LSA

CARLSBAD
CLOVIS
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

MEMORANDUM

DATE: December 30, 2021

TO: Orlando Hernandez, Planning Manager, City of Menifee

FROM: Jason Lui, Associate/Senior Noise Specialist

SUBJECT: River Walk Village Project (Tentative Tract Map No. 38219) Noise and Vibration Impact Analysis

INTRODUCTION

This Noise and Vibration Impact Analysis has been prepared to evaluate the potential noise and vibration impacts associated with the River Walk Village Project (project) in Menifee, California. This report is intended to satisfy the City of Menifee (City) requirements and the California Environmental Quality Act (CEQA) for a project-specific analysis by examining the noise and vibration impacts of the proposed uses on the project site to surrounding sensitive receptors. All references cited in this memorandum are included in Attachment A.

Project Location

The 14.31-acre (gross) River Walk Village Project (herein referred to as "proposed project" or "project") site is along the west side of Bradley Road, south of Salt Creek, and north of Lazy Creek Road in Menifee, Riverside County, California (Assessor's Parcel Nos. 338-015-031-0 and 338-150-046-4). Figure 1 shows the regional and project location (all figures are provided in Attachment B of this document).

Project Description

The project includes development of 198 detached single-family residential units and common areas. The residential units would consist of four two-story floor plans, ranging in size from 1,716 square feet (Plan 1) to 1,864 square feet (Plan 4). Each unit would include a two-car garage and private back yard space. Solar panels will be installed on every residence and all house electrical panels will be sized to accommodate future electric charging units in the individual private garages (200-amp panels). The individual residence solar power systems will each have a DC rating of 4.10 kilowatts (KW), an AC rating of 2.80 KW and an AC output current of 11.7 amps. The common area includes a 2,800-square-foot recreational building with a kitchenette and bathroom. Other common areas include a swimming pool and two tot lots on 14.31 gross acres. The recreation building will also be equipped with solar power generation to assist in common area electrical needs. Public electric vehicle charging stations will also be placed near the recreation building.

Project construction would include removal of existing on-site fencing and vegetation, excavation, grading, paving, construction of the residential buildings, recreation building, and parking areas, and

the installation of lighting, landscaping, and utility connections. Project construction is expected to start in July 2022 and finish by April 2024. Figure 2 shows the conceptual site plan.

CHARACTERISTICS OF SOUND

Sound is increasing to such disagreeable levels in the environment that it can threaten quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound; it describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Decibels (dB), unlike the linear scale (e.g., inches or pounds), are measured on a logarithmic scale, which is a scale based on powers of 10.

For example, 10 dB is 10 times more intense than 0 dB, 20 dB is 100 times more intense than 0 dB, and 30 dB is 1,000 times more intense than 0 dB. Thirty decibels (30 dB) represents 1,000 times as much acoustic energy as 0 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

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 dB 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 (e.g., highway traffic or railroad operations), the sound decreases 3 dB for each doubling of distance in a hard site environment; however, line source noise in a relatively flat environment with absorptive vegetation decreases 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The equivalent continuous

sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are L_{eq} and the Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours), and a 10 dBA weighting factor applied to noises occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The City uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum instantaneous noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category, audible impacts, refers to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because these levels have been found to be barely perceptible in exterior environments. The second category, potentially audible impacts, refers to a change in the noise level between 1 dB and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise levels of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear (the threshold of pain). A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas. Table A lists definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of measurement that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in 1 second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter deemphasizes the very low- and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. (All sound levels in this report are A-weighted, unless reported otherwise.)
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1%, 10%, 50%, and 90% of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 PM to 10:00 PM and after the addition of 10 dBA to sound levels occurring in the night between 10:00 PM and 7:00 AM.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 PM and 7:00 AM.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time; usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris 1991).

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	—
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	—
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	—
Near Freeway Auto Traffic	70	Moderately Loud	—
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	—
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	—
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	—
Rustling Leaves	20	Very Faint	—
Human Breathing	10	Very Faint	Threshold of Hearing
—	0	Very Faint	—

Source: Compiled by LSA (2015).

FUNDAMENTALS OF VIBRATION

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors. Outdoors, the motion may be discernible, 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 occupants as the motion of building surfaces, the rattling of items sitting on shelves or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 vibration velocity decibels (VdB) or less. This is an order of magnitude below the damage threshold for normal buildings. Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet (ft) from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (see the Federal Transit Administration [FTA] *Transit Noise and Vibration Impact Assessment Manual* [FTA 2018]). 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 ground-borne vibration from street traffic will not exceed the impact criteria; however, both construction of a project and freight train operations on railroad tracks could result in ground-borne vibration that may be perceptible and annoying.

Ground-borne noise is not likely to be a problem because noise arriving via the normal airborne path will usually be greater than ground-borne noise. Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for train-induced ground-borne vibration to cause cosmetic building damage, it is not uncommon for heavy-duty construction processes (e.g., blasting and pile driving) to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS velocity 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 the following:

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

where L_v is the VdB, V is the RMS velocity amplitude, and V_{ref} is the reference velocity amplitude, or 1 x 10^{-6} inches/second (in/sec) used in the United States.

REGULATORY SETTING

Federal Regulations

Federal Transit Administration

Vibration standards included in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) are used in this analysis for ground-borne vibration impacts on human annoyance. Table C provides the criteria for assessing the potential for interference or annoyance from vibration levels in a building.

Table C: Interpretation of Vibration Criteria for Detailed Analysis

Land Use	Maximum L_v (VdB)[1]	Description of Use
Workshop	90	Vibration that is distinctly felt. Appropriate for workshops and similar areas not as sensitive to vibration.
Office	84	Vibration that can be felt. Appropriate for offices and similar areas not as sensitive to vibration.
Residential Day	78	Vibration that is barely felt. Adequate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night and Operating Rooms	72	Vibration is not felt, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power microscopes (100X) and other equipment of low sensitivity.

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] As measured in 1/3-octave bands of frequency over the frequency range 8 to 80 Hz
FTA = Federal Transit Administration
Hz = hertz
L_v = velocity in decibels
VdB = vibration velocity decibels

The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table D lists the potential vibration building damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). These FTA guidelines show that a vibration level of up to 102 VdB (equivalent to 0.5 in/sec in PPV [FTA 2018]) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage. For non-engineered timber and masonry buildings, the construction building vibration damage criterion is 94 VdB (0.2 in/sec in PPV).

Table D: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate L_V (VdB)[1]
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: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
µin/sec = microinches per second
FTA = Federal Transit Administration
in/sec = inches per second
L_v = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

Local Regulations

City of Menifee

Noise Element of the General Plan. The Noise Element of the City's General Plan (City of Menifee 2013) lists the goals and policies required to meet the City's noise-related goals. The following lists the applicable goals and policies for the project.

> **Goal N-1:** Noise-sensitive land uses are protected from excessive noise and vibration exposure.
>
> - **Policy N-1.1:** Assess the compatibility of proposed land uses with the noise environment when preparing, revising, or reviewing development project applications.
> - **Policy N-1.2:** Require new projects to comply with the noise standards of local, regional, and state building code regulations, including but not limited to the city's Municipal Code, Title 24 of the California Code of Regulations, the California Green Building Code, and subdivision and development codes.
> - **Policy N-1.3:** Require noise abatement measures to enforce compliance with any applicable regulatory mechanisms, including building codes and subdivision and zoning regulations, and ensure that the recommended mitigation measures are implemented.
> - **Policy N-1.7:** Mitigate exterior and interior noises to the levels listed in Table E to the extent feasible, for stationary sources adjacent to sensitive receptors:

Table E: Stationary Source Noise Standards

Land Use	Period	Interior	Exterior
Residential	10:00 PM to 7:00 AM	40 dBA L_{eq} (10-minute)	45 dBA L_{eq} (10-minute)
	7:00 AM to 10:00 PM	55 dBA L_{eq} (10-minute)	65 dBA L_{eq} (10-minute)

Source: General Plan Noise Element (City of Menifee 2013) and Development Code (City of Menifee 2021a).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level

> - **Policy N-1.8:** Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state, and city noise standards and guidelines as a part of new development review.
> - **Policy N-1.12:** Minimize potential noise impacts associated with the development of mixed-use projects (vertical or horizontal mixed-use) where residential units are located above or adjacent to noise-generating uses.
> - **Policy N-1.13:** Require new development to minimize vibration impacts to adjacent uses during demolition and construction.

