SOUTH OF IRIS
NOISE IMPACT ANALYSIS

City of Moreno Valley

May 19, 2022

ganddini

Traffic Engineering ● Transportation Planning ● Parking ● Noise & Vibration
Air Quality ● Global Climate Change ● Health Risk Assessment

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Project No. 19474

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EXECUTIVE SUMMARY

The purpose of this report is to provide an assessment of the noise impacts associated with development and operation of the proposed South of Iris project and to identify mitigation measures that may be necessary to reduce those impacts. The noise issues related to the proposed land use and development have been evaluated in light of applicable federal, state and local policies, including those of the City of Moreno Valley.

Although this is a technical report, effort has been made to write the report clearly and concisely. A list of acronyms and glossary are provided in Appendix A and Appendix B of this report to assist the reader with technical terms related to noise analysis.

Project Location

The approximately 9.18-acre project site is located approximately 500 feet east of Indian Street between Iris Avenue and Goya Street in the City of Moreno Valley, California. The project site is currently vacant.

Project Description

The proposed project involves construction of a single-family detached housing project with 78 dwelling units. Access to the project site would be provided by one access driveway on Iris Avenue and one access driveway on Goya Street. The project includes roadway improvements on Iris Avenue, from the project's western to eastern boundaries, and Goya Avenue, from the project's western to eastern boundaries.

Construction Impacts

Modeled unmitigated construction noise levels ranged between 46 and 79 dBA L_{eq} at the nearest sensitive receptors to the project site.

Construction noise sources are regulated within the City of Moreno Valley Municipal Code Sections 8.14.040 and 11.80.030(D)(7). Section 8.14.040 prohibits construction other than between the hours of 7:00 AM to 7:00 PM Monday through Friday, excluding holidays, and from 8:00 AM to 4:00 PM on Saturday, unless written approval is obtained from the city building official or city engineer. In addition, Section 11.80.030(D)(7) prohibits the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of 8:00 PM and 7:00 AM the following day such that the sound there from creates a noise disturbance. The Final Environmental Impact Report (FEIR) for the MoVal 2040 General Plan utilized the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2018) criteria to establish construction-related significance thresholds. Per the FTA, daytime construction noise levels should not exceed 80 dBA L_{eq} for an 8-hour period at residential uses and 85 dBA L_{eq} for an 8-hour period at commercial uses. Project construction will not exceed the FTA thresholds for either residential or commercial use and would not occur outside of the hours outlined as "exempt" in City's Municipal Code Sections 8.14.040 and 11.80.030(D)(7); and therefore, will not result in a generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

Impacts would be less than significant, and no mitigation is required.

In addition to adherence to the City of Moreno Valley Municipal Code which limits the construction hours of operation, the following best management practices will be implemented to minimize construction noise, emanating from the proposed project:

Construction Noise - Best Management Practices

1. All construction equipment whether fixed or mobile, will be equipped with properly operating and maintained mufflers, consistent with manufacturer standards.
2. All stationary construction equipment will be placed so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. As applicable, all equipment shall be shut off when not in use.

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/vibration sources and existing sensitive receptors.

5. Jackhammers, pneumatic equipment, and all other portable stationary noise sources will be directed away and shielded from existing residences in the vicinity of the project site. Either one-inch plywood or sound blankets can be utilized for this purpose. They should reach up from the ground and block the line of sight between equipment and existing residences. The shielding should be without holes and cracks.

6. No amplified music and/or voice will be allowed on the project site.

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per Sections 8.14.040 and 11.80.030(D)(7) of the City of Moreno Valley's Municipal Code.

Noise Impacts to Off-Site Receptors Due to Project Generated Trips

The roadway noise level increases from project generated vehicular traffic were modeled utilizing a computer program that replicates the FHWA Traffic Noise Prediction Model FHWA-RD-77-108.

Project generated vehicle trips are anticipated to increase roadway noise between approximately 0.2 to 2 dBA CNEL along modeled roadway segments. Therefore, a change in noise level would not be audible and would be considered less than significant.

Traffic Noise Impacts to the Proposed Project

The City of Moreno Valley General Plan identifies exterior noise levels up to 65 dBA CNEL as normally acceptable and up to 70 dBA as conditionally acceptable for single-family residential uses. The State of California Building Code sets forth an interior noise standard of 45 dBA CNEL.

Future traffic noise levels associated with Iris Avenue are expected to reach up to 74 dBA CNEL at the proposed residential dwelling units and homes proposed with facades facing Iris Avenue, exceeding the "normally acceptable" noise standard of 65 dBA CNEL. Typical residential construction provides approximately 20 dB of exterior to interior noise reduction. The following best management practice will be implemented to ensure that interior noise levels do not exceed 45 dBA CNEL.

Transportation Noise Impacts – Best Management Practices

Upgraded windows and sliding glass doors with an STC level of at least 32 will be installed in the north facing facades of the first row of homes windows and sliding glass doors with an STC of at least 27 will be installed in the west facing façade of the most northwestern residential building and in the east facing façade of the most northeastern residential building. Impacts would be less than significant.

Construction Vibration Impacts: Architectural Damage

The FTA identifies a risk to "architectural" damage to reinforced-concrete, steel or timber (no plaster) buildings as a peak particle velocity (PPV) of 0.5, at engineered concrete and masonry (no plaster) buildings as a PPV of

0.3, at non-engineered timber and masonry buildings as a PPV of 0.2 and at buildings extremely susceptible to vibration damage as a PPV of 0.1. Therefore, impacts would be significant if construction activities result in groundborne vibration of 0.2 PPV or higher at residential structures and/or a PPV of 0.3 or higher at commercial structures. There are existing residential dwelling units as close as approximately 5 feet to the east and 110 feet to the west and church buildings as close as approximately 35 feet to the west of the project property lines. If a vibratory roller is used within 26 feet of an existing structure or if a large bulldozer is used within 15 feet of an existing structure, there will be some potential for this equipment to result in architectural damage and significant impacts. Therefore, construction related groundborne vibration has the potential to exceed the residential threshold of 0.2 PPV in/sec at residential structures to the east of the project site. The project will implement a best management practice that limits the use of a vibratory roller within 26 feet or a large bulldozer within 15 feet of the existing structures to the east of the project site. With implementation of best management practices, temporary vibration levels associated with project construction would be less than significant.

Construction Vibration Impacts: Annoyance

The FTA identifies the thresholds for annoyance due to vibration as 72 VdB at offsite residential sensitive uses and 75 VdB for offsite church sensitive uses. These thresholds could theoretically be exceeded at existing residential receptors to the east and west and church structures to the west of the project site, and residents may be temporarily annoyed. However, perceptibility of construction vibration would be temporary and would only occur while vibratory equipment is utilized within 150 feet of the existing structures. Furthermore, this impact would only occur during daytime hours and will be temporary. This impact would be less than significant. No mitigation is required.

Groundborne Vibration - Best Management Practice

1. A best management practice limiting the use of a vibratory roller within 26 feet or a large bulldozer within 15 feet of the existing residential structures to the east of the project site will be implemented to avoid significant impacts.

1. INTRODUCTION

This section describes the purpose of this noise impact analysis, project location, proposed development, and study area. Figure 1 shows the project location map and Figure 2 illustrates the project site plan.

PURPOSE AND OBJECTIVES

The purpose of this report is to provide an assessment of the noise impacts resulting from development of the proposed Canyon Ranch project and to identify mitigation measures that may be necessary to reduce those impacts. The noise issues related to the proposed land use and development have been evaluated in light of applicable federal, state and local policies, including those of the City of Moreno Valley.

Although this is a technical report, effort has been made to write the report clearly and concisely. A list of acronyms and glossary are provided in Appendix A and Appendix B of this report to assist the reader with technical terms related to noise analysis.

PROJECT LOCATION

The approximately 9.18-acre project site is located approximately 500 feet east of Indian Street between Iris Avenue and Goya Street in the City of Moreno Valley, California. The project site is currently vacant.

PROJECT DESCRIPTION

The proposed project involves construction of a single-family detached housing project with 78 dwelling units. Access to the project site would be provided by one access driveway on Iris Avenue and one access driveway on Goya Street. The project includes roadway improvements on Iris Avenue, from the project's western to eastern boundaries, and Goya Avenue, from the project's western to eastern boundaries.

The following best management practices related to noise and groundborne vibration will be added to project plans and implemented as part of the proposed project.

Construction Noise - Best Management Practices

1. All construction equipment whether fixed or mobile, will be equipped with properly operating and maintained mufflers, consistent with manufacturer standards.

2. All stationary construction equipment will be placed so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. As applicable, all equipment shall be shut off when not in use.

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/vibration sources and existing sensitive receptors.

5. Jackhammers, pneumatic equipment, and all other portable stationary noise sources will be directed away and shielded from existing residences in the vicinity of the project site. Either one-inch plywood or sound blankets can be utilized for this purpose. They should reach up from the ground and block the line of sight between equipment and existing residences. The shielding should be without holes and cracks.

6. No amplified music and/or voice will be allowed on the project site.

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per Sections 8.14.040 and 11.80.030(D)(7) of the City of Moreno Valley's Municipal Code.

Groundborne Vibration - Best Management Practice

1. A best management practice limiting the use of a vibratory roller within 26 feet or a large bulldozer within 15 feet of the existing residential structures to the east of the project site will be implemented to avoid significant impacts.

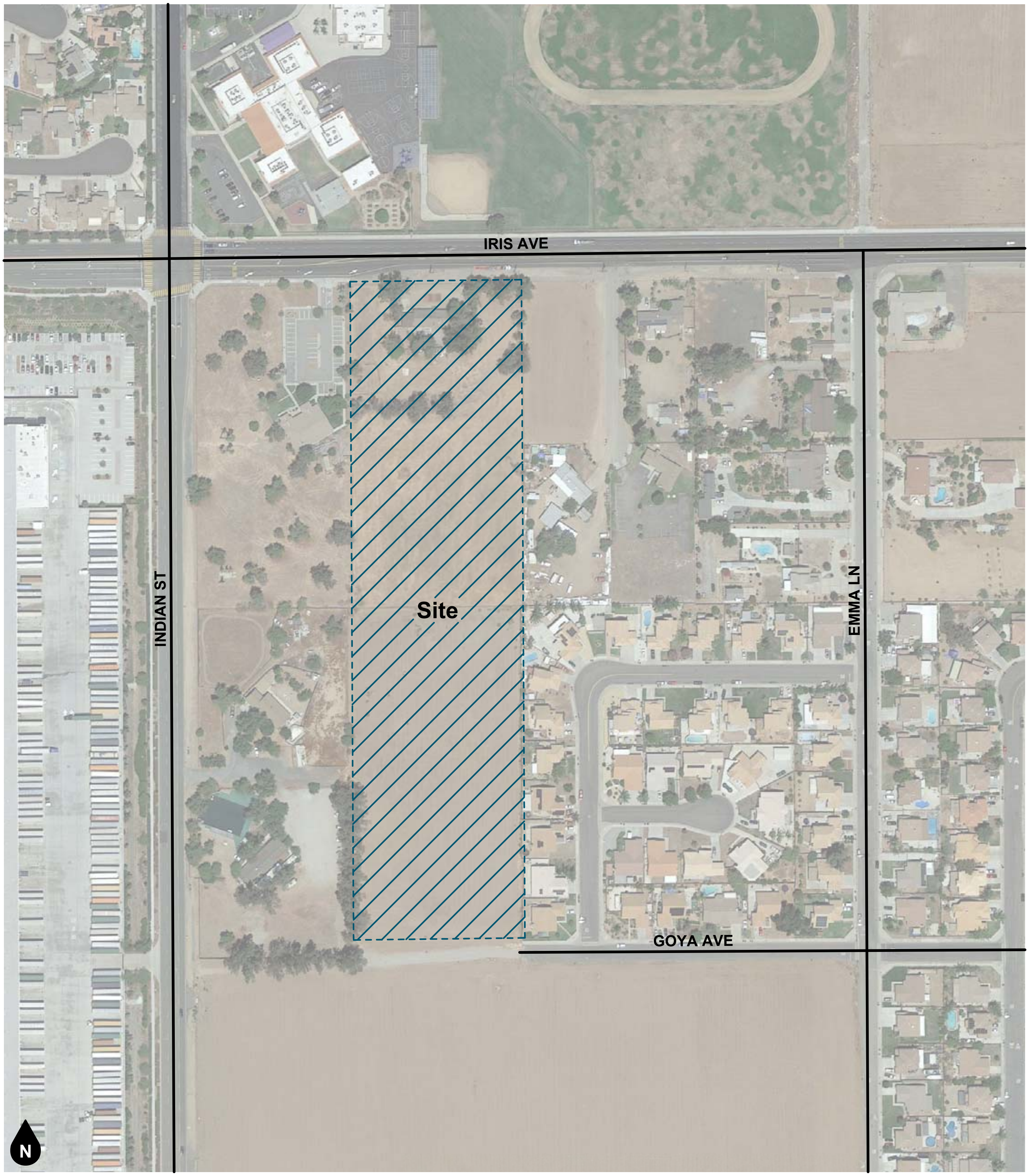


Figure 1
Project Location Map

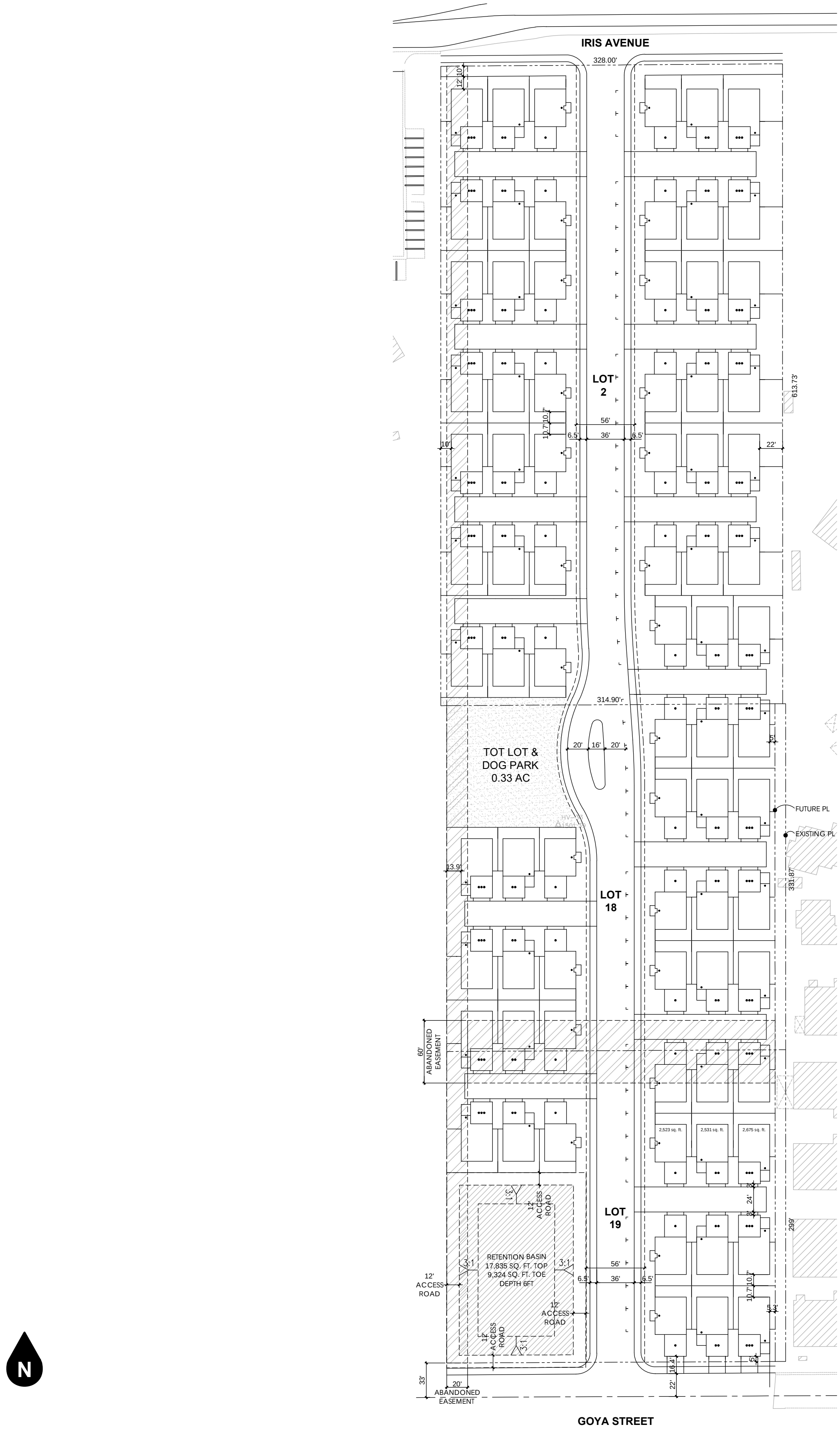


Figure 2
Site Plan

2. NOISE AND VIBRATION FUNDAMENTALS

NOISE FUNDAMENTALS

Sound is a pressure wave created by a moving or vibrating source that travels through an elastic medium such as air. Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in extreme circumstances, hearing impairment.

Commonly used noise terms are presented in Appendix B. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the "A-weighted" noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A-weighted measurements are written dB(A) or dBA.

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiates uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as a doubled traffic volume, would increase the noise levels by 3 dBA; halving of the energy would result in a 3 dBA decrease. Figure 3 shows the relationship of various noise levels to commonly experienced noise events.

Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, or the equivalent noise level for that period of time. For example, $L_{eq(3\text{-}hr)}$ would represent a 3-hour average. When no period is specified, a one-hour average is assumed.

Noise standards for land use compatibility are stated in terms of the Community Noise Equivalent Level (CNEL) and the Day-Night Average Noise Level (DNL). CNEL is a 24-hour weighted average measure of community noise. CNEL is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours. DNL is a very similar 24-hour average measure that weights only the nighttime hours.

It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA; that a change of 5 dBA is readily perceptible, and that an increase (decrease) of 10 dBA sounds twice (half) as loud. This definition is recommended by the California Department of Transportation's Technical Noise Supplement to the Traffic Noise Analysis Protocol (2013).

VIBRATION FUNDAMENTALS

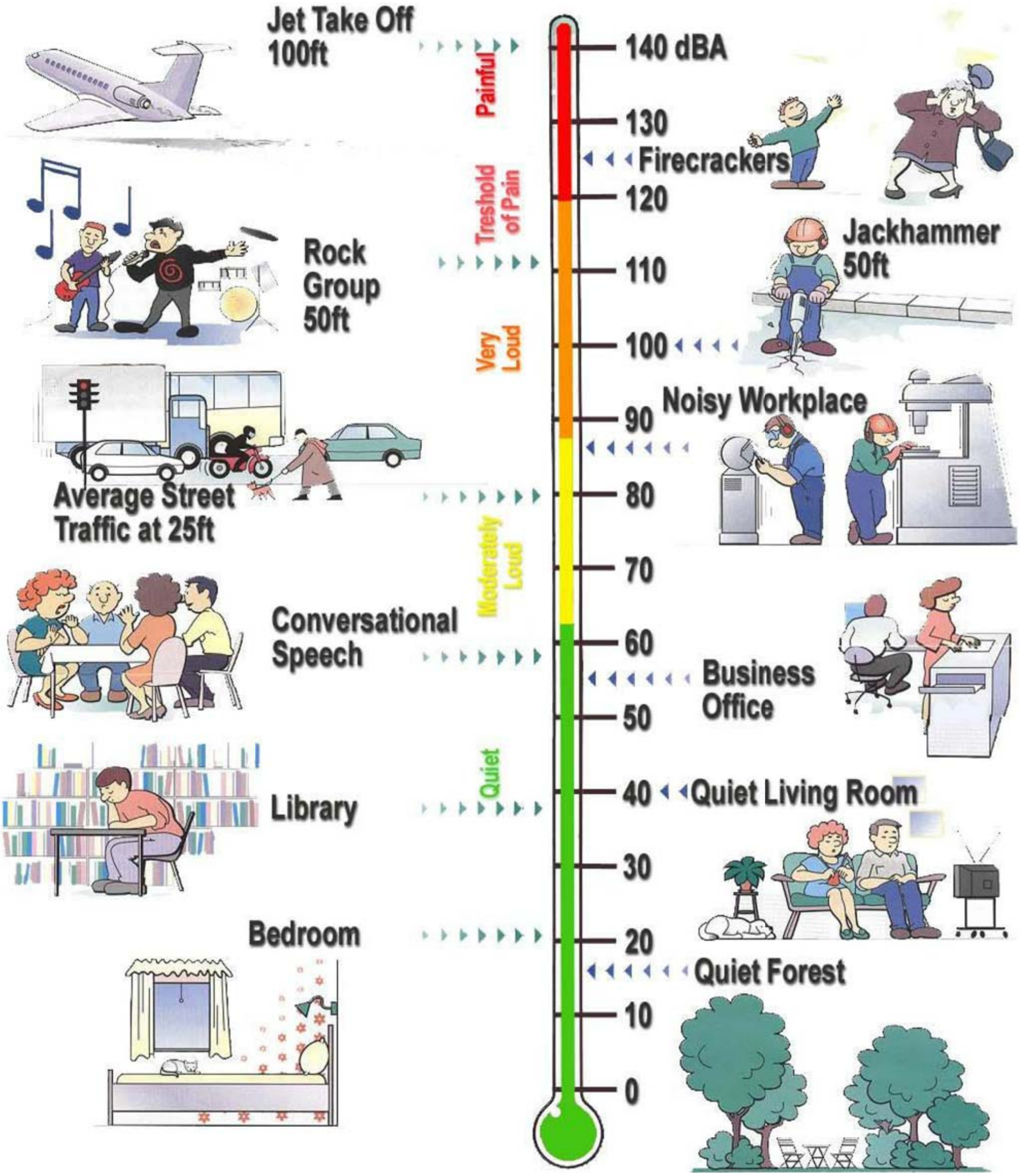
The way in which vibration is transmitted through the earth is called propagation. Propagation of earthborn vibrations is complicated and difficult to predict because of the endless variations in the soil through which waves travel. There are three main types of vibration propagation: surface, compression and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water.

Compression waves, or P-waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a “push-pull” fashion). P-waves are analogous to airborne sound waves. Shear waves, or S-waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse or “side-to-side and perpendicular to the direction of propagation”.

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and void spaces. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

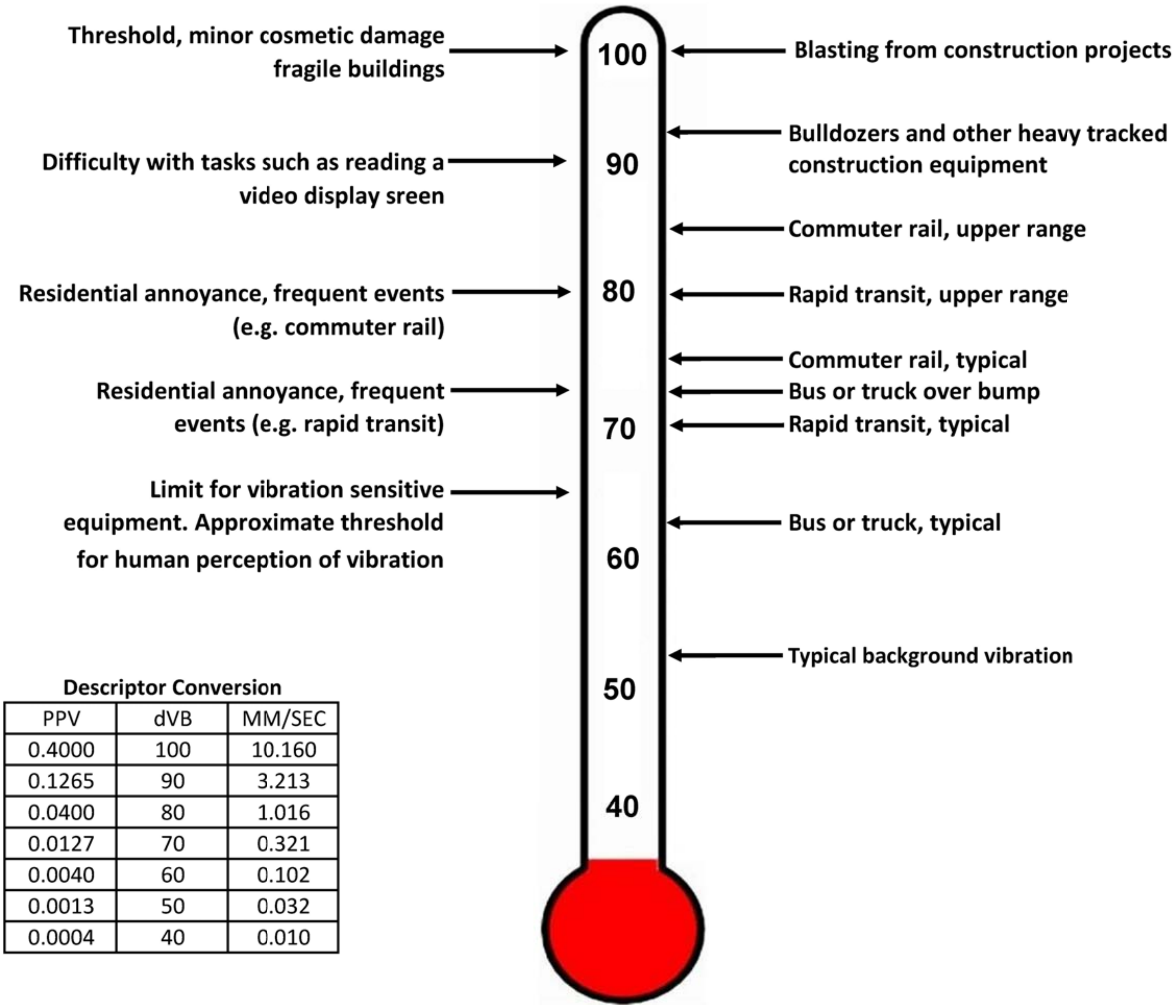
Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous peak of the vibration signal in inches per second. The RMS of a signal is the average of the squared amplitude of the signal in vibration decibels (VdB), ref one micro-inch per second. The Federal Railroad Administration uses the abbreviation “VdB” for vibration decibels to reduce the potential for confusion with sound decibel.

