up to 596 residential units; including a 217-unit Senior Living Facility, 379 multi-family residential units, and up to 8,914 square feet of commercial. The Project would also contain approximately 15.2 acres of open space, recreation, and drainage areas. The area surrounding the Project Site includes a small commercial area to the south, residential uses on the north and east, and I-5 on the west. The project site is zoned Mixed Use Neighborhood (MX-N) and with the same land use category. In addition, the southern end of the project site will include a neighborhood park including field space. The site is surrounded by development and has been highly disturbed by past agricultural activities and limited commercial use. Amenities recommended for the multifamily residential units and senior living structures include a combined berm and wall of no less than 10 feet in height along the western property boundary adjacent to I-5, the building design for residential units directly exposed to I-5 traffic along the western property boundary will use STC-28 windows for noise attenuation, and the recreational courtyard area within the center of the multifamily residential units will use solid gates on the west entry to provide noise attenuation.

1.5 Project Construction Activities/Schedule

The overall construction for this project will be four (4) years and four (4) months, with two phases. The initial construction phase will consist of 16 months of “horizontal” work (e.g., grading, bank stabilization, utilities, master developer improvements, etc.), which will be followed by 24 months to construction senior living facility (work on the other residential buildings occurring at the same time). The senior living facility will be occupied for about 12 months while construction continues on the additional residential (and commercial) buildings. Building construction adjacent to the senior living facility will occur first such that the later 12 months of construction will occur to the south with at least partially construction buildings in between.

1.6 Project Design Features

The following Project Design Features measures apply to the proposed project and will help to reduce and avoid potential impacts related to noise:

Pursuant to the City’s Municipal Code Section 11.44.080, no person may engage in any construction work that requires a building permit from the City on sites within 300 feet of a residentially zoned property, except between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday. No work may be performed on the following public holidays: New Year’s Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day. The City of Santa Clarita Public Works Department may issue a permit for work to be done "after hours" provided that containment of construction noises is provided.

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PDF Noise-2: Prior to issuance of grading permits, the City/project applicant shall incorporate the following measures as a note on the grading plan cover sheet to ensure that the greatest distance between noise sources and sensitive receptors during construction activities have been achieved.

- Construction equipment, fixed or mobile, shall be equipped with properly operating and maintained noise mufflers consistent with manufacturers' standards.
- Construction staging areas shall be located away from off-site sensitive uses during project construction.
- The project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site, whenever feasible.

2.0 Noise Impact Study

2.1 Fundamentals of Noise

2.1.1 Noise Principles and Descriptors

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions, or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. Acoustics addresses primarily the propagation and control of sound.[1]

Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound, with 0 dB corresponding roughly to the threshold of

1 M. David Egan, *Architectural Acoustics* (1988), Chapter 1.

human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.[2]

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude, with audible frequencies of the sound spectrum ranging from 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.[3] The typical human ear is not equally sensitive to this frequency range. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to these extremely low and extremely high frequencies. This method of frequency filtering, or weighting, is referred to as A-weighting, expressed in units of A-weighted decibels (dBA), which is typically applied to community noise measurements.[4] Some representative common outdoor and indoor noise sources and their corresponding A-weighted noise levels are shown in **Figure 3**, Decibel Scale and Common Noise Sources.

2.1.2 Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time; a noise level is a measure of noise at a given instant in time, as presented Figure 3. However, noise levels rarely persist at one level over a long period of time. Rather, community noise varies continuously over a period of time with respect to the sound sources contributing to the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with many of the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources, such as changes in traffic volume. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.[5]

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the noise exposure to be measured over periods of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. The following noise descriptors are used to characterize environmental noise levels over time, which are applicable to the project.[6]

L_{eq}: The equivalent sound level, is used to describe noise over a specified period of time in terms of a single numerical value; the L_{eq} of a time-varying signal and that of a steady

2 M. David Egan, *Architectural Acoustics* (1988), Chapter 1.
3 M. David Egan, *Architectural Acoustics* (1988), Chapter 1.
4 M. David Egan, *Architectural Acoustics* (1988), Chapter 1.
5 California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.2.2.1.
6 California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.2.2.2.

signal are the same if they deliver the same acoustic energy over a given time. The L_{eq} may also be referred to as the average sound level.

L_{max}: The maximum, instantaneous noise level experienced during a given period of time.

L_{min}: The minimum, instantaneous noise level experienced during a given period of time.

L_x: The noise level exceeded a percentage of a specified time period. For instance, L_{50} and L_{90} represent the noise levels that are exceeded 50 percent and 90 percent of the time, respectively.

L_{dn}: The average A-weighted noise level during a 24-hour day, obtained after an addition of 10 dB to measured noise levels between the hours of 10 p.m. to 7 a.m. to account for nighttime noise sensitivity. The L_{dn} is also termed the day-night average noise level (DNL).

CNEL: The Community Noise Equivalent Level (CNEL) is the average A-weighted noise level during a 24-hour day that is obtained after an addition of 5 dB to measured noise levels between the hours of 7 p.m. to 10 p.m. and after an addition of 10 dB to noise levels between the hours of 10 p.m. to 7 a.m. to account for noise sensitivity in the evening and nighttime, respectively. CNEL and L_{dn} are close to each other, with CNEL being more stringent and generally 1 dB higher than L_{dn}.

2.1.3 Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance, or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance);
- Interference effects (e.g., communication, sleep, and learning interference);
- Physiological effects (e.g., startle response); and
- Physical effects (e.g., hearing loss).

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects interrupt daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep.[7]

With regard to the subjective effects, the responses of individuals to similar noise events are diverse and influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity. Overall, there is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction on people. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based

7 California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.2.1.

on an individual's past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:[8]

- Except in carefully controlled laboratory experiments, a change of 1 dBA in ambient noise levels cannot be perceived;
- Outside of the laboratory, a 3 dBA change in ambient noise levels is considered to be a barely perceivable difference;
- A change in ambient noise levels of 5 dBA is considered to be a readily perceivable difference; and
- A change in ambient noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel scale. The human ear perceives sound in a non-linear fashion; therefore, the dBA scale was developed. Because the dBA scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. Under the dBA scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dBA higher than one of the sources under the same conditions. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA. Three sources of equal loudness together produce a sound level of approximately 5 dBA louder than one source, and 10 sources of equal loudness together produce a sound level of approximately 10 dBA louder than the single source.[9]

2.1.4 Noise Attenuation

When noise propagates over a distance, the noise level reduces with distance depending on the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern, referred to as "spherical spreading." Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (i.e., reduce) at a rate between 6 dBA for acoustically "hard" sites and 7.5 dBA for "soft" sites for each doubling of distance from the reference measurement, as their energy is continuously spread out over a spherical surface (e.g., for hard surfaces, 80 dBA at 50 feet attenuates to 74 at 100 feet, 68 dBA at 200 feet, etc.). Hard sites are those with a reflective surface between the source and the receiver, such as asphalt, or concrete, surfaces, or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the reduction in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface, such as soft dirt, grass, or scattered bushes

8 California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.2.1.
9 California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.2.1.1.

and trees, which in addition to geometric spreading, provides an excess ground attenuation value of 1.5 dBA (per doubling distance).[10]

Roadways and highways consist of several localized noise sources on a defined path, and hence are treated as "line" sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as "cylindrical spreading."[11] Line sources (e.g., traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement.[12] Therefore, noise due to a line source attenuates less with distance than that of a point source with increased distance.

Additionally, receptors located downwind from a noise source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Atmospheric temperature inversion (i.e., increasing temperature with elevation) can increase sound levels at long distances (e.g., more than 500 feet). Other factors such as air temperature, humidity, and turbulence can also have significant effects on noise levels.[13]

2.2 Ambient Noise Levels

The predominant existing noise source on the Project Site and surrounding areas is traffic noise from Interstate 5 and other local streets.

On March 4, 2021, short-term (15-minute duration) daytime ambient noise measurements were conducted at locations shown in **Figure 4** that represent the ambient noise environment at or in the vicinity of the nearby noise sensitive receptors. A summary of noise measurements is provided in **Table 1**, *Summary of Ambient Noise Measurements*, and details are included in **Appendix B** of this report.

TABLE 1
SUMMARY OF AMBIENT NOISE MEASUREMENTS

Location, Duration, and Date of Measurements	Duration	Average L_{eq}
R1, 3/4/21 (9:36 a.m. to 9:51 a.m.)	15 minutes	57.7
R2, 3/4/21 (9:58 a.m. to 10:13 a.m.)	15 minutes	66.1
R3, 3/4/21 (8:26 a.m. to 8:41 a.m.)	15 minutes	62.6
R4, 3/4/21 (8:49 a.m. to 9:04 a.m.)	15 minutes	67.2
R5, 3/4/21 (9:10 a.m. to 9:25 a.m.)	15 minutes	70.0

SOURCE: ESA, 2021

NOTE:

The ambient noise measurements were conducted using the Larson-Davis 820 Precision Integrated Sound Level Meter, which is a Type 1 standard instrument as defined in the American National Standard Institute S1.4. All instruments were calibrated and operated according to the applicable manufacturer specifications. The microphone was placed at a height of 5 feet above the local grade at the following locations.

[10] California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.1.4.2.
[11] California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.1.4.1.
[12] California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.1.4.1.
[13] California Department of Transportation, *Technical Noise Supplement (TeNS)* (September 2013), Section 2.1.4.3.

The representative ambient noise locations (R1 through R5), shown in Figure 4, are described as follows:

- Measurement Location R1: Existing noise environment to the north of the project site at the south end of existing residential uses along Hawkbryn Avenue between I-5 and The Old Road.
- Measurement Location R2: Existing noise environment at a residence along Old Wiley Canyon Road to the northeast of the project site.
- Measurement Location R3: Existing noise environment at a residence along Wiley Canyon Road to the east of the project site, near Fouri Road and Carland Drive.
- Measurement Location R4: Existing noise environment at a residence along Wiley Canyon Road to the southeast of the project site, near Fouri Road and Canewell Drive.
- Measurement Location R5: Existing noise environment at the south end of the project site, north of Calgrove Boulevard and east of I-5, adjacent to Santa Clarita Athletic Club and Survival of the Fittest Health and Wellness.

A summary of noise measurement data is provided in Table 1, and details are included in Appendix B of this report. Average noise levels range from 57.7 dBA to 70.0 dBA L_{eq}.

2.3 Regulatory Setting

A number of statutes, regulations, plans, and policies that address noise concerns have been adopted. Below is a discussion of the relevant regulatory setting and noise regulations, plans, and policies.

2.3.1 Federal

The Noise Control Act of 1972 establishes a national policy to promote an environment for all Americans to be free from noise that jeopardizes their health and welfare.

Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety, commonly referenced as the "Levels Document," establishes an Ldn of 55 dBA ("A-weighted decibel") as the requisite level, with an adequate margin of safety, for areas of outdoor uses, including residences and recreation areas (EPA, 1974). This document identifies safe levels of environmental noise exposure without consideration of costs for achieving these levels or other potentially relevant considerations.

Federal Highway Administration

The purpose of the Federal Highway Administration (FHWA) Noise Abatement Procedure is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, supply noise abatement criteria, and establish requirements for information to be given to local officials for use in the planning and design of highways. It establishes five categories of noise-sensitive receptors and prescribes the use of the hourly Leq as the criterion metric for evaluating traffic noise impacts.

Department of Housing and Urban Development (HUD)

The Department of Housing and Urban Development regulations set forth the following exterior noise standards for new home construction assisted or supported by the department:

- 65 Ldn or less – Acceptable
- 65 Ldn and < 75 Ldn – Normally unacceptable, appropriate sound attenuation measures must be provided
- 75 Ldn – Unacceptable

HUD's regulations do not contain standards for interior noise levels. Rather a goal of 45 dBA is set forth, and attenuation requirement are geard to achieve that goal.

Occupational Safety and Health Administration

The Occupational Safety and Health Administration (OSHA) Occupation Noise Exposure Hearing Conservation Amendment (Federal Register 48 [46], 9738-9785, 1983) stipulate that protection against the effects of noise exposure shall be provided for employees when sound levels exceed 90 dBA over an 8 hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. Additionally, a Hearing Conservation Program must be instituted by the employers whenever employee noise exposure equals or exceeds the action level of an 8-hour time-weighted average sound level of 85 dBA. The Hearing Conservation Program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping.

Federal Transit Administration and California Department of Transportation

The criteria for environmental impact from groundborne vibration are based on the maximum levels for a single event. **Table 2** lists the potential vibration damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment* (FTA 2006).

FTA guidelines show that a vibration level of up to 102 VdB (equivalent to 0.5 inch/sec in RMS) (FTA 2006) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 inch/sec in RMS).

TABLE 2
CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category	PPV (inch/sec)	Approximate L_V[a]
Reinforced-concrete, steel or timber (no plaster)	0.50	102
Engineered concrete and masonry (no plaster)	0.30	98
Non-engineered timber and masonry buildings	0.20	94
Buildings extremely susceptible to vibration damage	0.12	90

SOURCE: Federal Transit Administration. Table 12-3, *Transit Noise and Vibration Impact Assessment* (2006).
NOTES:
PPV = peak particle velocity; L_V = velocity in decibels; inch/sec = inches per second
[a] Root-mean-square velocity in decibels (VdB) re 1 microinch per second.

Based on Table 8-3 in the FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006), interpretation of vibration criteria for detailed analysis is 78 VdB for residential uses during daytime hours. During nighttime hours, the vibration criterion is 72 VdB. For office and office buildings, the FTA guidelines suggest that a vibration level of 84 VdB should be used for detailed analysis.

2.3.2 State

California Code of Regulations (CCR) Title 24 establishes the California Building Code (CBC). The most recent building standard adopted by the legislature and used throughout the state is the 2019 version, which took effect on January 1, 2020. The State of California's noise insulation standards are codified in the CBC (Title 24, Part 2, Chapter 12). These noise standards are for new construction in California for the purposes of interior compatibility with exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residences, schools, or hospitals, are near major transportation noises, and where such noise sources create an exterior noise level of 60 dBA CNEL, or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

The RMS values for building damage thresholds referenced above are shown in **Table 3**, which is taken from the *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013).