- **Policy N-1.17:** Prevent the construction of new noise-sensitive land uses within airport noise impact zones. New residential land uses within the 65 dBA CNEL contours of any public-use or military airports, as defined by the Riverside County Airport Land Use Commission, shall be prohibited.

Municipal Code. Section 8.01.010 of the City's Municipal Code (City of Menifee 2021b) permits any construction within the City within 0.25 mile (mi) from an occupied residence Monday through Saturday between the hours of 6:30 a.m. and 7:00 p.m., except on nationally recognized holidays. No construction shall be permitted on Sunday or nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.

Development Code. Section 9.210.060(B)(10) of the City's Development Code (City of Menifee 2021a) exempts sound emanating from heating and air conditioning equipment in proper repair.

Section 9.210.060(C) of the City's Development Code (City of Menifee 2021a) allows exceptions to be requested from the standards set forth in Section 9.210.060 of the City's Development Code and may be characterized as construction-related, single-event, or continuous-events exceptions:

- Private construction projects, with or without a building permit, located 0.25 mi or more from an inhabited dwelling.

- Private construction projects, with or without a building permit, located within 0.25 mi from an inhabited dwelling, shall be permitted Monday through Saturday, except on nationally recognized holidays, 6:30 a.m. to 7:00 p.m., or as specified in Section 8.01.010 of the Municipal Code (City of Menifee 2021b). There shall be no construction permitted on Sunday or nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.

- Construction-related exceptions. If construction occurs during off hours or exceeds noise thresholds, an application for a construction-related exception shall be made using the temporary use application provided by the Community Development Director in Chapter 9.110 of the City's Development Code (City of Menifee 2021a). For construction activities on Sunday or nationally recognized holidays, Section 8.01.010 of the Municipal Code shall prevail.

Section 9.210.060(D) of the City's Development Code (City of Menifee 2021a) prohibits the creation of any sound on any property that causes the exterior and interior sound level on any other occupied property to exceed the noise standards shown in Table E (Stationary Source Noise Standards) above.

Section 9.210.070 of the City's Development Code (City of Menifee 2021a) requires that all uses shall be operated so as not to generate vibration discernible without instruments by the average person while on or beyond the lot upon which the source is located or within an adjoining enclosed space if more than one establishment occupies a structure. Vibration caused by motor vehicles, trains, and temporary construction is exempted from this standard.

EXISTING SETTING

Sensitive Land Uses in the Project Vicinity

Existing land uses within the project area include residences, an assisted living facility, a church, open space, commercial, and office uses. Single-family residences are to the north, east, and west of the project site. The assisted living facility, commercial, and office uses are east of the project site. Also, the church is south of the project site.

Overview of the Existing Noise Environment

The primary existing noise sources in the project area are transportation facilities. Traffic on Bradley Road and other local streets contributes to the ambient noise levels in the project vicinity. Noise from motor vehicles is generated by engines, the interaction between the tires and the road, and the vehicles' exhaust systems. Other sources of noise in the project area that contribute to the existing noise environment include commercial and office activities east of the project site and church activities south of the project site.

Ambient Noise Measurements

Long-Term Noise Measurements

Four long-term (24-hour) noise level measurement were conducted from October 6, 2021, to October 7, 2021, using Larson Davis Spark 706RC Dosimeters. Table F summarizes the results of the four long-term noise level measurements. As shown in Table F, the L_{eq} ranged between 42.1 to 65.7 dBA, the L_{max} ranged between 46.2 to 85.9 dBA, and calculated CNEL levels ranged from 54.4 to 66.3 dBA. Attachment C provides the detailed hourly L_{eq}, L_{max}, and L_{min} results from the four long-term noise level measurements. Figure 3 shows the long-term monitoring locations.

Table F: Long-Term Ambient Noise Monitoring Results

Monitoring No.	Location	Noise Level (dBA)			Noise Sources
		L_{eq}	L_{max}	CNEL	
LT-1	26953 Potomac Road, near southwest corner of property, approximately 260 ft west of centerline of Bradley Road	45.1–57.8	61.7–78.5	58.5	Traffic on Bradley Road
LT-2	29620 Bradley Road, on light pole in front of building, approximately 85 ft east of centerline of Bradley Road	53.2–65.7	70.6–85.9	66.3	Traffic on Bradley Road
LT-3	29725 Bradley Road, on light pole on north side of property, approximately 185 ft west of centerline of Bradley Road	43.8–59.9	60.1–79.9	58.3	Traffic on Bradley Road, parking lot activity
LT-4	26800 Hanalei Court, in backyard, 38 ft west of wall	42.1–53.2	46.2–76.1	54.4	Residential heating, ventilation, and air conditioning units and pool overflow

Source: Compiled by LSA (2021).
Note: The long-term (24 hour) noise level measurements were conducted from October 6 to October 7, 2021.
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous sound level

Existing Aircraft Noise

French Valley Airport is a public airport that is 8.7 mi southeast of the project site. Also, Perris Valley Airport is a private airport that is 4.9 mi north of the project site. The airport noise contours for both the French Valley Airport and Perris Valley Airport in the *Riverside County Airport Land Use Compatibility Plan* (RCALUC 2004) show that the project site is outside the 55 dBA CNEL noise contour.

Existing Traffic Noise

The guidelines included in the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA 1977; FHWA RD-77-108) were used to evaluate highway traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. The existing (2021) average daily traffic (ADT) volumes were obtained from the project's traffic study (LSA 2021a). The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Table G provides the existing traffic noise levels in the project vicinity. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Attachment D provides the specific assumptions used in developing these noise levels and model printouts.

Table G: Existing (2021) Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane
Bradley Road between Rio Vista Drive and Lazy Creek Road	16,874	< 50	106	227	68.4
Bradley Road between Lazy Creek Road and Park Avenue	17,989	53	111	237	68.7
Bradley Road between Park Avenue and Newport Road	18,775	54	114	244	68.9
Newport Road between Bradley Road and Calle Tomas	47,911	123	254	542	72.5
Newport Road between Calle Tomas and Avenida De Cortez/Town Center Drive	47,784	123	254	542	72.4
Newport Road between Avenida De Cortez/Town Center Drive and Haun Road	54,834	134	278	593	72.9
Newport Road between Haun Road and I-215 Southbound Ramps	73,055	162	336	718	73.8

Source: Compiled by LSA (2021).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
ft = foot/feet
I-215 = Interstate 215

Table G shows that traffic noise levels along Newport Road are high, with the 70, 65, and 60 dBA CNEL distances extending up to 162 ft, 336 ft, and 718 ft, respectively, from the roadway centerline. Also, Table G shows that traffic noise levels along Bradley Road are moderately high, with the 70, 65, and

60 dBA CNEL distances extending up to 54 ft, 114 ft, and 244 ft, respectively, from the roadway centerline.