PPV is appropriate for evaluating the potential of building damage and VdB is commonly used to evaluate human response. Decibel notation acts to compress the range of numbers required in measuring vibration. Similar to the noise descriptors, L_{eq} and L_{max} can be used to describe the average vibration and the maximum vibration level observed during a single vibration measurement interval. Figure 4 illustrates common vibration sources and the human and structural responses to ground-borne vibration. As shown in the figure, the threshold of perception for human response is approximately 65 VdB; however, human response to vibration is not usually substantial unless the vibration exceeds 70 VdB. Vibration tolerance limits for sensitive instruments such as magnetic resonance imaging (MRI) or electron microscopes could be much lower than the human vibration perception threshold.



Source: Bruel & Kjaer 2001

Figure 3
Weighted Sound Levels in Common Environments



Descriptor Conversion

PPV	dVB	MM/SEC
0.4000	100	10.160
0.1265	90	3.213
0.0400	80	1.016
0.0127	70	0.321
0.0040	60	0.102
0.0013	50	0.032
0.0004	40	0.010

Source: FRA, 2012. Federal Railroad Administration High-Speed Ground Transportation Noise and Vibration Impact Assessment. Office of Railroad Policy Development, Washington, D.C. DOT/FRA/ORD-12/15. September.

Figure 4
Typical Levels of Groundborne Vibration

3. EXISTING NOISE ENVIRONMENT

EXISTING LAND USES AND SENSITIVE RECEPTORS

The project site is generally bordered by Iris Avenue to the north; vacant land, single-family residential uses to the east; Goya Avenue to the south; and church and single-family residential uses to the west of the project site.

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, single and multiple-family residential, including transient lodging, motels and hotel uses make up the majority of these areas. Sensitive land uses that may be affected by project noise include the existing single-family residential uses located adjacent to the east and west and approximately 197 feet to the east, 407 feet to the northwest (across Iris Avenue and Indian Street intersection), and 702 feet to the south of the project site. In addition, existing church uses are located adjacent to the west and approximately 165 feet to the east and existing school uses are located approximately 100 feet to the north (across Iris Avenue).

AMBIENT NOISE MEASUREMENTS

An American National Standards Institute (ANSI Section S1.4 2014 Class 1) Larson Davis model LxT sound level meter was used to document existing ambient noise levels. In order to document existing ambient noise levels in the project area, five (5) 15-minute daytime noise measurements were taken between 12:55 PM and 3:42 PM on May 11, 2022. Field worksheets and noise measurement output data are included in Appendix C.

As shown in Figure 5, the noise meter was placed at the following locations:

- STNM1: represents the existing noise environment of the single-family residences located to the east of the project site boundary on the western side of Smoke Tree Place (16185 Smoke Tree Place, Moreno Valley). The noise meter was placed near the eastern property line of the single-family residence on the western side of Smoke Tree Place.

- STNM2: represents the existing noise environment of the single-family residence located to the east of the project site boundary on the western side of New Light Way (16101 New Light Way, Moreno Valley). The noise meter was placed near the northeastern property line of the single-family residence near the southern terminus of New Light Way.

- STNM3: represents the existing noise environment of the school use located to the north of the project site boundary (15950 Indian Street, Moreno Valley). The noise meter was placed just north of Iris Avenue near the southern property line of the school.

- STNM4: represents the existing noise environment of the church use located to the west of the project site boundary at the southeastern corner of the intersection of Iris Avenue and Indian Street (24525 Iris Avenue, Moreno Valley). The noise meter was placed within the project site near to the eastern property line of the church use.

- STNM5: represents the existing noise environment of the single-family residential use and church use located to the west of the project site along Indian Street (16180 and 16220 Indian Street, Moreno Valley). The noise meter was placed within the southwestern corner of the project site near to the eastern property line of the church use and Goya Avenue.

Table 1 provides a summary of the short-term ambient noise data. Short-term ambient noise levels were measured between 45.1 and 68.7 dBA L_{eq}. The dominant noise source was vehicle traffic associated with Iris Avenue, Indian Street, Smoke Tree Place, and New light Way as well as residential ambiance and bird song.

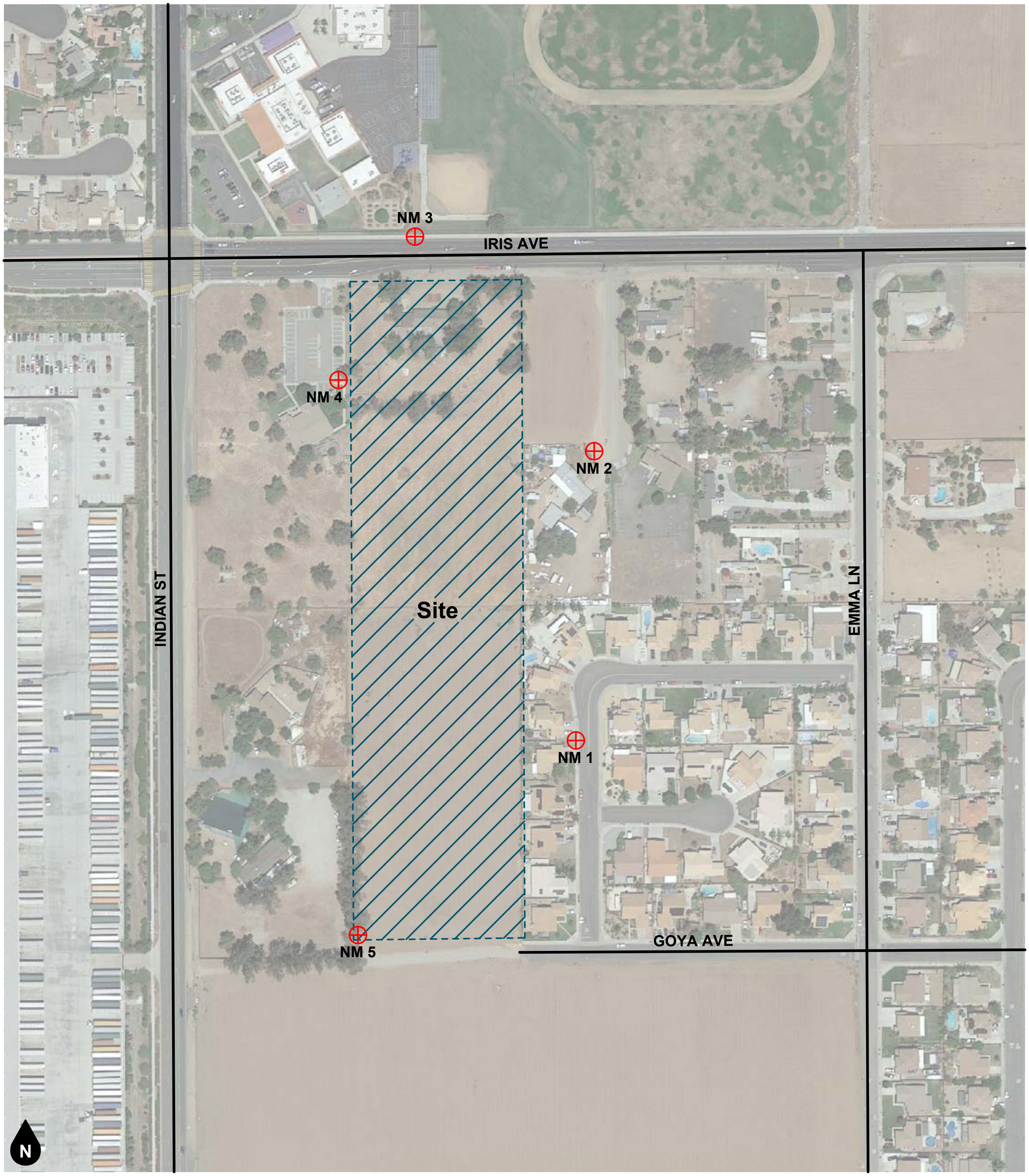
Table 1
Short-Term Noise Measurement Summary (dBA)

Daytime Measurements[1,2]								
Site Location	Time Started	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
STNM1	12:55 PM	54.4	70.0	38.8	64.7	59.9	49.8	44.9
STNM2	1:30 PM	56.9	69.7	44.6	66.5	63.2	54.7	51.3
STNM3	2:03 PM	68.7	86.3	47.1	76.2	73.8	69.1	64.3
STNM4	2:33 PM	49.1	62.4	40.1	55.7	51.9	49.7	47.3
STNM5	3:27 PM	45.1	55.0	38.8	50.1	47.8	45.7	44.3

Notes:

(1) See Figure 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.

(2) Noise measurements performed on May 11, 2022



Legend

⊕ Noise Measurement Location
NM 1

Figure 5
Noise Measurement Location Map

4. REGULATORY SETTING

FEDERAL REGULATION

Federal Noise Control Act of 1972

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In response, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Levels of Environmental Noise). The Levels of Environmental Noise recommended that the Ldn should not exceed 55 dBA outdoors or 45 dBA indoors to prevent significant activity interference and annoyance in noise-sensitive areas.

In addition, the Levels of Environmental Noise identified five (5) dBA as an "adequate margin of safety" for a noise level increase relative to a baseline noise exposure level of 55 dBA Ldn (i.e., there would not be a noticeable increase in adverse community reaction with an increase of five dBA or less from this baseline level). The EPA did not promote these findings as universal standards or regulatory goals with mandatory applicability to all communities, but rather as advisory exposure levels below which there would be no risk to a community from any health or welfare effect of noise.

In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to State and local governments. However, noise control guidelines and regulations contained in EPA rulings in prior years remain in place by designated Federal agencies, allowing more individualized control for specific issues by designated Federal, State, and local government agencies.

STATE REGULATIONS

State of California Building Code

Per Title 24 California Building Code the project will be required to be constructed in compliance with Section 1207 of the California Building Code (CBC) noise insulation standards. The following outlines the minimum building requirements for multi-family attached residential dwelling units as it relates to noise isolation for common separating assemblies:

1. Walls, partitions, and floor/ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.
2. Floor/ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.
3. Penetrations or openings in sound rated assemblies must be sealed, lined, insulated, or otherwise treated to maintain required ratings.
4. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

Thus, the design of party walls and floor/ceiling assemblies for multi-family attached residential dwelling units must be based on laboratory tested assemblies which test at a sound transmission class of 50 STC, or better.

In addition to compliance with the State of California Title 12 requirements, the following BMPs have been incorporated into the project description and will be added to the project plans.

State of California General Plan Guidelines 2017

Though not adopted by law, the State of California General Plan Guidelines 2017, published by the California Governor's Office of Planning and Research (OPR) (OPR Guidelines), provides guidance for the compatibility of projects within areas of specific noise exposure. The OPR Guidelines identify the suitability of various types of construction relative to a range of outdoor noise levels and provide each local community some flexibility in setting local noise standards that allow for the variability in community preferences. Findings presented in the Levels of Environmental Noise Document (EPA 1974) influenced the recommendations of the OPR Guidelines, most importantly in the choice of noise exposure metrics (i.e., Ldn or CNEL) and in the upper limits for the normally acceptable outdoor exposure of noise-sensitive uses.

The OPR Guidelines include a Noise and Land Use Compatibility Matrix which identifies acceptable and unacceptable community noise exposure limits for various land use categories. Where the "normally acceptable" range is used, it is defined as the highest noise level that should be considered for the construction of the buildings which do not incorporate any special acoustical treatment or noise mitigation. The "conditionally acceptable" or "normally unacceptable" ranges include conditions calling for detailed acoustical study prior to the construction or operation of the proposed project. The City of Moreno Valley has adopted their own version of the State Land Use Compatibility Guidelines for land use planning and to assess potential transportation noise impacts to proposed land uses (see Table 2).

LOCAL REGULATIONS

City of Moreno Valley General Plan

The City of Moreno Valley has adopted their own version of the State Land Use Compatibility Guidelines for land use planning and to assess potential transportation noise impacts to proposed land uses (see Table 2). According to the City's compatibility guidelines, daytime exterior noise levels of up to 65 dBA CNEL are considered to be normally acceptable and up to 70 dBA CNEL are considered to be conditionally acceptable for single-family residential land uses.

The City of Moreno Valley has also established the following General Plan goals and polices pertaining to noise.

Goal N-1 Design for a pleasant, healthy sound environment conducive to living and working.

Policies

N.1-1: Protect occupants of existing and new buildings from exposure to excessive noise, particularly adjacent to freeways, major roadways, the railroad, and within areas of aircraft overflight.

N.1-3: Apply the community noise compatibility standards (Table N-1) to all new development and major redevelopment projects outside the noise and safety compatibility zones established in the March Air Reserve Base/ Inland Port Airport Land Use Compatibility (ALUC) Plan in order to protect against the adverse effects of noise exposure. Projects within the noise and safety compatibility zones are subject to the standards contained in the ALUC Plan.

N.1-4: Require a noise study and/or mitigation measures if applicable for all projects that would expose people to noise levels greater than the "normally acceptable" standard and for any other projects that are likely to generate noise in excess of these standards.

N.1-5: Noise impacts should be controlled at the noise source where feasible, as opposed to at receptor end with measures to buffer, dampen, or actively cancel noise sources. Site design, building orientation, building design, hours of operation, and other techniques, for new developments deemed to be noise generators shall be used to control noise sources.

N.1-6: Require noise buffering, dampening, or active cancellation, on rooftop or other outdoor mechanical equipment located near residences, parks, and other noise sensitive land uses.

N.1-7: Developers shall reduce the noise impacts on new development through appropriate means (e.g., double-paned or soundproof windows, setbacks, berming, and screening). Noise attenuation methods should avoid the use of visible sound walls where possible.

Goal N-2 Ensure that noise does not have a substantial, adverse effect on the quality of life in the community.

Policies

N.2-1: Use the development review process to proactively identify and address potential noise compatibility issues.

N.2-3: Limit the potential noise impacts of construction activities on surrounding land uses through noise regulations in the Municipal Code that address allowed days and hours of construction, types of work, construction equipment, and sound attenuation devices.

N.2-4: Collaborate with the March Joint Powers Authority, March Inland Port Airport Authority, Riverside County Airport Land Use Commission, and other responsible agencies to formulate and apply strategies to address noise and safety compatibility protection from airport operations.

N.2-5: Encourage residential development heavily impacted by aircraft-related noise to transition to uses that are more compatible.

City of Moreno Valley Municipal Code

Section 8.14.040 Miscellaneous standards and regulations

Hours of Construction. Any construction within the city shall only be completed between the hours of 7:00 AM 7:00 PM Monday through Friday, excluding holidays, and from 8:00 AM to 4:00 PM on Saturday, unless written approval is obtained from the city building official or city engineer.

Section 9.10.170 Vibration

No vibration shall be permitted which can be felt at or beyond the property line.

Section 11.80.030 Prohibited acts

A. General Prohibition. It is unlawful and a violation of this chapter to maintain, make, cause, or allow the making of any sound that causes a noise disturbance, as defined in Section 11.80.020.

C. Non-impulsive Sound Decibel Limits. No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any non-impulsive sound which exceeds the limits set forth for the source land use category (as defined in Section 11.80.020) and shown in Table 3 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance.

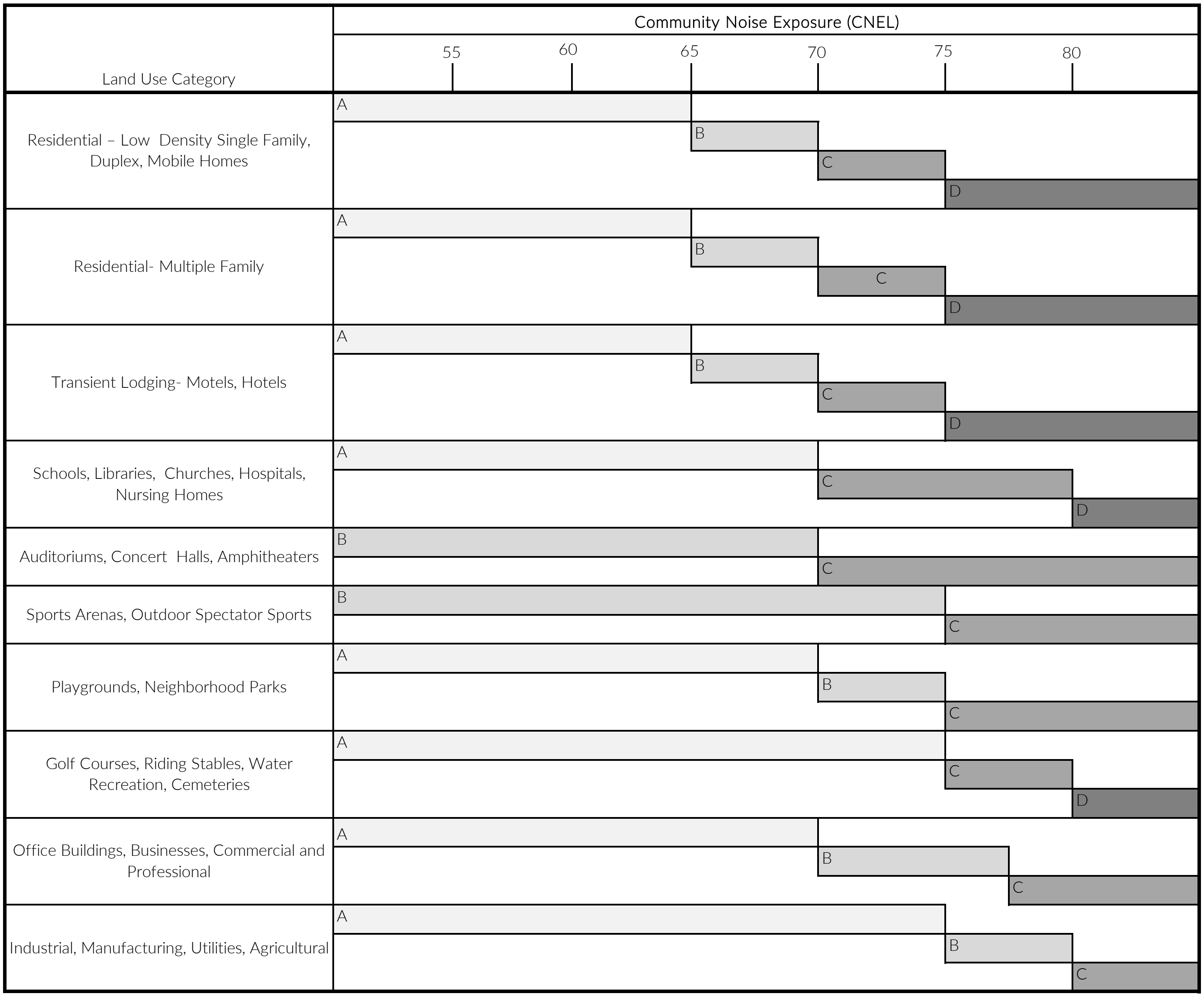
D. Specific Prohibitions. In addition to the general prohibitions set out in subsection A of this section, and unless otherwise exempted by the Noise Regulation Chapter of the City's Municipal Code, the following specific acts, or the causing or permitting thereof, are regulated as follows:

    7. Construction and Demolition. No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of 8:00 PM and 7:00 AM the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee. This shall not apply to the use of power tools as provided in subsection (D)(9) of this section.

    9. Power Tools. No person shall operate or permit the operation of any mechanically, electrically or gasoline motor-driven tool during nighttime hours so as to cause a noise disturbance across a residential real property boundary.

    10. Pumps, Air Conditioners, Air-Handling Equipment and Other Continuously Operating Equipment. Notwithstanding the general prohibitions of subsection, a of the Noise Regulation Chapter of the City's Municipal Code, no person shall operate or permit the operation of any pump, air conditioning, air-handling or other continuously operating motorized equipment in a state of disrepair or in a manner which otherwise creates a noise disturbance distinguishable from normal operating sounds.

Table 2
City of Moreno Valley Community Noise Compatibility Matrix



A	Normally Acceptable:	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
B	Conditionally Acceptable:	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice
C	Normally Unacceptable:	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
D	Clearly Unacceptable:	New construction or development should generally not be undertaken.

Source: MoVal 2040 General Plan Noise Element Table N-1, 2021.

Table 3
City of Moreno Valley Maximum Sound Levels (in dBA) for Source Land Uses

Residential		Commercial	
Daytime[1]	Nighttime[2]	Daytime[1]	Nighttime[2]
60	55	65	60

Source: City of Moreno Valley Municipal Code, Table 11.80.030-2.

(1) Section 11.80.020 of the City of Moreno Valley Municipal Code defines “Daytime” as 8:00 AM to 10:00 PM of the same day.

(2) Section 11.80.020 of the City of Moreno Valley Municipal Code defines “Nighttime” as 10:01 PM to 7:59 AM of the following day.

5. ANALYTICAL METHODOLOGY AND MODEL PARAMETERS

This section discusses the analysis methodologies used to assess noise impacts.

CONSTRUCTION NOISE MODELING

Construction noise associated with the proposed project was calculated at the sensitive receptor locations, utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Distances to receptors were based on the acoustical center of the project site. The equipment used to calculate the construction noise levels for each phase were based on the assumptions provided in the CalEEMod modeling in the Air Quality, Global Climate Change, and Energy Impact Analysis prepared for the proposed project (Ganddini Group, Inc., 2022). For construction noise purposes, the distance measured from the project site to sensitive receptors was assumed to be the acoustical center of the project site to the property line of residential properties with existing residential buildings. Sound emission levels associated with typical construction equipment as well as typical usage factors provided in Table 4 were utilized for modeling purposes. Construction noise worksheets are provided in Appendix D.

FEDERAL HIGHWAY ADMINISTRATION (FHWA) TRAFFIC NOISE PREDICTION MODEL

The roadway noise level increases from project generated vehicular traffic were modeled utilizing a computer program that replicates the FHWA Traffic Noise Prediction Model FHWA-RD-77-108.

The FHWA Traffic Noise Prediction Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emissions Levels.[1] Adjustments are then made to the REMEL to account for: total average daily traffic volumes, roadway classification (i.e., collector, secondary, major or arterial), the roadway active width (i.e., distance between the center of the outermost travel lanes on each side of the roadway), travel speed, truck mix (i.e., percentage of automobiles, medium trucks, and heavy trucks in the traffic volume), roadway grade and site conditions (hard or soft ground surface relating to the absorption of the ground, pavement, or landscaping). Research conducted by Caltrans identifies that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model.[2] Therefore, surfaces adjacent to all modeled roadways were assumed to have a “soft site”. Possible reductions in noise levels due to intervening topography and buildings were not accounted for in this analysis.

Project average daily traffic volumes were obtained from the South of Iris Project Transportation Study Screening Assessment, Ganddini Group Inc. (April 8, 2022). As no project trip distribution has been provided, it was assumed that approximately 80 percent of the project's vehicle trips would travel along Iris Avenue and approximately 20 percent would travel along Goya Avenue. Existing average daily traffic volumes on Iris Avenue were obtained from the Perris at Pentecostal Traffic Impact Analysis, Ganddini Group Inc. (January 9, 2022) and existing traffic volumes on Goya Avenue were estimated using measured ambient noise levels (see Table 1, STNM5). Vehicle/truck mixes and D/E/N splits for use in acoustical studies published by the Riverside County Department of Industrial Hygiene were utilized for noise modeling[3]. Existing Plus Project vehicle mixes

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[1] California Department of Transportation Environmental Program, Office of Environmental Engineering. Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction. September 1995. TAN 95-03.

[2] California Department of Transportation. Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report. June 1995. FHWA/CA/TL-95/23.

[3] Riverside, County Department of Public Health, Requirements for Determining and Mitigating Traffic Noise Impacts to Residential Structures, Steven Hinde, REHS, CIH, Senior Industrial Hygienist, November 23, 2009.

were calculated by adding the proposed project trips to existing conditions. FHWA spreadsheets are included in Appendix E.

SOUNDPLAN NOISE MODEL

The SoundPLAN acoustical modeling software was utilized to model future roadway noise levels at the proposed sensitive receptors (e.g., residences). SoundPLAN is capable of evaluating both mobile and stationary noise sources (e.g., vehicle traffic, rail, parking lots, drive-thru menus, car wash equipment, vacuums, etc.) and much more. The SoundPLAN software utilizes algorithms (based on the inverse square law) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations. In addition to the information provided below, noise modeling data is provided in Table 4.

Iris Avenue borders the project site to the north and Indian Avenue runs parallel to the project site, approximately 300 feet to the west. The City of Moreno Valley 2040 Draft General Plan Circulation Element identifies Iris Avenue as an Arterial roadway with a 100-foot right-of-way and Indian Avenue as a Minor Arterial with an 88-foot right-of-way. Goya Avenue borders the site to the south but is not a General Plan roadway of acoustical significance. The General Plan Circulation Element states that the desired maximum roadway capacity on arterials averages between 30,000 to 55,000 vehicles per day depending on the number of lanes, type and width of directional separation, presence of on-street parking or bicycle facilities, configuration, and frequency of access to adjacent land uses, and intersection configurations.