TABLE 3
GUIDELINE VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA

	Maximum PPV (inch/sec)	
Structure and Condition	**Transient Sources[a]**	**Continuous/Frequent Intermittent Sources[b]**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

SOURCE: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual* (2013), Table 19.
NOTES:
PPV = peak particle velocity; inch/sec = inches per second

[a] Transient sources create a single, isolated vibration event, such as blasting or drop balls.
[b] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

2.3.3 City of Santa Clarita

The proposed project is located within the City of Santa Clarita. Applicable City of Santa Clarita noise standards and policies are described below.

Noise Element of the General Plan

The City of Santa Clarita has set land use standards for noise in its General Plan Noise Element (June 25, 1991; First Amendment, May 23, 2000; **Appendix E**). One of the goals of the Noise Element is to mitigate, and if possible prevent, significant noise levels in residential neighborhoods. It requires that developers of new single-family and multi-family residential neighborhoods in areas where the ambient noise level exceeds 55 dBA (night) and 65 dBA (day) (or the equivalent of 65 dBA CNEL) provide mitigation measures for the new residences to reduce interior noise levels. Medical office buildings are acceptable in areas up to 70 dBA CNEL where no outdoor active uses are proposed and the interior noise levels are mitigated (California Department of Health 1978).

Municipal Code Noise Ordinance

The City's Municipal Code, Chapter 11.44, Noise Limits, establishes noise standards in various land use zones during daytime (7:00 AM–10:00 PM) and nighttime (10:00 PM–7:00 AM) periods. For residential zones, the base noise levels are 65 dBA during the daytime period and 55 dBA during the nighttime period. For commercial and manufacturing zones, the base noise levels are 80 dBA during the daytime period and 70 dBA during the nighttime period. For repetitive impulsive noise or steady, whine, screech, or hum noise, the base noise levels noted above are reduced by 5 dBA. If the noise occurs more than 5 but less than 15 minutes per hour during the daytime period, the above base noise levels are raised by 5 dBA. If the noise occurs more than 1 but less than 5 minutes per hour during the daytime period, the above base noise levels are raised by 10 dBA. If the noise occurs less than 1 minute per hour during daytime period, the above base noise levels are raised by 20 dBA.

Section 11.40.040 sets the following noise levels for residential, commercial, and manufacturing uses taking place on private property and for construction activities on private property outside of the hourly limits provided in Section 11.40.080. The levels are shown in **Table 4**, City Ordinance Noise Limits.

TABLE 4
CITY ORDINANCE NOISE LIMITS

Region	Time	Exterior Sound Level (dB)
Residential Zone	Day	65
Residential Zone	Night	55
Commercial and Manufacturing	Day	80
Commercial and Manufacturing	Night	70

SOURCE: City of Santa Clarita.
NOTES:
Wherever a boundary line occurs between a residential property and a commercial/manufacturing property, the noise level of the quieter zone is to be used. Section 11.44.070

Pursuant to the City's Municipal Code Section 11.44.080, no person may engage in any construction work that requires a building permit from the City on sites within 300 feet of a residentially zoned property, except between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday. No work may be performed on the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day. The City of Santa Clarita Public Works Department may issue a permit for work to be done "after hours" provided that containment of construction noises is provided.

For planning purposes, the 24-hour average sound levels (CNEL) are roughly equivalent to L_{eq} measurements plus 5 dBA when traffic is the dominant noise source (Office of Noise Control, 1976:21).

2.4 Significance Thresholds

Pursuant to *CEQA Guidelines* Appendix G, the project would result in a significant impact related to noise and vibration if it would expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

For the purposes of this analysis and consistency with *CEQA Guidelines* Appendix G, applicable local plans, and agency and professional standards, the project would have a significant impact to noise and/or groundborne vibration if it would:

- 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;
- Generate excessive groundborne vibration or groundborne noise levels; or
- 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 plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport) (refer to Environmental Checklist 13c in Appendix A, *Initial Study*).

The proposed project would result in no impacts relevant to airport land use plans, airports, or private airstrips; therefore, these issues do not require further analysis in this study.

Construction Noise

Pursuant to the City's Municipal Code Section 11.44.080, no person may engage in any construction work that requires a building permit from the City on sites within 300 feet of a residentially zoned property, except between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday. No work may be performed on the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day. The City of Santa Clarita Public Works Department may issue a permit for work to be done "after hours" provided that containment of construction noises is provided.

Due to the King & Gardiner Farms, LLC vs. County of Kern[14] court case opinions, in addition to the comparison to adopted maximum noise level threshold, the increase over existing ambient

[14] https://casetext.com/case/king-gardiner-farms-llc-v-cnty-of-kern

noise level (by no more than 5 dBA), or the ambient-based noise threshold, should be evaluated as well.

Operational Noise

The City's Municipal Code, Chapter 11.44, Noise Limits, establishes noise standards in various land use zones during daytime (7:00 AM–10:00 PM) and nighttime (10:00 PM–7:00 AM) periods. As shown in Table 4 above, for residential zones, the base noise levels are 65 dBA during the daytime period and 55 dBA during the nighttime period. For commercial and manufacturing zones, the base noise levels are 80 dBA during the daytime period and 70 dBA during the nighttime period. For repetitive impulsive noise or steady, whine, screech, or hum noise, the base noise levels noted above are reduced by 5 dBA. If the noise occurs more than 5 but less than 15 minutes per hour during the daytime period, the above base noise levels are raised by 5 dBA. If the noise occurs more than 1 but less than 5 minutes per hour during the daytime period, the above base noise levels are raised by 10 dBA. If the noise occurs less than 1 minute per hour during daytime period, the above base noise levels are raised by 20 dBA.

Groundborne Vibration and Noise

The City has not adopted criteria to assess vibration impacts during construction. Thus, for this Project, the City has determined to use the FTA's criteria for structural damage and human annoyance, as described in **Table 2** and **Table 3**, respectively, above, to evaluate potential impacts related to Project construction and operation.

- Potential Building Damage – Project construction activities that cause groundborne vibration levels to exceed the potential structural damage threshold of 0.5-in/sec PPV at the nearest off-site buildings or structures of Building Category I, Reinforced-concrete, steel, or timber (no plaster).
- Potential Building Damage – Project construction activities that cause groundborne vibration levels to exceed the potential structural damage threshold of 0.3-in/sec PPV at the nearest off-site buildings of Building Category II, Engineered concrete and masonry (no plaster).
- Potential Building Damage – Project construction activities that cause groundborne vibration levels to exceed the potential structural damage threshold of 0.2-in/sec PPV at the nearest off-site buildings of Building Category III, Non-engineered timber and masonry buildings.
- Potential Building Damage – Project construction activities that cause groundborne vibration levels to exceed the potential structural damage threshold of 0.12-in/sec PPV at the nearest off-site buildings of Building Category IV, Buildings extremely susceptible to building damage.

Based on FTA guidelines, construction and operational vibration impacts associated with human annoyance would be significant if the following were to occur:

- Project construction and operational activities cause ground-borne vibration levels to exceed the following at off-site residential uses:
    - 72 VdB for frequent events (more than 70 events per day);
    - 75 VdB for occasional events (30 to 70 events per day); or

  - 80 VdB for infrequent events (fewer than 30 events per day).
- Project construction and operational activities cause ground-borne vibration levels to exceed the following at off-site institutional uses with primarily daytime use:
  - 75 VdB for frequent events (more than 70 events per day);
  - 78 VdB for occasional events (30 to 70 events per day); or
  - 83 VdB for infrequent events (fewer than 30 events per day).

2.5 Methodology

On-Site Construction Noise

On-site construction noise impacts were projected by determining the noise levels expected to be generated by the different types of construction activities anticipated, calculating the construction-related noise levels produced by the construction equipment assumed at sensitive receptors. More, specifically, the following steps were undertaken to assess construction-period noise impacts.

1. Typical noise levels for each type of construction equipment expected to be used based on information provided by the Applicant were obtained from the Federal Highway Administration (FHWA) roadway construction noise model (RCNM)(FHWA 2006);
2. Distances between construction site locations (noise sources) within the Project Site and surrounding sensitive receptors were measured using Project architectural drawing, Google Earth, and site plans;
3. The construction noise levels were then calculated for each construction phase using the FHWA RCNM, conservatively, in terms of hourly L_{eq}, for sensitive receptor locations based on the standard point source noise-distance attenuation factor of 6 dBA for each doubling of distance, assuming that all of the equipment for each construction phase would be in use concurrently and that the loudest equipment would be located at the edge of the Project Site closest to the sensitive receptor locations; and

Construction noise levels were then compared to the construction noise significance thresholds identified above in Section 2.4, *Thresholds of Significance*.

Off-Site Roadway Noise

Roadway CNEL noise levels were calculated using the methodology based on the Federal Highway Administration's (FHWA's) Highway Traffic Noise Model (TNM) and traffic volumes at the study intersections reported in Wiley Canyon Mixed-Use Traffic Analysis prepared by Stantec Consulting Services Inc.[15] The modeling analysis calculates the average noise level at specific locations based on traffic volumes, average speeds, and site environmental conditions.

This method allows for the definition of roadway configurations, barrier information (if any), and receiver locations. Roadway noise attributable to Project development was calculated and compared to baseline noise levels that would occur under the "without Project" condition.

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[15] Stantec Consulting Services Inc. Wiley Canyon Mixed-Use Traffic Analysis, July 11, 2022.

Stationary Point-Source Noise

Stationary point-source noise levels were evaluated by identifying the noise levels generated by outdoor stationary noise sources such as rooftop mechanical equipment, parking structure, automobile operations, and loading/refuse collection area activity, calculating the hourly L_{eq} noise level from each noise source at sensitive receiver property lines, and comparing such noise levels to existing ambient noise levels. More specifically, the following steps were undertaken to calculate outdoor stationary point-source noise impacts:

1. Ambient noise levels at surrounding sensitive receptor locations were estimated based on field measurement data (see **Table 2-1**);
2. Typical noise levels generated by each type of stationary point-source noise generator including mechanical equipment, open spaces, loading dock, and parking structure operations were obtained from measured noise levels for similar equipment/activities, noise levels published in environmental noise assessment documents for land use development projects or scientific journals, or noise levels from equipment manufacturer specifications
3. Distances between stationary point-source noise generators and surrounding sensitive receptor locations were measured using Project architectural drawings, Google Earth, and site plans;
4. Stationary point-source noise levels were then calculated for each sensitive receptor location based on the standard point source noise-distance attenuation factor of 6 dBA for each doubling of distance;
5. Noise level increases, if any, were compared to the stationary point-source noise significance thresholds identified above in Section 2.4, *Thresholds of Significance*; and

Outdoor mechanical equipment is assessed based on the City Municipal Code requirements and measured data, and their impacts on the nearby offsite receptors are determined based on their distance from these receptors. The noise levels determined at the offsite, noise-sensitive receptors are then compared to the stationary source noise significance thresholds identified in the City Municipal Code.

Ground-borne Vibration and Noise

Groundborne vibration and noise impacts were evaluated for potential building damage and human annoyance impacts by identifying the Project's potential vibration sources, estimating the distance between the Project's vibration sources and the nearest structure and vibration annoyance receptor locations, and making a significance determination based on the significance thresholds described above in Section 2.3, *Thresholds of Significance*.

Construction activities may generate groundborne vibration and noise from transient sources due to the temporary and sporadic use of vibration-generating equipment. Operation of the Project has no potential to cause structure damage to the Project's own buildings or to off-site buildings that are farther away because the Project would not include any equipment that would generate substantial vibration or noise levels. Construction and operational activities may generate groundborne vibration and noise levels that could be felt by people as a result of trucks and vehicles driving to and from the Project Site, or from the operation of typical commercial-grade stationary mechanical and electrical equipment used for residential and commercial land uses, such as air handling units, condenser units, and exhaust fans, which could produce groundborne vibration and noise.

2.6 Environmental Impacts

The project would potentially result in the exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. ***(Significant Impact without Mitigation)***

2.6.1 Project Construction

This section includes an overview of the typical methods, equipment, and work force that would be used for construction of the Proposed Project. Unless otherwise noted, construction activities are anticipated to occur between the hours of 7 a.m. and 7 p.m., Monday through Friday, consistent with the City of Santa Clarita Noise Ordinance. If construction is required on one of more Saturdays, construction activities will be limited to the hours between 8 a.m. and 5 p.m., also consistent with the Noise Ordinance.

Typical Construction Equipment

Short-term noise impacts would be associated with excavation, grading, paving, and underground construction during construction of the proposed project. Construction-related short-term noise levels would be higher than existing ambient noise levels in the project area today but would no longer occur once conversion of the project is completed.

Construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single-event noise-exposure potential causing intermittent noise nuisance (passing trucks at 50 feet would generate up to a maximum of 87 dBA L_{max} for a short period of time, usually seconds), the effect on longer-term (hourly or daily) ambient noise levels would be small after averaging with lower ambient noise in the absence of truck noise. Therefore, short-term construction-related impacts associated with worker commute and equipment transport to the project site would be less than significant.

The second type of short-term noise impact is related to noise generated during site preparation and onsite 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. **Table 5** lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 feet between the equipment and a noise receptor, taken from the FHWA Roadway Construction Noise Model (RCNM) (FHWA 2006). It should be noted that not all of the equipment on the list would be used for the project construction.