IMPACTS

Short-Term Construction Noise Impacts

Two types of short-term noise impacts would occur during project construction. The first type would be from construction crew commutes and the transport of construction equipment and materials to the project site and would incrementally raise noise levels on access roads leading to the site. The pieces of construction equipment for construction activities would move on site, would remain for the duration of each construction phase, and would not add to the daily traffic volume in the project vicinity. Although there would be a relatively high single-event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to a maximum of 84 dBA), the effect on longer-term (hourly or daily) ambient noise levels would be small because the number of hourly/daily construction-related vehicle trips is small compared to the existing hourly/daily traffic volume on Bradley Road and Newport Road. The building construction phase would generate the most trips out of all of the construction phases, at 216 trips per hour and 432 trips per day based on the results of the California Emissions Estimator Model (Version 2020.4.0) in the project's Air Quality and Greenhouse Gas Emissions Analysis (LSA 2021b). Roadways that would be used to access the project site are Bradley Road and Newport Road. Based on Table G, Bradley Road and Newport Road have existing daily traffic volumes of 16,874 and 47,784 and estimated hourly traffic volumes of 1,687 and 4,778, respectively, near the project site. Based on the maximum daily trips generated by construction-related traffic, construction-related traffic would increase noise by up to 0.5 dBA. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, no short-term construction-related impacts associated with worker commutes and transport of construction equipment and material to the project site would occur, and no noise reduction measures would be required.

The second type of short-term noise impact is related noise generated from construction activities. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. The project anticipates site preparation and grading, building construction, paving, and architectural coating phases of construction. These various sequential phases change the character of the noise generated on a project site. Therefore, the noise levels vary 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 H lists the L_{max} recommended for noise impact assessments for typical construction equipment included in the *FHWA Highway Construction Noise Handbook* (FHWA 2006), based on a distance of 50 ft between the equipment and a noise receptor.

Typical noise levels range up to 88 dBA L_{max} at 50 ft during the noisiest construction phases. The site preparation and grading phase tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front-end loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders.

Table H: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor[1] (%)	Maximum Noise Level (L_{max}) at 50 ft[2]
Backhoe	40	80
Compactor (ground)	20	80
Compressor	40	80
Crane	16	85
Dozer	40	85
Dump Truck	40	84
Excavator	40	85
Flatbed Truck	40	84
Forklift	20	85
Front-End Loader	40	80
Grader	40	85
Impact Pile Driver	20	95
Jackhammer	20	85
Pavement Scarifier	20	85
Paver	50	85
Pickup Truck	40	55
Pneumatic Tools	50	85
Pump	50	77
Rock Drill	20	85
Roller	20	85
Scraper	40	85
Tractor	40	84
Welder	40	73

Source: *FHWA Highway Construction Noise Handbook.* Table 9.1 (FHWA 2006).
Note: The noise levels reported in this table are rounded to the nearest whole number.
[1] The usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power.
[2] Maximum noise levels were developed based on Specification 721.560 from the CA/T program to be consistent with the City of Boston, Massachusetts, Noise Code for the "Big Dig" project.
CA/T = Central Artery/Tunnel
FHWA = Federal Highway Administration
ft = foot/feet
L_{max} = maximum instantaneous noise level

Project construction is expected to require the use of graders, bulldozers, and water trucks/pickup trucks. Noise associated with the use of each type of construction equipment for the site preparation and grading phase is estimated to be between 55 dBA L_{max} and 85 dBA L_{max} at a distance of 50 ft from the active construction area. As shown in Table H, the maximum noise level generated by each grader is assumed to be approximately 85 dBA L_{max} at 50 ft. Each bulldozer would generate approximately 85 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks/pickup trucks is approximately 55 dBA L_{max} at 50 ft from these vehicles. Each doubling of the sound sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of construction would be 88 dBA L_{max} at a distance of 50 ft from the active construction area.

Table I shows the worst-case construction noise levels at the closest land uses to the project construction boundary. As shown in Table I, the closest residential and commercial/office property lines are approximately 65 feet west and 85 feet east of the project construction boundary and may be subject to short-term construction noise reaching 85.7 dBA L_{max} (81.7 dBA L_{eq}) and 83.4 dBA L_{max} (79.4 dBA L_{eq}), respectively, generated by construction activities on the project site. Also, the church

Table I: Summary of Construction Noise Levels

Land Use	Direction	Reference Noise Level (dBA) at 50 ft		Reference Distance (ft)	Distance[1] (ft)	Distance Attenuation (dBA)	Noise Level (dBA)	
		L_{max}	L_{eq}				L_{max}	L_{eq}
Residence	North	88	84	50	430	18.7	69.3	65.3
Residence	East	88	84	50	80	4.1	83.9	79.9
Residence (Assisted Living)	East	88	84	50	80	4.1	83.9	79.9
Commercial/Office	East	88	84	50	80	4.6	83.4	79.4
Church	South	88	84	50	50	0.0	88.0	84.0
Residence	West	88	84	50	65	2.3	85.7	81.7

Source: Compiled by LSA (2021).
[1] The distance is from the project construction boundary to the adjacent property line.
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
ft = foot/feet
L_{max} = maximum instantaneous noise level

property line is within 50 feet south of the project construction boundary and may be subject to short-term construction noise reaching 88.0 dBA L_{max} (84.0 dBA L_{eq}) or higher generated by construction activities on the project site. Ambient noise levels in the project vicinity range between 42.1 and 65.7 dBA L_{eq} and 46.2 and 85.9 dBA L_{max} based on the long-term noise level measurement summary shown in Table F. Although the noise generated by project construction activities would be higher than the ambient noise levels and may result in a temporary increase in the ambient noise levels, construction noise would stop once project construction is completed. The project would be required to comply with the construction hours allowed under the City's Municipal Code Noise Ordinance, and the best construction practices listed below would minimize construction noise:

- The construction contractor shall limit construction activities to between the hours of 6:30 a.m. and 7:00 p.m. on Monday through Saturday. No construction shall be permitted outside these hours, on Sunday, or on nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.

- During all project site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and most noise-sensitive receptors nearest the project site during all project construction.

- The construction contractor shall place all stationary construction equipment so that the emitted noise is directed away from the sensitive receptors nearest the project site.

Therefore, no noise impacts from construction activities would occur. No noise reduction measures are required.

Short-Term Construction Vibration Impacts

Although vibration levels generated from short-term construction are exempted from Section 9.215.070 of the City's Development Code (City of Menifee 2021a), vibration levels generated from short-term construction were evaluated for the level of human annoyance and potential for building damage. This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and assesses the potential for building damage using vibration levels in PPV (in/sec). Vibration levels calculated in RMS velocity are best for characterizing human response to building vibration, whereas vibration levels in PPV are best for characterizing damage potential. As shown in Table D, the FTA guidelines indicate that a vibration level up to 102 VdB (equivalent to 0.5 PPV [in/sec]) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage (FTA 2018). For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 PPV [in/sec]). For a fragile building, the construction vibration damage criterion is 90 VdB (0.12 PPV [in/sec]).

Table J shows the reference vibration levels at a distance of 25 ft for each type of standard construction equipment from the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). Outdoor site preparation and grading for the project are expected to require the use of a large bulldozer and loaded trucks, which would generate ground-borne vibration levels of up to 87 VdB (0.089 PPV [in/sec]) and 86 VdB (0.076 PPV [in/sec]), respectively, when measured at 25 ft.

Table J: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 ft	
	PPV (in/sec)	L_V (VdB)[1]
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer[2]	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks[2]	**0.076**	**86**
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Sources: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
[2] Equipment shown in **bold** is expected to be used on site.
µin/sec = micro-inches per second
ft = foot/feet
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The greatest vibration levels are anticipated during the site preparation and grading phase. All other phases are expected to result in lower vibration levels. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary), because vibration impacts normally occur within the buildings.