It is important to evaluate potential impacts of the noisiest possible future conditions. These conditions occur when the maximum number of vehicles pass at the greatest speed. This scenario usually corresponds to Level of Service C (LOS C) Conditions, or about 75% of buildout capacity. The level of service (LOS) C ADT for Iris Avenue is expected to be approximately 41,250 and the LOS C ADT for Indian Avenue is expected to be approximately 22,250 (City of Moreno Valley 2021). Arterials are expected to handle truck traffic. An auto/medium truck/heavy truck vehicle mix of 92/3/5 and a speed of 40 miles per hour were used for both roadways for modeling purposes.

Table 4 (1 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Spec. Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)	No. 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
Flat Bed Truck	No	40	84	74	4
Forklift[2,3]	No	50	n/a	61	n/a
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS 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 Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-N/A-	0
Impact Pile Driver	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 Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	50	85	77	9
Paving Equipment	No	50	85	77	9
Pneumatic Tools	No	50	85	85	90

Table 4 (2 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Spec. Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)	No. of Actual Data Samples (Count)
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit 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
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching 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

Notes:

(1) Source: FHWA Roadway Construction Noise Model User's Guide January 2006.

(2) Warehouse & Forklift Noise Exposure - NoiseTesting.info Carl Stautins, November 4, 2014
http://www.noisetesting.info/blog/carl-strautins/page-3/

(3) Data provided Leq as measured at the operator. Sound Level at 50 feet is calculated using Inverse Square Law.

6. IMPACT ANALYSIS

This impact discussion analyzes the potential for noise and/or groundborne vibration impacts to cause the exposure of a person to, or generation of, noise levels in excess of established City of Moreno Valley standards related to construction, operation, and transportation noise related impacts to, or from, the proposed project.

IMPACTS RELATED TO CONSTRUCTION NOISE

The construction phases for the proposed project are anticipated to include grading/off-site improvements, building construction, paving and architectural coating.[4] Assumptions for the phasing, duration, and required equipment for the construction of the proposed project were obtained from the project applicant. Construction activities are anticipated to begin no sooner than the beginning of January 2023 and take approximately 2.5 years to complete with completion estimated no earlier than July 2025.

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. The existing single-family residential and church uses adjacent to the east and west and the school use located approximately 100 feet to the north of the project site property lines may be affected by short-term noise impacts associated with construction noise.

Construction noise associated with the proposed project was calculated utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Distances to receptors were based on the acoustical center of the proposed construction activity. Construction noise levels were calculated for each phase. Anticipated noise levels during each construction phase are presented in Table 5. Worksheets for each phase are included as Appendix D.

A comparison of existing noise levels and existing plus project construction noise levels are presented in Table 5. STNM1 was chosen to represent noise levels at the residential property lines to the east of the project site, STNM5 was chosen to represent the single-family residential property lines of properties to the west and south of the project site, STNM4 was chosen to represent the church property line of properties to the west of the project site, and STNM3 was chosen to represent the school property line of the properties to the north of the project site.

Modeled unmitigated construction noise levels are expected to range between 46 and 79 dBA L_{eq} (see Table 5). The expected duration of each phase and the loudest sound level at the nearest sensitive receptors (single-family residential to east/west and church use to west) is presented below:

Phase	Number of Days	Maximum Leq
Grading/Off-Site Improvements	46	79.1
Building Construction	516	75.9
Paving	45	71.4
Architectural Coating	45	63.9

As discussed earlier, construction noise sources are regulated within the City of Moreno Valley Municipal Code Sections 8.14.040 and 11.80.030(D)(7). Section 8.14.040 prohibits construction other than between

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[4] The Air Quality, Global Climate Change, and Energy Impact Analysis prepared for the proposed project (Ganddini Group, Inc. May 13, 2022) assumed the off-site roadway improvements along Goya Ave and Iris Ave would overlap with the grading phase of the proposed project. Therefore, to be conservative and consistent, the loudest equipment phase (grading) of the off-site improvements was combined with the equipment anticipated during grading of the proposed project to produce a worst-case construction noise level during grading.

the hours of 7:00 AM to 7:00 PM Monday through Friday, excluding holidays, and from 8:00 AM to 4:00 PM on Saturday, unless written approval is obtained from the city building official or city engineer. In addition, Section 11.80.030(D)(7) prohibits the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of 8:00 PM and 7:00 AM the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee.

The Final Environmental Impact Report (FEIR) for the MoVal 2040 General Plan utilized the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2018) criteria to establish construction-related significance thresholds; therefore, this analysis also utilized the FTA construction-related significance thresholds. Per the FTA, daytime construction noise levels should not exceed 80 dBA L_{eq} for an 8-hour period at residential uses and 85 dBA L_{eq} for an 8-hour period at commercial uses. Project construction will not exceed the FTA thresholds for either residential or commercial use and would not occur outside of the hours outlined as "exempt" in City's Municipal Code Sections 8.14.040 and 11.80.030(D)(7); and therefore, will not result in a generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

Impacts would be less than significant, and no mitigation is required.

In addition to adherence to the City of Moreno Valley Municipal Code which limits the construction hours of operation, the following best management practices will be implemented to further reduce construction noise emanating from the proposed project:

Construction Noise - Best Management Practices

1. All construction equipment whether fixed or mobile, will be equipped with properly operating and maintained mufflers, consistent with manufacturer standards.

2. All stationary construction equipment will be placed so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. As applicable, all equipment shall be shut off when not in use.

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/vibration sources and existing sensitive receptors.

5. Jackhammers, pneumatic equipment, and all other portable stationary noise sources will be directed away and shielded from existing residences in the vicinity of the project site. Either one-inch plywood or sound blankets can be utilized for this purpose. They should reach up from the ground and block the line of sight between equipment and existing residences. The shielding should be without holes and cracks.

6. No amplified music and/or voice will be allowed on the project site.

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per Sections 8.14.040 and 11.80.030(D)(7) of the City of Moreno Valley's Municipal Code.

Off-Site Construction Noise

Construction truck trips would occur throughout the construction period. According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL.[5] The existing average daily

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[5] Federal Highway Administration, Highway Noise Prediction Model, December 1978.

traffic volume on Iris Avenue in the vicinity of the project site is approximately 11,600 vehicle trips per day.[6] As shown in the CalEEMod output files provided in the Air Quality, Global Climate Change, and Energy Impact Analysis prepared for the proposed project (Ganddini Group, 2022) the greatest number of construction-related vehicle trips per day would be during building construction at up to 102 vehicle trips per day (75 for worker trips and 27 for vendor trips). Given the project site's proximity to the 215 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps. Therefore, the addition of project vendor/haul trucks and worker vehicles per day along off-site roadway segments would not be anticipated to result in a doubling of traffic volumes. Off-site project generated construction vehicle trips would result in a negligible noise level increase and would not result in a substantial increase in ambient noise levels. Impacts would be less than significant. No mitigation measures are required.

NOISE IMPACTS TO OFF-SITE RECEPTORS DUE TO PROJECT GENERATED TRIPS

During operation, the proposed project is expected to generate approximately 736 average daily trips with 54 trips during the AM peak-hour and 73 trips during the PM peak-hour.

Existing and Existing Plus Project traffic noise levels associated with Iris Avenue and Goya Avenue were modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated at the right of way from the centerline of the analyzed roadway. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. Roadway input parameters including average daily traffic volumes (ADTs), speeds, and vehicle distribution data is shown in Table 6. The potential off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions and is demonstrated in Table 6.

Existing Year (With Project): This scenario refers to existing year plus project traffic noise conditions and is demonstrated in Table 6.

As shown in Table 7, the modeled Existing traffic noise levels range between 50 to 73 dBA CNEL at the right-of-way of the modeled roadway segments; and the modeled Existing Plus Project traffic noise levels range between 52 to 73 dBA CNEL at the right-of-way of the modeled roadway segments.

As stated previously, increases in ambient noise along affected roadways due to project generated vehicle traffic is considered substantial if they:

- Increase noise levels by 5 dB or more where the no project noise level is less than 60 dBA CNEL;
- Increase noise levels by 3 dB or more where the no project noise level is 60 dBA CNEL to 65 dBA CNEL; or
- Increase noise levels by 1.5 dB or more where the no project noise level is greater than 65 dBA CNEL.

Project generated vehicle trips are anticipated to increase noise levels along Goya Avenue by approximately 2 dB; however, the modeled existing plus project noise level is 52 dBA CNEL which is below 65 dBA CNEL. In addition, project generated vehicle trips are anticipated to increase noise levels along Iris Avenue by only approximately 0.2 dB. Therefore, a change in noise level would be considered less than significant. No mitigation is required.

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[6] The existing average daily traffic volume on Iris Avenue was obtained from the Perris at Pentecostal Traffic Impact Analysis, Ganddini Group Inc. (January 9, 2022).

TRAFFIC NOISE IMPACTS TO THE PROPOSED PROJECT

The City of Moreno Valley General Plan identifies exterior noise levels up to 65 dBA CNEL as normally acceptable and up to 70 dBA as conditionally acceptable for single-family residential uses (see Table 2). The State of California Building Code sets forth an interior noise standard of 45 dBA CNEL.

As shown on Figures 6 and 7, future traffic noise levels from Iris Avenue are expected to reach up to 74 dBA CNEL at the proposed residential dwelling units and homes proposed with facades facing Iris Avenue. Typical residential construction provides approximately 20 dB of exterior to interior noise reduction. In order to ensure that interior noise levels do not exceed 45 dBA CNEL, the following best management practices will be implemented.

Transportation Noise Impacts – Best Management Practices

Upgraded windows and sliding glass doors with an STC level of at least 32 will be installed in the north facing facades of the first row of homes windows and sliding glass doors with an STC of at least 27 will be installed in the west facing façade of the most northwestern residential building and in the east facing façade of the most northeastern residential building. Impacts would be less than significant.

GROUNDBORNE VIBRATION IMPACTS

There are several types of construction equipment that can cause vibration levels high enough to annoy persons in the vicinity and/or result in architectural or structural damage to nearby structures and improvements. For example, as shown in Table 8, a vibratory roller could generate up to 0.21 PPV at a distance of 25 feet; and operation of a large bulldozer (0.089 PPV) at a distance of 25 feet (two of the most vibratory pieces of construction equipment). Groundborne vibration at sensitive receptors associated with this equipment would drop off as the equipment moves away. For example, as the vibratory roller moves further than 100 feet from the sensitive receptors, the vibration associated with it would drop below 0.0026 PPV. It should be noted that these vibration levels are reference levels and may vary slightly depending upon soil type and specific usage of each piece of equipment.

Architectural Damage

Vibration generated by construction activity generally has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile. (California Department of Transportation, 2020)

Table 9 identifies the threshold at which there is a risk to “architectural” damage to reinforced-concrete, steel or timber (no plaster) buildings as a peak particle velocity (PPV) of 0.5, at engineered concrete and masonry (no plaster) buildings as a PPV of 0.3, at non-engineered timber and masonry buildings as a PPV of 0.2 and at buildings extremely susceptible to vibration damage as a PPV of 0.1. Therefore, impacts would be significant if construction activities result in groundborne vibration of 0.2 PPV or higher at residential structures and/or a PPV of 0.3 or higher at commercial structures. Calculated project generated construction vibration levels are shown in Table 10.

There are existing residential dwelling units as close as approximately 5 feet to the east and 110 feet to the west and church buildings as close as approximately 35 feet to the west of the project property lines. Estimated groundborne vibration levels at the nearest sensitive receptors are presented in Table 10. In summary, if a vibratory roller is used within 26 feet of an existing structure or if a large bulldozer is used within 15 feet of an existing structure there will be some potential for this equipment to result in architectural damage and significant impacts. Implementation of the following best management practice will avoid significant impacts.

Groundborne Vibration - Best Management Practice

1. A best management practice limiting the use of a vibratory roller within 26 feet or a large bulldozer within 15 feet of the existing residential structures to the east of the project site will be implemented to avoid significant impacts.

Annoyance to Persons

The primary effect of perceptible vibration is often a concern. However, secondary effects, such as the rattling of a china cabinet, can also occur, even when vibration levels are well below perception. Any effect (primary perceptible vibration, secondary effects, or a combination of the two) can lead to annoyance. The degree to which a person is annoyed depends on the activity in which they are participating at the time of the disturbance. For example, someone sleeping, or reading will be more sensitive than someone who is running on a treadmill. Reoccurring primary and secondary vibration effects often lead people to believe that the vibration is damaging their home, although vibration levels are well below minimum thresholds for damage potential. (California Department of Transportation, 2020)

As shown in Table 11, vibration becomes strongly perceptible to residential sensitive receptors at a level of 72 VdB and church sensitive receptors at 75 VdB. A vibratory roller could generate up to 72 VdB at a distance of 136 feet from the source and a large bulldozer could generate 72 VdB at a distance of 80 feet from the source. In addition, a vibratory roller could generate up to 75 VdB at a distance of 108 feet from the source and a large bulldozer could generate 75 VdB at a distance of 63 feet from the source. Calculated project generated construction vibration levels are shown in Table 10.

As described above, the closest vibration-sensitive receptors to the project site include the residential dwelling units located as close as approximately 5 feet to the east and 110 feet to the west and the church structures as close as approximately 35 feet to the west of the project property lines. As shown in Table 5 the thresholds for annoyance due to vibration (72 VdB at offsite residential sensitive uses and 75 VdB for offsite church sensitive uses) could theoretically be exceeded at existing residential receptors to the east and west and church structures to the west of the project site, and residents may be temporarily annoyed. However, perceptibility of construction vibration would be temporary and would only occur while vibratory equipment is utilized within 150 feet of the existing structures. Furthermore, this impact would only occur during daytime hours and will be temporary. This impact would be less than significant. No mitigation is required. Vibration worksheets are provided in Appendix G.

Table 5
Construction Noise Levels (dBA L_{eq})

Phase	Receptor Location	Existing Ambient Noise Levels (dBA Leq)[2]	Construction Noise Levels (dBA Leq)
Grading/Off-Site Improvements[3]	Residential to East	54.4	79.1
	Residential to West	45.1	79.1
	Church to West	49.1	79.1
	School use to North	68.7	65.9
	Residential to South	45.1	60.8
Building Construction	Residential to East	54.4	75.9
	Residential to West	45.1	75.9
	Chruch to West	49.1	75.9
	School use to North	68.7	62.7
	Residential to South	45.1	57.6
Paving	Residential to East	54.4	71.4
	Residential to West	45.1	71.4
	Church to West	49.1	71.4
	School use to North	68.7	58.2
	Residential to South	45.1	53.1
Architectural Coating	Residential to East	54.4	63.9
	Residential to West	45.1	63.9
	Church to West	49.1	63.9
	School use to North	68.7	50.7
	Residential to South	45.1	45.6

Notes:

(1) Construction noise worksheets are provided in Appendix D.

(2) Per measured existing ambient noise levels. STNM1 was used for residential receptors to the east, STNM5 for residential receptors to the west, STNM4 for church receptors to the west, STNM3 for school receptors to the north, and STNM5 for residential receptors to the south.

(3) The Air Quality, Global Climate Change, and Energy Impact Analysis prepared for the proposed project (Ganddini Group, Inc. May 13, 2022) assumed the off-site roadway improvements along Goya Ave and Iris Ave would overlap with the grading phase of the proposed project. Therefore, to be conservative and consistent, the loudest equipment phase (grading) of the off-site improvements was combined with the equipment anticipated during grading of the proposed project to produce a worst-case construction noise level during grading.

Table 6
Project Average Daily Traffic Volumes and Roadway Parameters

Roadway	Segment	Average Daily Traffic Volume[1]		Posted Travel Speeds (MPH)	Site Conditions
		Existing	Existing Plus Project		
Iris Avenue	Indian Street to Emma Lane	11,600	12,189	40	Soft
Goya Avenue	East of Project Driveway	233	380	25	Soft

Vehicle Distribution (Light Mix)[2]			
Motor-Vehicle Type	(7 AM-7 PM)	(7 PM-10 PM)	(10 PM-7 AM)
Automobiles	75.56	13.96	10.49
Medium Trucks	48.91	2.17	48.91
Heavy Trucks	47.30	5.41	47.30

Vehicle Distribution (Heavy Mix)[2]			
Motor-Vehicle Type	Daytime % (7 AM-7 PM)	Evening % (7 PM-10 PM)	Night % (10 PM-7 AM)
Automobiles	75.54	14.02	10.43
Medium Trucks	48.00	2.00	50.00
Heavy Trucks	48.00	2.00	50.00

Notes:

(1) Project average daily traffic volumes were obtained from the South of Iris Project Transportation Study Screening Assessment, Ganddini Group Inc. (April 8, 2022). As no project trip distribution has been provided, it was assumed that approximately 80 percent of the project's vehicle trips would travel along Iris Avenue and approximately 20 percent would travel along Goya Avenue. Existing average daily traffic volumes on Iris Avenue were obtained from the Perris at Pentecostal Traffic Impact Analysis, Ganddini Group Inc. (January 9, 2022) and existing traffic volumes on Goya Avenue were estimated using measured ambient noise levels (see Table 1, STNM5).

(2) Existing vehicle percentages are based on the Riverside County Industrial Hygiene Letter for Traffic Noise.

Table 7
Change in Existing Noise Levels Along Roadways as a Result of Project (dBA CNEL)

Roadway	Segment	Distance from roadway centerline to right-of-way (feet)[2]	Modeled Noise Levels (dBA CNEL)[1]				
			Existing Without Project at right-of-way	Existing Plus Project at right-of-way	Change in Noise Level	Exceeds Standards[3]	Increase of 3 dB or More?
Iris Avenue	Indian Street to Emma Lane	50	72.81	73.03	0.22	Yes	No
Goya Avenue	East of Project Driveway	33	49.58	51.70	2.12	Yes	No

Notes:

(1) Exterior noise levels calculated 5 feet above pad elevation, perpendicular to subject roadway.

(2) Right of way per the City of Moreno Valley General Plan Final Program EIR (July 2006).

(3) Per the City of Moreno Valley normally acceptable standard for single-family detached residential dwelling units (see Table 2).

Table 8
Construction Equipment Vibration Source Levels

Equipment		PPV at 25 ft, in/sec	Approximate Lv* at 25 ft
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.170	93
clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
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 Manual, 2018.

*RMS velocity in decibels, VdB re 1 micro-in/sec

Table 9
Construction Vibration Damage Criteria

Building/Structural Category	PPV, in/sec	Approximate Lv*
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extemely susceptible to vibration damage	0.1	90

Notes:

Source: Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual (September 2018).

*RMS velocity in decibels, VdB re 1 micro-in/sec

Table 10
Construction Vibration Levels at the Nearest Receptors

Receptor Location	Distance from Property Line to Nearest Structure (feet)	Equipment	Vibration Level[1]	Threshold Exceeded?[2]	Vibration Level with Best Management Practices[1,3]	Threshold Exceeded With Best Management Practices?[2,3]
Architectural Damage Analysis						
Church to West	35	Vibratory Roller	0.127	No	-	-
	35	Large Bulldozer	0.054	No	-	-
Residential to West	110	Vibratory Roller	0.023	No	-	-
	110	Large Bulldozer	0.010	No	-	-
Residential to East	5	Vibratory Roller	2.348	Yes	0.198	No
	5	Large Bulldozer	0.995	Yes	0.191	No
Annoyance Analysis						
Church to West	35	Vibratory Roller	90	Yes	-	-
	35	Large Bulldozer	83	Yes	-	-
Residential to West	110	Vibratory Roller	75	Yes	-	-
	110	Large Bulldozer	68	No	-	-
Residential to East	5	Vibratory Roller	115	Yes	-	-
	5	Large Bulldozer	108	Yes	-	-

Notes:

(1) Vibration levels are provided in PPV in/sec for architectural damage and VdB for annoyance.

(2) The FTA identifies the threshold at which there is a risk to "architectural" damage to non-engineered timber and masonry buildings as a PPV of 0.2 in/sec (see Table 5). In addition, the FTA identifies a vibration annoyance threshold of 72 VdB for residential uses and 75 VdB for chuch uses (see Table 4). Per the FTA Transit Noise and VIbration Impact Assessment Manual (September 2018), commercial uses are not considered vibration-sensitive land uses; therefore, the annoyance threshold does not apply to commercial uses.

(3) Best management practices for architectural damage include limiting the use of vibratory rollers, or other similar vibratory equipment, within 26 feet and large bulldozers within 15 feet of residential structures to the east of the project site.

Table 11
Ground-Borne Vibration (GBV) Impact Criteria for General Vibration Assessment

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch/sec)		
	Frequent Events	Occasional Events	Events
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB*	65 VdB*	65 VdB*
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Source:Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual (September 2018).

*This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. For equipment that is more sensitive, a Detailed Vibration Analysis must be performed.

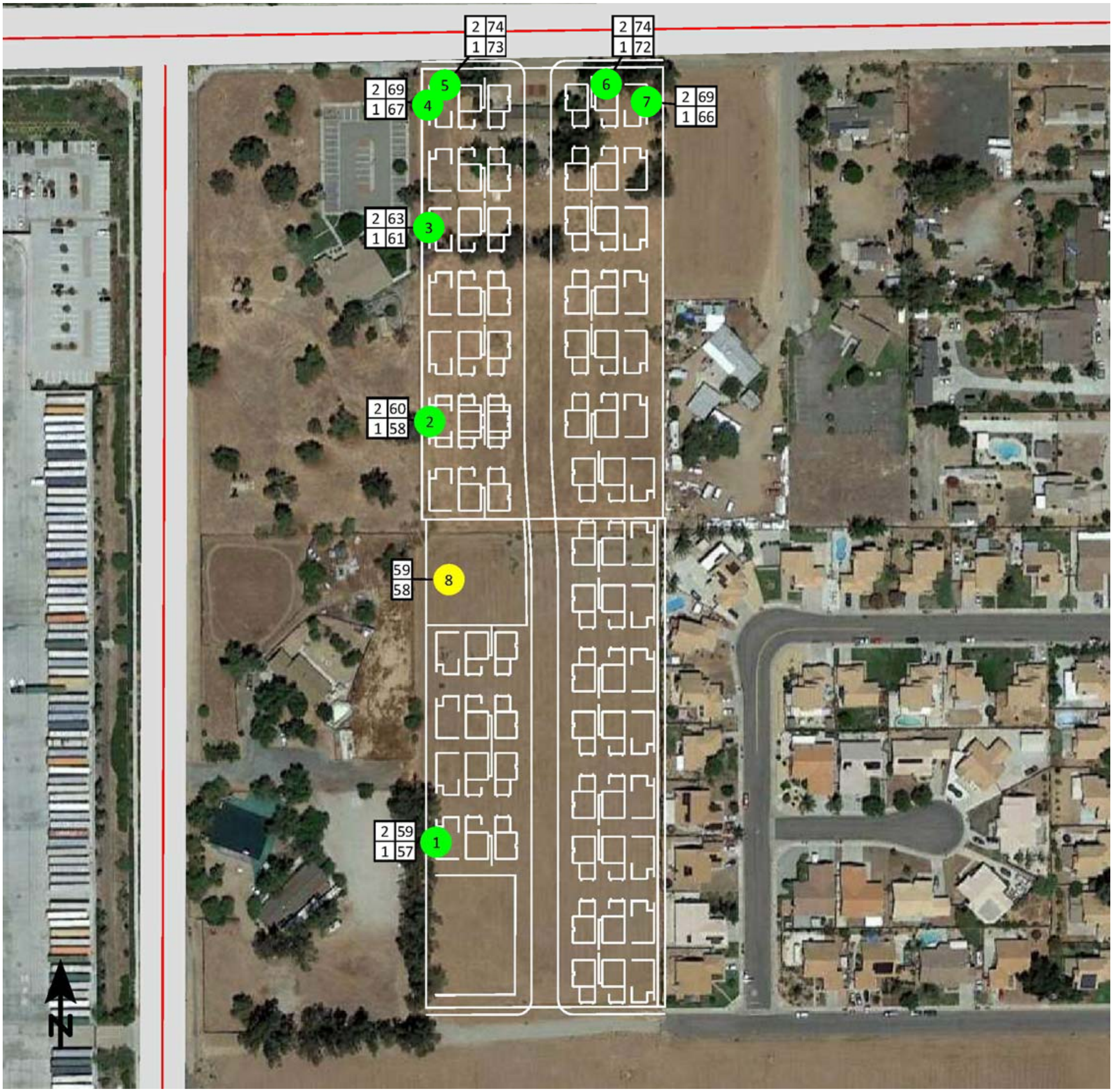

Figure 6
Operational Noise Levels (dBA, Leq)

7. IMPACTS - CEQA THRESHOLDS

CALIFORNIA ENVIRONMENTAL QUALITY ACT THRESHOLDS

The California Environmental Quality Act Guidelines (Appendix G) establishes thresholds for noise impact analysis. This noise study includes analysis of noise and vibration impacts necessary to assess the project in light of the following Appendix G Checklist Thresholds.

Would the project result in:

a) Generation of 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?

Substantial increases in ambient noise levels are usually associated with project construction noise (temporary) and project operational noise (permanent).

Project Construction Noise: Construction noise sources are regulated within the City of Moreno Valley Municipal Code Sections 8.14.040 and 11.80.030(D)(7). Section 8.14.040 prohibits construction other than between the hours of 7:00 AM to 7:00 PM Monday through Friday, excluding holidays, and from 8:00 AM to 4:00 PM on Saturday, unless written approval is obtained from the city building official or city engineer. In addition, Section 11.80.030(D)(7) prohibits the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of 8:00 PM and 7:00 AM the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee.