TABLE 5
RCNM DEFAULT NOISE EMISSION REFERENCE LEVELS AND USAGE FACTORS

Equipment Description	Impact Device?	Acoustical Usage Factor	Spec. 721.560 L_{max} at 50 Feet (dBA, slow)	Actual Measured L_{max} at 50 Feet (dBA, slow)	Number of Actual Data Samples (Count)
All other equipment >5 HP	No	50	85	N/A	0
Auger drill rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar bender	No	20	80	N/A	0
Blasting	Yes	N/A	94	N/A	0
Boring jack power unit	No	50	80	83	1
Chain saw	No	20	85	84	46
Clam shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete batch plant	No	15	83	N/A	0
Concrete mixer truck	No	40	85	79	40
Concrete pump truck	No	20	82	81	30
Concrete saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill rig truck	No	20	84	79	22
Drum mixer	No	50	80	80	1
Dump truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flatbed truck	No	40	84	74	4
Frontend loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25 kVA, variable-message signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	N/A	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal boring hydraulic jack	No	25	80	82	6
Hydra break ram	Yes	10	90	N/A	0
Impact derive	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man lift	No	20	85	75	23
Mounted impact hammer (hoe ram)	Yes	20	90	90	212
Pavement scarifier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup truck	No	40	55	75	1

TABLE 5 (CONTINUED)
RCNM DEFAULT NOISE EMISSION REFERENCE LEVELS AND USAGE FACTORS

Equipment Description	Impact Device?	Acoustical Usage Factor	Spec. 721.560 L_{max} at 50 Feet (dBA, slow)	Actual Measured L_{max} at 50 Feet (dBA, slow)	Number of Actual Data Samples (Count)
Pneumatic tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator unit	No	100	82	73	3
Rivet buster/chipping gun	Yes	20	85	79	19
Rock drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand blasting (single nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Sheers (on backhoe)	No	40	85	96	5
Slurry plant	No	100	78	78	1
Slurry trench machine	No	50	82	80	75
Soil mix drill rig	No	50	80	N/A	0
Tractor	No	40	84	N/A	0
Vacuum excavator (vac-truck)	No	40	85	85	149
Vacuum street sweeper	No	10	80	82	19
Ventilation fan	No	100	85	79	13
Vibrating hopper	No	50	85	87	1
Vibratory concrete mixer	No	20	80	80	1
Vibratory pile driver	No	20	95	101	44
Warning horn	No	5	85	83	12
Welder/torch	No	40	73	74	5

SOURCE: Federal Highway Administration, *Highway Construction Noise Handbook* (2006), Table 9.1.
dBA = A-weighted decibels; HP = horsepower; N/A = not applicable

Construction Phasing

The overall construction for this project will be four (4) years and four (4) months. The initial construction phase will consist of 16 months of "horizontal" work (e.g., grading, bank stabilization, utilities, master developer improvements, etc.), which will be followed by 18 months to construction senior living facility (work on the other residential buildings occurring at the same time) and initial construction of the apartments. The senior living facility will be occupied for about 18 months while construction continues on the additional residential (and commercial) buildings. Building construction adjacent to the senior living facility will occur first such that the later 12 months of construction will occur to the south with at least partially construction buildings in between. While the senior facility will be exposed to 18 months of construction in areas adjacent to the Senior Facility on the Project Site, the apartment structures will be in place at the north end and offer shielding for construction noise from the north.

Project construction will constitute 8 phases, as shown in **Table 6**. Individual pieces of heavy-duty off-road construction equipment that would be used for construction of the Project would generate maximum noise levels of 73 dBA to 90 dBA Lmax at a reference distance of 50 feet from the noise source, as shown in Table 5. The construction equipment noise levels at a distance of 50 feet (Referenced Maximum Noise Levels) are based on the FHWA RCNM User's Guide,[16] which is a technical report containing actual measured noise data for construction equipment. 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. While the operating cycles may involve 1 or 2 minutes of full power operation (generating the maximum sound levels identified in Table 2-6-1), the equipment would be moving around and would not stay at a specific location for the entire cycle. Therefore, adjacent receivers would be exposed to the maximum noise level intermittently rather than continuously.

TABLE 6
CONSTRUCTION PHASING[a]

Phase	Description
Phase 1	Demolition
Phase 2	Site preparation
Phase 3	Grading/Excavation
Phase 4	Drainage/Utilities/Sub-grade
Phase 5	Foundation/Concrete Pour
Phase 6	Building Construction
Phase 7	Paving
Phase 8	Architectural Coating

[a] Based on CalEEMod and construction information provided by the client.
SOURCE: Client and ESA 2021

The area surrounding the Project Site includes residential uses to the north and east; I-5 to the west; and a small commercial area to the south. Existing noise sensitive uses (residences) in the immediate vicinity include:

- To the north: 330 feet or more
- To the east: 130 feet or more

As stated previously, sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source, such as highway traffic or railroad operations, the sound decreases 3 dBA for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases 4.5 dBA for each doubling of distance. Each of these existing residential uses are located 100 feet (-6 dBA relative to the noise level at 50 feet) or more from the project site boundary.

[16] FHWA, Roadway Construction Noise Model, 2006.

Construction noise is temporary and will cease to occur after completion of the project construction. It is considered best practice that all construction, maintenance, or demolition activities within the City's boundary be limited to the hours between 7 a.m. and 7 p.m., Monday through Friday and Saturday. No construction work should occur on Sundays and federal holidays.

The Project Site is located near a residential neighborhood, with residential homes on the north and east sides of the project site. **Table 7** lists the estimated construction noise levels at the representative off-site sensitive uses to the east and north of the project site where the nearest noise-sensitive receivers are located. As shown in Table 7, Project construction would result in all these off-site sensitive receivers to experience up to 89 dBA Leq with overlapping construction phases on the Project site. **Figure 4** shows these off-site noise modeling locations. Construction noise modeling is included in **Appendix C**.

TABLE 7
ESTIMATED CONSTRUCTION NOISE LEVELS AT EXISTING OFF-SITE SENSITIVE RECEPTORS

Noise Sensitive Receptor	Construction Phases	Distance between Nearest Receptor and Construction Site, feet	Estimated Construction Noise Levels at Noise Sensitive Receptor by Construction Phase, a Hourly Leq (dBA)
R1 Existing residences to the north of the project site, along Hawkbryn Avenue near Wiley Canyon Road	Demolition	50 to 600 feet	83
	Site preparation		83
	Grading/Excavation		79
	Drainage/Utilities/Sub-grade		80
	Foundation/Concrete Pour		83
	Building Construction		83
	Paving		75
	Architectural Coating		73
	Maximum Overlap Noise		**86.3**
R2 Existing residences to the northeast of the project site, along Old Wiley Canyon Road on the east side of Wiley Canyon Road	Demolition	50 to 800 feet	71
	Site preparation		70
	Grading/Excavation		71
	Drainage/Utilities/Sub-grade		68
	Foundation/Concrete Pour		70
	Building Construction		70
	Paving		66
	Architectural Coating		61
	Maximum Overlap Noise		**73.7**
R3 Existing residences to the east of the project site, along Wiley Canyon Road near Fourl Road	Demolition	100 to 600 feet	78
	Site preparation		77
	Grading/Excavation		76
	Drainage/Utilities/Sub-grade		74
	Foundation/Concrete Pour		77
	Building Construction		77
	Paving		71
	Architectural Coating		68
	Maximum Overlap Noise		**80.8**

TABLE 7
ESTIMATED CONSTRUCTION NOISE LEVELS AT EXISTING OFF-SITE SENSITIVE RECEPTORS

Noise Sensitive Receptor	Construction Phases	Distance between Nearest Receptor and Construction Site, feet	Estimated Construction Noise Levels at Noise Sensitive Receptor by Construction Phase, a Hourly Leq (dBA)
R4 Existing residences to the southeast of the project site, along Wiley Canyon Road near Canerwell Street	Demolition	100 to 800 feet	78
	Site preparation		77
	Grading/Excavation		76
	Drainage/Utilities/Sub-grade		77
	Foundation/Concrete Pour		74
	Building Construction		77
	Paving		70
	Architectural Coating		67
	Maximum Overlap Noise		**80.8**
R5 Existing residences to the south of the project site, along Calgrove Boulevard near La Salle Canyon Drive	Demolition	300 to 1,200 feet	70
	Site preparation		68
	Grading/Excavation		69
	Drainage/Utilities/Sub-grade		66
	Foundation/Concrete Pour		69
	Building Construction		68
	Paving		63
	Architectural Coating		59
	Maximum Overlap Noise		**72.1**

[a] Estimated construction noise levels represent the worst-case condition when noise generators are located closest to the receptors and are expected to last the entire duration of each construction phase.

SOURCE: ESA, 2022.

Construction on the project site would expose the nearest noise-sensitive uses in the project vicinity to noise levels reaching up to 89 dBA Leq over a period of one hour for the existing residences to the north, northeast, east, and southeast in the project vicinity. During other construction phases, noise associated with on-site activity would be lower than those during the grading period.

Pursuant to the City's Municipal Code Section 11.44.080, no person may engage in any construction work that requires a building permit from the City on sites within 300 feet of a residentially zoned property, except between the hours of 7:00 AM and 7:00 PM, Monday through Friday, and 8:00 AM and 6:00 PM on Saturday. No work may be performed on the following public holidays: New Year's Day, Independence Day, Thanksgiving, Christmas Day, Memorial Day, and Labor Day. The City of Santa Clarita Public Works Department may issue a permit for work to be done "after hours" provided that containment of construction noises is provided.

During the City's permitted construction hours, Project construction would result in noise levels at adjacent sensitive receiver locations to exceed the ambient noise (57.7 to 70 dBA Leq) plus 5 dBA (62.7 to 77 dBA Leq). Therefore, in order to minimize potential noise impacts, mitigation measures such as stand-alone construction noise barriers, are recommended.

Temporary mitigation measure will limit construction equipment within 200 feet of the northern and eastern boundary of the project site to small, reduced-noise equipment. Temporary construction noise barriers with sufficient height to block the line-of-sight between the project construction area and adjacent sensitive receiver are recommended during project construction. However, compliance with the City's Municipal Code Section 11.44.080 will allow the project to be in conformance with required noise construction restrictions.

Because construction noise is temporary and will cease to occur after completion of the project construction, exceptions to the City's standards in its Municipal Code may be requested for construction-related events, which would be considered by the City's Director of Building and Safety.

Potential Later Phase Construction Noise Impacts on Residential Uses Constructed and Occupied in Earlier Phases

The senior living facility will be occupied for about 18 months while construction continues on the additional residential (and commercial) buildings. Based on the preliminary site plan, the Senior Living building is approximately 50 feet from the construction area of other residential buildings. Once these nearest residential buildings have been constructed, they will function as barrier shielding for construction activity in areas beyond these residential buildings nearest to the Senior Living building. Based on Table 7, construction noise would reach a maximum of 88.8 dBA Leq at a receiver as close as 50 feet to the construction area. Therefore, mitigation measures recommended for R1 and R2 would be applicable to the Senior Living residences during the later phases construction when the residential buildings nearest to the Senior Living building are be constructed.

2.6.2 Project Operations

This section describes the activities relating to operation of the Proposed Project; including project-related vehicular traffic and any onsite noise-generating equipment and activity.

Traffic Noise Impacts on Off-Site Land Uses

To characterize the project area's future day/night noise environment, the noise levels attributed to future traffic volumes on local roadways were estimated using a spreadsheet model developed based on the methodologies provided in FHWA Traffic Noise Model (TNM) Technical Manual.[17] In addition, the Caltrans Technical Noise Supplement (TeNS) document states that the peak hour traffic noise level would be equivalent to the L_{dn} level based on the assumptions of (1) the peak hour traffic volume would be 10 percent of the average daily traffic volume, and (2) the split of daytime and nighttime average daily traffic volume is 85/15 percent.[18] Further, the CNEL level would be 0.3 dBA higher than L_{dn} level based on the assumption of 80 percent in daytime and 5 percent in evening time.

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[17] FHWA, *Federal Highway Administration's Traffic Noise Model, Version 1.0 Technical Manual* (February 1998). https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/old_versions/tnm_version_10/tech_manual/index.cfm.

[18] California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (September 2013). http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf.

Table 8 lists the existing baseline traffic noise levels. **Table 9** lists the existing baseline plus project traffic noise levels. Adding the Project traffic to the existing conditions would result in changes in the traffic noise levels from no measurable change compared to the corresponding baseline traffic noise level along most of the roadway segments analyzed, except along The Old Road between Pico Canyon Road and Calgrove Boulevard (1.3 dBA increase). The existing baseline plus project traffic noise levels along these roadway segments would have noise level changes less than the 3 dBA increase normally considered to have potentially significant noise impact and would not have any project-related traffic noise impacts. Therefore, no significant traffic noise impact under the existing plus project scenario would occur from the implementation of the Project. Traffic noise modeling is included in **Appendix D**.

TABLE 8
EXISTING BASELINE ROADWAY NOISE LEVELS

Roadway Segment	Traffic Noise Levels (dBA CNEL) Existing (2021)[a]
Calgrove Boulevard e/o The Old Road	69.2
Calgrove Boulevard s/o The Old Road	74.6
Pico Canyon Road e/o The Old Road	69.7
Pico Canyon Road w/o The Old Road	70.4
The Old Road between Pico Canyon Road and Calgrove Boulevard	71.3
The Old Road n/o Pico Canyon Road	70.3

SOURCE: ESA 2021
NOTES:
Decibel levels were calculated at a distance of 30 feet from the roadway centerline.
[a] Traffic study prepared for the proposed project identified 2020 traffic volumes as existing conditions.

TABLE 9
EXISTING ROADWAY WITH PROJECT NOISE LEVELS

	Traffic Noise Levels (dBA CNEL)			
Roadway Segment	Existing (2021)[a]	Existing (2021) with Project	Increase over Existing	Significant Increase?[b]
Calgrove Boulevard e/o The Old Road	69.2	69.6	0.4	No
Calgrove Boulevard s/o The Old Road	74.6	74.7	0.0	No
Pico Canyon Road e/o The Old Road	69.7	69.8	0.0	No
Pico Canyon Road w/o The Old Road	70.4	70.5	0.1	No
The Old Road between Pico Canyon Road and Calgrove Boulevard	71.3	72.6	1.3	No
The Old Road n/o Pico Canyon Road	70.3	70.5	0.3	No

SOURCE: ESA 2021
NOTES:
Decibel levels were calculated at a distance of 30 feet from the roadway centerline.
[a] Traffic study prepared for the proposed project identified 2021 traffic volumes as existing conditions.
[b] Threshold used for significant increase is 3 dBA.