The formulas for vibration transmission are provided below:

$$L_vdB\ (D) = L_vdB\ (25\ ft) - 30\ Log\ (D/25)$$

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Table K lists the projected vibration levels from various construction equipment expected to be used on the project site to the closest buildings in the project vicinity. As shown in Table K, the closest structures are residences to the west, a church to the south, and commercial/office to the east and would experience a vibration level of up to 73 VdB (0.017 PPV [in/sec]). This vibration level would not result in community annoyance because the vibration level would not exceed the FTA's community annoyance threshold of 78 VdB for daytime residences and the church, which would have similar vibration sensitivity as daytime residences. Also, this vibration level would not result in community annoyance because the vibration level would not exceed the FTA's community annoyance threshold of 84 VdB for the commercial/office building. In addition, this vibration level would not have the potential to affect the residential buildings to the west, the church building to the south, and commercial/office buildings to the east because vibration levels would not exceed the FTA vibration damage threshold of 94 VdB (0.2 PPV [in/sec]) for buildings constructed equivalent to non-engineered timber and masonry. Other nearby buildings are farther away and would experience lower vibration levels. Therefore, no construction vibration impacts would occur, and no vibration reduction measures are required.

Table K: Summary of Construction Vibration Levels

Land Use	Direction	Equipment/Activity	Reference Vibration Level at 25 ft		Distance to Structure (ft)	Maximum Vibration Level	
			VdB	PPV (in/sec)		VdB	PPV (in/sec)
Residence	North	Large Bulldozer	87	0.089	445	49	0.001
		Loaded Truck	86	0.076	445	48	0.001
Residence	East	Large Bulldozer	87	0.089	95	70	0.012
		Loaded Truck	86	0.076	95	69	0.010
Residence (Assisted Living)	East	Large Bulldozer	87	0.089	100	69	0.011
		Loaded Truck	86	0.076	100	68	0.010
Commercial/ Office	East	Large Bulldozer	87	0.089	140	65	0.007
		Loaded Truck	86	0.076	140	64	0.006
Church	South	Large Bulldozer	87	0.089	75	73	0.017
		Loaded Truck	86	0.076	75	72	0.015
Residence	West	Large Bulldozer	87	0.089	80	72	0.016
		Loaded Truck	86	0.076	80	71	0.013

Source: Compiled by LSA (2021).
Note: The FTA-recommended building damage threshold is 0.2 PPV (in/sec) for buildings constructed of non-engineered timber and masonry.
Ft = foot/feet
FTA = Federal Transit Administration
in/sec = inches per second
PPV = peak particle velocity
VdB = vibration velocity decibels

Long-Term Aircraft Noise Impacts

As discussed above, French Valley Airport is a public airport that is 8.7 mi southeast of the project site. Also, Perris Valley Airport is a private airport that is 4.9 mi north of the project site. The airport noise

contour for both the French Valley Airport and Perris Valley Airport in the *Riverside County Airport Land Use Compatibility Plan* (RCALUC 2004) show that the project site is outside the 55 dBA CNEL noise contour. Therefore, the project would not expose people residing or working in the project area to excessive noise levels.

Long-Term Traffic Noise Impacts

The guidelines included in the *FHWA Highway Traffic Noise Prediction Model* (FHWA 1977) (FHWA RD-77-108) were used to evaluate highway traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. The existing (2021) and opening year cumulative (2023) ADT volumes were obtained from the project's traffic study (LSA 2021a). The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Tables L and M show the existing (2021) and the opening year cumulative (2023) traffic noise levels without and with the project along roadways in the project vicinity. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Attachment D provides the specific assumptions used in developing these noise levels and model printouts.

Tables L and M show that the project-related traffic noise would increase by up to 0.4 dBA. A noise increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, no traffic noise impacts from project-related traffic on off-site sensitive receptors would occur. No noise reduction measures are required.

Long-Term Stationary Noise Impacts

Heating, Ventilation, and Air Conditioning Equipment

The project would include a ground-floor heating, ventilation, and air conditioning (HVAC) unit for each residential dwelling unit. The HVAC equipment could operate 24 hours per day. Each residential HVAC unit would generate a noise level of 43.0 dBA at 50 ft. Section 9.215.060(B)(10) of the City's Development Code (City of Menifee 2021a) exempts sound emanating from heating and air conditioning equipment in proper repair. Therefore, no noise impacts from on-site HVAC equipment would occur. No noise reduction measures are required.

Long-Term Vibration Impacts

The project would not generate vibration. In addition, vibration levels generated from project-related traffic on the adjacent roadways (Bradley Road and Newport Road) are exempt based on Section 9.215.070 of the City's Development Code. Therefore, no vibration impacts from project-related operations would occur, and no vibration reduction measures are required.

Table L: Existing (2021) Traffic Noise Levels Without and With Project

Roadway Segment	Without Project Traffic Conditions					With Project Traffic Conditions					
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase from Baseline Conditions (dBA)
Bradley Road between Rio Vista Drive and Lazy Creek Road	16,874	< 50	106	227	68.4	18,370	54	112	240	68.8	0.4
Bradley Road between Lazy Creek Road and Park Avenue	17,989	53	111	237	68.7	19,391	55	116	249	69.0	0.3
Bradley Road between Park Avenue and Newport Road	18,775	54	114	244	68.9	20,177	57	119	256	69.2	0.3
Newport Road between Bradley Road and Calle Tomas	47,911	123	254	542	72.5	48,939	125	258	550	72.5	0.0
Newport Road between Calle Tomas and Avenida De Cortez/Town Center Drive	47,784	123	254	542	72.4	48,812	124	257	549	72.5	0.1
Newport Road between Avenida De Cortez/Town Center Drive and Haun Road	54,834	134	278	593	72.9	55,768	135	281	600	73.0	0.1
Newport Road between Haun Road and I-215 Southbound Ramps	73,055	162	336	718	73.8	73,897	163	339	723	73.8	0.0

Source: Compiled by LSA (2021).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
ft = foot/feet
I-215 = Interstate 215

Table M: Opening Year Cumulative (2023) Traffic Noise Levels Without and With Project

Roadway Segment	Without Project Traffic Conditions					With Project Traffic Conditions					
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase from Baseline Conditions (dBA)
Bradley Road between Rio Vista Drive and Lazy Creek Road	19,095	55	115	247	68.9	20,591	58	121	259	69.3	0.4
Bradley Road between Lazy Creek Road and Park Avenue	20,655	58	121	260	69.3	22,057	60	127	271	69.6	0.3
Bradley Road between Park Avenue and Newport Road	24,743	65	137	293	70.1	26,145	67	142	304	70.3	0.2
Newport Road between Bradley Road and Calle Tomas	59,932	141	294	629	73.4	60,960	142	298	637	73.5	0.1
Newport Road between Calle Tomas and Avenida De Cortez/Town Center Drive	60,296	141	295	632	73.5	61,324	143	299	639	73.5	0.0
Newport Road between Avenida De Cortez/Town Center Drive and Haun Road	68,739	154	322	689	73.9	69,673	155	325	696	74.0	0.1
Newport Road between Haun Road and I-215 Southbound Ramps	89,195	183	383	820	74.6	90,037	184	385	825	74.7	0.1

Source: Compiled by LSA (2021).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
ft = foot/feet
I-215 = Interstate 215

BEST CONSTRUCTION PRACTICES

The following best construction practices would be consistent with the City's requirements outlined in Section 9.215.060(B)(10) of the City's Development Code and would further minimize construction noise:

- The construction contractor shall limit construction activities to between the hours of 6:30 a.m. and 7:00 p.m. on Monday through Saturday. No construction shall be permitted outside these hours, on Sunday, or on nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.
- During all project site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and most noise-sensitive receptors nearest the project site during all project construction.
- The construction contractor shall place all stationary construction equipment so that the emitted noise is directed away from the sensitive receptors nearest the project site.

REDUCTION MEASURES

Short-Term Construction Noise Impacts

No noise reduction measures are required.

Short-Term Construction Vibration Impacts

No vibration reduction measures are required.

Aircraft Noise Impacts

No noise reduction measures are required.

Traffic Noise Impacts

No noise reduction measures are required.

Long-Term Stationary Noise Impacts

No noise reduction measures are required.

Long-Term Vibration Impacts

No vibration reduction measures are required.