The Final Environmental Impact Report (FEIR) for the MoVal 2040 General Plan utilized the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2018) criteria to establish construction-related significance thresholds. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} averaged over an 8-hour period ($L_{eq\ (8\text{-}hr)}$; and the nighttime noise threshold is 70 dBA $L_{eq\ (8\text{-}hr)}$. For commercial uses, the daytime and nighttime noise threshold is 85 dBA $L_{eq\ (8\text{-}hr)}$. In compliance with the City's Code, construction would not occur during the noise-sensitive nighttime hours.

Project Operational Noise (permanent): On-site operational noise is usually only evaluated for commercial and industrial projects. Quantitative analysis of on-site operational noise is typically not conducted for residential projects as they usually do not include stationary noise sources that could result in substantial increases in ambient noise levels resulting in violation of established standards. Therefore, the evaluation of project operational noise in this study is limited to the potential impacts associated with project generated vehicle traffic (off-site noise). Depending upon how many units are proposed and the existing noise environment, project generated vehicle trips could result in substantial increases in noise levels.

Per the Final Environmental Impact Report (FEIR) for the MoVal 2040 General Plan, project-generated traffic noise would be considered substantial and constitute a significant noise impact if the project would:

- Increase noise levels by 5 dB or more where the no project noise level is less than 60 dBA CNEL;
- Increase noise levels by 3 dB or more where the no project noise level is 60 dBA CNEL to 65 dBA CNEL; or
- Increase noise levels by 1.5 dB or more where the no project noise level is greater than 65 dBA CNEL.

b) Generate excessive groundborne vibration or groundborne noise levels?

Ground-borne noise refers to the noise generated by ground-borne vibration. Ground-borne noise that accompanies the building vibration is usually perceptible only inside buildings and typically is only an issue at locations with subway or tunnel operations where there is no airborne noise path or for buildings with substantial sound insulation such as a recording studio.[7] As such, available guidelines from the Federal Transit Administration (FTA) are utilized to assess impacts due to ground-borne vibration. The FTA has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. As shown in Table 9, the threshold at which there is a risk to "architectural" damage to reinforced-concrete, steel or timber (no plaster) buildings is a peak particle velocity (PPV) of 0.5, at engineered concrete and masonry (no plaster) buildings a PPV of 0.3, at non-engineered timber and masonry buildings a PPV of 0.2 and at buildings extremely susceptible to vibration damage a PPV of 0.1. The FTA has also adopted standards associated with human annoyance for groundborne vibration impacts for the following three land-use categories:

(1) Vibration Category 1 – High Sensitivity,
(2) Vibration Category 2 – Residential, and
(3) Vibration Category 3 – Institutional.

The FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference. The vibration criteria associated with human annoyance for these three land-use categories are shown in Table 11. Table 11 shows that 72 VdB is the threshold for annoyance from groundborne vibration at sensitive receptors.

Therefore, impacts related to building damage would be significant if construction activities result in groundborne vibration of 0.2 PPV or higher at residential structures and/or a PPV of 0.3 or higher at commercial structures. Impacts related to human annoyance would be significant if they result in groundborne vibration levels that exceed 72 VdB at sensitive receptor locations. Furthermore, the City of Moreno Valley Municipal Code Section 9.10.170 states that no vibration shall be permitted which can be felt at or beyond the property line.

CEQA IMPACT ANALYSIS

Will the project result in the:

a) *Generation of 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?*

Less Than Significant Impact:

On-Site Construction Noise

The construction phases for the proposed project are anticipated to include grading/off-site improvements, building construction, paving and architectural coating. Assumptions for the phasing, duration, and required equipment for the construction of the proposed project were obtained from the project applicant.

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[7] Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2018, pp 108, 112.

Construction activities are anticipated to begin no sooner than the beginning of January 2023 and take approximately 2.5 years to complete with completion estimated no earlier than July 2025.

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. The existing single-family residential and church uses adjacent to the east and west and the school use located approximately 100 feet to the north of the project site property lines may be affected by short-term noise impacts associated with construction noise.

Modeled unmitigated construction noise levels are expected to range between 46 and 79 dBA L_{eq} (see Table 5). The expected duration of each phase and the loudest sound level at the nearest sensitive receptors (single-family residential to east/west and church use to west) is presented below:

Phase	**Number of Days**	**Maximum Leq**
Grading/Off-Site Improvements	46	79.1
Building Construction	516	75.9
Paving	45	71.4
Architectural Coating	45	63.9

As discussed earlier, construction noise sources are regulated within the City of Moreno Valley Municipal Code Sections 8.14.040 and 11.80.030(D)(7). Section 8.14.040 prohibits construction other than between the hours of 7:00 AM to 7:00 PM Monday through Friday, excluding holidays, and from 8:00 AM to 4:00 PM on Saturday, unless written approval is obtained from the city building official or city engineer. In addition, Section 11.80.030(D)(7) prohibits the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of 8:00 PM and 7:00 AM the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee.

The Final Environmental Impact Report (FEIR) for the MoVal 2040 General Plan utilized the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2018) criteria to establish construction-related significance thresholds. Per the FTA, daytime construction noise levels should not exceed 80 dBA L_{eq} for an 8-hour period at residential uses and 85 dBA L_{eq} for an 8-hour period at commercial uses. Project construction will not exceed the FTA thresholds for either residential or commercial use and would not occur outside of the hours outlined as “exempt” in City’s Municipal Code Sections 8.14.040 and 11.80.030(D)(7); and therefore, will not result in a generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

Impacts would be less than significant, and no mitigation is required.

In addition to adherence to the City of Moreno Valley Municipal Code which limits the construction hours of operation, the following best management practices will be implemented to minimize construction noise, emanating from the proposed project:

Construction Noise - Best Management Practices

1. All construction equipment whether fixed or mobile, will be equipped with properly operating and maintained mufflers, consistent with manufacturer standards.

2. All stationary construction equipment will be placed so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. As applicable, all equipment shall be shut off when not in use.

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/vibration sources and existing sensitive receptors.

5. Jackhammers, pneumatic equipment, and all other portable stationary noise sources will be directed away and shielded from existing residences in the vicinity of the project site. Either one-inch plywood or sound blankets can be utilized for this purpose. They should reach up from the ground and block the line of sight between equipment and existing residences. The shielding should be without holes and cracks.

6. No amplified music and/or voice will be allowed on the project site.

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per Sections 8.14.040 and 11.80.030(D)(7) of the City of Moreno Valley's Municipal Code.

Off-Site Construction Noise

Construction truck trips would occur throughout the construction period. According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL.[8] The existing average daily traffic volume on Iris Avenue in the vicinity of the project site is approximately 11,600 vehicle trips per day.[9] As shown in the CalEEMod output files provided in the Air Quality, Global Climate Change, and Energy Impact Analysis prepared for the proposed project (Ganddini Group, 2022) the greatest number of construction-related vehicle trips per day would be during building construction at up to 102 vehicle trips per day (75 for worker trips and 27 for vendor trips). Given the project site's proximity to the 215 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps. Therefore, the addition of project vendor/haul trucks and worker vehicles per day along off-site roadway segments would not be anticipated to result in a doubling of traffic volumes. Off-site project generated construction vehicle trips would result in a negligible noise level increase and would not result in a substantial increase in ambient noise levels. Impacts would be less than significant. No mitigation measures are required.

b) Generation of excessive groundborne vibration of groundborne noise levels?

Less Than Significant Impact:

There are several types of construction equipment that can cause vibration levels high enough to cause architectural damage and/or annoyance to persons in the vicinity. For example, as shown in Table 8, a vibratory roller could generate up to 0.21 PPV at a distance of 25 feet; and operation of a large bulldozer (0.089 PPV) at a distance of 25 feet (two of the most vibratory pieces of construction equipment).

Available guidelines from the Federal Transit Administration (FTA) are utilized to assess impacts due to ground-borne vibration. The FTA has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. As shown in Table 9, the threshold at which there is a risk to "architectural" damage to reinforced-concrete, steel or timber (no plaster) buildings is a peak particle velocity (PPV) of 0.5, at engineered concrete and masonry (no plaster) buildings a PPV of 0.3, at non-engineered timber and masonry buildings a PPV of 0.2 and at buildings extremely susceptible to vibration damage a PPV of 0.1. The FTA has also adopted standards associated with human annoyance for groundborne vibration impacts for the following three land-use categories:

(1) Vibration Category 1 – High Sensitivity,
(2) Vibration Category 2 – Residential, and
(3) Vibration Category 3 – Institutional.

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[8] Federal Highway Administration, Highway Noise Prediction Model, December 1978.

[9] The existing average daily traffic volume on Iris Avenue was obtained from the Perris at Pentecostal Traffic Impact Analysis, Ganddini Group Inc. (January 9, 2022).

The FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference. The vibration criteria associated with human annoyance for these three land-use categories are shown in Table 11. Table 11 shows that 72 VdB is the threshold for annoyance from groundborne vibration at sensitive receptors.

As stated previously, for conservative purposes, this construction vibration analysis compares the estimated vibration levels generated during construction of the project to the 0.2 in/sec PPV significance threshold for non-engineered timber and masonry buildings.

There are existing residential dwelling units as close as approximately 5 feet to the east and 110 feet to the west and church buildings as close as approximately 35 feet to the west of the project property lines. Estimated groundborne vibration levels at the nearest sensitive receptors are presented in Table 10. In summary, if a vibratory roller is used within 26 feet of an existing structure or if a large bulldozer is used within 15 feet of an existing structure there will be some potential for this equipment to result in architectural damage and significant impacts. A best management practice limiting the use of a vibratory roller within 26 feet or a large bulldozer within 15 feet of the existing residential structures to the east of the project site will reduce impacts. With implementation of best management practices, potential impacts related to architectural damage would be reduced to less than significant.

Groundborne Vibration - Best Management Practice

1. A best management practice limiting the use of a vibratory roller within 26 feet or a large bulldozer within 15 feet of the existing residential structures to the east of the project site will be implemented to avoid significant impacts.

A vibratory roller could generate up to 72 VdB at a distance of 136 feet from the source and a large bulldozer could generate 72 VdB at a distance of 80 feet from the source. In addition, a vibratory roller could generate up to 75 VdB at a distance of 108 feet from the source and a large bulldozer could generate 75 VdB at a distance of 63 feet from the source. As described above, the closest vibration-sensitive receptors to the project site include the residential dwelling units located as close as approximately 5 feet to the east and 110 feet to the west and the church structures as close as approximately 35 feet to the west of the project property lines. As shown in Table 9, the thresholds for annoyance due to vibration (72 VdB at offsite residential sensitive uses and 75 VdB for offsite church sensitive uses) could theoretically be exceeded at existing residential receptors to the east and west and church structures to the west of the project site, and residents may be temporarily annoyed. However, perceptibility of construction vibration would be temporary and would only occur while vibratory equipment is utilized within 150 feet of the existing structures. Furthermore, this impact would only occur during daytime hours and will be temporary. This impact would be less than significant. No mitigation is required.

Operation of the proposed project will involve the movement of passenger vehicles and trucks. Driving surfaces associated with the project will be paved and will generally be smooth. Loaded trucks generally have a PPV of 0.076 at a distance of 25 feet (Caltrans 2020). Groundborne vibration levels associated with passenger vehicles is much lower. The movement of vehicles on the project site would not result in the generation of excessive groundborne vibration or groundborne noise. Impacts would be less than significant. No mitigation is required.

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

Less than Significant Impact:

The closest airport to the project site is the March Air Reserve Base/Inland Port Airport located approximately 0.67 miles to the west of the project site. The City of Moreno Valley 2040 General Plan Map S-7, Airport Land Use Compatibility Zones, shows that the project site is in Zone E. The Riverside County Airport Land Use Commission March Air Reserve Base / Inland Port Airport Land Use Compatibility Plan (ALUCP 2014) states that Zone E is beyond the 55 dBA CNEL noise contour for the airport; however, occasional overflights may be intrusive to some outdoor activities in this zone. Furthermore, Zone E does not have a limit for residential use. As stated in the ALUCP, as the project is a residential use located within an airport land use compatibility zone, information regarding airport proximity and the existence of aircraft overflights must be disclosed to future residents. Therefore, the proposed project would not expose people residing or working in the area to excessive noise levels. There is no impact, and no mitigation is required.

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APPENDICES

APPENDIX A

LIST OF ACRONYMS

Term	Definition
ADT	Average Daily Traffic
ANSI	American National Standard Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
D/E/N	Day / Evening / Night
dB	Decibel
dBA or dB(A)	Decibel "A-Weighted"
dBA/DD	Decibel per Double Distance
dBA L_{eq}	Average Noise Level over a Period of Time
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
L_{02},L_{08},L_{50},L_{90}	A-weighted Noise Levels at 2 percent, 8 percent, 50 percent, and 90 percent, respectively, of the time period
DNL	Day-Night Average Noise Level
$L_{eq(x)}$	Equivalent Noise Level for '"x" period of time
L_{eq}	Equivalent Noise Level
L_{max}	Maximum Level of Noise (measured using a sound level meter)
L_{min}	Minimum Level of Noise (measured using a sound level meter)
Lp	Sound Pressure Level
LOS C	Level of Service C
Lw	Sound Power Level
OPR	California Governor's Office of Planning and Research
PPV	Peak Particle Velocities
RCNM	Road Construction Noise Model
REMEL	Reference Energy Mean Emission Level
RMS	Root Mean Square

APPENDIX B

DEFINITIONS OF ACOUSTICAL TERMS

Term	Definition
Ambient Noise Level	The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant.
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.
CNEL	Community Noise Equivalent Level. CNEL is a weighted 24-hour noise level that is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours.
Decibel, dB	A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
DNL, Ldn	Day Night Level. The DNL, or Ldn is a weighted 24-hour noise level that is obtained by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the nighttime hours.
Equivalent Continuous Noise Level, L_{eq}	A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound.
Fast/Slow Meter Response	The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second.
Frequency, Hertz	In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the number of cycles per second).
L_{02}, L_{08}, L_{50}, L_{90}	The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
L_{max}, L_{min}	Lmax is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. Lmin is the minimum level.
Offensive/ Offending/Intrusive Noise	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level.
Root Mean Square (RMS)	A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function.

APPENDIX C

NOISE MEASUREMENT FIELD WORKSHEETS

Noise Measurement
Field Data

Project Name: South of Iris Avenue, City of Moreno Valley. **Date:** May 11, 2022

Project #: 19474

Noise Measurement #: STNM1 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 16185 Smoke Tree Pl, Moreno Valley, California 92551

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by single-family residential & vacant land to east, Goya Ave & vacant land to south, single-family residential & church uses to west, & Iris Ave to north. Noise Measurement Site: Single-family residential neighborhood w/ Smoke Tree Pl to east.

Weather: <5% cloud, sunshine. **Settings:** [✓ SLOW] FAST

Temperature: 62 deg F **Wind:** 9 mph **Humidity:** 32% **Terrain:** Flat

Start Time: 12:55 PM **End Time:** 1:10 PM **Run Time:**

Leq: 54.4 dB

Lmax 70 dB

L2 64.7 dB

L8 59.9 dB

L25 49.8 dB

L50 44.9 dB

Primary Noise Source: Bird song, residential ambiance, 1 vehicle passed microphone during 15 minute noise measurement.

Secondary Noise Sources: Leaf rustle from 9 mph breeze, very distant traffic ambiance, overhead air traffic.

NOISE METER: SoundTrack LXT Class 1

MAKE: Larson Davis

MODEL: LXT1

SERIAL NUMBER: 3099

FACTORY CALIBRATION DATE: 11/17/2021

FIELD CALIBRATION DATE: 5/11/2022

CALIBRATOR: Larson Davis CA 250

MAKE: Larson Davis

MODEL: CA 250

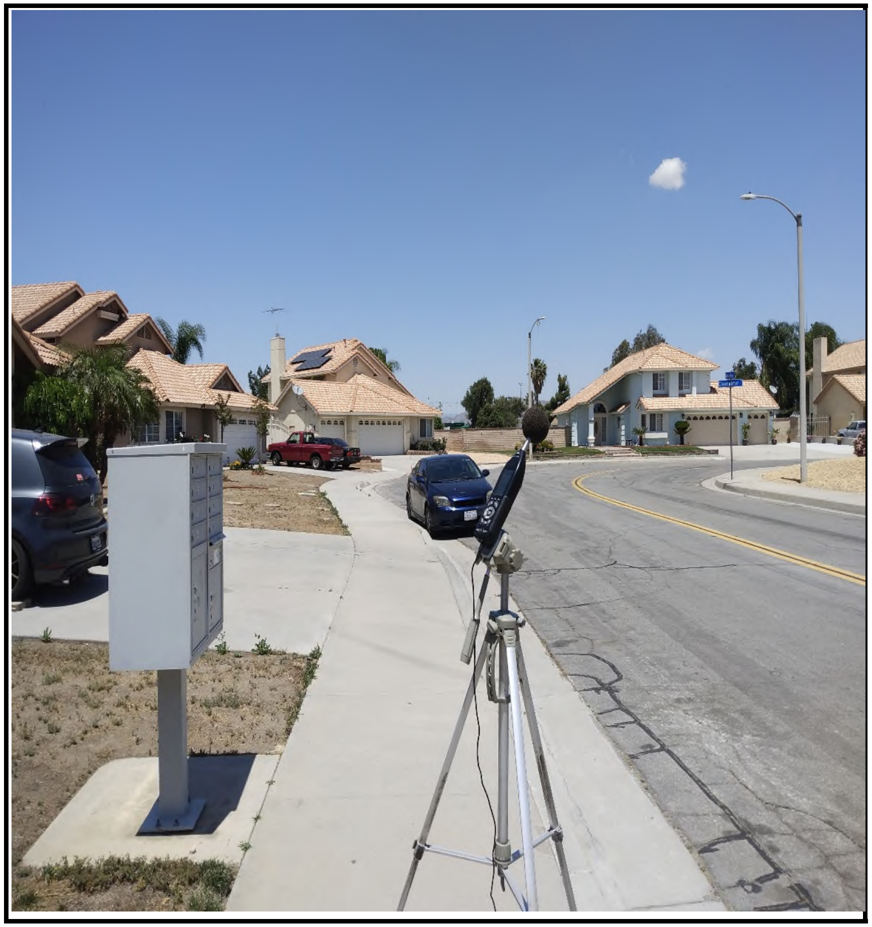
SERIAL NUMBER: 2723

FACTORY CALIBRATION DATE: 11/18/2021

Noise Measurement
Field Data

PHOTOS:

STNM1 looking WNW towards frontyard of residence 16185 Smoke Tree Pl, Moreno Valley.



STNM1 looking N up Smoke Tree Pl towards Clear Water Dr, Moreno Valley.

Summary

File Name on Meter	LxT_Data.034.s
File Name on PC	LxT_0003099-20220511 125521-LxT_Data.034.ld
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM1 33°53'8.81"N 117°13'56.74"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley

Measurement

Start	2022-05-11 12:55:21
Stop	2022-05-11 13:10:21
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-11 12:54:39
Post-Calibration	None

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	122.8 dB

Results

LAeq		54.4	
LAE		83.9	
EA		27.473	µPa^{2}h
EA8		879.150	µPa^{2}h
EA40		4.396	mPa^{2}h
LZpeak (max)	2022-05-11 12:56:52	100.8	dB
LASmax	2022-05-11 13:03:59	70.0	dB
LASmin	2022-05-11 13:05:42	38.8	dB

		Statistics	
LCeq	64.4 dB	**LA2.00**	64.7 dB
LAeq	54.4 dB	**LA8.00**	59.9 dB
LCeq - LAeq	10.0 dB	**LA25.00**	49.8 dB
LAIeq	57.4 dB	**LA50.00**	44.9 dB
LAeq	54.4 dB	**LA66.60**	43.3 dB
LAIeq - LAeq	3.1 dB	**LA90.00**	41.0 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.034.s	Computer's File Name	LxT_0003099-20220511 125521-LxT_Data.034.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM1 33°53'8.81"N 117°13'56.74"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley		

Start Time	2022-05-11 12:55:21	Duration	0:15:00.0		
End Time	2022-05-11 13:10:21	Run Time	0:15:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	54.4 dB		
LAE	83.9 dB	SEA	--- dB
EA	27.5 µPa²h	LAFTM5	59.4 dB
EA8	879.1 µPa²h		
EA40	4.4 mPa²h		

LZ_{peak}	100.8 dB	2022-05-11 12:56:52
LAS_{max}	70.0 dB	2022-05-11 13:03:59
LAS_{min}	38.8 dB	2022-05-11 13:05:42

LA_{eq}	54.4 dB		
LC_{eq}	64.4 dB	LC_{eq} - LA_{eq}	10.0 dB
LAI_{eq}	57.4 dB	LAI_{eq} - LA_{eq}	3.1 dB

Exceedances	Count	Duration
LAS > 65.0 dB	3	0:00:28.2
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	--- dB	--- dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

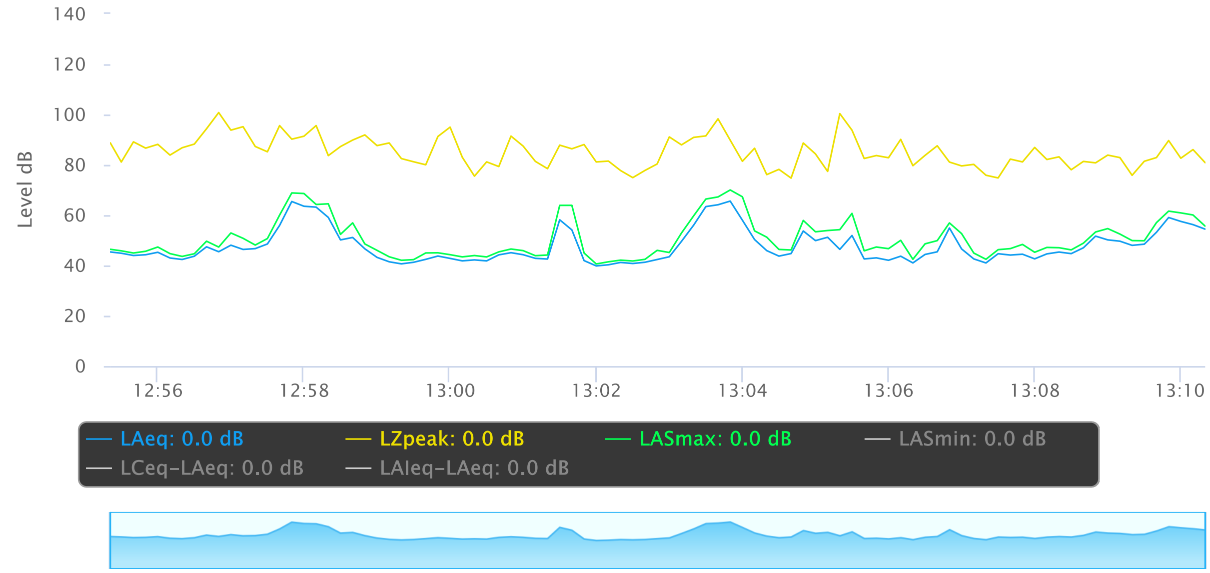
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	54.4 dB		64.4 dB		--- dB	
$Ls_{(max)}$	70.0 dB	2022-05-11 13:03:59	--- dB		--- dB	
$LS_{(min)}$	38.8 dB	2022-05-11 13:05:42	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		100.8 dB	2022-05-11 12:56:52

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

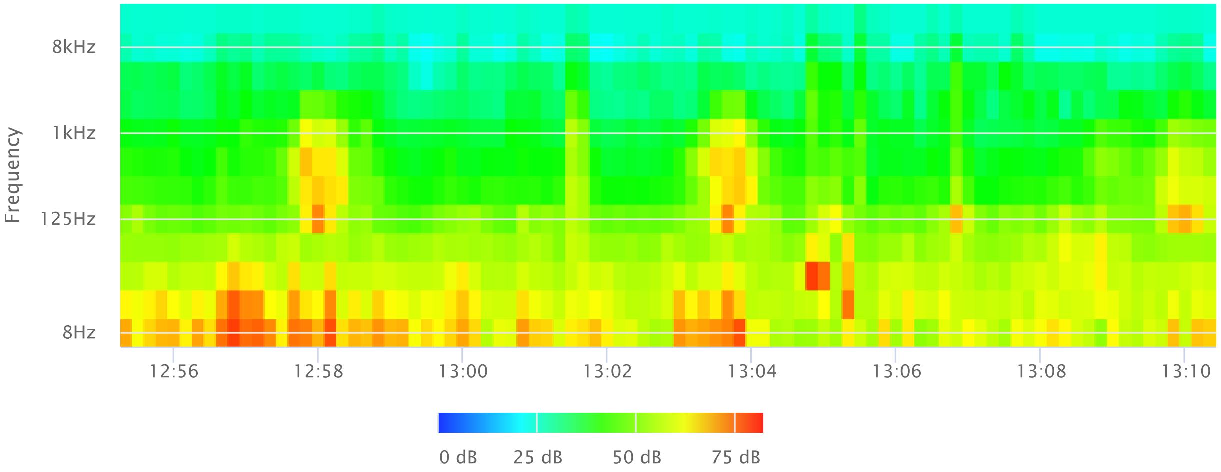
Statistics

LAS 2.0	64.7 dB
LAS 8.0	59.9 dB
LAS 25.0	49.8 dB
LAS 50.0	44.9 dB
LAS 66.6	43.3 dB
LAS 90.0	41.0 dB