Table 10 lists the future baseline plus project traffic noise levels. Adding the Project traffic to the future conditions would result in changes in the traffic noise levels from no measurable change compared to the corresponding baseline traffic noise level along most of the roadway segments analyzed, except The Old Road between Pico Canyon Road and Calgrove Boulevard (1.6 dBA increase). The future baseline plus project traffic noise levels along these roadway segments would have noise level changes less than the 3 dBA increase normally considered to have potentially significant noise impact and would not have any project-related traffic noise impacts. Therefore, no significant traffic noise impact would occur from the implementation of the Project.

Table 11 lists the cumulative baseline plus project traffic noise levels. Adding the Project traffic to the cumulative conditions would result in changes in the traffic noise levels from no measurable change compared to the corresponding baseline traffic noise level along most of the roadway segments analyzed, except along The Old Road between Pico Canyon Road and Calgrove Boulevard (1.6 dBA increase). The cumulative baseline plus project traffic noise levels along these roadway segments would have noise level changes less than the 3 dBA increase normally considered to have potentially significant noise impact and would not have any project-related traffic noise impacts. Therefore, no significant traffic noise impact would occur from the implementation of the Project.

TABLE 10
FUTURE ROADWAY WITH PROJECT NOISE LEVELS

	Traffic Noise Levels (dBA CNEL)			
Roadway Segment	**Future (2029)[a]**	**Future (2029) with Project**	**Increase over Existing**	**Significant Increase?[b]**
Calgrove Boulevard e/o The Old Road	69.2	69.6	0.4	No
Calgrove Boulevard s/o The Old Road	74.7	74.7	0.0	No
Pico Canyon Road e/o The Old Road	69.8	69.8	0.0	No
Pico Canyon Road w/o The Old Road	70.4	70.5	0.1	No
The Old Road between Pico Canyon Road and Calgrove Boulevard	71.3	72.9	1.6	No
The Old Road n/o Pico Canyon Road	70.3	70.5	0.3	No

SOURCE: ESA 2021

NOTES:

Decibel levels were calculated at a distance of 30 feet from the roadway centerline.

[a] Traffic study prepared for the proposed project identified 2029 traffic volumes as future conditions.

[b] Threshold used for significant increase is 3 dBA.

TABLE 11
CUMULATIVE ROADWAY WITH PROJECT NOISE LEVELS

Roadway Segment	Traffic Noise Levels (dBA CNEL) Existing (2021)[a]	Future (2029) with Project	Increase over Existing	Significant Increase?[b]
Calgrove Boulevard e/o The Old Road	69.2	69.6	0.4	No
Calgrove Boulevard s/o The Old Road	74.6	74.7	0.0	No
Pico Canyon Road e/o The Old Road	69.7	69.8	0.0	No
Pico Canyon Road w/o The Old Road	70.4	70.5	0.1	No
The Old Road between Pico Canyon Road and Calgrove Boulevard	71.3	72.9	1.6	No
The Old Road n/o Pico Canyon Road	70.3	70.5	0.3	No

SOURCE: ESA 2021

NOTES:

Decibel levels were calculated at a distance of 30 feet from the roadway centerline.

a Traffic study prepared for the proposed project identified 2020 traffic volumes as existing conditions and 2029 as future conditions.

b Threshold used for significant increase is 3 dBA.

On-site Noise Generating Activity on Off-Site Land Uses

Fixed Mechanical Equipment Noise

The regular testing and maintenance of mechanical equipment such as emergency generators may generate audible noise levels. Generators may result in a noise level of 81 dBA at a distance of 50 feet. The City's Municipal Code noise ordinance established a noise standard of 65 dBA during daytime and 55 dBA during nighttime for residential uses. The closest offsite sensitive is located 130 feet away to the east of the Project Site, which would receive a noise reduction of 8 dBA by distance attenuation alone compared to the noise level measured at 50 feet from the noise source. There is also noise reduction provided by intervening buildings/structures between the receivers to the east and where the emergency generators are located at the Project Site, which would provide additional (10 dBA or more) noise attenuation. Mechanical equipment such as emergency generators that would be fully shielded from nearby noise sensitive uses would avoid conflicts with adjacent uses and would not result in audible increases in noise levels. Noise associated with emergency generators would be reduced by 18 dBA or more to 63 dBA when compared to the noise level measured at 50 feet from the noise source. This range of noise levels is below the City's 65 dBA threshold for daytime hours. Impacts related to mechanical equipment noise would be less than significant and no mitigation measures are required.

Parking Area Noise

Onsite parking would be provided by surface parking. These parking areas would not be enclosed and would potentially expose off-site uses to parking related noise. Typical noise levels in a parking area with slow-moving vehicles and engine start noise would range between 60 and 65 dBA at a distance of 50 feet. The closest offsite sensitive is located 130 feet away to the east of the Project Site, which would receive a noise reduction of 8 dBA by distance attenuation alone. There is also potential noise reduction provided by intervening buildings/structures between the receivers and the Project Site, which would provide additional (5 dBA or more) noise attenuation.

As such, noise associated with parking lot would be reduced by 13 dBA or more to 47 to 52 dBA compared to the noise level measured at 50 feet from the noise source. This range of noise levels is lower than the City's 65 dBA threshold during daytime hours and 55 dBA during the nighttime hours, and impacts would be less than significant. No mitigation measures are required.

Heating, Ventilation, and Air-Conditioning Systems

The HVAC systems for maintaining comfortable temperatures buildings developed under the proposed Project would consist largely of packaged air conditioning systems. The precise locations of HVAC systems are unknown at this time. Possible HVAC system locations would include street level and rooftops. HVAC units can generate noise levels of approximately 51 dBA L_{eq} at a reference distance of 100 feet from the operating units during maximum heating or air conditioning operations.[19]

The closest offsite sensitive is located 130 feet away to the east of the Project Site, which would receive a noise reduction of 2 dBA by distance attenuation alone when compared to the noise level measured at 100 feet from the noise source. There is also potential noise reduction provided by intervening buildings/structures between the receivers and the Project Site, which would provide additional (10 dBA or more) noise attenuation. As such, noise associated with HVAC would be reduced by 7 dBA or more to 44 dBA Leq or lower, and impacts would be less than significant. No mitigation measures are required.

2.7 Noise Mitigation Measures

2.7.1 Project Construction

The following mitigation measure would be necessary for the proposed project during construction to minimize construction noise at sensitive receptors at adjacent off-site sensitive receiver locations, and for the Senior Living building during the later phases of construction on-site after the Senior Living building has been constructed and occupied:

NO-1: Temporary mitigation measure shall limit construction equipment within 200 feet of the northern and eastern boundary of the project site, to small, reduced noise equipment that has a maximum noise generation level of 77 dBA Leq at 50 feet. This measure also applies to construction equipment during the later phases of construction for residential buildings within 200 feet of the Senior Living Building after it is occupied.

NO-2: Temporary construction noise barriers with sufficient height to block the line-of-sight between the project construction area and adjacent sensitive receivers, including proposed on-site residential uses that are completed and occupied while construction in other parts of the Project Site continues, are recommended during project construction.

2.7.2 Project Operations

No mitigation measures would be necessary for project operation on off-site land uses.

[19] Puron, 2005. *48PG03-28 Product Data*. p. 10 – 11.

3.0 Vibration Impact Study

3.1 Fundamentals of Vibration

Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors. The motion may be discernible outdoors, but without the effects associated with the shaking of a building, there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as the motion of building surfaces, the rattling of items moving on shelves or hanging on walls, or as a low-frequency rumbling noise. The rumbling noise is caused by the vibrating walls, floors, and ceilings that are radiating sound waves. However, building damage is not a factor for normal transportation projects, except for occasional blasting and pile driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 VdB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of groundborne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earth-moving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with groundborne vibration and noise from these sources are usually localized to areas within approximately 100 feet of the vibration source, although there are examples of groundborne vibration causing interference out to distances greater than 200 feet (FTA 2006). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed, for most projects, that the roadway surface will be smooth enough that groundborne vibration from street traffic will not exceed the impact criteria; however, construction of the project could result in groundborne vibration that could be perceptible and annoying. Groundborne noise is not likely to be a problem as noise arriving via the normal airborne path usually will be greater than groundborne noise.

Groundborne vibration has the potential to disturb people as well as to damage buildings. Although it is very rare for mobile source-induced groundborne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and the pile driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2006). Groundborne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). RMS is best for characterizing human response to building vibration, and PPV is used to characterize potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

$$L_v = 20 \log_{10} [V/V_{ref}]$$

where L_v is the VdB, "V" is the RMS velocity amplitude, and "V_{ref}" is the reference velocity amplitude, or $1x10^{-6}$ inches per second (inch/sec) used in the United States. **Table 12** illustrates human response to various vibration levels, as described in the *Transit Noise and Vibration Impact Assessment* (FTA 2006).

Factors that influence groundborne vibration and noise include the following:

- **Vibration Source:** Vehicle/equipment suspension, wheel types and condition, track/roadway surface, track support system, speed, transit structure, 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 the factors listed above, 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 to bedrock.

TABLE 12
HUMAN RESPONSE TO DIFFERENT LEVELS OF GROUNDBORNE NOISE AND VIBRATION

Vibration Velocity Level (VdB)	Noise Level (dBA)		Human Response
	Low Frequency[a]	Mid Frequency[b]	
65	25	40	Approximate threshold of perception for many humans. Low-frequency sound usually inaudible, mid-frequency sound excessive for quiet sleeping areas.
75	35	50	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying. Low-frequency noise acceptable for sleeping areas, mid-frequency noise annoying in most quiet occupied areas.
85	45	60	Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise annoying for sleeping areas, mid-frequency noise annoying even for infrequent events with institutional land uses such as schools and churches.

SOURCE: Federal Transit Administration. Table 7-1, *Transit Noise and Vibration Impact Assessment* (2006).
NOTES:
VdB = vibration velocity decibels; dBA = A-weighted decibels
[a] Approximate noise level when vibration spectrum peak is near 30 Hz.
[b] Approximate noise level when vibration spectrum peak is near 60 Hz.

Experience with groundborne vibration shows that 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, resulting in groundborne vibration problems at large distance from the source. Factors such as layering of the soil and depth to 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.

3.1.1 Thresholds of Significance for Vibration

Federal Transit Administration and California Department of Transportation

The criteria for environmental impact from groundborne vibration are based on the maximum levels for a single event. **Table 13** lists the potential vibration damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment* (FTA 2006).

TABLE 13
CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category	PPV (inch/sec)	Approximate L_V[a]
Reinforced-concrete, steel or timber (no plaster)	0.50	102
Engineered concrete and masonry (no plaster)	0.30	98
Non-engineered timber and masonry buildings	0.20	94
Buildings extremely susceptible to vibration damage	0.12	90

SOURCE: Federal Transit Administration. Table 12-3, *Transit Noise and Vibration Impact Assessment* (2018).
NOTES:
PPV = peak particle velocity; L_V = velocity in decibels; inch/sec = inches per second
[a] Root-mean-square velocity in decibels (VdB) re 1 microinch per second.

FTA guidelines show that a vibration level of up to 102 VdB (equivalent to 0.5 inch/sec in RMS) (FTA 2006) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 inch/sec in RMS). The RMS values for building damage thresholds referenced above are shown in **Table 14**, which is taken from the *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013).

TABLE 14
GUIDELINE VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA

	Maximum PPV (inch/sec)	
Structure and Condition	Transient Sources[a]	Continuous/Frequent Intermittent Sources[b]
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.20	0.10
Historic and some old buildings	0.50	0.25
Older residential structures	0.50	0.30
New residential structures	1.00	0.50
Modern industrial/commercial buildings	2.00	0.50

SOURCE: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual* (2013), Table 19.
NOTES:
PPV = peak particle velocity; inch/sec = inches per second
[a] Transient sources create a single, isolated vibration event, such as blasting or drop balls.
[b] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Based on Table 8-3 in the FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006), interpretation of vibration criteria for detailed analysis is 78 VdB for residential uses during daytime hours. During nighttime hours, the vibration criterion is 72 VdB. For office and office buildings, the FTA guidelines suggest that a vibration level of 84 VdB should be used for detailed analysis.

City of Santa Clarita

The City has not adopted a vibration criteria limit.

3.1.2 Construction Vibration Impacts

Because vibration level in RMS is best for characterizing human response to building vibration and vibration level in PPV is best used to characterize potential for damage, this construction vibration impact analysis will discuss the human annoyance using vibration levels in VdB and will assess the potential for building damages using vibration levels in PPV (inch/sec).

Outdoor site preparation for the proposed project is expected to use a bulldozer, loader, a water truck, a concrete truck, and a forklift. It is anticipated that the greatest levels of vibration would occur during the site preparation phase. All other phases are expected to result in lower vibration levels.

Vibration level (VdB) attenuation through soil is represented by the following equation:

$$L_{VdB}(D) = L_{VdB}(25 \text{ feet}) - 30 \log(D/25)$$

Where D is the distance between the vibration source and the receiver. LvdB (25 feet) is the source vibration level measured at 25 feet. A vibration level at 50 feet is 9 VdB lower than the vibration level at 25 feet.

Existing noise sensitive uses in the immediate vicinity include residential uses to the north and east of the project site, with the closest residences approximately 200 feet from the project boundary. Vibration at 200 feet from the source is 27 VdB lower than the vibration level at 25 feet.