Attachments: A: References
B: Figures 1 through 3
C: Noise Monitoring Results
D: FHWA Traffic Noise Model Printouts

ATTACHMENT A

REFERENCES

City of Menifee. 2013. General Plan Noise Element. Website: https://www.cityofmenifee.us/228/Noise-Element (accessed December 2021)

_____. 2021a. Development Code.

_____. 2021b. Municipal Code. April.

Federal Highway Administration (FHWA). 1977. *FHWA Highway Traffic Noise Prediction Model*. FHWA-RD-77-108.

_____. 2006. *FHWA Highway Construction Noise Handbook*. Roadway Construction Noise Model. FHWA-HEP-06-015. DOT-VNTSC-FHWA-06-02. NTIS No. PB2006-109012. August.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. September. Website: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf (accessed December 2021).

Harris, Cyril M., editor. 1991. *Handbook of Acoustical Measurements and Noise Control*. 3rd ed.

LSA Associates, Inc. 2021a. Traffic Study for the River Walk Village Project. December.

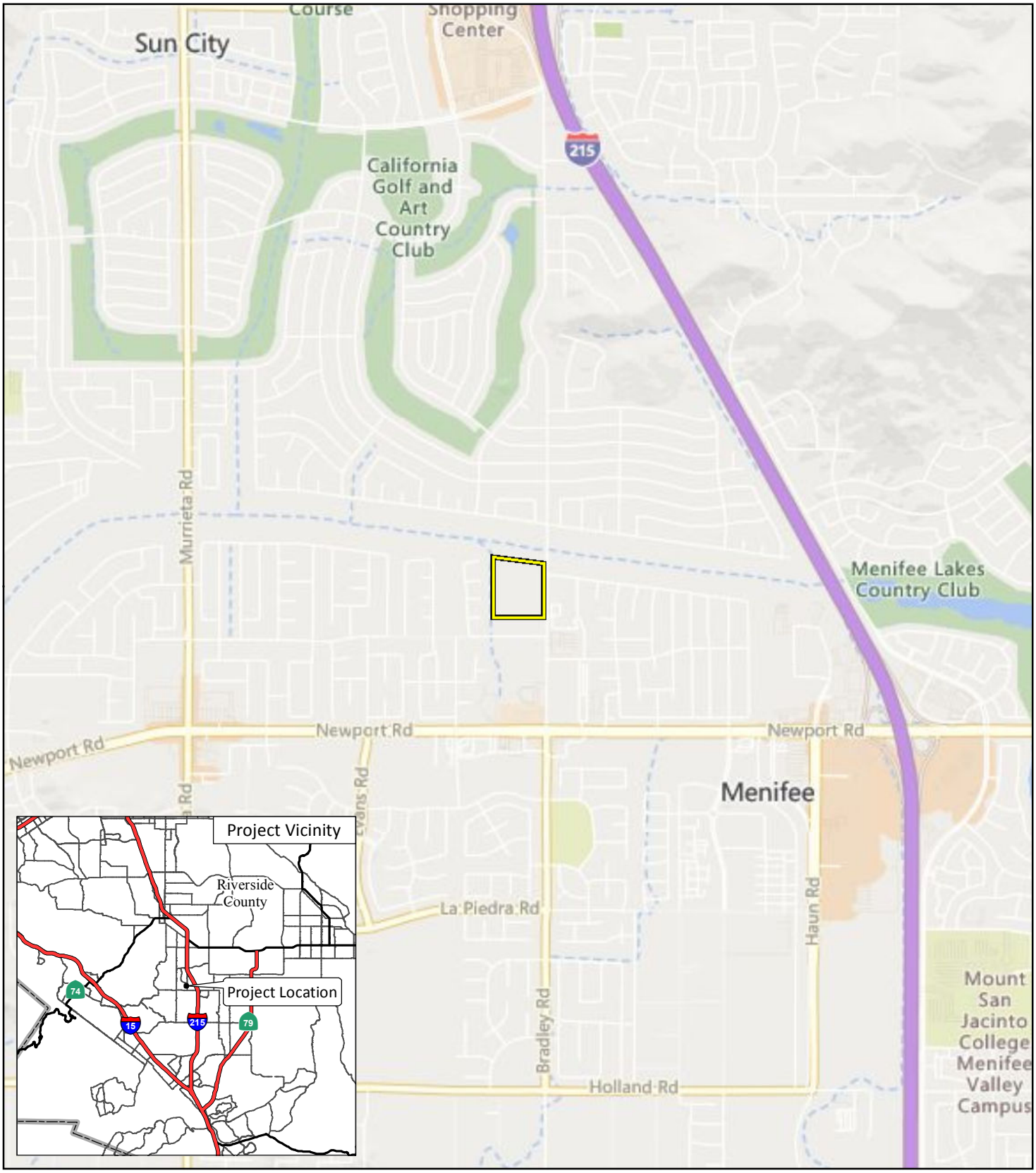
_____. 2021b. Air Quality and Greenhouse Gas Emissions Analysis for the River Walk Village Project. December.

Riverside County Airport Land Use Commission (RCALUC). 2004. *Riverside County Airport Land Use Compatibility Plan.* October 14. Website: http://www.rcaluc.org/Plans/New-Compatibility-Plan (accessed December 2021).

ATTACHMENT B

FIGURES 1 THROUGH 3

Figure 1: Regional and Project Location
Figure 2: Conceptual Site Plan
Figure 3: Noise Monitoring Locations