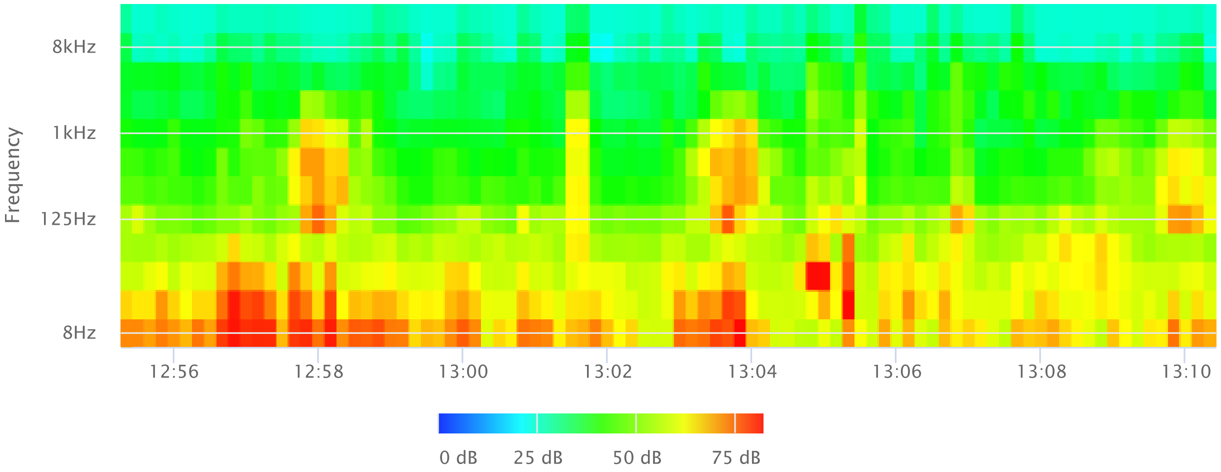
Time History



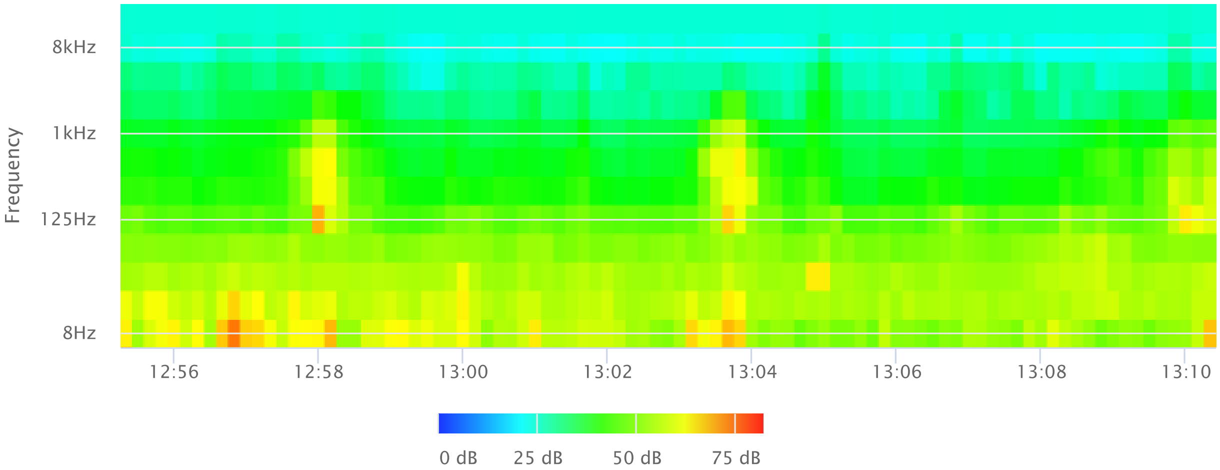
OBA 1/1 Leq



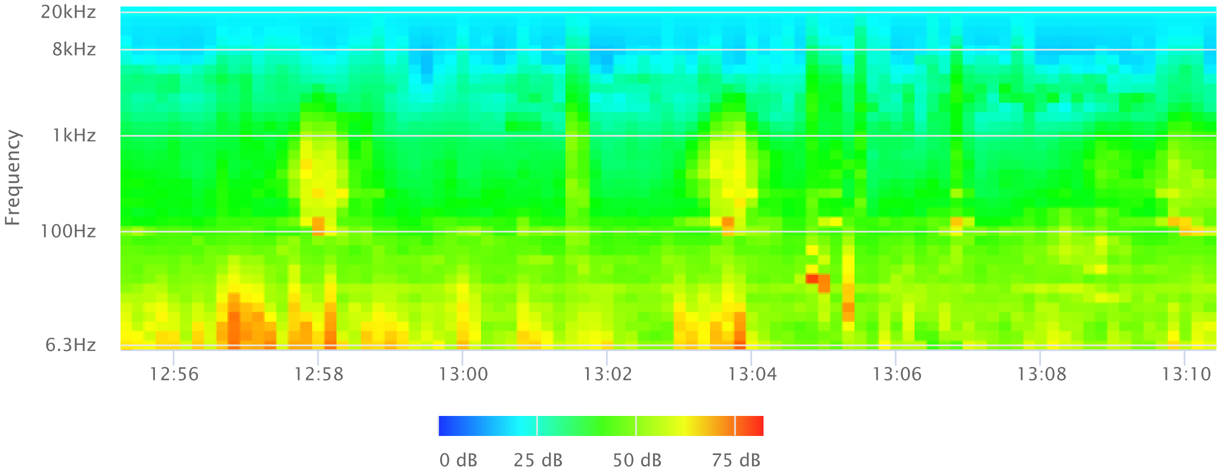
OBA 1/1 Lmax



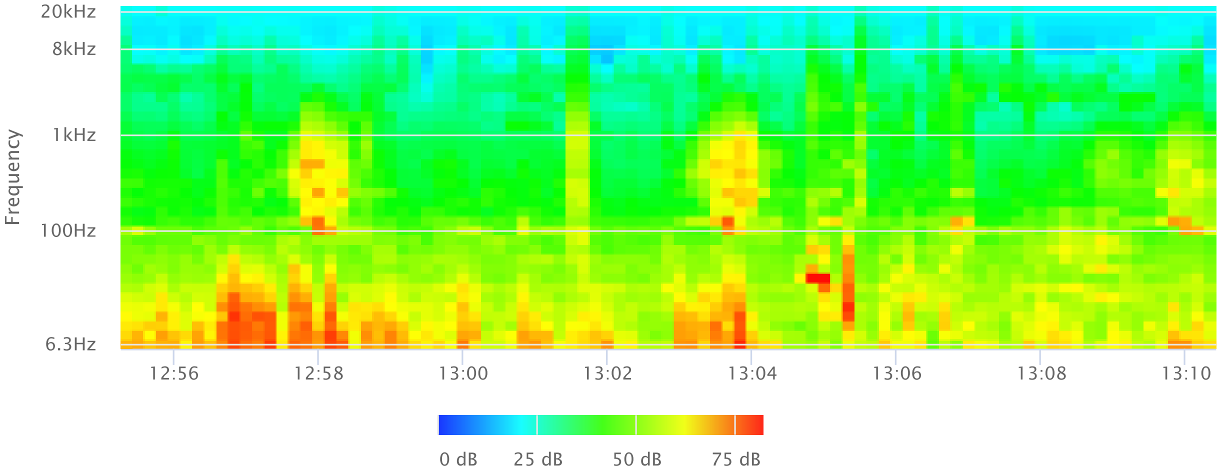
OBA 1/1 Lmin



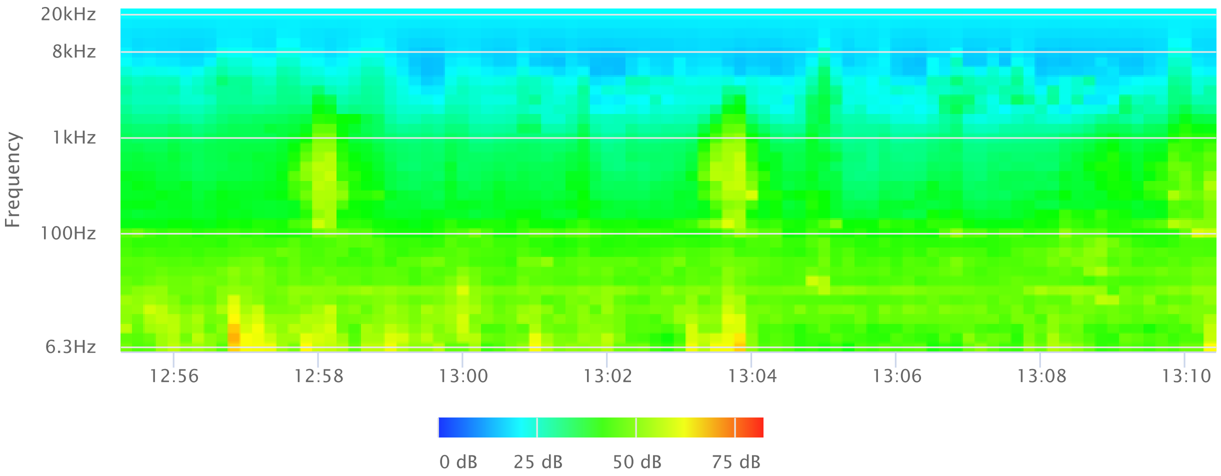
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin



Frequency
20kHz
8kHz
1kHz
100Hz
6.3Hz
12:56
12:58
13:00
13:02
13:04
13:06
13:08
13:10
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: South of Iris Avenue, City of Moreno Valley. **Date:** May 11, 2022

Project #: 19474

Noise Measurement #: STNM2 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 16101 New Light Way, Moreno Valley, California 92551

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by single-family residential & vacant land to east, Goya Ave & vacant land to south, single-family residential & church uses to west, & Iris Ave to north. Noise Measurement Site: New light way to east/northeast, vacant land to north, single-family residential use to south, and church use to southeast.

Weather: <5% cloud, sunshine. **Settings:** [✓ SLOW] FAST

Temperature: 62 deg F **Wind:** 9 mph **Humidity:** 32% **Terrain:** Flat

Start Time: 1:30 PM **End Time:** 1:45 PM **Run Time:**

Leq: 56.9 dB

Lmax 69.7 dB

L2 66.5 dB

L8 63.2 dB

L25 54.7 dB

L50 51.3 dB

Primary Noise Source: Bird song, residential ambiance, 4 vehicles passed microphone during 15 minute noise measurement.

Secondary Noise Sources: Leaf rustle from 9 mph breeze, traffic ambiance from Iris Avenue, overhead air traffic.

NOISE METER: SoundTrack LXT Class 1

MAKE: Larson Davis

MODEL: LXT1

SERIAL NUMBER: 3099

FACTORY CALIBRATION DATE: 11/17/2021

FIELD CALIBRATION DATE: 5/11/2022

CALIBRATOR: Larson Davis CA 250

MAKE: Larson Davis

MODEL: CA 250

SERIAL NUMBER: 2723

FACTORY CALIBRATION DATE: 11/18/2021

Noise Measurement
Field Data

PHOTOS:

STNM2 looking S towards frontyard of residence 16101 New Light Way, Moreno Valley.

STNM2 looking N up New Light Way towards Iris Avenue intersection.

Summary

File Name on Meter	LxT_Data.035.s
File Name on PC	LxT_0003099-20220511 133027-LxT_Data.035.ld
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM2 33°53'14.58"N 117°13'56.18"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley

Measurement

Start	2022-05-11 13:30:27
Stop	2022-05-11 13:45:27
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-11 13:30:07
Post-Calibration	None

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	122.8 dB

Results

LAeq	56.9	
LAE	86.5	
EA	49.51534 µPa²h	
EA8	1.584491 mPa²h	
EA40	7.922455 mPa²h	
LZpeak (max)	2022-05-11 13:44:16	109.8 dB
LASmax	2022-05-11 13:35:40	69.7 dB
LASmin	2022-05-11 13:43:53	44.6 dB

			Statistics
LCeq	68.5 dB	**LA2.00**	66.5 dB
LAeq	56.9 dB	**LA8.00**	63.2 dB
LCeq - LAeq	11.6 dB	**LA25.00**	54.7 dB
LAIeq	60.2 dB	**LA50.00**	51.3 dB
LAeq	56.9 dB	**LA66.60**	49.9 dB
LAIeq - LAeq	3.2 dB	**LA90.00**	47.7 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.035.s	Computer's File Name	LxT_0003099-20220511 133027-LxT_Data.035.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM2 33°53'14.58"N 117°13'56.18"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley		

Start Time	2022-05-11 13:30:27	Duration	0:15:00.0		
End Time	2022-05-11 13:45:27	Run Time	0:15:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	56.9 dB		
LAE	86.5 dB	SEA	--- dB
EA	49.5 µPa²h	LAFTM5	61.9 dB
EA8	1.6 mPa²h		
EA40	7.9 mPa²h		
LZ_{peak}	109.8 dB	2022-05-11 13:44:16	
LAS_{max}	69.7 dB	2022-05-11 13:35:40	
LAS_{min}	44.6 dB	2022-05-11 13:43:53	
LA_{eq}	56.9 dB		
LC_{eq}	68.5 dB	LC_{eq} - LA_{eq}	11.6 dB
LAI_{eq}	60.2 dB	LAI_{eq} - LA_{eq}	3.2 dB

Exceedances	Count	Duration
LAS > 65.0 dB	6	0:01:05.2
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	--- dB	--- dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

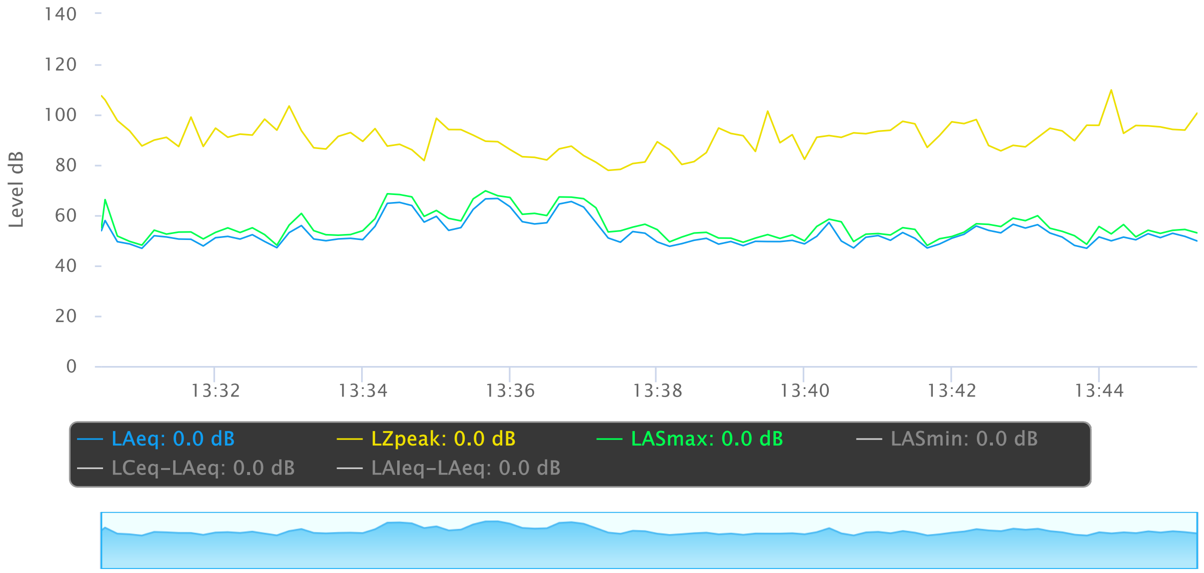
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	56.9 dB		68.5 dB		--- dB	
$Ls_{(max)}$	69.7 dB	2022-05-11 13:35:40	--- dB		--- dB	
$LS_{(min)}$	44.6 dB	2022-05-11 13:43:53	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		109.8 dB	2022-05-11 13:44:16

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

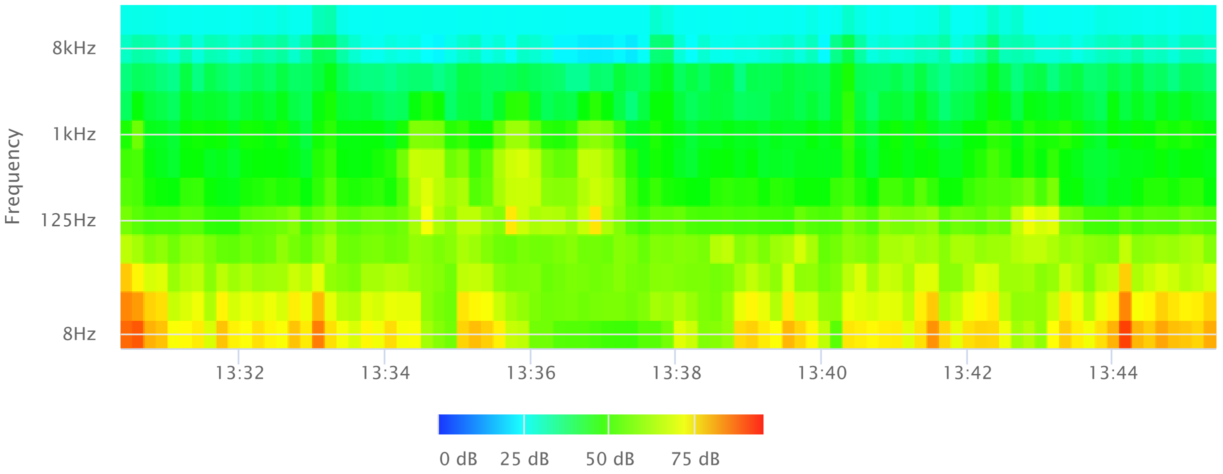
Statistics

LAS 2.0	66.5 dB
LAS 8.0	63.2 dB
LAS 25.0	54.7 dB
LAS 50.0	51.3 dB
LAS 66.6	49.9 dB
LAS 90.0	47.7 dB

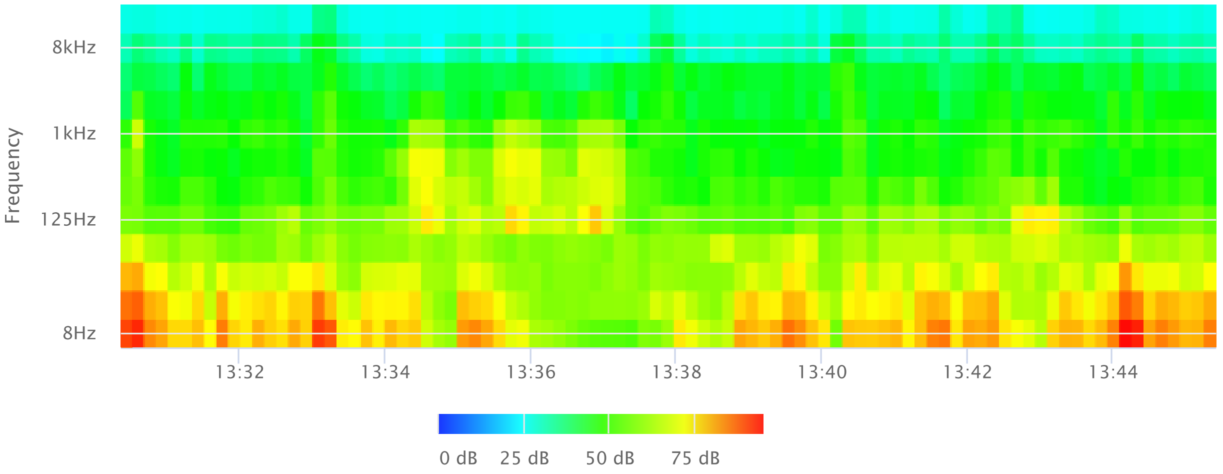
Time History



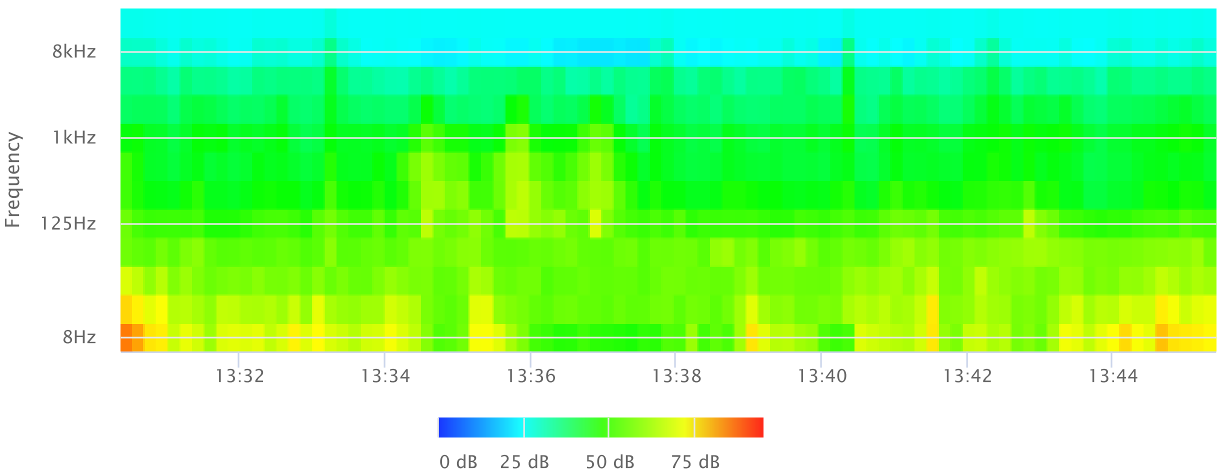
OBA 1/1 Leq



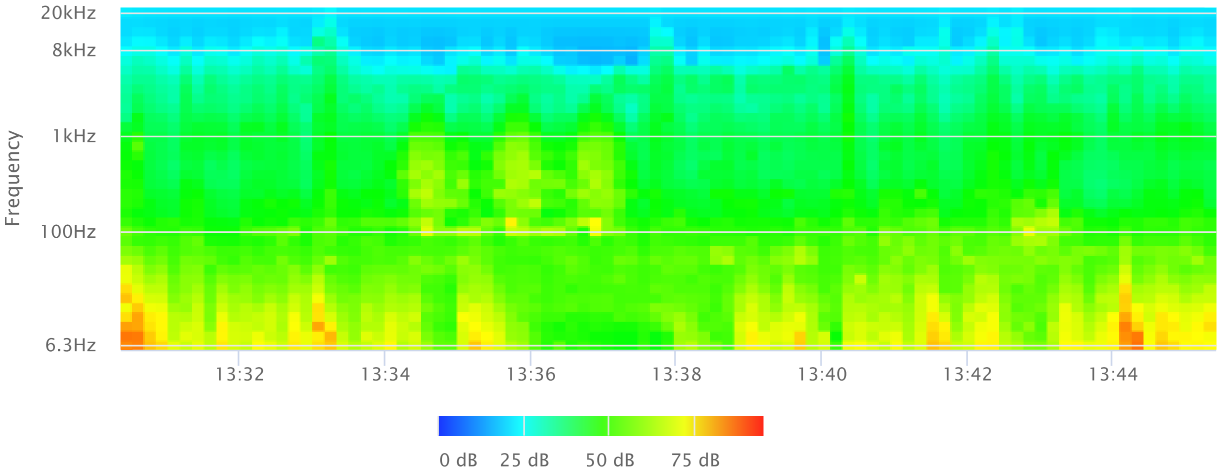
OBA 1/1 Lmax



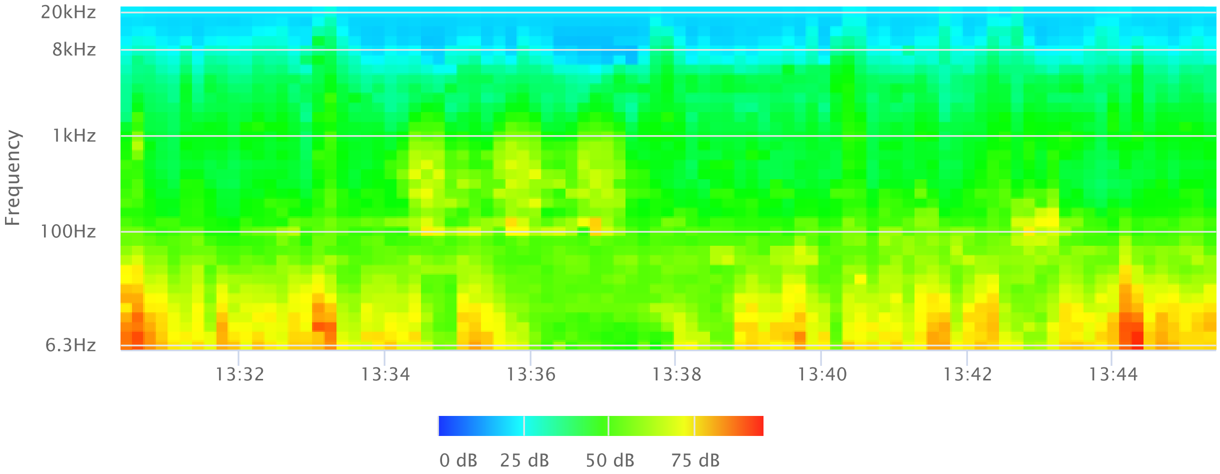
OBA 1/1 Lmin



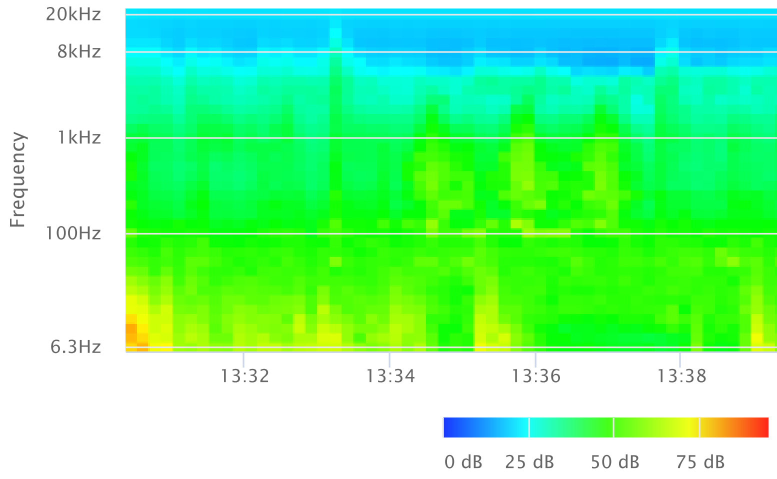
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
Frequency
100Hz
6.3Hz
13:32
13:34
13:36
13:38
13:40
13:42
13:44
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: South of Iris Avenue, City of Moreno Valley. **Date:** May 11, 2022

Project #: 19474

Noise Measurement #: STNM3 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 15950 Indian Street, Moreno Valley, California 92551

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by single-family residential & vacant land to east, Goya Ave & vacant land to south, single-family residential & church uses to west, & Iris Ave to north. Noise Measurement Site: Iris Ave to south w/ vacant project site further south & school use to north.