Because vibration impacts occur normally within the buildings, the distance to the nearest sensitive uses, for vibration impact analysis purposes, is measured between the nearest off-site sensitive use buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary). The project site contains shallow hard bedrock that needs to be ripped off by large bulldozers. Bulldozers and other heavy-tracked construction equipment generate approximately 87 VdB of groundborne vibration when measured at 25 feet, based on the *Transit Noise and Vibration Impact Assessment* (FTA 2006). This level of groundborne vibration exceeds the threshold of human perception, which is around 65 VdB. Although this range of groundborne vibration levels would result in potential annoyance to residential buildings adjacent to the project site, they would not cause any damage to the buildings. Construction vibration, similar to vibration from other sources, would not have any significant effects on outdoor activities (e.g., those outside the residential buildings in the project vicinity). As shown in Table 13, FTA guidelines show that a vibration level of up to 102 VdB (an equivalent to 0.5 inch/sec in RMS) (FTA 2006) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 inch/sec in RMS). The RMS values for building damage thresholds referenced in **Table 15** were taken from the *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013). Table 14 further shows the PPV values at 25 feet from the construction vibration source as well as vibration levels in terms of VdB at 25 feet from the construction vibration source.

TABLE 15
VIBRATION SOURCE AMPLITUDES FOR CONSTRUCTION EQUIPMENT

	Reference PPV/L_V at 25 Feet	
Equipment	**PPV (inch/sec)**	**L_V (VdB)**
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Earth Mover	0.011	69
Excavator	0.047	81
Fork Lift	0.047	81
Skid Steer	0.047	81
Wheel Loader	0.076	86
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

SOURCE: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment* (2006), Table 12-2.
NOTES:
PPV = peak particle velocity; L_V = velocity in decibels; inch/sec = inches per second; VdB = vibration velocity decibels

Construction Vibration Structural Damages

The closest residential buildings adjacent to the project site are approximately 200 feet from the nearest construction area on the project site. Based on Table 13 and Table 3-3, it would take a vibration PPV level of more than 0.2 inch/sec (or 94 VdB) or 0.5 inch/sec (or 102 VdB) to potentially result in any building damages. The project site contains shallow hard bedrock that needs to be ripped off by heavy bulldozers. Table 14 shows that none of the construction activities anticipated on the project site, including large bulldozers, would result in a vibration level that would reach 0.5 inch/sec PPV (or 102 VdB) at 25 feet from each of the project construction equipment and/or activities. At 200 feet, the vibration level would be reduced by 27 VdB. Even under the condition that the site contains shallow hard bedrock that may affect the distance attenuation of the vibration sources, the vibration level from large bulldozer would be lower than the 87 VdB measured at 25 feet. It would definitely be lower than the vibration damage threshold of 94 VdB even if no vibration attenuation is achieved through the shallow hard bedrock on the project site. Other off-site buildings are farther away from the project site and would be exposed to even lower construction vibration levels. Therefore, no building damages would occur as a result of the project construction.

Construction Vibration Human Annoyance

As previously stated, vibration level (VdB) attenuation through soil is represented by the following equation:

$$LvdB (D) = LvdB (25 feet) – 30 Log (D/25)$$

Where D is the distance between the vibration source and the receiver. LvdB (25 feet) is the source vibration level measured at 25 feet. A vibration level at 50 feet is 9 VdB lower than the vibration level at 25 feet. Vibration at 200 feet from the source is 27 VdB lower than the vibration level at 25 feet. Therefore, receptors at 200 feet from the construction activity may be exposed to groundborne vibration up to 60 VdB.

Table 16 lists the projected vibration level from various construction equipment expected to be used on the project site to the sensitive uses in the project vicinity. For the project construction activity, the equipment with the highest vibration generation potential is the large bulldozer, which would generate 87 VdB at 25 feet. With the vibration attenuation through distance divergence, the vibration from project construction would be reduced by 18 VdB at the nearest residential buildings adjacent to the project site that are at least 100 feet from the project boundary. The highest construction vibration levels at residential buildings adjacent to the project site would be 60 VdB or lower. Even under the condition that the site contains shallow hard bedrock that may affect the distance attenuation of the vibration sources, the vibration level from large bulldozer would be lower than the 87 VdB measured at 25 feet, even if no vibration attenuation is achieved through the shallow hard bedrock on the project site.

TABLE 16
SUMMARY OF CONSTRUCTION EQUIPMENT AND ACTIVITY VIBRATION

	Vibration Level (VdB)			
Equipment/Activity	**At 25 Feet**	**Distance Attenuation**	**Intervening Canal[a]**	**Maximum Vibration Level**
Residences to the East (200 feet)				
Large dozers, front end loaders, grader, backhoe[b]	87	27	0	60
Loaded trucks	86	27	0	59
Jackhammers, forklift	79	27	0	52

SOURCE: Compiled by ESA (2021).

NOTES:

The FTA recommended building damage threshold is 0.2 inch/sec or approximately 94 VdB at the receiving property structure or building.

[a] No intervening structure that would provide a damping effect on vibration.

[b] Large bulldozer represents the construction equipment with the highest vibration potential that would be used on site. Other equipment would result in a lower vibration when compared to that of large bulldozers.

This range of vibration levels from construction equipment or activity would be below the FTA threshold of 94 VdB (or 0.2 inch/sec PPV) for building damage. No significant construction vibration impacts would occur; therefore, no mitigation measures are required.

As shown in Table 3-5, all construction equipment vibration levels would not exceed the FTA's 78 VdB threshold at the nearest noise-sensitive receiver locations during daytime hours or the FTA's 84 VdB threshold for annoyance of occupants in residential buildings.

Summary of Construction Vibration Impacts

The project site contains shallow hard bedrock that needs to be ripped off by heavy bulldozers. Table 3-5 lists the maximum vibration levels that would result from the on-site construction equipment. The projected maximum construction vibration level during project construction at the nearest noise-sensitive receiver locations would not exceed the FTA's vibration standards of 78 VdB for sensitive uses (residences) or the FTA's 84 VdB threshold for commercial/industrial office buildings. No significant construction vibration impacts would occur.

Mitigation Measures for Construction Vibration Impacts

No mitigation measures for vibration impacts are required during project construction.

3.1.3 Operation Vibration Impacts

The project proposes residential uses that would not generate any substantial ground vibration. No operational vibration impacts would occur.

3.2 Vibration Mitigation Measures

3.2.1 Project Construction

With implementation of the Project Design Features, no vibration mitigation measures would be necessary for the proposed project during construction.

3.2.2 Project Operations

No vibration mitigation measures would be necessary for project operation.

3.3 Summary of Vibration Impact Analysis Results

Operation of the project would not expose persons to, or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies with the implementation of the project design features. Therefore, operation vibration impacts would be less than significant.

4.0 References

California Code of Regulations, Title 14, Section 15168(c).

California Department of Transportation, *Technical Noise Supplement* (TeNS), September 2013.

City of Santa Clarita, Noise Element and Municipal Code.

Federal Highway Administration, *Roadway Construction Noise Model User's Guide*, 2006.

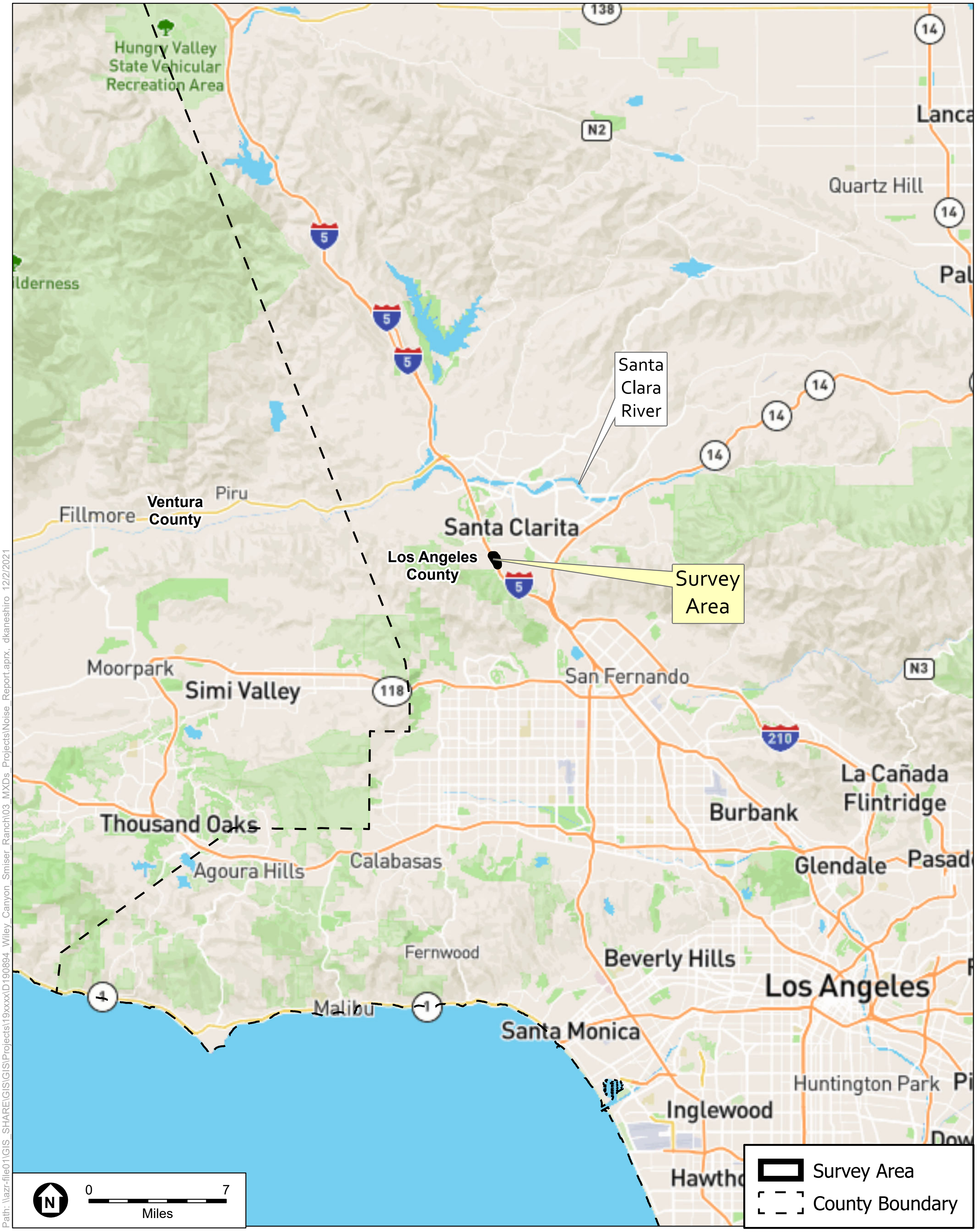
FTA, *Transit Noise and Vibration Impact Assessment*, May 2006.

Traffic Impact Study, October 2021.

USEPA, *EPA Identifies Noise Levels Affecting Health and Welfare*, April 1974.

USEPA, Protective Noise Levels, Condensed Version of EPA Levels Document (EPA 550/9-79-100, November 1978).

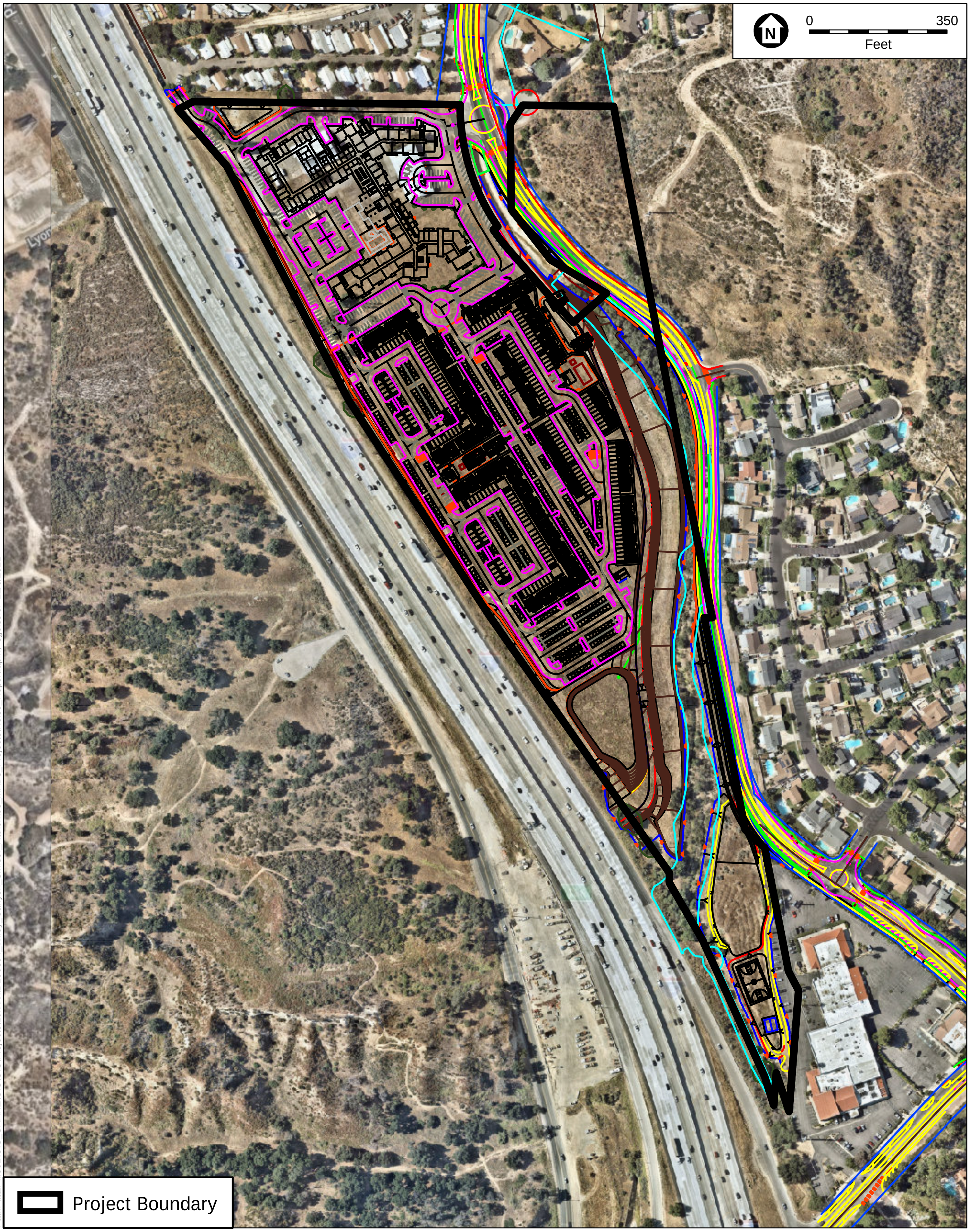
Appendix A
Project Figures



SOURCE: Open Street Map; ESA, 2019.