LSA

LEGEND

Project Location

FIGURE 1

0 1000 2000

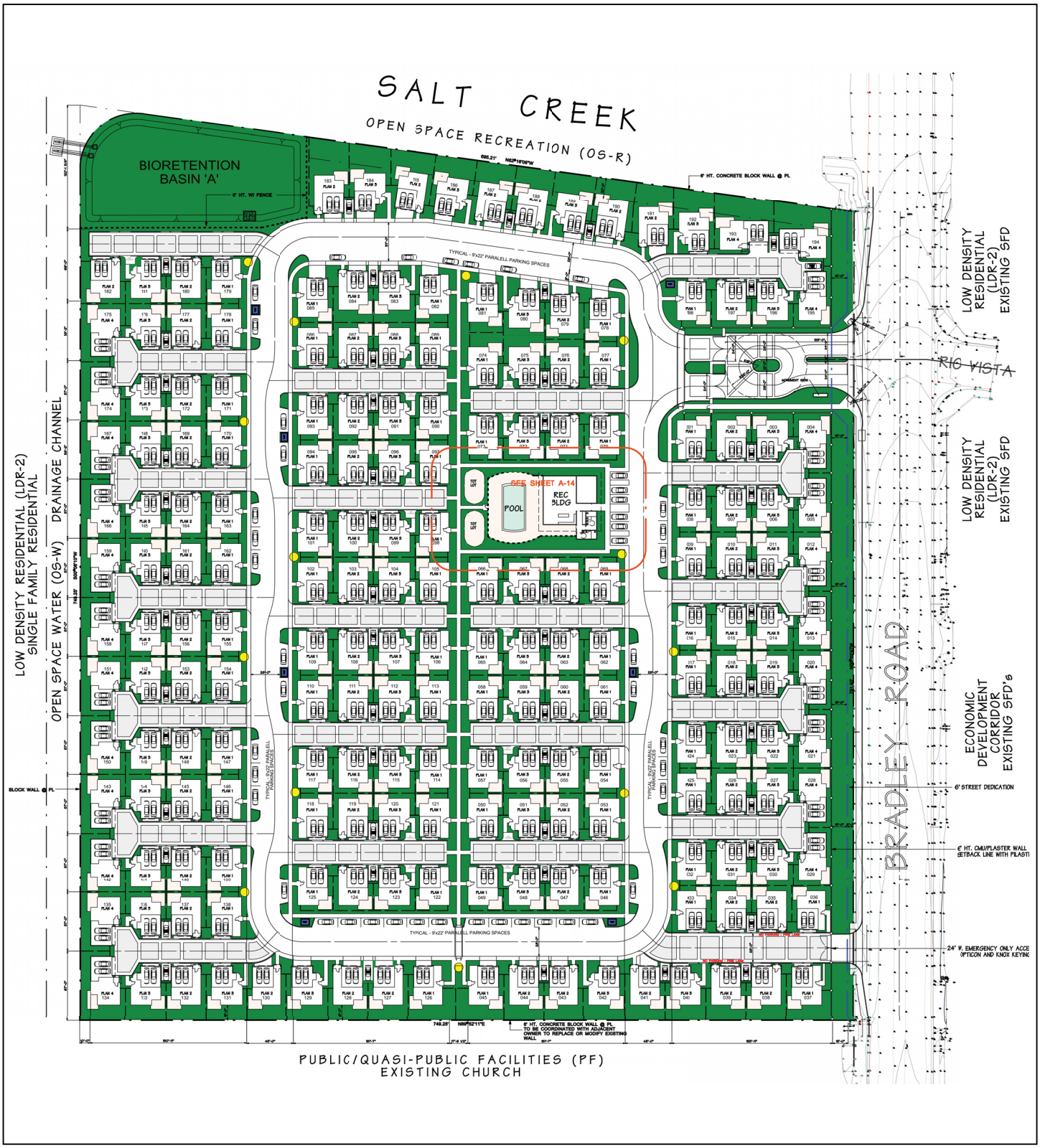
FEET

SOURCE: Bing (2020)

I:\CIM2105\GIS\MXD\Noise\ProjLoc_Noise.mxd (12/27/2021)

River Walk Village

Regional and Project Location



LSA

FIGURE 2

N

0 66 132

FEET

River Walk Village

Conceptual Site Plan

SOURCE: Randy Morris Architect, October 2021

I:\CIM2105\G\SitePlan.ai (12/23/2021)

LSA

LEGEND

- Project Site Boundary
- ST-1 - Short-Term Noise Monitoring Location
- LT-1 - Long-Term Noise Monitoring Location

FIGURE 3

N

0 100 200

FEET

SOURCE: Google Earth 2021

I:\CIM2105\G\Noise_Locs.ai (10/15/2021)

River Walk Village

Noise Monitoring Locations

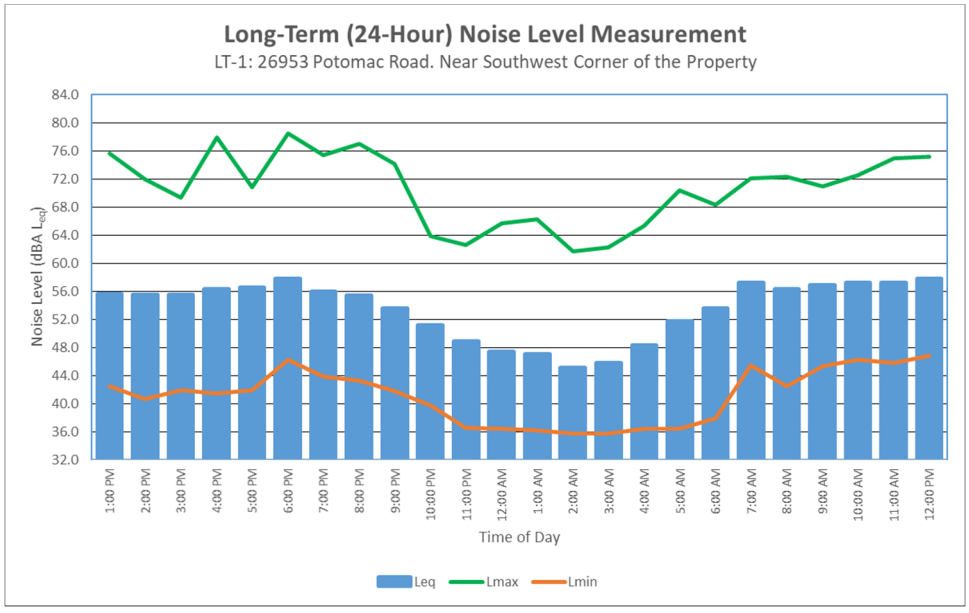
ATTACHMENT C

NOISE MONITORING RESULTS

Long-Term (24-Hour) Noise Level Measurement Results at LT-1

	Start Time	Date	Noise Level (dBA)		
			L_{eq}	L_{max}	L_{min}
1	1:00 PM	10/6/21	55.6	75.6	42.5
2	2:00 PM	10/6/21	55.5	72.0	40.7
3	3:00 PM	10/6/21	55.5	69.3	41.9
4	4:00 PM	10/6/21	56.3	77.9	41.4
5	5:00 PM	10/6/21	56.5	70.8	41.9
6	6:00 PM	10/6/21	57.8	78.5	46.3
7	7:00 PM	10/6/21	55.9	75.4	43.9
8	8:00 PM	10/6/21	55.4	77.0	43.3
9	9:00 PM	10/6/21	53.5	74.1	41.8
10	10:00 PM	10/6/21	51.2	63.9	39.7
11	11:00 PM	10/7/21	48.9	62.6	36.5
12	12:00 AM	10/7/21	47.4	65.7	36.4
13	1:00 AM	10/7/21	47.0	66.2	36.2
14	2:00 AM	10/7/21	45.1	61.7	35.7
15	3:00 AM	10/7/21	45.8	62.2	35.8
16	4:00 AM	10/7/21	48.3	65.3	36.4
17	5:00 AM	10/7/21	51.7	70.3	36.4
18	6:00 AM	10/7/21	53.6	68.3	37.9
19	7:00 AM	10/7/21	57.2	72.1	45.5
20	8:00 AM	10/7/21	56.3	72.3	42.5
21	9:00 AM	10/7/21	56.9	70.9	45.3
22	10:00 AM	10/7/21	57.2	72.5	46.2
23	11:00 AM	10/7/21	57.3	74.9	45.8
24	12:00 PM	10/7/21	57.8	75.2	46.8

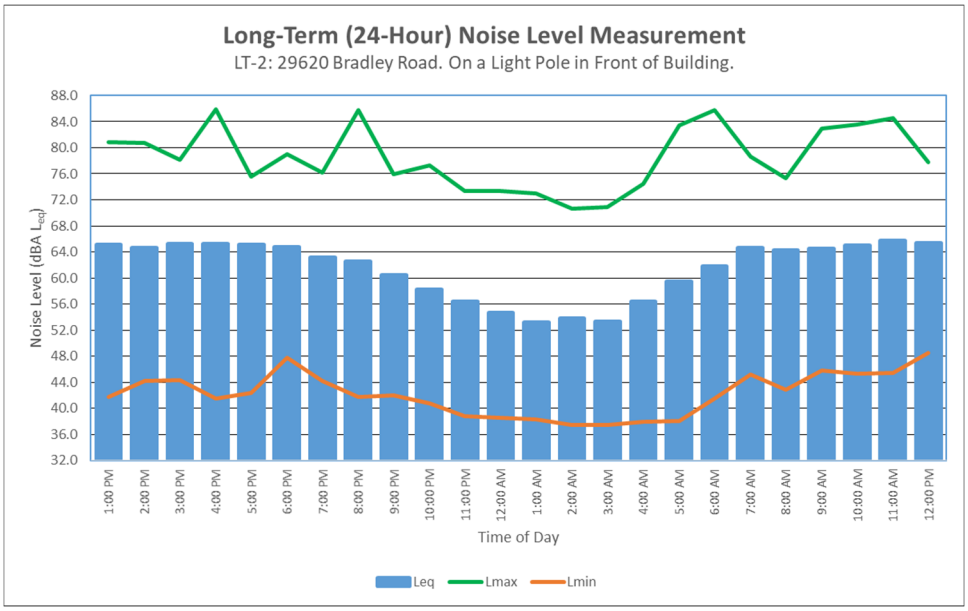
Source: Compiled by LSA Associates, Inc. (2021).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