Weather: <5% cloud, sunshine. **Settings:** [✓ SLOW] FAST

Temperature: 62 deg F **Wind:** 9 mph **Humidity:** 32% **Terrain:** Flat

Start Time: 2:03 PM **End Time:** 2:18 PM **Run Time:**

Leq: 68.7 dB

Lmax 86.3 dB

L2 76.2 dB

L8 73.8 dB

L25 69.1 dB

L50 64.3 dB

Primary Noise Source: 191 vehicles passed microphone traveling along Iris Avenue during 15 minute noise measurement.

Secondary Noise Sources: Bird song, pedestrians, leaf rustle from 9 mph breeze, overhead air traffic.

NOISE METER: SoundTrack LXT Class 1

MAKE: Larson Davis

MODEL: LXT1

SERIAL NUMBER: 3099

FACTORY CALIBRATION DATE: 11/17/2021

FIELD CALIBRATION DATE: 5/11/2022

CALIBRATOR: Larson Davis CA 250

MAKE: Larson Davis

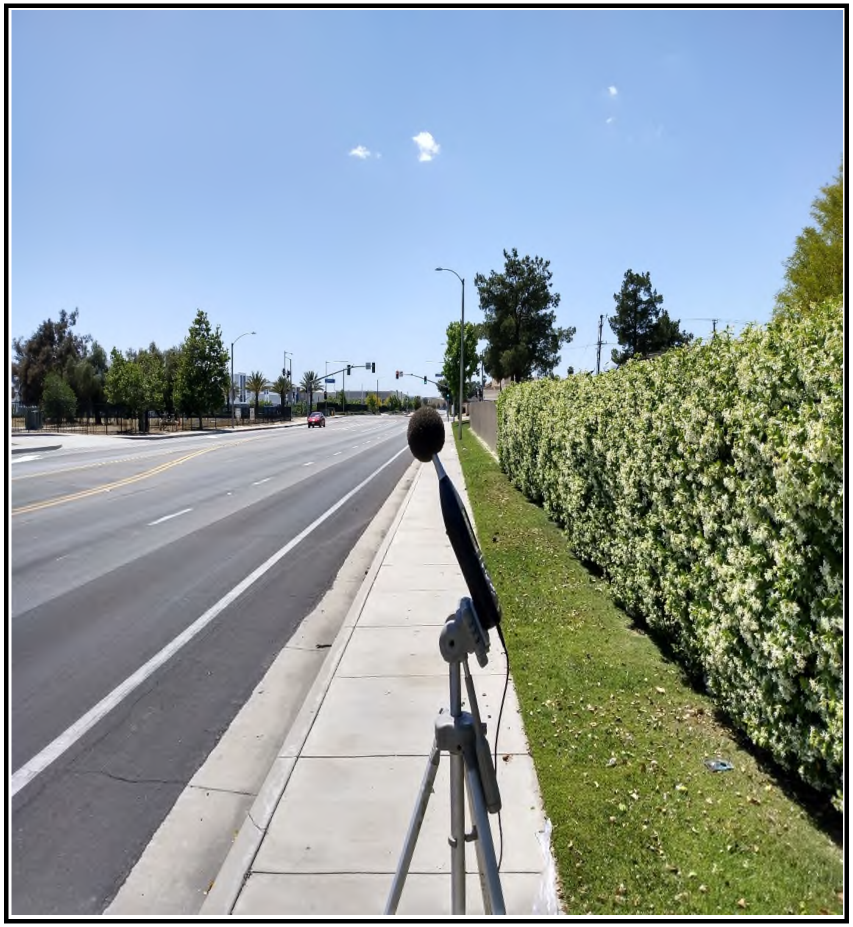
MODEL: CA 250

SERIAL NUMBER: 2723

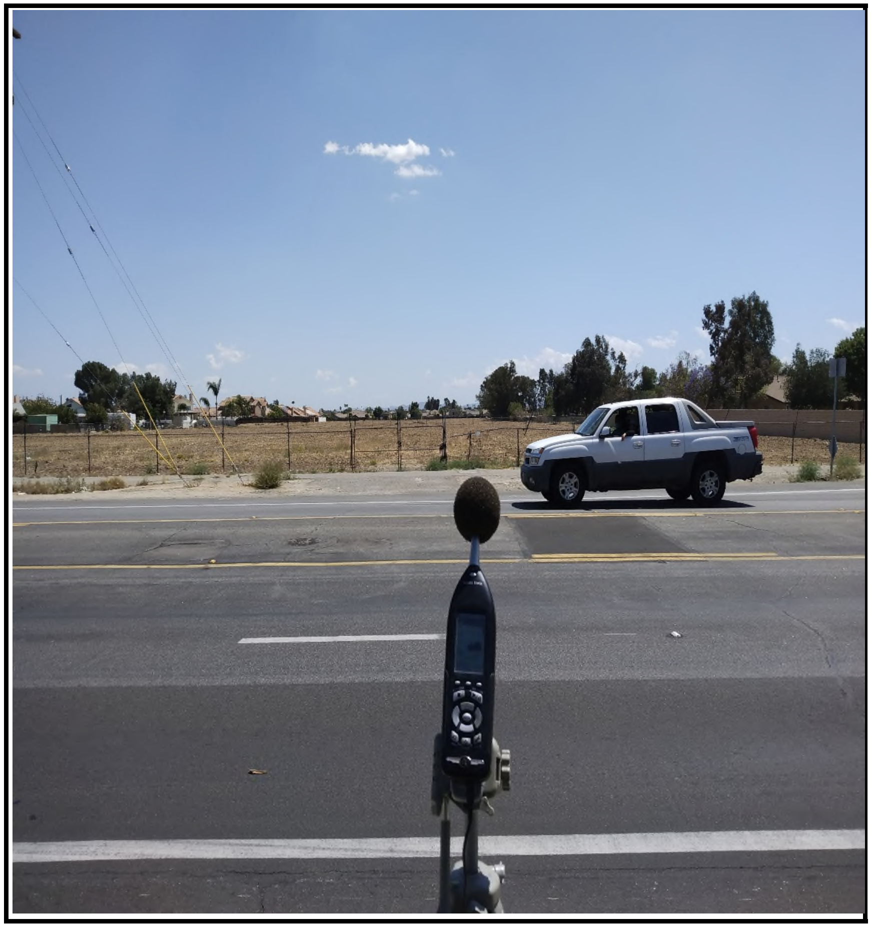
FACTORY CALIBRATION DATE: 11/18/2021

Noise Measurement
Field Data

PHOTOS:



STNM3 looking W down Iris Ave towards Indian Street intersection. School on the right of image, behind hedge.



STNM3 looking S across Iris Ave towards project site area.

Summary

File Name on Meter	LxT_Data.036.s
File Name on PC	LxT_0003099-20220511 140305-LxT_Data.036.ld
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM3 33°53'18.41"N 117°14'0.55"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley

Measurement

Start	2022-05-11 14:03:05
Stop	2022-05-11 14:18:05
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-11 14:02:49
Post-Calibration	None

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	123.0 dB

Results

LAeq	68.7	
LAE	98.2	
EA	737.3641 µPa²h	
EA8	23.59565 mPa²h	
EA40	117.9782 mPa²h	
LZpeak (max)	2022-05-11 14:16:47	104.3 dB
LASmax	2022-05-11 14:16:46	86.3 dB
LASmin	2022-05-11 14:13:56	47.1 dB

		Statistics	
LCeq	74.4 dB	**LA2.00**	76.2 dB
LAeq	68.7 dB	**LA8.00**	73.8 dB
LCeq - LAeq	5.7 dB	**LA25.00**	69.1 dB
LAIeq	72.0 dB	**LA50.00**	64.3 dB
LAeq	68.7 dB	**LA66.60**	60.2 dB
LAIeq - LAeq	3.3 dB	**LA90.00**	51.6 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.036.s	Computer's File Name	LxT_0003099-20220511 140305-LxT_Data.036.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM3 33°53'18.41"N 117°14'0.55"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley		

Start Time	2022-05-11 14:03:05	Duration	0:15:00.0		
End Time	2022-05-11 14:18:05	Run Time	0:15:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	68.7 dB		
LAE	98.2 dB	SEA	--- dB
EA	737.4 $\mu\text{Pa}^2\text{h}$	LAFTM5	75.2 dB
EA8	23.6 mPa^2h		
EA40	118.0 mPa^2h		

LZ_{peak}	104.3 dB	2022-05-11 14:16:47
LAS_{max}	86.3 dB	2022-05-11 14:16:46
LAS_{min}	47.1 dB	2022-05-11 14:13:56

LA_{eq}	68.7 dB		
LC_{eq}	74.4 dB	LC_{eq} - LA_{eq}	5.7 dB
LAI_{eq}	72.0 dB	LAI_{eq} - LA_{eq}	3.3 dB

Exceedances	Count	Duration
LAS > 65.0 dB	49	0:07:50.7
LAS > 85.0 dB	1	0:00:01.3
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	--- dB	--- dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

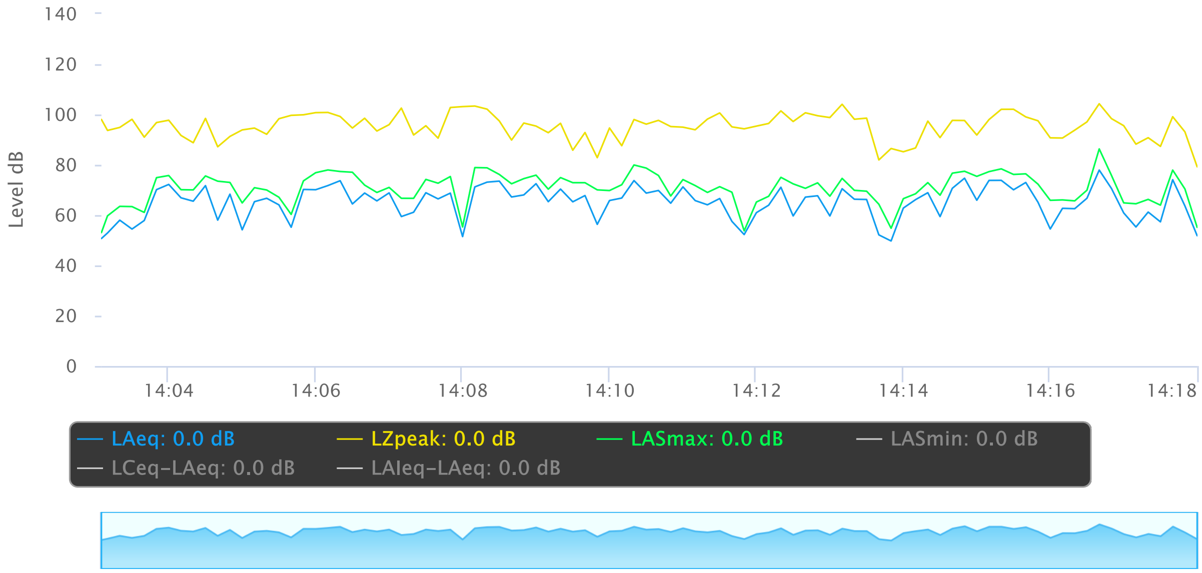
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	68.7 dB		74.4 dB		--- dB	
$Ls_{(max)}$	86.3 dB	2022-05-11 14:16:46	--- dB		--- dB	
$LS_{(min)}$	47.1 dB	2022-05-11 14:13:56	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		104.3 dB	2022-05-11 14:16:47

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

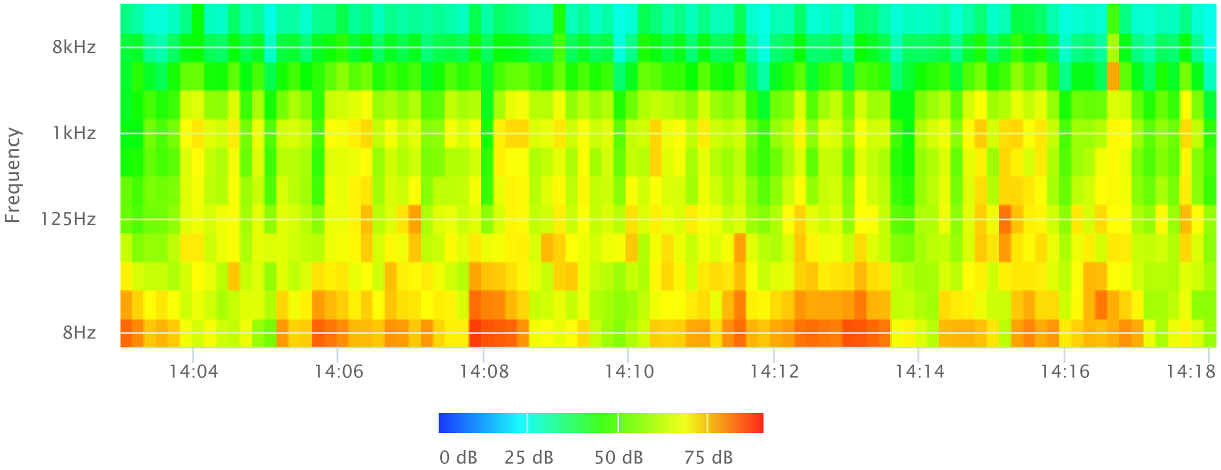
Statistics

LAS 2.0	76.2 dB
LAS 8.0	73.8 dB
LAS 25.0	69.1 dB
LAS 50.0	64.3 dB
LAS 66.6	60.2 dB
LAS 90.0	51.6 dB

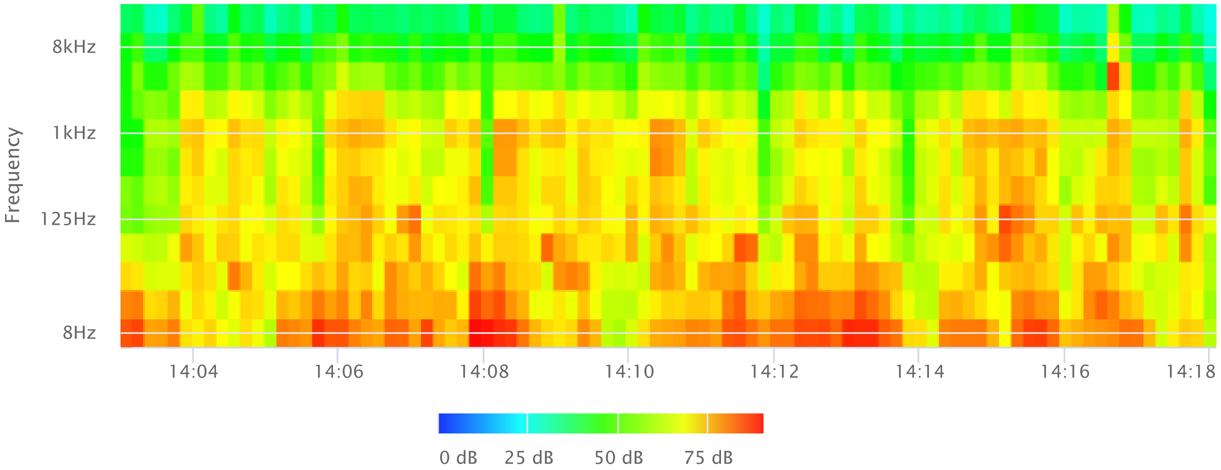
Time History



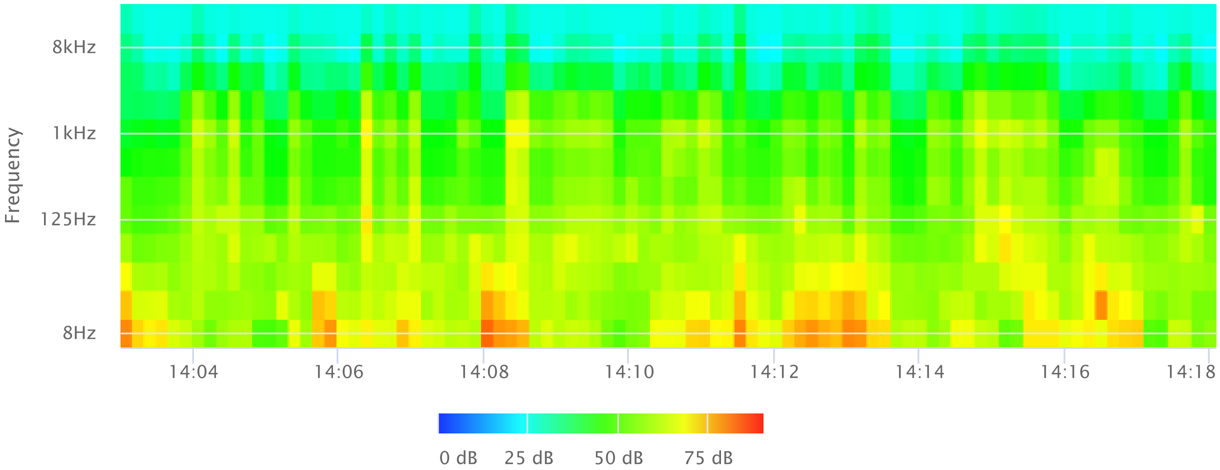
OBA 1/1 Leq



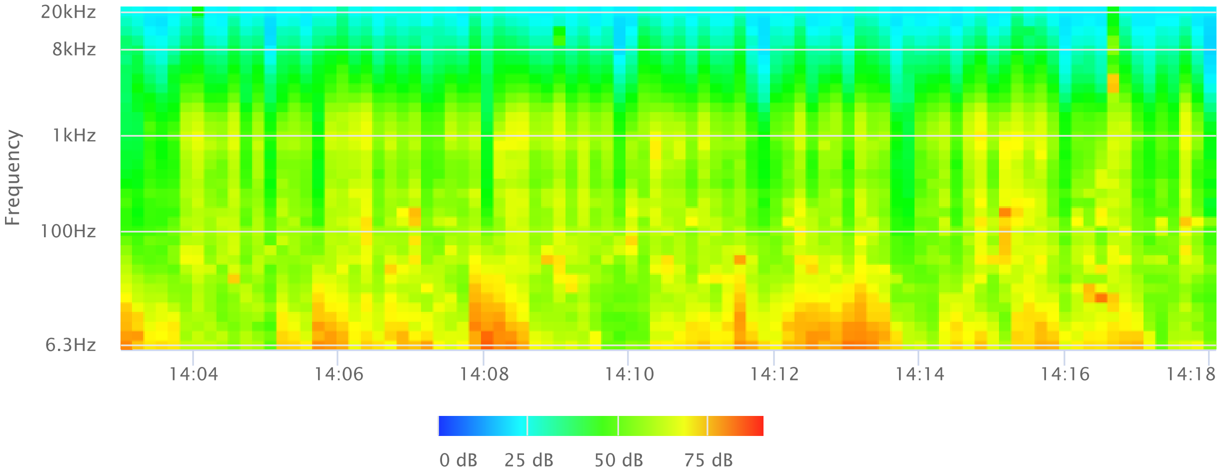
OBA 1/1 Lmax



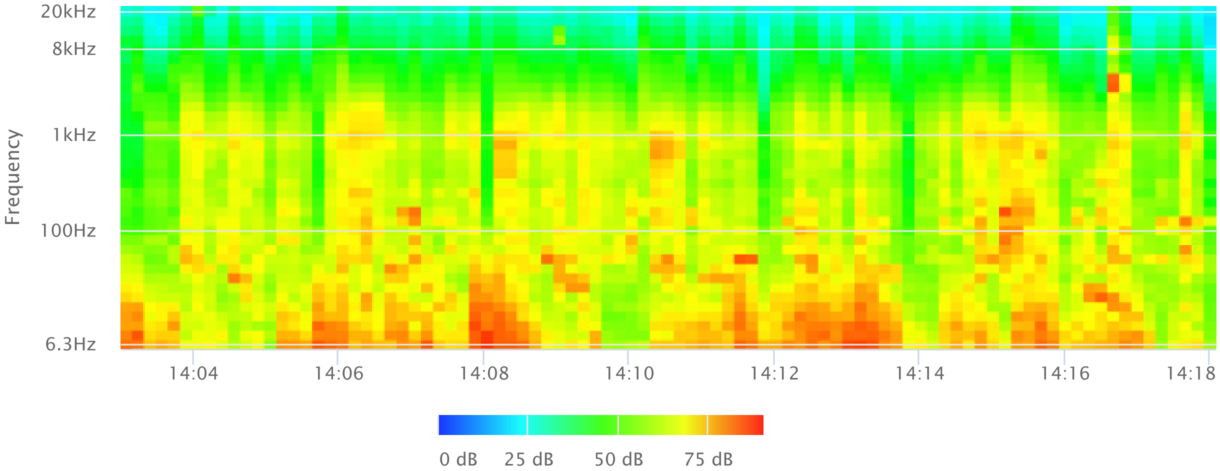
OBA 1/1 Lmin



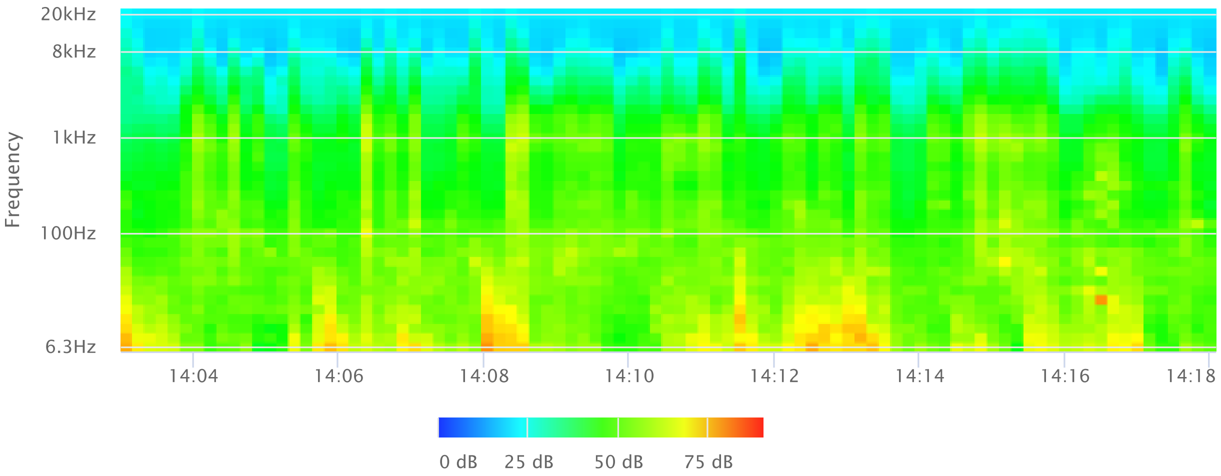
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
Frequency
100Hz
6.3Hz
14:04
14:06
14:08
14:10
14:12
14:14
14:16
14:18
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: South of Iris Avenue, City of Moreno Valley. **Date:** May 11, 2022

Project #: 19474

Noise Measurement #: STNM4 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 24525 Iris Avenue, Moreno Valley, California 92551

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by single-family residential & vacant land to east, Goya Ave & vacant land to south, single-family residential & church uses to west, & Iris Ave to north. Noise Measurement Site: Church use w/ associated parking lot to west & vacant project site to east/north/south with Iris Ave further north.

Weather: <5% cloud, sunshine. **Settings:** [✓ SLOW] FAST

Temperature: 62 deg F **Wind:** 9 mph **Humidity:** 32% **Terrain:** Flat

Start Time: 2:33 PM **End Time:** 2:48 PM **Run Time:**

Leq: 49.1 dB

Lmax 62.4 dB

L2 55.7 dB

L8 51.9 dB

L25 49.7 dB

L50 47.3 dB

Primary Noise Source: Traffic ambiance from Iris Avenue & Indian Street.

Secondary Noise Sources: Bird song, leaf rustle from 9 mph breeze, overhead air traffic.

NOISE METER: SoundTrack LXT Class 1

MAKE: Larson Davis

MODEL: LXT1

SERIAL NUMBER: 3099

FACTORY CALIBRATION DATE: 11/17/2021

FIELD CALIBRATION DATE: 5/11/2022

CALIBRATOR: Larson Davis CA 250

MAKE: Larson Davis

MODEL: CA 250

SERIAL NUMBER: 2723

FACTORY CALIBRATION DATE: 11/18/2021

Noise Measurement
Field Data

PHOTOS:

east, Goya

Ave to nor

project site t

STNM4 looking N towards Iris Ave, eastern edge of property 24525 Iris Avenue, Moreno Valley on the left of image.

STNM4 looking E across site area towards New Light Way.

Noise Measurement
Field Data

o east/north/souht with Iris Ave further north.