Wiley Canyon (Smiser Ranch) Mixed Use Project

Figure 1
Regional Project Location Map

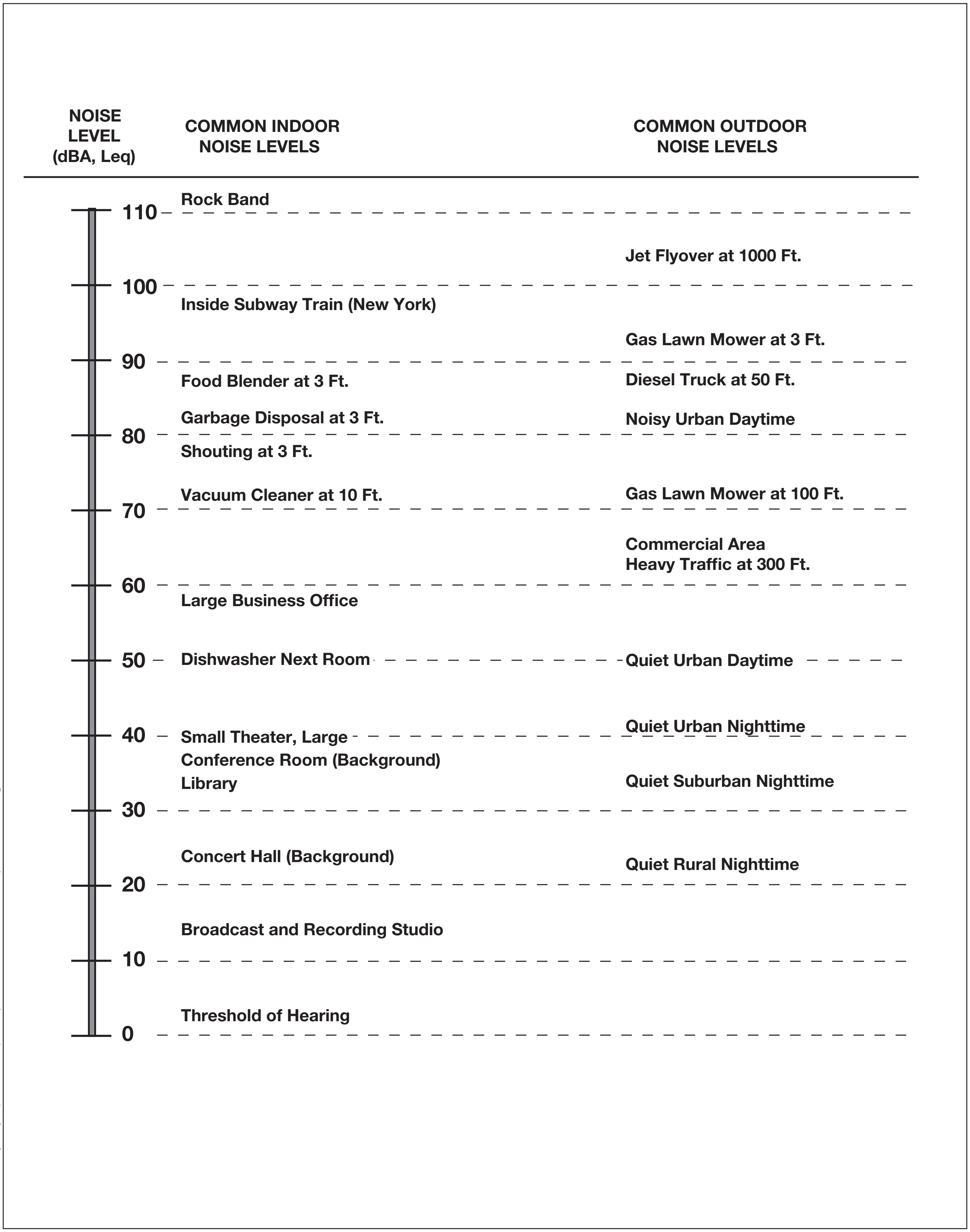


SOURCE: NearMap; ESA, 2020.

Wiley Canyon (Smiser Ranch) Mixed Use Project

Figure 2
Project Layout Plan

ESA



SOURCE: State of California, Department of Transportation (Caltrans), Technical Noise Supplement (TeNS). October 1998. Available: http://www.dot.ca.gov/hq/env/noise/pub/Technical Noise Supplement.pdf

Figure 3
Decibel Scale and Common Noise Sources

SOURCE: NearMap; ESA, 2020.

Wiley Canyon (Smiser Ranch) Mixed Use Project

Figure 4
Ambient Noise Monitoring and Construction Noise Modeling Locations

ESA

APPENDIX B

AMBIENT NOISE MEASUREMENT DATA

WILEY CANYON MIXED USE PROJECT

CITY OF SANTA CLARITA, CALIFORNIA

Summary

File Name on Meter	LxT_Data.077
File Name on PC	SLM_0005055_LxT_Data_077.02.ldbin
Serial Number	0005055
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	
Job Description	
Note	

Measurement

Description	
Start	2021-03-04 09:10:17
Stop	2021-03-04 09:25:17
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-05-14 15:30:12
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	Bin Max			
Overload	144.6 dB			
	A	**C**	**Z**	
Under Range Peak	**100.5**	97.5	102.5	dB
Under Range Limit	**37.7**	37.4	44.4	dB
Noise Floor	28.6	28.2	35.3	dB

Results

LASeq	70.0 dB	
LASE	99.5 dB	
EAS	989.839 µPa²h	
EAS8	31.675 mPa²h	
EAS40	158.374 mPa²h	
LApeak (max)	2021-03-04 09:15:59	94.2 dB
LASmax	2021-03-04 09:16:10	79.3 dB
LASmin	2021-03-04 09:21:26	63.1 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	75.5 dB	
LASeq	70.0 dB	
LCSeq - LASeq	5.5 dB	
LAIeq	71.0 dB	
LAeq	70.0 dB	
LAIeq - LAeq	1.0 dB	

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	70.0					
LS(max)	79.3	2021/03/04 9:16:10				
LS(min)	63.1	2021/03/04 9:21:26				
LPeak(max)	94.2	2021/03/04 9:15:59				

Summary

File Name on Meter	LxT_Data.079
File Name on PC	SLM_0005055_LxT_Data_079.01.ldbin
Serial Number	0005055
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	
Job Description	
Note	

Measurement

Description	
Start	2021-03-04 09:58:55
Stop	2021-03-04 10:13:55
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-05-14 15:30:12
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	Bin Max			
Overload	144.6 dB			
	A	**C**	**Z**	
Under Range Peak	**100.5**	97.5	102.5	dB
Under Range Limit	**37.7**	37.4	44.4	dB
Noise Floor	28.6	28.2	35.3	dB

Results

LASeq	66.1 dB	
LASE	95.7 dB	
EAS	408.978 µPa²h	
EAS8	13.087 mPa²h	
EAS40	65.436 mPa²h	
LApeak (max)	2021-03-04 10:02:09	96.3 dB
LASmax	2021-03-04 10:12:51	78.4 dB
LASmin	2021-03-04 10:13:55	51.1 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	71.1 dB	
LASeq	66.1 dB	
LCSeq - LASeq	5.0 dB	
LAIeq	68.0 dB	
LAeq	66.1 dB	
LAIeq - LAeq	1.9 dB	

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	66.1					
Ls(max)	78.4	2021/03/04 10:12:51				
Ls(min)	51.1	2021/03/04 10:13:55				
LPeak(max)	96.3	2021/03/04 10:02:09				

Summary

File Name on Meter	LxT_Data.075
File Name on PC	SLM_0005055_LxT_Data_075.02.ldbin
Serial Number	0005055
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	
Job Description	
Note	

Measurement

Description	
Start	2021-03-04 08:26:51
Stop	2021-03-04 08:41:51
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-05-14 15:30:12
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamp	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
OBA Range	Normal		
OBA Bandwidth	1/1 and 1/3		
OBA Freq. Weighting	A Weighting		
OBA Max Spectrum	Bin Max		
Overload	144.6 dB		
	A	**C**	**Z**
Under Range Peak	**100.5**	97.5	102.5 dB
Under Range Limit	**37.7**	37.4	44.4 dB
Noise Floor	28.6	28.2	35.3 dB

Results

LASeq	62.6 dB	
LASE	92.1 dB	
EAS	181.553 µPa²h	
EAS8	5.810 mPa²h	
EAS40	29.048 mPa²h	
LApeak (max)	2021-03-04 08:32:07	86.1 dB
LASmax	2021-03-04 08:35:22	70.7 dB
LASmin	2021-03-04 08:32:53	57.1 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	69.4 dB	
LASeq	62.6 dB	
LCSeq - LASeq	6.8 dB	
LAIeq	63.3 dB	
LAeq	62.6 dB	
LAIeq - LAeq	0.7 dB	

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	62.6					
LS(max)	70.7	2021/03/04 8:35:22				
LS(min)	57.1	2021/03/04 8:32:53				
LPeak(max)	86.1	2021/03/04 8:32:07				

Summary

File Name on Meter	LxT_Data.076
File Name on PC	SLM_0005055_LxT_Data_076.02.ldbin
Serial Number	0005055
Model	SoundTrack LxT®
Firmware Version	2.402
User	
Location	
Job Description	
Note	

Measurement

Description	
Start	2021-03-04 08:49:07
Stop	2021-03-04 09:04:07
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	2020-05-14 15:30:12
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	Bin Max			
Overload	144.6 dB			
	A	**C**	**Z**	
Under Range Peak	**100.5**	97.5	102.5	dB
Under Range Limit	**37.7**	37.4	44.4	dB
Noise Floor	28.6	28.2	35.3	dB

Results

LASeq	67.2 dB	
LASE	96.7 dB	
EAS	521.563 µPa²h	
EAS8	16.690 mPa²h	
EAS40	83.450 mPa²h	
LApeak (max)	2021-03-04 08:58:08	89.2 dB
LASmax	2021-03-04 08:55:40	77.1 dB
LASmin	2021-03-04 08:49:09	62.0 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	73.3 dB	
LASeq	67.2 dB	
LCSeq - LASeq	6.1 dB	
LAIeq	67.9 dB	
LAeq	67.2 dB	
LAIeq - LAeq	0.7 dB	

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	67.2					
LS(max)	77.1	2021/03/04 8:55:40				
LS(min)	62.0	2021/03/04 8:49:09				
LPeak(max)	89.2	2021/03/04 8:58:08				

Summary

File Name on Meter	LxT_Data.077		
File Name on PC	SLM_0005055_LxT_Data_077.02.ldbin		
Serial Number	0005055		
Model	SoundTrack LxT®		
Firmware Version	2.402		
User			
Location			
Job Description			
Note			

Measurement

Description			
Start	2021-03-04 09:10:17		
Stop	2021-03-04 09:25:17		
Duration	00:15:00.0		
Run Time	00:15:00.0		
Pause	00:00:00.0		
Pre Calibration	2020-05-14 15:30:12		
Post Calibration	None		
Calibration Deviation	---		

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Exponential			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	Bin Max			
Overload	144.6 dB			
	A	**C**	**Z**	
Under Range Peak	**100.5**	97.5	102.5	dB
Under Range Limit	**37.7**	37.4	44.4	dB
Noise Floor	28.6	28.2	35.3	dB

Results

LASeq	70.0 dB	
LASE	99.5 dB	
EAS	989.839 µPa²h	
EAS8	31.675 mPa²h	
EAS40	158.374 mPa²h	
LApeak (max)	2021-03-04 09:15:59	94.2 dB
LASmax	2021-03-04 09:16:10	79.3 dB
LASmin	2021-03-04 09:21:26	63.1 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s
LCSeq	75.5 dB	
LASeq	70.0 dB	
LCSeq - LASeq	5.5 dB	
LAIeq	71.0 dB	
LAeq	70.0 dB	
LAIeq - LAeq	1.0 dB	

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	70.0					
LS(max)	79.3	2021/03/04 9:16:10				
LS(min)	63.1	2021/03/04 9:21:26				
LPeak(max)	94.2	2021/03/04 9:15:59				

APPENDIX C

CONSTRUCTION NOISE MODELING

WILEY CANYON MIXED USE PROJECT

CITY OF SANTA CLARITA, CALIFORNIA

Project: Wiley Canyon

Construction Noise Impact on Sensitive Receptors

ESA

Parameters

Construction Hours:		
	8	Daytime hours (7 am to 7 pm)
	0	Evening hours (7 pm to 10 pm)
	0	Nighttime hours (10 pm to 7 am)
Leq to L10 factor	3	