Long-Term (24-Hour) Noise Level Measurement Results at LT-2

	Start Time	Date	Noise Level (dBA)		
			L_{eq}	L_{max}	L_{min}
1	1:00 PM	10/6/21	65.1	80.8	41.7
2	2:00 PM	10/6/21	64.6	80.7	44.2
3	3:00 PM	10/6/21	65.2	78.2	44.3
4	4:00 PM	10/6/21	65.2	85.9	41.5
5	5:00 PM	10/6/21	65.1	75.6	42.4
6	6:00 PM	10/6/21	64.8	79.0	47.8
7	7:00 PM	10/6/21	63.1	76.2	44.2
8	8:00 PM	10/6/21	62.5	85.8	41.8
9	9:00 PM	10/6/21	60.4	75.9	42.0
10	10:00 PM	10/6/21	58.2	77.3	40.7
11	11:00 PM	10/7/21	56.4	73.4	38.8
12	12:00 AM	10/7/21	54.7	73.4	38.5
13	1:00 AM	10/7/21	53.2	73.0	38.3
14	2:00 AM	10/7/21	53.7	70.6	37.4
15	3:00 AM	10/7/21	53.3	70.9	37.4
16	4:00 AM	10/7/21	56.3	74.5	37.9
17	5:00 AM	10/7/21	59.4	83.5	38.1
18	6:00 AM	10/7/21	61.8	85.8	41.5
19	7:00 AM	10/7/21	64.7	78.6	45.2
20	8:00 AM	10/7/21	64.2	75.3	42.9
21	9:00 AM	10/7/21	64.6	83.0	45.8
22	10:00 AM	10/7/21	65.0	83.6	45.3
23	11:00 AM	10/7/21	65.7	84.5	45.4
24	12:00 PM	10/7/21	65.3	77.8	48.5

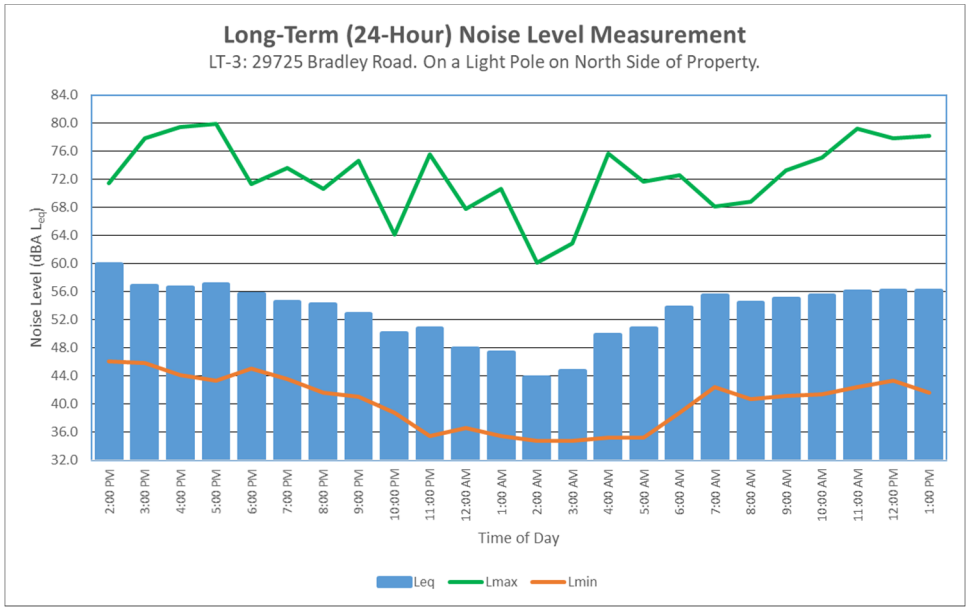
Source: Compiled by LSA Associates, Inc. (2021).
dBA = A-weighted decibel
L_{max} = maximum instantaneous noise level
L_{eq} = equivalent continuous sound level
L_{min} = minimum measured sound level



Long-Term (24-Hour) Noise Level Measurement Results at LT-3

	Start Time	Date	Noise Level (dBA)		
			L_{eq}	L_{max}	L_{min}
1	2:00 PM	10/6/21	59.9	71.5	46.1
2	3:00 PM	10/6/21	56.8	77.8	45.9
3	4:00 PM	10/6/21	56.6	79.4	44.1
4	5:00 PM	10/6/21	57.0	79.9	43.4
5	6:00 PM	10/6/21	55.7	71.3	45.1
6	7:00 PM	10/6/21	54.5	73.6	43.6
7	8:00 PM	10/6/21	54.2	70.6	41.7
8	9:00 PM	10/6/21	52.8	74.7	41.1
9	10:00 PM	10/6/21	50.1	64.1	38.8
10	11:00 PM	10/6/21	50.8	75.6	35.5
11	12:00 AM	10/7/21	47.9	67.8	36.6
12	1:00 AM	10/7/21	47.4	70.6	35.5
13	2:00 AM	10/7/21	43.8	60.1	34.8
14	3:00 AM	10/7/21	44.7	62.9	34.8
15	4:00 AM	10/7/21	49.9	75.7	35.3
16	5:00 AM	10/7/21	50.8	71.7	35.3
17	6:00 AM	10/7/21	53.7	72.6	38.8
18	7:00 AM	10/7/21	55.5	68.1	42.4
19	8:00 AM	10/7/21	54.4	68.8	40.7
20	9:00 AM	10/7/21	55.0	73.3	41.2
21	10:00 AM	10/7/21	55.5	75.1	41.4
22	11:00 AM	10/7/21	56.0	79.2	42.5
23	12:00 PM	10/7/21	56.2	77.8	43.4
24	1:00 PM	10/7/21	56.2	78.2	41.6

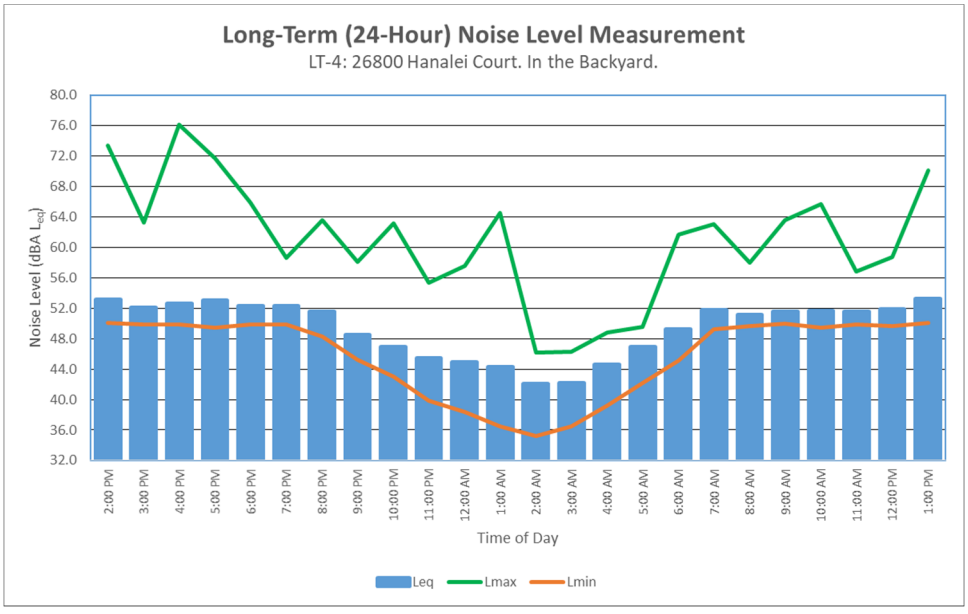
Source: Compiled by LSA Associates, Inc. (2021).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