Summary

File Name on Meter	LxT_Data.037.s
File Name on PC	LxT_0003099-20220511 143332-LxT_Data.037.l
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM4 33°53'15.45"N 117°14'1.47"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley

Measurement

Start	2022-05-11 14:33:32
Stop	2022-05-11 14:48:32
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-11 14:33:06
Post-Calibration	None

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	123.0 dB

Results

LAeq	49.1	
LAE	78.7	
EA	8.167217 µPa²h	
EA8	261.351 µPa²h	
EA40	1.306755 mPa²h	
LZpeak (max)	2022-05-11 14:41:17	104.5 dB
LASmax	2022-05-11 14:48:24	62.4 dB
LASmin	2022-05-11 14:44:46	40.1 dB

LCeq	65.3 dB
LAeq	49.1 dB
LCeq - LAeq	16.1 dB
LAIeq	51.3 dB
LAeq	49.1 dB
LAIeq - LAeq	2.2 dB
Overload Count	0

Statistics

LA2.00	55.7 dB
LA8.00	51.9 dB
LA25.00	49.7 dB
LA50.00	47.3 dB
LA66.60	46.2 dB
LA90.00	43.9 dB

Measurement Report

Report Summary

Meter's File Name	LxT_Data.037.s	Computer's File Name	LxT_0003099-20220511 143332-LxT_Data.037.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM4 33°53'15.45"N 117°14'1.47"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley		

Start Time	2022-05-11 14:33:32	Duration	0:15:00.0		
End Time	2022-05-11 14:48:32	Run Time	0:15:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	49.1 dB		
LAE	78.7 dB	SEA	--- dB
EA	8.2 µPa²h	LAFTM5	53.0 dB
EA8	261.4 µPa²h		
EA40	1.3 mPa²h		

LZ_{peak}	104.5 dB	2022-05-11 14:41:17
LAS_{max}	62.4 dB	2022-05-11 14:48:24
LAS_{min}	40.1 dB	2022-05-11 14:44:46

LA_{eq}	49.1 dB		
LC_{eq}	65.3 dB	LC_{eq} - LA_{eq}	16.1 dB
LAI_{eq}	51.3 dB	LAI_{eq} - LA_{eq}	2.2 dB

Exceedances	Count	Duration
LAS > 65.0 dB	0	0:00:00.0
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	--- dB	--- dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

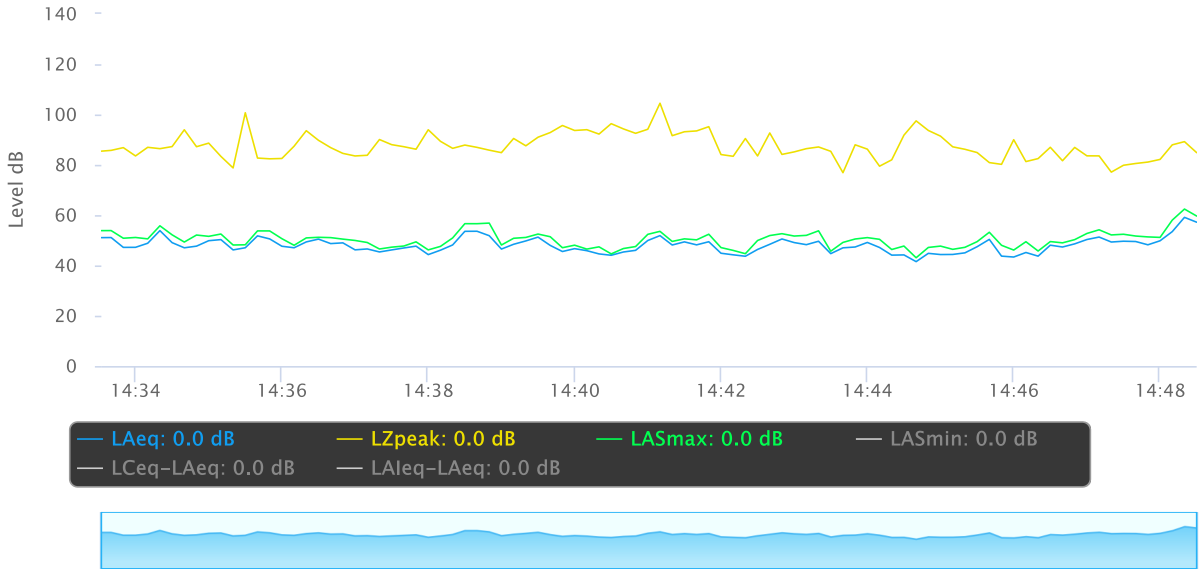
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	49.1 dB		65.3 dB		--- dB	
$Ls_{(max)}$	62.4 dB	2022-05-11 14:48:24	--- dB		--- dB	
$LS_{(min)}$	40.1 dB	2022-05-11 14:44:46	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		104.5 dB	2022-05-11 14:41:17

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

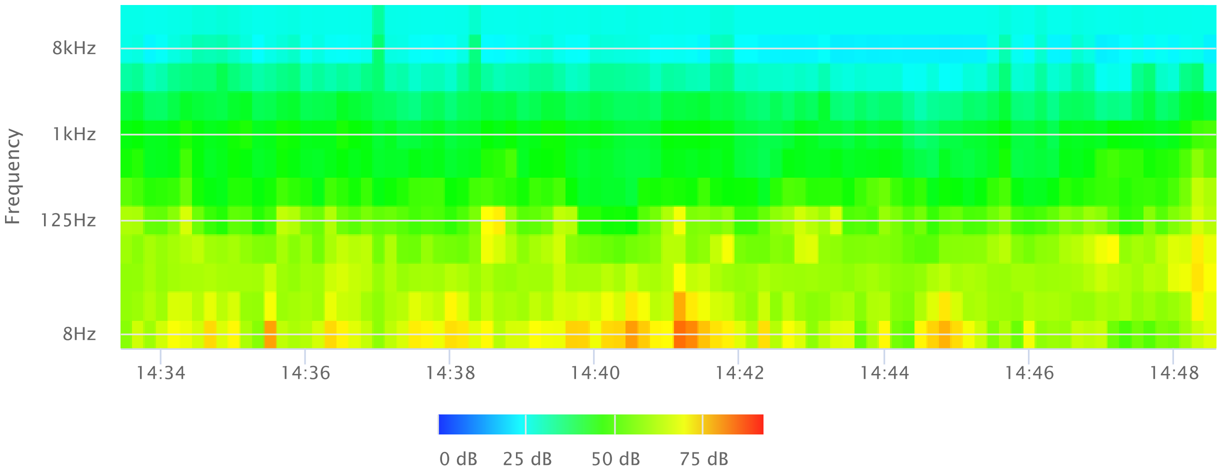
Statistics

LAS 2.0	55.7 dB
LAS 8.0	51.9 dB
LAS 25.0	49.7 dB
LAS 50.0	47.3 dB
LAS 66.6	46.2 dB
LAS 90.0	43.9 dB

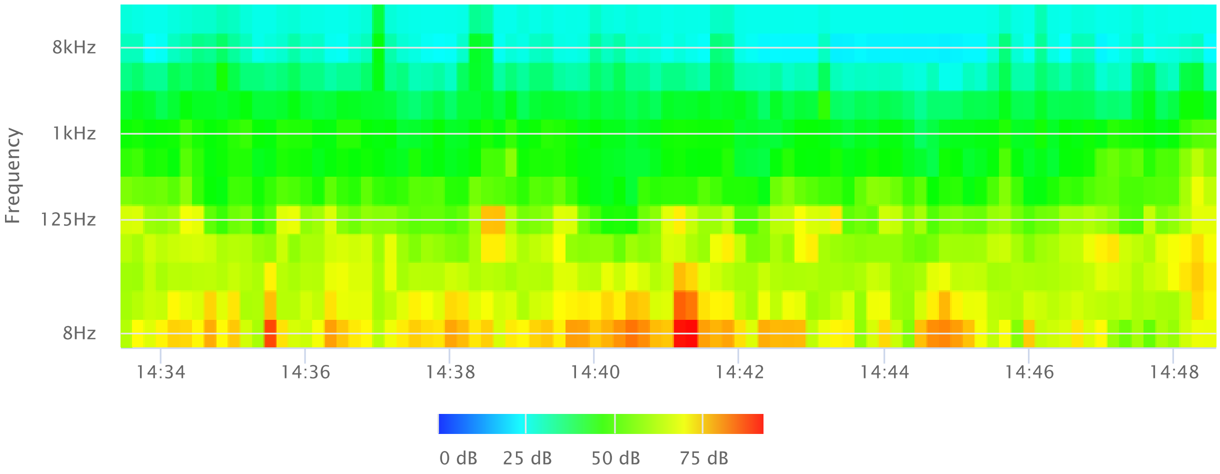
Time History



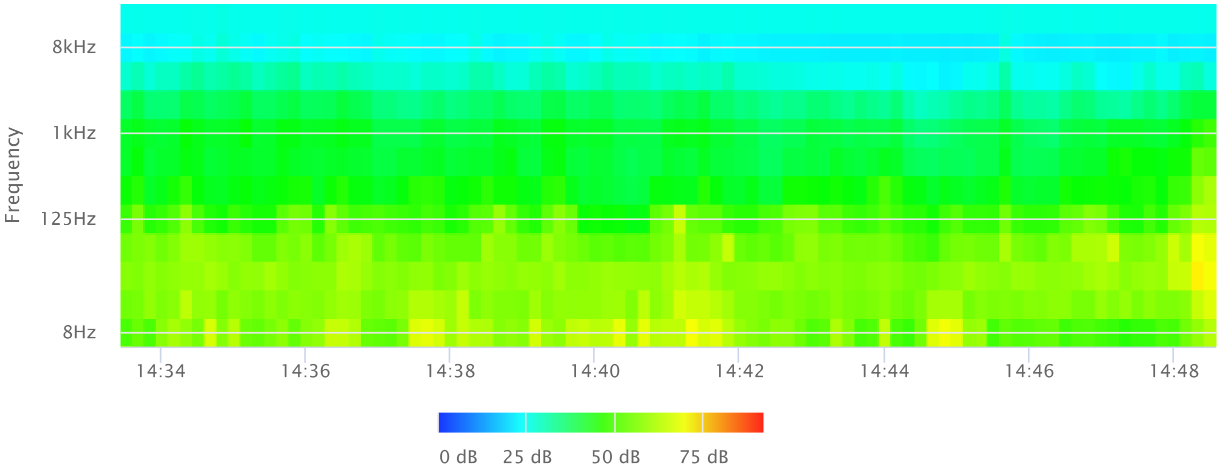
OBA 1/1 Leq



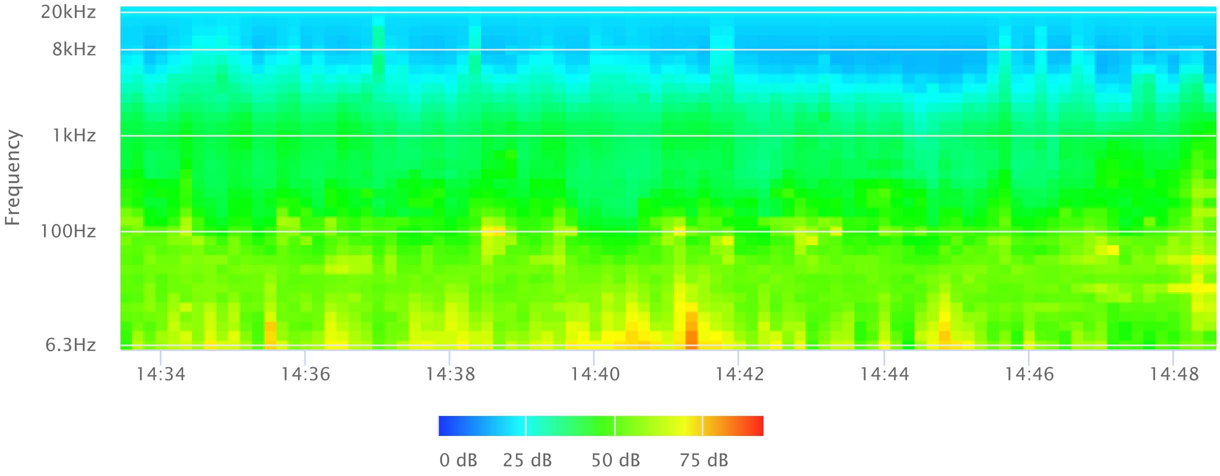
OBA 1/1 Lmax



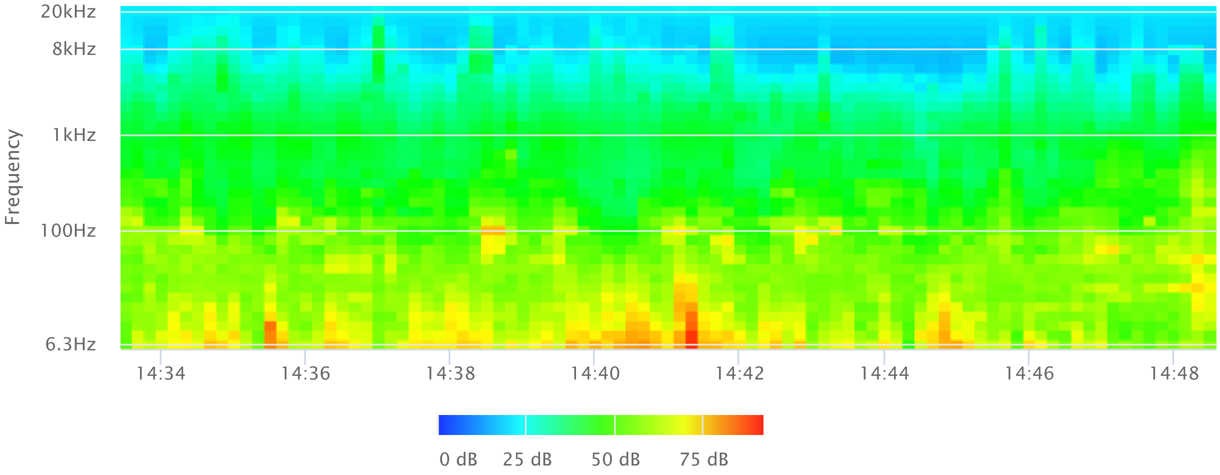
OBA 1/1 Lmin



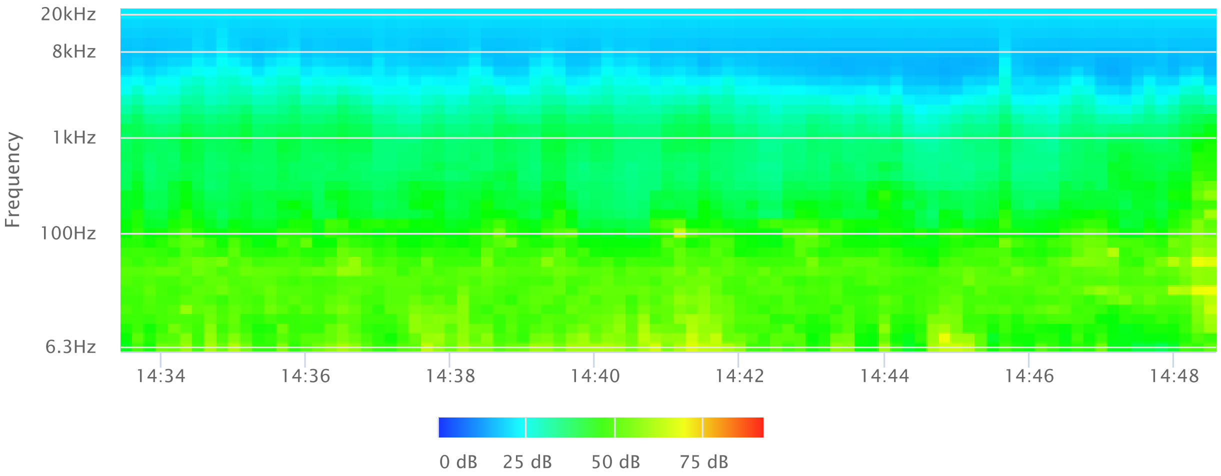
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
14:34
14:36
14:38
14:40
14:42
14:44
14:46
14:48
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: South of Iris Avenue, City of Moreno Valley. **Date:** May 11, 2022

Project #: 19474

Noise Measurement #: STNM5 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 16220 Indian Street, Moreno Valley, California 92551

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by single-family residential & vacant land to east, Goya Ave & vacant land to south, single-family residential & church uses to west, & Iris Ave to north. Noise Measurement Site: Taken at northeast corner of vacant project site. Vacant site to north/east, Goya Ave to south, & a church use to west.

Weather: <5% cloud, sunshine. **Settings:** [✓ SLOW] FAST

Temperature: 62 deg F **Wind:** 9 mph **Humidity:** 32% **Terrain:** Flat

Start Time: 3:27 PM **End Time:** 3:42 PM **Run Time:**

Leq: 45.1 dB **Primary Noise Source:** Traffic ambiance from Iris Avenue & Indian Street.

Lmax 55 dB

L2 50.1 dB **Secondary Noise Sources:** Bird song, leaf rustle from 9 mph breeze, overhead air traffic.

L8 47.8 dB

L25 45.7 dB

L50 44.3 dB

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CA 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CA 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	11/17/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	5/11/2022		

Noise Measurement
Field Data

PHOTOS:

STNM5 looking E toward residences along Smoke Tree Pl. Goya Ave is on the right hand side of the image.

STNM5 looking N towards Iris Ave. 16220 Indian Street, Moreno Valley Valley is on the left hand side of the image.

Summary

File Name on Meter	LxT_Data.038.s
File Name on PC	LxT_0003099-20220511 152720-LxT_Data.038.l
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM5 33°53'5.36"N 117°14'1.59"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley

Measurement

Start	2022-05-11 15:27:20
Stop	2022-05-11 15:42:20
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-11 15:26:55
Post-Calibration	None

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	122.9 dB

Results

LAeq	45.1	
LAE	74.6	
EA	3.24088 µPa²h	
EA8	103.7082 µPa²h	
EA40	518.5408 µPa²h	
LZpeak (max)	2022-05-11 15:27:33	98.5 dB
LASmax	2022-05-11 15:34:00	55.0 dB
LASmin	2022-05-11 15:30:00	38.8 dB

		Statistics	
LCeq	62.7 dB	**LA2.00**	50.1 dB
LAeq	45.1 dB	**LA8.00**	47.8 dB
LCeq - LAeq	17.6 dB	**LA25.00**	45.7 dB
LAIeq	47.4 dB	**LA50.00**	44.3 dB
LAeq	45.1 dB	**LA66.60**	43.4 dB
LAIeq - LAeq	2.3 dB	**LA90.00**	41.3 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.038.s	Computer's File Name	LxT_0003099-20220511 152720-LxT_Data.038.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM5 33°53'5.36"N 117°14'1.59"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19474 South of Iris Avenue, City of Moreno Valley		

Start Time	2022-05-11 15:27:20	Duration	0:15:00.0		
End Time	2022-05-11 15:42:20	Run Time	0:15:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	45.1 dB		
LAE	74.6 dB	SEA	--- dB
EA	3.2 μPa^{2}h	LAFTM5	48.9 dB
EA8	103.7 μPa^{2}h		
EA40	518.5 μPa^{2}h		
LZ_{peak}	98.5 dB	2022-05-11 15:27:33	
LAS_{max}	55.0 dB	2022-05-11 15:34:00	
LAS_{min}	38.8 dB	2022-05-11 15:30:00	
LA_{eq}	45.1 dB		
LC_{eq}	62.7 dB	LC_{eq} - LA_{eq}	17.6 dB
LAI_{eq}	47.4 dB	LAI_{eq} - LA_{eq}	2.3 dB

Exceedances	Count	Duration
LAS > 65.0 dB	0	0:00:00.0
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	--- dB	--- dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

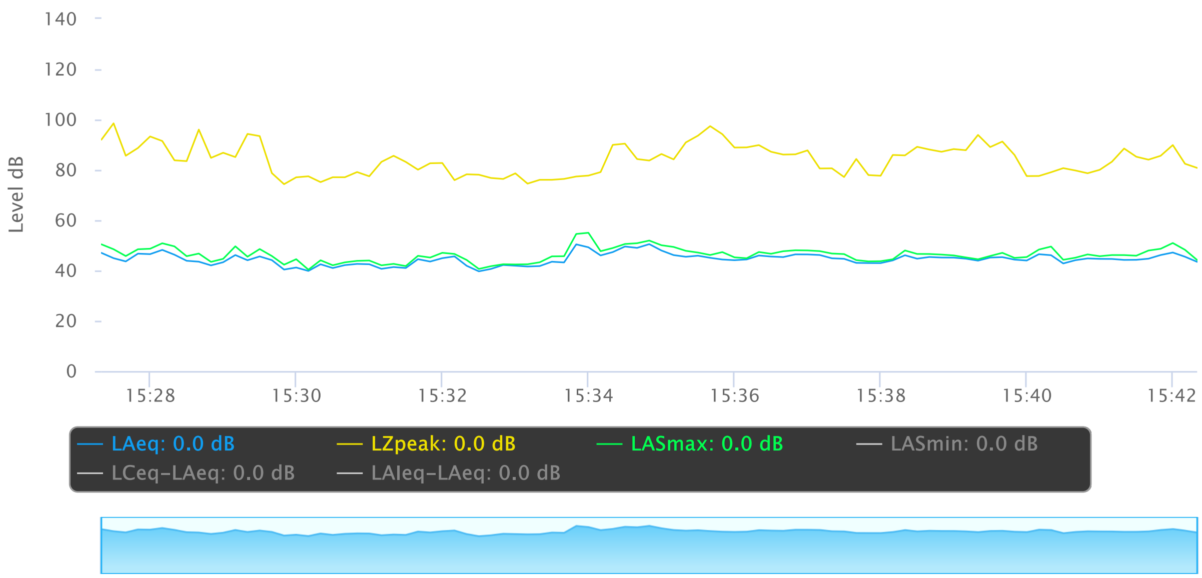
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	45.1 dB		62.7 dB		--- dB	
$Ls_{(max)}$	55.0 dB	2022-05-11 15:34:00	--- dB		--- dB	
$LS_{(min)}$	38.8 dB	2022-05-11 15:30:00	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		98.5 dB	2022-05-11 15:27:33

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

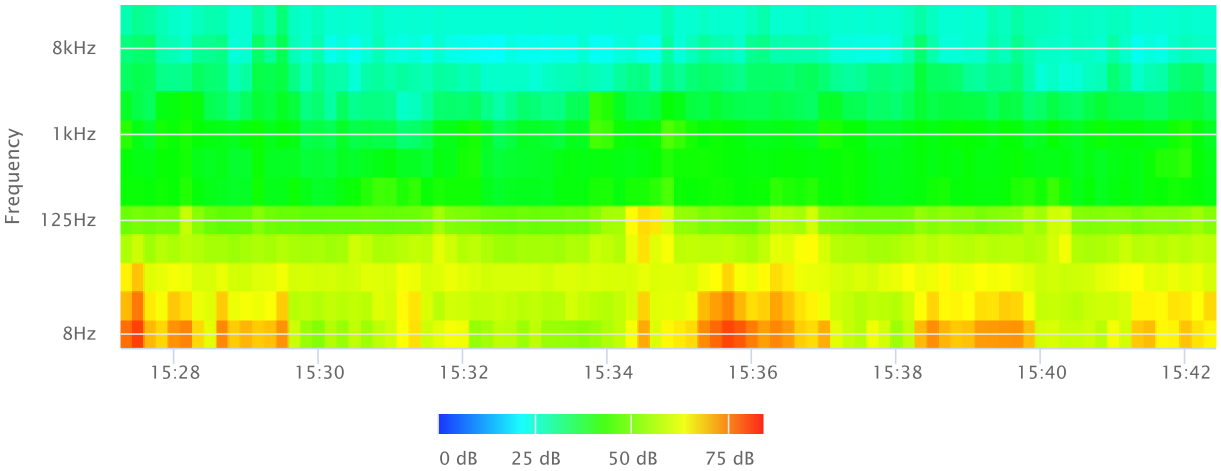
Statistics

LAS 2.0	50.1 dB
LAS 8.0	47.8 dB
LAS 25.0	45.7 dB
LAS 50.0	44.3 dB
LAS 66.6	43.4 dB
LAS 90.0	41.3 dB