				R1					R2					R3					R4					R5				
Construction Phase **Equipment Type**	**No. of Equip.**	**Reference Noise Level at 50ft. Lmax**	**Acoustical Usage Factor**	**Distance (ft)**	**Lmax**	**Leq**	**L10**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L11**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L12**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L11**	**Estimated Noise Shielding, dBA**	**Distance (ft)**	**Lmax**	**Leq**	**L12**	**Estimated Noise Shielding, dBA**
Demolition					*90*	*83*				*77*	*71*				*85*	*78*				*85*	*78*				*76*	*70*		
Compressor (air)	1	78	40%	250	64	60	63	0	500	58	54	57	0	300	62	58	61	0	300	62	58	61	0	600	56	52	55	0
Front End Loader	1	79	40%	250	65	61	64	0	500	59	55	58	0	300	63	59	62	0	300	63	59	62	0	600	57	53	56	0
Concrete Saw	1	90	20%	50	90	83	86	0	250	76	69	72	0	100	84	77	80	0	100	84	77	80	0	300	74	67	70	0
Other Equipment	2	85	50%	250	74	71	74	0	500	68	65	68	0	300	72	69	72	0	300	72	69	72	0	600	66	63	66	0
Dump Truck	1	76	40%	250	62	58	61	0	500	56	52	55	0	300	60	56	59	0	300	60	56	59	0	600	54	50	53	0
Excavator	2	81	40%	250	70	66	69	0	500	64	60	63	0	300	68	64	67	0	300	68	64	67	0	600	62	58	61	0
Forklift	1	75	10%	600	53	43	46	0	800	51	41	44	0	600	53	43	46	0	800	51	41	44	0	1200	47	37	40	0
Tractor/Loader/Backhoe	2	78	40%	600	59	55	58	0	800	57	53	56	0	600	59	55	58	0	800	57	53	56	0	1200	53	49	52	0
Front End Loader	1	79	40%	600	57	53	56	0	800	55	51	54	0	600	57	53	56	0	800	55	51	54	0	1200	51	47	50	0
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Tractor/Loader/Backhoe	1	78	40%	250	64	60	63	0	500	58	54	57	0	300	62	58	61	0	300	62	58	61	0	600	56	52	55	0
Welder	1	74	40%	250	60	56	59	0	500	54	50	53	0	300	58	54	57	0	300	58	54	57	0	600	52	48	51	0
	15																											
Site Preparation					*90*	*83*				*77*	*70*				*84*	*77*				*84*	*77*				*75*	*68*		
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Concrete Saw	1	90	20%	50	90	83	86	0	250	76	69	72	0	100	84	77	80	0	100	84	77	80	0	300	74	67	70	0
Forklift	1	75	10%	600	53	43	46	0	800	51	41	44	0	600	53	43	46	0	800	51	41	44	0	1200	47	37	40	0
Dump Truck	1	76	40%	250	62	58	61	0	500	56	52	55	0	300	60	56	59	0	300	60	56	59	0	600	54	50	53	0
Roller	1	80	20%	250	66	59	62	0	500	60	53	56	0	300	64	57	60	0	300	64	57	60	0	600	58	51	54	0
Front End Loader	1	79	40%	250	65	61	64	0	500	59	55	58	0	300	63	59	62	0	300	63	59	62	0	600	57	53	56	0
Scraper	1	84	40%	250	70	66	69	0	500	64	60	63	0	300	68	64	67	0	300	68	64	67	0	600	62	58	61	0
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Vacuum Street Sweeper	1	82	10%	600	60	50	53	0	800	58	48	51	0	600	60	50	53	0	800	58	48	51	0	1200	54	44	47	0
	9																											
Grading/Excavation					*83*	*79*				*75*	*71*				*80*	*76*				*80*	*76*				*73*	*69*		
Tractor/Loader/Backhoe	2	78	40%	250	67	63	66	0	500	61	57	60	0	300	65	61	64	0	300	65	61	64	0	600	59	55	58	0
Compactor (Ground)	1	83	20%	600	61	54	57	0	800	59	52	55	0	600	61	54	57	0	800	59	52	55	0	1200	55	48	51	0
Other Equipment	1	85	50%	600	63	60	63	0	800	61	58	61	0	600	63	60	63	0	800	61	58	61	0	1200	57	54	57	0
Excavator	1	81	40%	50	81	77	80	0	250	67	63	66	0	100	75	71	74	0	100	75	71	74	0	300	65	61	64	0
Grader	2	85	40%	600	66	62	65	0	800	64	60	63	0	600	66	62	65	0	800	64	60	63	0	1200	60	56	59	0
Pumps	1	81	50%	250	67	64	67	0	500	61	58	61	0	300	65	62	65	0	300	65	62	65	0	600	59	56	59	0
Dozer	1	82	40%	250	68	64	67	0	500	62	58	61	0	300	66	62	65	0	300	66	62	65	0	600	60	56	59	0
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Scraper	6	84	40%	250	78	74	77	0	500	72	68	71	0	300	76	72	75	0	300	76	72	75	0	600	70	66	69	0
Slurry Trenching Machine	1	80	50%	600	58	55	58	0	800	56	53	56	0	600	58	55	58	0	800	56	53	56	0	1200	52	49	52	0
	17																											
Drainage/Utilities/Sub-grade					*86*	*80*				*74*	*68*				*81*	*74*				*81*	*74*				*72*	*66*		
Compressor (Air)	2	78	40%	600	59	55	58	0	800	57	53	56	0	600	59	55	58	0	800	57	53	56	0	1200	53	49	52	0
Tractor/Loader/Backhoe	2	78	40%	600	59	55	58	0	800	57	53	56	0	600	59	55	58	0	800	57	53	56	0	1200	53	49	52	0
Drill Rig Truck	1	79	20%	250	65	58	61	0	500	59	52	55	0	300	63	56	59	0	300	63	56	59	0	600	57	50	53	0
Compactor (Ground)	2	83	20%	50	86	79	82	0	250	72	65	68	0	100	80	73	76	0	100	80	73	76	0	300	70	63	66	0
Dump Truck	1	76	40%	250	62	58	61	0	500	56	52	55	0	300	60	56	59	0	300	60	56	59	0	600	54	50	53	0
Excavator	2	81	40%	250	70	66	69	0	500	64	60	63	0	300	68	64	67	0	300	68	64	67	0	600	62	58	61	0
Forklift	1	75	10%	250	61	51	54	0	500	55	45	48	0	300	59	49	52	0	300	59	49	52	0	600	53	43	46	0
Front End Loader	2	79	40%	250	68	64	67	0	500	62	58	61	0	300	66	62	65	0	300	66	62	65	0	600	60	56	59	0
Pumps	2	81	50%	600	62	59	62	0	800	60	57	60	0	600	62	59	62	0	800	60	57	60	0	1200	56	53	56	0
Forklift	1	75	10%	250	61	51	54	0	500	55	45	48	0	300	59	49	52	0	300	59	49	52	0	600	53	43	46	0
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Slurry Trenching Machine	1	80	50%	600	58	55	58	0	800	56	53	56	0	600	58	55	58	0	800	56	53	56	0	1200	52	49	52	0
	18																											
Foundations/Concrete Pour					*90*	*83*				*77*	*70*				*84*	*77*				*84*	*77*				*75*	*69*		
Compressor (Air)	2	78	40%	600	59	55	58	0	800	57	53	56	0	600	59	55	58	0	800	57	53	56	0	1200	53	49	52	0
Tractor/Loader/Backhoe	1	78	40%	250	64	60	63	0	500	58	54	57	0	300	62	58	61	0	300	62	58	61	0	600	56	52	55	0
Drum Mixer	0	80	50%	600	0	0	3	0	800	0	0	3	0	600	0	0	3	0	800	0	0	3	0	1200	0	0	3	0
Concrete Saw	1	90	20%	50	90	83	86	0	250	76	69	72	0	100	84	77	80	0	100	84	77	80	0	300	74	67	70	0
Compactor (Ground)	1	83	20%	600	61	54	57	0	800	59	52	55	0	600	61	54	57	0	800	59	52	55	0	1200	55	48	51	0
Excavator	1	81	40%	250	67	63	66	0	500	61	57	60	0	300	65	61	64	0	300	65	61	64	0	600	59	55	58	0
Forklift	1	75	10%	600	53	43	46	0	800	51	41	44	0	600	53	43	46	0	800	51	41	44	0	1200	47	37	40	0
Grader	0	85	40%	600	0	0	3	0	800	0	0	3	0	600	0	0	3	0	800	0	0	3	0	1200	0	0	3	0
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Pumps	1	81	50%	600	59	56	59	0	800	57	54	57	0	600	59	56	59	0	800	57	54	57	0	1200	53	50	53	0
Dozer	1	82	40%	250	68	64	67	0	500	62	58	61	0	300	66	62	65	0	300	66	62	65	0	600	60	56	59	0
Vacuum Street Sweeper	1	82	10%	250	68	58	61	0	500	62	52	55	0	300	66	56	59	0	300	66	56	59	0	600	60	50	53	0
Crane	1	81	16%	250	67	59	62	0	500	61	53	56	0	300	65	57	60	0	300	65	57	60	0	600	59	51	54	0
	12																											
Building Construction					*90*	*83*				*77*	*70*				*84*	*77*				*84*	*77*				*75*	*68*		
Compressor (Air)	3	78	40%	600	61	57	60	0	800	59	55	58	0	600	61	57	60	0	800	59	55	58	0	1200	55	51	54	0
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Concrete Saw	1	90	20%	50	90	83	86	0	250	76	69	72	0	100	84	77	80	0	100	84	77	80	0	300	74	67	70	0
Crane	1	81	16%	600	59	51	54	0	800	57	49	52	0	600	59	51	54	0	800	57	49	52	0	1200	53	45	48	0
Other Equipment	1	85	50%	600	63	60	63	0	800	61	58	61	0	600	63	60	63	0	800	61	58	61	0	1200	57	54	57	0
Forklift	3	75	10%	250	66	56	59	0	500	60	50	53	0	300	64	54	57	0	300	64	54	57	0	600	58	48	51	0
Tractor/Loader/Backhoe	1	78	40%	250	64	60	63	0	500	58	54	57	0	300	62	58	61	0	300	62	58	61	0	600	56	52	55	0
Pumps	1	81	50%	250	67	64	67	0	500	61	58	61	0	300	65	62	65	0	300	65	62	65	0	600	59	56	59	0
Welder	4	74	40%	250	66	62	65	0	500	60	56	59	0	300	64	60	63	0	300	64	60	63	0	600	58	54	57	0
	16																											
Paving					*79*	*75*				*70*	*66*				*75*	*71*				*74*	*70*				*68*	*63*		
Compressor (Air)	1	78	40%	250	64	60	63	0	500	58	54	57	0	300	62	58	61	0	300	62	58	61	0	600	56	52	55	0
Tractor/Loader/Backhoe	1	78	40%	250	64	60	63	0	500	58	54	57	0	300	62	58	61	0	300	62	58	61	0	600	56	52	55	0
Grader	1	85	40%	600	63	59	62	0	800	61	57	60	0	600	63	59	62	0	800	61	57	60	0	1200	57	53	56	0
Paver	1	77	50%	50	77	74	77	0	250	63	60	63	0	100	71	68	71	0	100	71	68	71	0	300	61	58	61	0
Other Equipment	2	85	50%	600	66	63	66	0	800	64	61	64	0	600	66	63	66	0	800	64	61	64	0	1200	60	57	60	0
Roller	4	80	20%	600	64	57	60	0	800	62	55	58	0	600	64	57	60	0	800	62	55	58	0	1200	58	51	54	0
Vacuum Street Sweeper	1	82	10%	250	68	58	61	0	500	62	52	55	0	300	66	56	59	0	300	66	56	59	0	600	60	50	53	0
	11																											
Architectural Coating					*81*	*73*				*68*	*61*				*75*	*68*				*75*	*67*				*66*	*59*		
Compressor (Air)	2	78	40%	600	59	55	58	0	800	57	53	56	0	600	59	55	58	0	800	57	53	56	0	1200	53	49	52	0
Tractor/Loader/Backhoe	1	78	40%	600	56	52	55	0	800	54	50	53	0	600	56	52	55	0	800	54	50	53	0	1200	50	46	49	0
Crane	1	81	16%	50	81	73	76	0	250	67	59	62	0	100	75	67	70	0	100	75	67	70	0	300	65	57	60	0
Forklift	2	75	10%	600	56	46	49	0	800	54	44	47	0	600	56	46	49	0	800	54	44	47	0	1200	50	40	43	0
Forklift	2	75	10%	250	64	54	57	0	500	58	48	51	0	300	62	52	55	0	300	62	52	55	0	600	56	46	49	0
	8																											
Overlapping Phases	106																											
3.2 Demolition - 2023 and 3.3 Site Preparation - 2023						86					74					81					81					72		
3.4 Grading/Excavation - 2023 and 3.5 Drainage/Utilities/Sub-Grade - 2023						82					73					78					78					71		
3.5 Drainage/Utilities/Sub-Grade - 2023 and 3.6 Foundations/Concrete Pour - 2023						85					72					79					79					71		
3.6 Foundations/Concrete Pour - 2023 and 3.8 Architectural Coatings - 2023						84					71					78					78					69		
3.6 Foundations/Concrete Pour - 2023 and 3.9 Paving - 2023						84					72					78					78					70		
3.7 Building Construction - 2023 and 3.8 Architectural Coatings - 2023						84					71					78					78					69		
3.8 Architectural Coatings - 2023 and 3.9 Paving - 2023						77					67					72					72					64		
3.6 Foundations/Concrete Pour - 2023 and 3.8 Architectural Coatings - 2023 and 3.9 Paving - 2023						84					72					79					79					70		
Maximum Combined Noise Levels						**86.3**					**73.7**					**80.8**					**80.8**					**72.1**		

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005

APPENDIX D

TRAFFIC NOISE MODELING

WILEY CANYON MIXED USE PROJECT

CITY OF SANTA CLARITA, CALIFORNIA

ESA | 18 October 2021
Jonathan Chen | TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: Wiley Canyon
RUN: Wiley Canyon
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Lden	No Barrier Lden Calculated	No Barrier Lden Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated Lden	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Residential Building (Building 7)	1	1	0.0	87.1	66	87.1	10	Snd Lvl	74.3	12.8	8	4.8
Senior Living	2	1	0.0	86.2	66	86.2	10	Snd Lvl	73.7	12.5	8	4.5