Long-Term (24-Hour) Noise Level Measurement Results at LT-4

	Start Time	Date	Noise Level (dBA)		
			L_{eq}	L_{max}	L_{min}
1	2:00 PM	10/6/21	53.1	73.4	50.1
2	3:00 PM	10/6/21	52.1	63.3	49.9
3	4:00 PM	10/6/21	52.6	76.1	49.9
4	5:00 PM	10/6/21	53.0	71.7	49.4
5	6:00 PM	10/6/21	52.3	65.9	49.9
6	7:00 PM	10/6/21	52.3	58.6	49.9
7	8:00 PM	10/6/21	51.6	63.6	48.3
8	9:00 PM	10/6/21	48.5	58.1	45.2
9	10:00 PM	10/6/21	46.9	63.1	43.0
10	11:00 PM	10/6/21	45.5	55.3	39.8
11	12:00 AM	10/7/21	44.9	57.6	38.4
12	1:00 AM	10/7/21	44.2	64.5	36.5
13	2:00 AM	10/7/21	42.1	46.2	35.2
14	3:00 AM	10/7/21	42.1	46.3	36.5
15	4:00 AM	10/7/21	44.6	48.8	39.2
16	5:00 AM	10/7/21	46.9	49.6	42.2
17	6:00 AM	10/7/21	49.2	61.7	45.1
18	7:00 AM	10/7/21	51.7	63.0	49.2
19	8:00 AM	10/7/21	51.1	58.0	49.7
20	9:00 AM	10/7/21	51.6	63.6	50.0
21	10:00 AM	10/7/21	51.6	65.7	49.4
22	11:00 AM	10/7/21	51.6	56.8	49.9
23	12:00 PM	10/7/21	51.9	58.7	49.7
24	1:00 PM	10/7/21	53.2	70.1	50.1

Source: Compiled by LSA Associates, Inc. (2021).
dBA = A-weighted decibel
L_{max} = maximum instantaneous noise level
L_{eq} = equivalent continuous sound level
L_{min} = minimum measured sound level



ATTACHMENT D

FHWA TRAFFIC NOISE MODEL PRINTOUTS

TABLE Existing 2021-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Rio Vista Drive and Lazy Creek Road
NOTES: River Walk Village Project - Existing 2021

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 16874 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.40

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	106.2	227.2	488.6

TABLE Existing 2021-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Lazy Creek Road and Park Avenue
NOTES: River Walk Village Project - Existing 2021

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 17989 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.68

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
52.9	110.7	237.0	509.8

TABLE Existing 2021-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Park Avenue and Newport Road
NOTES: River Walk Village Project - Existing 2021

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18775 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.87

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
54.3	113.9	243.8	524.5

TABLE Existing 2021-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Bradley Road and Calle Tomas
NOTES: River Walk Village Project - Existing 2021

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 47911 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
123.0	254.2	542.5	1166.1

TABLE Existing 2021-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Calle Tomas and Avenida De Cortez/Town Center Drive
NOTES: River Walk Village Project - Existing 2021

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 47784 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.45

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
122.8	253.8	541.5	1164.1

TABLE Existing 2021-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Avenida De Cortez/Town Center Drive and Haun Road
NOTES: River Walk Village Project - Existing 2021

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 54834 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 41 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.94

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
134.0	277.8	593.3	1275.6

TABLE Existing 2021-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Haun Road and I-215 Southbound Ramps
NOTES: River Walk Village Project - Existing 2021

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 73055 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 50 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.77

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	162.3	336.2	717.9	1543.5

TABLE Existing 2021 With Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Rio Vista Drive and Lazy Creek Road
NOTES: River Walk Village Project - Existing 2021 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18370 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.77

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
53.6	112.2	240.3	516.9

TABLE Existing 2021 With Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Lazy Creek Road and Park Avenue
NOTES: River Walk Village Project - Existing 2021 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 19391 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	55.4	116.3	249.1	535.9

TABLE Existing 2021 With Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Park Avenue and Newport Road
NOTES: River Walk Village Project - Existing 2021 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20177 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES			
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.18

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
56.8	119.4	255.8	550.3

TABLE Existing 2021 With Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Bradley Road and Calle Tomas
NOTES: River Walk Village Project - Existing 2021 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 48939 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.55

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
124.5	257.7	550.2	1182.7

TABLE Existing 2021 With Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Calle Tomas and Avenida De Cortez/Town Center Drive
NOTES: River Walk Village Project - Existing 2021 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 48812 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.54

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
124.3	257.3	549.2	1180.7

TABLE Existing 2021 With Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Avenida De Cortez/Town Center Drive and Haun Road
NOTES: River Walk Village Project - Existing 2021 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 55768 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 41 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.02

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
135.4	280.9	600.0	1290.1

TABLE Existing 2021 With Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Haun Road and I-215 Southbound Ramps
NOTES: River Walk Village Project - Existing 2021 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 73897 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 50 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.82

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
163.4	338.7	723.4	1555.3

TABLE Cumulative 2023-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Rio Vista Drive and Lazy Creek Road
NOTES: River Walk Village Project - Cumulative 2023

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 19095 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.94

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
54.9	115.1	246.6	530.4

TABLE Cumulative 2023-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Lazy Creek Road and Park Avenue
NOTES: River Walk Village Project - Cumulative 2023

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20655 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.28

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
57.6	121.2	259.8	558.9

TABLE Cumulative 2023-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Park Avenue and Newport Road
NOTES: River Walk Village Project - Cumulative 2023

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 24743 SPEED (MPH): 45 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.07

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
64.6	136.6	292.9	630.4

TABLE Cumulative 2023-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Bradley Road and Calle Tomas
NOTES: River Walk Village Project - Cumulative 2023

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 59932 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.43

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
140.9	294.2	629.4	1353.6

TABLE Cumulative 2023-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Calle Tomas and Avenida De Cortez/Town Center Drive
NOTES: River Walk Village Project - Cumulative 2023

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 60296 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
141.4	295.4	631.9	1359.1

TABLE Cumulative 2023-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Avenida De Cortez/Town Center Drive and Haun Road
NOTES: River Walk Village Project - Cumulative 2023

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 68739 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 41 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.92

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
153.9	322.1	689.4	1482.9

TABLE Cumulative 2023-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Haun Road and I-215 Southbound Ramps
NOTES: River Walk Village Project - Cumulative 2023

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 89195 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 50 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 74.63

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
183.3	383.1	819.6	1762.9

TABLE Cumulative 2023 With Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Rio Vista Drive and Lazy Creek Road
NOTES: River Walk Village Project - Cumulative 2023 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20591 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.27

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
57.5	121.0	259.2	557.8

TABLE Cumulative 2023 With Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Lazy Creek Road and Park Avenue
NOTES: River Walk Village Project - Cumulative 2023 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 22057 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.57

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
60.1	126.6	271.4	583.9

TABLE Cumulative 2023 With Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Bradley Road between Park Avenue and Newport Road
NOTES: River Walk Village Project - Cumulative 2023 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 26145 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.30

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
66.9	141.6	303.9	654.0

TABLE Cumulative 2023 With Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Bradley Road and Calle Tomas
NOTES: River Walk Village Project - Cumulative 2023 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 60960 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.50

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
142.4	297.5	636.5	1369.0

TABLE Cumulative 2023 With Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Calle Tomas and Avenida De Cortez/Town Center Drive
NOTES: River Walk Village Project - Cumulative 2023 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 61324 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 39 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.53

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
142.9	298.7	639.0	1374.5

TABLE Cumulative 2023 With Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Avenida De Cortez/Town Center Drive and Haun Road
NOTES: River Walk Village Project - Cumulative 2023 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 69673 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 41 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 73.98

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
155.2	325.0	695.6	1496.3

TABLE Cumulative 2023 With Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/20/2021
ROADWAY SEGMENT: Newport Road between Haun Road and I-215 Southbound Ramps
NOTES: River Walk Village Project - Cumulative 2023 With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 90037 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 50 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 74.67

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
184.3	385.5	824.8	1774.0