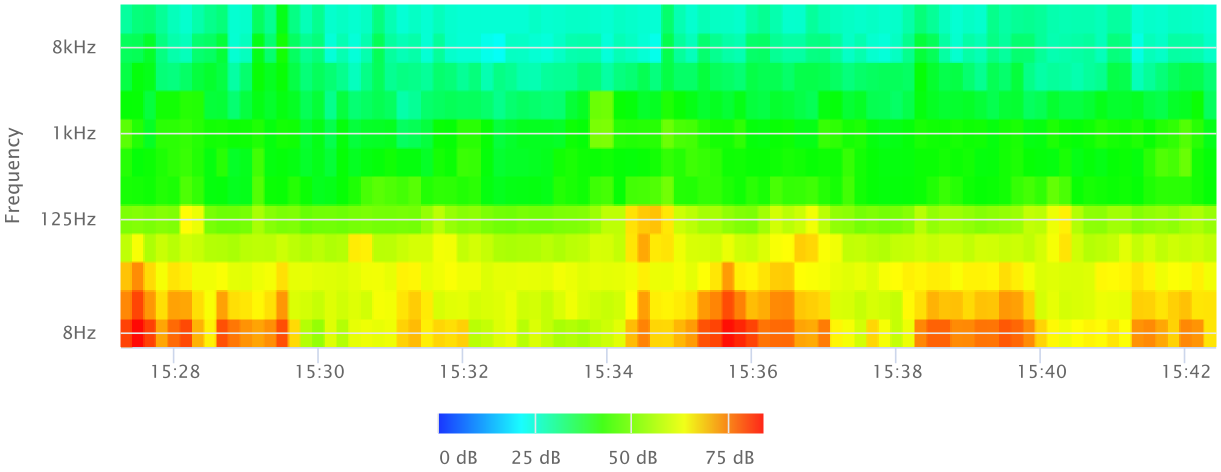
Time History



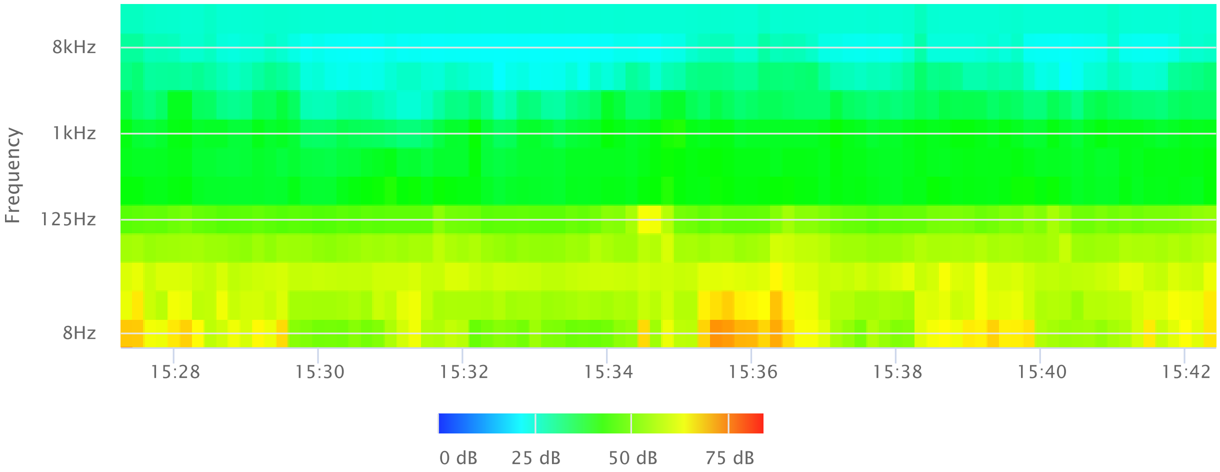
OBA 1/1 Leq



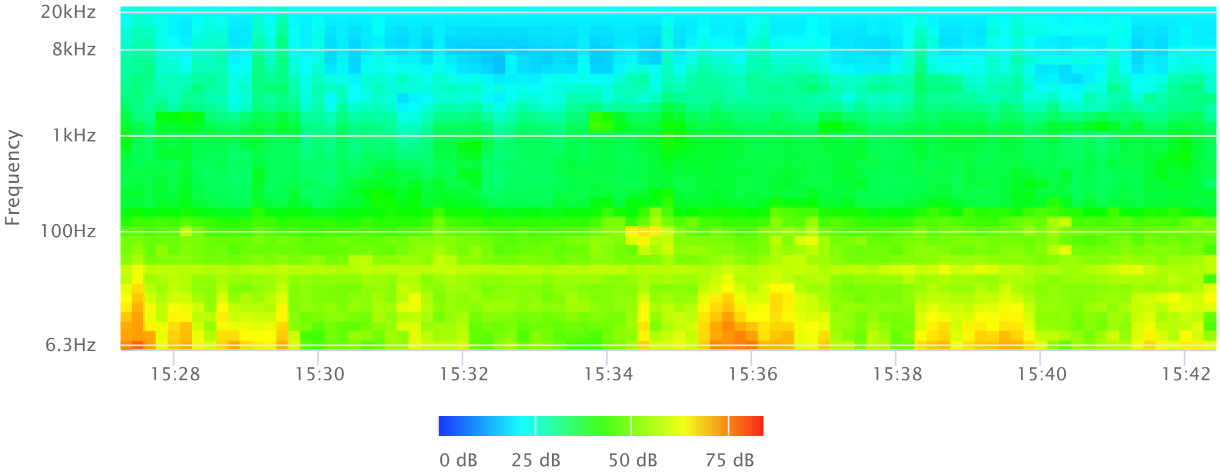
OBA 1/1 Lmax



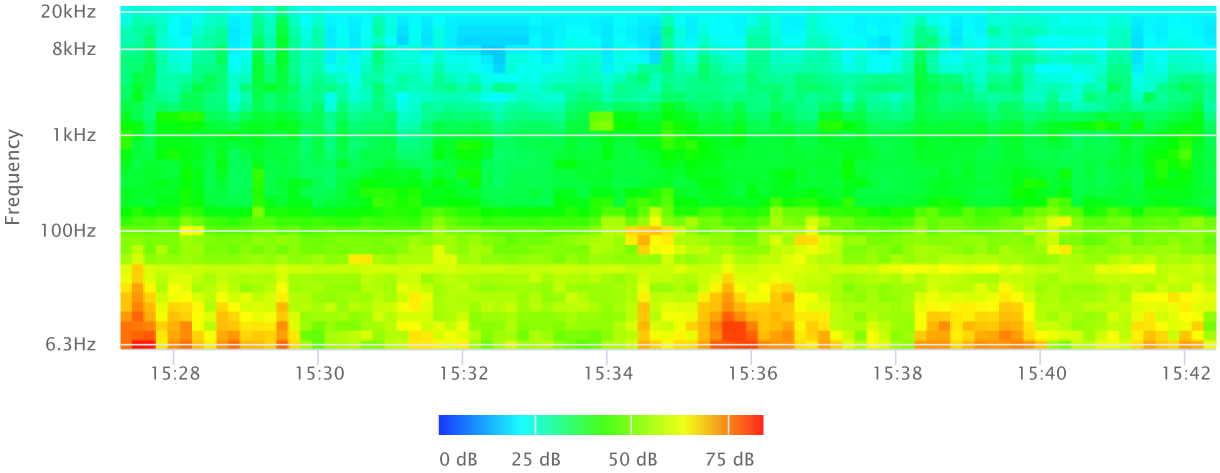
OBA 1/1 Lmin



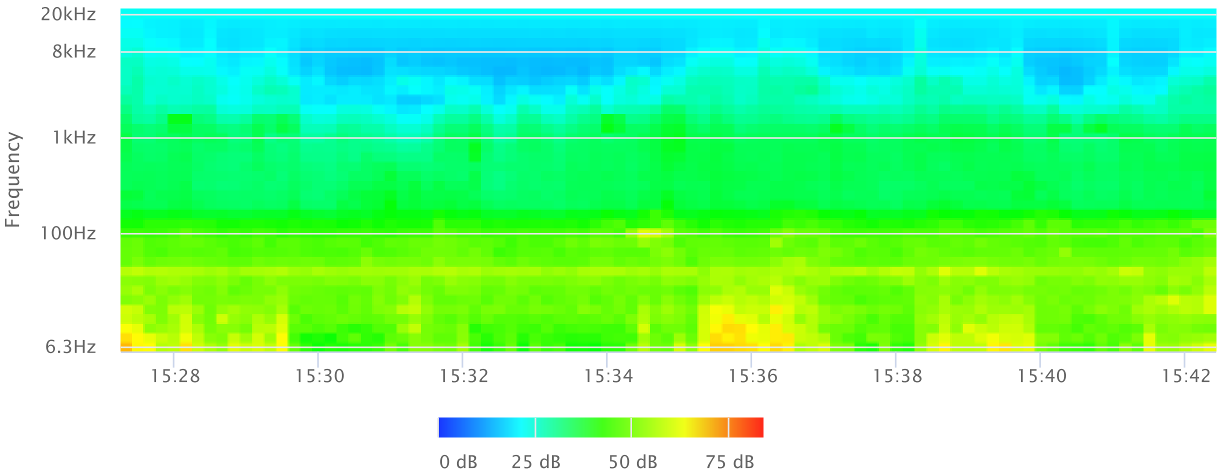
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
Frequency
100Hz
6.3Hz
15:28
15:30
15:32
15:34
15:36
15:38
15:40
15:42
0 dB
25 dB
50 dB
75 dB

APPENDIX D

CONSTRUCTION NOISE MODELING

Receptor - Residential Receptors to East

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Grading and Off-Site Roadway Improvements[4]									
Excavator	1	81	160	40	0.4	-10.1	-4.0	70.9	66.9
Grader	2	85	160	40	0.80	-10.1	-1.0	74.9	73.9
Rubber Tired Dozers	2	82	160	40	0.80	-10.1	-1.0	71.9	70.9
Tractors/Loaders/Backhoes	4	84	160	40	1.60	-10.1	2.0	73.9	75.9
							Log Sum	79.2	79.1
Building Construction									
Cranes	1	81	160	16	0.16	-10.1	-8.0	70.9	62.9
Forklifts [2]	3	48	160	40	1.20	-10.1	0.8	37.9	38.7
Generator Sets	1	81	160	50	0.50	-10.1	-3.0	70.9	67.9
Welders	1	74	160	40	0.40	-10.1	-4.0	63.9	59.9
Tractors/Loaders/Backhoes	3	84	160	40	1.20	-10.1	0.8	73.9	74.7
							Log Sum	77.1	75.9
Paving									
Pavers	2	77	160	50	1.00	-10.1	0.0	66.9	66.9
Paving Equipment	2	77	160	50	1.00	-10.1	0.0	66.9	66.9
Rollers	2	80	160	20	0.40	-10.1	-4.0	69.9	65.9
							Log Sum	72.9	71.4
Architectural Coating									
Air Compressors	1	78	160	40	0.40	-10.1	-4.0	67.9	63.9
							Log Sum	67.9	63.9

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

(4) The AQ-GHG-En study prepared for the proposed project (Ganddini Group, Inc. May 2022) assumed the off-site roadway improvements along Goya Ave and Iris Ave would overlap with the grading phase of the proposed project. Therefore, to be conservative and consistent with the AQ-GHG-En study, the loudest equipment phase (grading) of the off-site improvements was combined with the equipment anticipated during grading of the proposed project to produce a worst-case construction noise level during grading.

Receptor - Residential Receptors to West

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Grading and Off-Site Roadway Improvements[4]									
Excavator	1	81	160	40	0.4	-10.1	-4.0	70.9	66.9
Grader	2	85	160	40	0.80	-10.1	-1.0	74.9	73.9
Rubber Tired Dozers	2	82	160	40	0.80	-10.1	-1.0	71.9	70.9
Tractors/Loaders/Backhoes	4	84	160	40	1.60	-10.1	2.0	73.9	75.9
							Log Sum	79.2	79.1
Building Construction									
Cranes	1	81	160	16	0.16	-10.1	-8.0	70.9	62.9
Forklifts [2]	3	48	160	40	1.20	-10.1	0.8	37.9	38.7
Generator Sets	1	81	160	50	0.50	-10.1	-3.0	70.9	67.9
Welders	1	74	160	40	0.40	-10.1	-4.0	63.9	59.9
Tractors/Loaders/Backhoes	3	84	160	40	1.20	-10.1	0.8	73.9	74.7
							Log Sum	77.1	75.9
Paving									
Pavers	2	77	160	50	1.00	-10.1	0.0	66.9	66.9
Paving Equipment	2	77	160	50	1.00	-10.1	0.0	66.9	66.9
Rollers	2	80	160	20	0.40	-10.1	-4.0	69.9	65.9
							Log Sum	72.9	71.4
Architectural Coating									
Air Compressors	1	78	160	40	0.40	-10.1	-4.0	67.9	63.9
							Log Sum	67.9	63.9

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

(4) The AQ-GHG-En study prepared for the proposed project (Ganddini Group, Inc. May 2022) assumed the off-site roadway improvements along Goya Ave and Iris Ave would overlap with the grading phase of the proposed project. Therefore, to be conservative and consistent with the AQ-GHG-En study, the loudest equipment phase (grading)

Receptor - Church Receptors to West

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Grading and Off-Site Roadway Improvements[4]									
Excavator	1	81	160	40	0.4	-10.1	-4.0	70.9	66.9
Grader	2	85	160	40	0.80	-10.1	-1.0	74.9	73.9
Rubber Tired Dozers	2	82	160	40	0.80	-10.1	-1.0	71.9	70.9
Tractors/Loaders/Backhoes	4	84	160	40	1.60	-10.1	2.0	73.9	75.9
							Log Sum	79.2	79.1
Building Construction									
Cranes	1	81	160	16	0.16	-10.1	-8.0	70.9	62.9
Forklifts [2]	3	48	160	40	1.20	-10.1	0.8	37.9	38.7
Generator Sets	1	81	160	50	0.50	-10.1	-3.0	70.9	67.9
Welders	1	74	160	40	0.40	-10.1	-4.0	63.9	59.9
Tractors/Loaders/Backhoes	3	84	160	40	1.20	-10.1	0.8	73.9	74.7
							Log Sum	77.1	75.9
Paving									
Pavers	2	77	160	50	1.00	-10.1	0.0	66.9	66.9
Paving Equipment	2	77	160	50	1.00	-10.1	0.0	66.9	66.9
Rollers	2	80	160	20	0.40	-10.1	-4.0	69.9	65.9
							Log Sum	72.9	71.4
Architectural Coating									
Air Compressors	1	78	160	40	0.40	-10.1	-4.0	67.9	63.9
							Log Sum	67.9	63.9

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

(4) The AQ-GHG-En study prepared for the proposed project (Ganddini Group, Inc. May 2022) assumed the off-site roadway improvements along Goya Ave and Iris Ave would overlap with the grading phase of the proposed project. Therefore, to be conservative and consistent with the AQ-GHG-En study, the loudest equipment phase (grading)

Receptor - School receptor to North

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Grading and Off-Site Roadway Improvements[4]									
Excavator	1	81	730	40	0.4	-23.3	-4.0	57.7	53.7
Grader	2	85	730	40	0.80	-23.3	-1.0	61.7	60.7
Rubber Tired Dozers	2	82	730	40	0.80	-23.3	-1.0	58.7	57.7
Tractors/Loaders/Backhoes	4	84	730	40	1.60	-23.3	2.0	60.7	62.8
							Log Sum	66.0	65.9
Building Construction									
Cranes	1	81	730	16	0.16	-23.3	-8.0	57.7	49.8
Forklifts[2]	3	48	730	40	1.20	-23.3	0.8	24.7	25.5
Generator Sets	1	81	730	50	0.50	-23.3	-3.0	57.7	54.7
Welders	1	74	730	40	0.40	-23.3	-4.0	50.7	46.7
Tractors/Loaders/Backhoes	3	84	730	40	1.20	-23.3	0.8	60.7	61.5
							Log Sum	63.9	62.7
Paving									
Pavers	2	77	730	50	1.00	-23.3	0.0	53.7	53.7
Paving Equipment	2	77	730	50	1.00	-23.3	0.0	53.7	53.7
Rollers	2	80	730	20	0.40	-23.3	-4.0	56.7	52.7
							Log Sum	59.7	58.2
Architectural Coating									
Air Compressors	1	78	730	40	0.40	-23.3	-4.0	54.7	50.7
							Log Sum	54.7	50.7

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

(4) The AQ-GHG-En study prepared for the proposed project (Ganddini Group, Inc. May 2022) assumed the off-site roadway improvements along Goya Ave and Iris Ave would overlap with the grading phase of the proposed project. Therefore, to be conservative and consistent with the AQ-GHG-En study, the loudest equipment phase (grading)

Receptor - Residential to South

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Grading and Off-Site Roadway Improvements[4]									
Excavator	1	81	1312	40	0.4	-28.4	-4.0	52.6	48.6
Grader	2	85	1312	40	0.80	-28.4	-1.0	56.6	55.7
Rubber Tired Dozers	2	82	1312	40	0.80	-28.4	-1.0	53.6	52.7
Tractors/Loaders/Backhoes	4	84	1312	40	1.60	-28.4	2.0	55.6	57.7
							Log Sum	60.9	60.8
Building Construction									
Cranes	1	81	1312	16	0.16	-28.4	-8.0	52.6	44.7
Forklifts [2]	3	48	1312	40	1.20	-28.4	0.8	19.6	20.4
Generator Sets	1	81	1312	50	0.50	-28.4	-3.0	52.6	49.6
Welders	1	74	1312	40	0.40	-28.4	-4.0	45.6	41.6
Tractors/Loaders/Backhoes	3	84	1312	40	1.20	-28.4	0.8	55.6	56.4
							Log Sum	58.8	57.6
Paving									
Pavers	2	77	1312	50	1.00	-28.4	0.0	48.6	48.6
Paving Equipment	2	77	1312	50	1.00	-28.4	0.0	48.6	48.6
Rollers	2	80	1312	20	0.40	-28.4	-4.0	51.6	47.6
							Log Sum	54.6	53.1
Architectural Coating									
Air Compressors	1	78	1312	40	0.40	-28.4	-4.0	49.6	45.6
							Log Sum	49.6	45.6

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

(4) The AQ-GHG-En study prepared for the proposed project (Ganddini Group, Inc. May 2022) assumed the off-site roadway improvements along Goya Ave and Iris Ave would overlap with the grading phase of the proposed project. Therefore, to be conservative and consistent with the AQ-GHG-En study, the loudest equipment phase (grading)

APPENDIX E

TRAFFIC NOISE FHWA WORKSHEETS

Existing Traffic Noise

1 :Id
Iris Avenue :Road
Indian Street to Emma Lane :Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	11600
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

Noise Parameters	Daytime			Evening			Night		
	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	671.80	13.92	23.20	498.74	2.32	3.87	123.68	19.33	32.22
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	21.95	5.11	7.33	20.65	-2.67	-0.45	14.60	6.54	8.76
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	64.24	56.35	63.42	62.94	48.57	55.64	56.89	57.78	64.84
	DAY LEQ	67.23		EVENING LEQ	63.81		NIGHT LEQ	66.17	

F	CNEL	72.81	Day hour	89.00
	DAY LEQ	67.23	Absorptive?	no
			Use hour?	no
			GRADE dB	0.00

Notes:
(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108
(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

1 :Id
Iris Avenue :Road
Indian Street to Emma Lane :Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	12189
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	705.90	14.63	24.38	524.05	2.44	4.06	129.95	20.31	33.86
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	22.16	5.32	7.54	20.87	-2.46	-0.24	14.81	6.75	8.97
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	64.45	56.57	63.63	63.16	48.79	55.85	57.10	57.99	65.06
	DAY LEQ	67.44		EVENING LEQ	64.03		NIGHT LEQ	66.38	

CNEL	73.03
DAY LEQ	67.44

Day hour	89.00
Absorptive?	no
Use hour?	no
GRADE dB	0.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

2 :Id

Goya Avenue :Road

East of Project Driveway :Segment

Vehicle Distribution (Light Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.56	13.96	10.49	97.40
Medium Trucks	48.91	2.17	48.91	1.84
Heavy Trucks	47.30	5.41	47.30	0.74

ADT	233
Speed	25
Distance	33
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	14.29	0.17	0.07	10.56	0.03	0.03	2.65	0.23	0.09
Speed in MPH	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
NOISE CALCULATIONS									
Reference levels	59.44	71.09	77.24	59.44	71.09	77.24	59.44	71.09	77.24
ADJUSTMENTS									
Flow	7.27	-11.86	-15.96	5.95	-19.37	-19.36	-0.06	-10.61	-14.71
Distance	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	43.44	35.96	38.01	42.13	28.45	34.62	36.11	37.21	39.26
	DAY LEQ	45.10		EVENING LEQ	42.99		NIGHT LEQ	42.50	

CNEL	**49.58**
DAY LEQ	45.10

Day hour	90.00
Absorptive?	no
Use hour?	no
GRADE dB	1.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside light truck mix.

Existing Plus Project Traffic Noise

2	:Id
Goya Avenue	:Road
East of Project Driveway	:Segment

Vehicle Distribution (Light Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.56	13.96	10.49	97.40
Medium Trucks	48.91	2.17	48.91	1.84
Heavy Trucks	47.30	5.41	47.30	0.74

ADT	380
Speed	25
Distance	33
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	23.32	0.29	0.11	17.23	0.05	0.05	4.32	0.38	0.15
Speed in MPH	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
NOISE CALCULATIONS									
Reference levels	59.44	71.09	77.24	59.44	71.09	77.24	59.44	71.09	77.24
ADJUSTMENTS									
Flow	9.39	-9.73	-13.84	8.08	-17.24	-17.23	2.07	-8.49	-12.59
Distance	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	45.57	38.09	40.14	44.25	30.58	36.74	38.24	39.34	41.39
	DAY LEQ	47.23		EVENING LEQ	45.12		NIGHT LEQ	44.63	

CNEL	51.70
DAY LEQ	47.23

Day hour	90.00
Absorptive?	no
Use hour?	no
GRADE dB	1.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside light truck mix.

APPENDIX F

SOUNDPLAN WORKSHEETS

Noise emissions of road traffic

		Traffic values						Contr	Cons	Affec		Gradie
Statio km	ADT Veh/24	Vehicles type	Vehicle name	day Veh/h	evening Veh/h	night Veh/h	Speed km/h	devic	Spee km/h	veh. %	Road surface	Min / M %
Indian Ave N						Traffic direction: In entry direction						
0+63	22500	Total	-	1375	980	340	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	1303	968	240	64					
		Medium trucks	-	27	5	38	64					
		Heavy trucks	-	45	8	63	64					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
0+70	-							-	-	-	-	-
Indian Ave S						Traffic direction: In entry direction						
0+00	22500	Total	-	1375	980	340	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	1303	968	240	64					
		Medium trucks	-	27	5	38	64					
		Heavy trucks	-	45	8	63	64					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
0+64	-							-	-	-	-	-
Iris Avenue						Traffic direction: In entry direction						
0+00	41252	Total	-	2521	1796	623	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	2389	1774	440	64					
		Medium trucks	-	50	8	69	64					
		Heavy trucks	-	83	14	115	64					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
0+60	-							-	-	-	-	-

Receiver list

No.	Receiver name	Building side	Floor	Limit Lden dB(A)	Level Lden dB(A)	Conflict Lden dB
1	1	West	1.Fl	-	56.9	-
			2.Fl	-	58.6	-
2	2	West	1.Fl	-	58.3	-
			2.Fl	-	60.0	-
3	3	West	1.Fl	-	60.9	-
			2.Fl	-	62.6	-
4	4	West	1.Fl	-	67.3	-
			2.Fl	-	69.4	-
5	5	North	1.Fl	-	72.6	-
			2.Fl	-	74.1	-
6	6	North	1.Fl	-	72.2	-
			2.Fl	-	73.9	-
7	7	East	1.Fl	-	66.4	-
			2.Fl	-	68.7	-
8	8	-	1.Fl	-	57.6	-
			2.Fl	-	59.3	-

APPENDIX G

VIBRATION WORKSHEETS

GROUNDBORNE VIBRATION ANALYSIS

Project: 19474 South of Iris Project — Date: 5/2/22
Source: Vibratory Roller
Scenario: Unmitigated
Location: Church to West
Address:
PPV = PPVref(25/D)^n (in/sec)

INPUT

INPUT SECTION IN GREEN

Equipment = Type	1	Vibratory Roller
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.
D =	35.00	Distance from Equipment to Receiver (ft)
n =	1.50	Vibration attenuation rate through the ground

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.127	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19474 South of Iris Project	Date:	5/2/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Church to West		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	35.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.054	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19474 South of Iris Project	Date:	5/2/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to the West		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	110.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.023	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project: 19474 South of Iris Project Date: 5/2/22
Source: Large Bulldozer
Scenario: Unmitigated
Location: Residential to the West
Address:
PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	110.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.010	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project: 19474 South of Iris Project Date: 5/2/22
Source: Vibratory Roller
Scenario: Unmitigated
Location: Residential to East
Address:
PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	5.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	2.348	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project: 19474 South of Iris Project
Date: 5/2/22
Source: Large Bulldozer
Scenario: Unmitigated
Location: Residential to East
Address:
PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	5.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.995	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19474 South of Iris Project	Date:	5/2/22
Source:	Vibratory Roller		
Scenario:	BMPs		
Location:	Residential to East with BMP		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	26.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.198	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19474 South of Iris Project	Date:	5/2/22
Source:	Large Bulldozer		
Scenario:	BMPs		
Location:	Residential to East with BMP		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	15.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.191	IN/SEC	OUTPUT IN BLUE

Construction Annoyance Vibration Calculations

Source: Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual (September 2018).

Eq. 7-3: Lvdistance = Lvref - 30log (D/25)

Lvdistance = the rms velocity level adjsuted for distance, VdB
Lvref = the source reference vibration level at 25 feet, VdB
D = distance from the equipment to th receiver, ft.

Large Bulldozer:

Church to West: Lvdistance = 87 - 30 log (35/25) = 82.62 VdB

Residential to West: Lvdistance = 87 - 30 log (110/25) = 67.7 VdB

Residential to East: Lvdistance = 87 - 30 log (5/25) = 108.0 VdB

Residential: Under Threshold Mitigation Distance: 87 - 30 log (80/25) = 71.85 VdB
Church: Under Threshold Mitigation Distance: 87 - 30 log (63/25) = 74.96 VdB

Vibratory Roller:

Church to West: Lvdistance = 94 - 30 log (35/25) = 89.62 VdB

Residential to West: Lvdistance = 94 - 30 log (110/25) = 74.7 VdB

Residential to East: Lvdistance = 94 - 30 log (5/25) = 115.0 VdB

Residential: Under Threshold Mitigation Distance: 94 - 30 log (136/25) = 71.93 VdB
Church: Under Threshold Mitigation Distance: 94 - 30 log (108/25) = 74.94 VdB

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