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	2	12.5	12.6	12.8
All Impacted	2	12.5	12.6	12.8
All that meet NR Goal	2	12.5	12.6	12.8

ESA **18 October 2021**
Jonathan Chen **TNM 2.5**
Calculated with TNM 2.5

RESULTS: BARRIER DESIGN
PROJECT/CONTRACT: **Wiley Canyon**
RUN: **Wiley Canyon**
BARRIER DESIGN: **INPUT HEIGHTS**

ATMOSPHERICS: **68 deg F, 50% RH**

Selected Receivers

Name	No.	Calc	Noise Reduction			Barrier Reviewed	Important Segments			Partial
		Lden	Calc	Goal	Calc-Goal		Name	No.	Height	Lden
		dBA	dB	dB	dB				ft	dBA
Residential Building (Building 7)	1	74.3	12.8	8	4.8	Barrier7-Barrier8-Barrier11	point8	8	16.0	71.6
						Barrier7-Barrier8-Barrier11	point9	9	16.0	70.5
						Barrier7-Barrier8-Barrier11	point7	7	16.0	60.0
Senior Living	2	73.7	12.5	8	4.5	Barrier7-Barrier8-Barrier11	point6	6	16.0	71.5
						Barrier7-Barrier8-Barrier11	point11	11	16.0	68.0
						Barrier7-Barrier8-Barrier11	point7	7	16.0	63.8
						Barrier7-Barrier8-Barrier11	point8	8	16.0	58.1
						Barrier7-Barrier8-Barrier11	point13	13	16.0	52.1
						Barrier7-Barrier8-Barrier11	point14	14	16.0	51.1

Total Cost, All Barriers (including additional cost(s)) $0

ESA | 18 October 2021
Jonathan Chen | TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT:	Wiley Canyon
RUN:	Wiley Canyon
BARRIER DESIGN:	INPUT HEIGHTS
ATMOSPHERICS:	68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Lden	No Barrier Lden Calculated	No Barrier Lden Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated Lden	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Residential Building (Building 7)	1	1	0.0	87.1	66	87.1	10	Snd Lvl	73.4	13.7	8	5.7
Senior Living	2	1	0.0	86.2	66	86.2	10	Snd Lvl	72.8	13.4	8	5.4

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	2	13.4	13.5	13.7
All Impacted	2	13.4	13.5	13.7
All that meet NR Goal	2	13.4	13.5	13.7

ESA **18 October 2021**

Jonathan Chen **TNM 2.5**

Calculated with TNM 2.5

RESULTS: BARRIER DESIGN

PROJECT/CONTRACT: **Wiley Canyon**

RUN: **Wiley Canyon**

BARRIER DESIGN: **INPUT HEIGHTS**

ATMOSPHERICS: **68 deg F, 50% RH**

Selected Receivers										
Name	**No.**									
		Calc	**Noise Reduction**			**Barrier Reviewed**	**Important Segments**			**Partial**
		Lden	**Calc**	**Goal**	**Calc-Goal**		**Name**	**No.**	**Height**	**Lden**
		dBA	dB	dB	dB				ft	dBA
Residential Building (Building 7)	1	73.4	13.7	8	5.7	Barrier7-Barrier8-Barrier11	point8	8	18.0	70.7
						Barrier7-Barrier8-Barrier11	point9	9	18.0	69.7
						Barrier7-Barrier8-Barrier11	point7	7	18.0	59.1
Senior Living	2	72.8	13.4	8	5.4	Barrier7-Barrier8-Barrier11	point6	6	18.0	70.5
						Barrier7-Barrier8-Barrier11	point11	11	18.0	67.2
						Barrier7-Barrier8-Barrier11	point7	7	18.0	62.9
						Barrier7-Barrier8-Barrier11	point8	8	18.0	57.3
						Barrier7-Barrier8-Barrier11	point13	13	18.0	51.1
						Barrier7-Barrier8-Barrier11	point14	14	18.0	50.1
Total Cost, All Barriers (including additional cost(s))					$0					

ESA | 18 October 2021
Jonathan Chen | TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: Wiley Canyon
RUN: Wiley Canyon
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing Lden	No Barrier Lden Calculated	No Barrier Lden Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated Lden	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Residential Building (Building 7)	1	1	0.0	87.1	66	87.1	10	Snd Lvl	72.6	14.5	8	6.5
Senior Living	2	1	0.0	86.2	66	86.2	10	Snd Lvl	72.1	14.1	8	6.1

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	2	14.1	14.3	14.5
All Impacted	2	14.1	14.3	14.5
All that meet NR Goal	2	14.1	14.3	14.5

TRAFFIC NOISE ANALYSIS TOOL

Project Name: Wiley Canyon
Analysis Scenario: 2030 I-5 Traffic Noise
Source of Traffic Volumes: Caltrans

Receiver	Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph) Auto	Speed (mph) MT	Speed (mph) HT	Peak Hour Volume Auto	Peak Hour Volume MT	Peak Hour Volume HT	Peak Hour Noise Level (Leq(h) dBA)	Noise Level dBA CNEL
Residences	I-5 between Calgrove Blvd and Lyons Ave	Hard	107	65	65	55	19,066	883	2,430	84.5	84.8
Senior Living	I-5 between Calgrove Blvd and Lyons Ave	Hard	143	65	65	55	19,066	883	2,430	83.2	83.5

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.

TRAFFIC NOISE ANALYSIS TOOL

Project Name: **Wiley Canyon**
Analysis Scenario: **2030 I-5 Traffic Noise**
Source of Traffic Volumes: **Caltrans**

Receiver	Roadway Segment	Ground Type	Distance from Roadway to Receiver (feet)	Speed (mph)			Peak Hour Volume			Peak Hour Noise Level (Leq(h) dBA)	Barrier Height (feet)	Peak Hour Noise Level (Leq(h) dBA) w/ Barrier
				Auto	MT	HT	Auto	MT	HT			
Residences	I-5 between Calgrove Blvd and Lyons Ave	Hard	107	65	65	55	19,066	883	2,430	84.5	20	68.7
Senior Living	I-5 between Calgrove Blvd and Lyons Ave	Hard	143	65	65	55	19,066	883	2,430	83.2	20	69.7

Model Notes:
The calculation is based on the methodology described in FHWA Traffic Noise Model Technical Manual (1998).
The peak hour noise level at 50 feet was validated with the results from FHWA Traffic Noise Model Version 2.5.
Accuracy of the calculation is within ±0.1 dB when comparing to TNM results.
Noise propagation greater than 50 feet is based on the following assumptions:
For hard ground, the propagation rate is 3 dB per doubling the distance.
For soft ground, the propagation rate is 4.5 dB per doubling the distance.
Vehicles are assumed to be on a long straight roadway with cruise speed.
Roadway grade is less than 1.5%.
Barrier attenuation methodology is based on ISO 9613.

APPENDIX E

GENERAL PLAN NOISE ELEMENT POLICY COMPLIANCE ANALYSIS

WILEY CANYON MIXED USE PROJECT

CITY OF SANTA CLARITA, CALIFORNIA

WILEY CANYON MIXED USE PROJECT

CITY OF SANTA CLARITA, CALIFORNIA

Project Description

The proposed project is located on an approximately 31-acre site located at 24924 Hawkbryn Avenue, Santa Clarita, County of Los Angeles (project site). The project site is located immediately east of Interstate Highway 5 (I-5), north of Calgrove Boulevard, and with access from Wiley Canyon Road on the east. The project site consists of two parcels (APNs 2825-012-010 and 2825-012-011) that currently used for agricultural uses. A portion of the South Fork of the Santa Clara River runs along the eastern boundary of the property with the north end of the drainage being channelized.

Surrounding land uses include I-5 on the west, a small commercial area to the south, and residential uses on the north and east. Regional access to the project site is provided by I-5 and Calgrove Boulevard to the southwest of the project site.

The proposed project consists of 375 multifamily residential units, 10,886 square feet of retail commercial development and a 216-unit Senior Living Facility. Approximately 16 acres of the site would be developed with the remaining 15.2 acres retained as open space, landscaping or recreation areas. The project site is zoned Mixed Use Neighborhood (MX-N) and with the same land use category. In addition, the southern end of the project site will include a neighborhood park including field space. The site is surrounded by development and has been highly disturbed by past agricultural activities and limited commercial use.

Regulatory Requirement

City of Santa Clarita Noise Element of the General Plan

The City of Santa Clarita has set land use standards for noise in its General Plan Noise Element (June 25, 1991; First Amendment, May 23, 2000). One of the goals of the Noise Element is to mitigate, and if possible prevent, significant noise levels in residential neighborhoods. It requires that developers of new single-family and multi-family residential neighborhoods in areas where the ambient noise level exceeds 55 dBA (night) and 65 dBA (day) (or the equivalent of 65 dBA CNEL) provide mitigation measures for the new residences to reduce interior noise levels. Medical office buildings are acceptable in areas up to 70 dBA CNEL where no outdoor active uses are proposed and the interior noise levels are mitigated (California Department of Health 1978).

Traffic Noise Impacts on the Proposed On-site Land Uses

The City's General Plan Noise Element does not set limits for exterior noise levels for various land uses. For single- and multi-family residential uses, whether it is pure residential or mixed-use area, the normally acceptable exterior noise level is up to 65 dBA CNEL. Therefore, the following analysis discusses potential noise impacts to the proposed residential units and identify mitigation measures to mitigate exterior noise levels to the normally acceptable (65 dBA CNEL) exterior noise levels for new residential uses.

The project proposes residential uses on the project site that could be exposed to traffic noise from vehicular traffic on I-5 between Calgrove Boulevard and Lyons Avenue. As shown in **Table E-1**, Freeway Traffic Noise, traffic noise level along this segment of I-5 would have 87.1 dBA CNEL extending to the proposed on-site multifamily (Building 7) residential units. At the proposed onsite senior living units, traffic noise level would be 86.2 dBA CNEL. Since there is no frontage road between the project site and I-5, traffic noise level at the front line of the proposed multifamily residential buildings and at the proposed onsite senior living units would range from 86.2 to 87.1 dBA CNEL without any man-made noise barriers.

TABLE E-1
FREEWAY TRAFFIC NOISE LEVELS

Roadway Segment	Traffic Noise Levels (dBA CNEL)			
	Future (2030)[a]			
	No Barrier	16 ft	18 ft	20 ft
I-5 between Calgrove Boulevard and Lyons Avenue				
Proposed Multifamily Residential Units (Building 7)	87.1	74.3	73.4	72.6
Proposed Senior Living Units	86.2	73.7	72.8	72.1

SOURCE: ESA 2021

NOTES:

Decibel levels were calculated at the property line of receivers. Noise barrier was modeled along the property line, which is 5 feet below freeway travel lanes.

[a] Traffic volumes used for I-5 are projected to year 2030 as future buildout conditions.

The project site, on average, is approximately 5 feet below the freeway travel lanes. Therefore, any stand-alone noise barrier designed to reduce the freeway traffic noise would need to be built on top of a 5-foot-high retaining wall. As shown in Table E-1, even with a 20-foot-high noise barrier on top of the retaining wall along the project property line, freeway traffic noise levels would remain above the 65 dBA CNEL exterior noise standard for residential uses in the ground floor outdoor living areas. It is therefore recommended that backyards or patios not be placed on the west side of these frontline residential buildings.

Since the proposed townhomes along the project's western border would have noise attenuating windows but no decks along the freeway side that would be exposed to relatively high traffic noise levels, no outdoor living areas or bedrooms/living rooms would be exposed to high traffic noise levels.

Based on the U.S. EPA Levels Document, standard buildings in warm climate areas would provide a 24 dBA exterior-to-interior noise attenuation with windows and doors closed, and 12 dBA noise attenuation with windows open. In order to meet the 45 dBA CNEL interior noise standard for residential uses, residences proposed within the impact zone of 57 dBA CNEL should be equipped with mechanical ventilation (e.g., air conditioning) to ensure that windows can remain closed for prolonged periods of time. For residences proposed within the impacts zone of 69 dBA CNEL, building façade upgrades (e.g., windows upgrades with sound transmission class ratings higher than the STC-28 standard building design would provide) would be required. Based on the above analysis, future residences in the area east of I-5 would be required to have mechanical ventilation provided as either a standard feature or a mitigation.

Project Design Features Recommended for on On-site Land Uses

The following summarizes noise abatement measures recommended for future onsite uses along the I-5:

- A noise barrier of berm-wall combination with a minimum combined height of 10 feet above ground along the project boundary along I-5 will be constructed for Residential units in PA-1 and PA-3 within the frontline buildings (senior living units in PA-1 and buildings 1 through 8 in PA-3) that have direct line-of-sight to the I-5 traffic.
- All residential buildings fronting the I-5 will not include balcony or deck on the west side of the buildings.
- Internal recreational areas that have direct line-of-sight to the I-5 traffic will be shielded by a 10-foot wall along the west side entry. All entry gates will consist of solid materials with a minimum height of 6 feet.
- Building façade upgrades, such as windows upgrades with sound transmission class ratings of STC-38 (higher than the STC-28 standard building design would provide) will be included for frontline residential buildings (senior living units in PA-1 and buildings 1 through 8 in PA-3) that have windows directly exposed to traffic on the I-5. Standard building design with STC-28 windows is sufficient for residential units on the east side of senior living buildings in PA-1 and Buildings 1 through 8 in PA-3 that have no direct exposure to the I-5 traffic.
- Mechanical ventilation, such as air conditioning, will be included for frontline residential buildings (senior living units in PA-1 and buildings 1 through 8 in PA-3) to ensure that windows can remain closed for prolonged periods of time. Mechanical ventilation will also be included for all other on-site residential buildings.
- Mechanical ventilation, such as air conditioning, will be included for residential buildings (1 through 5) in PA-2 to ensure that windows can remain closed for prolonged periods of time.