LILAC AVENUE TRUCK REPAIR FACILITY NOISE IMPACT ANALYSIS

County of San Bernardino

December 1, 2022

gandhi

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

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prepared by
Roma Stromberg, INCE, MS
Catherine Howe, MS

GANDDINI GROUP INC.
555 Parkcenter Drive, Suite 225
Santa Ana, CA 92705
(714) 795-3100 | ganddini.com

Project No. 19495

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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 Lilac Avenue Truck Repair Facility 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 County of San Bernardino.

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 2.39-acre project site is located at 11317 Lilac Avenue, in the unincorporated area of Bloomington, in the County of San Bernardino, California. The site is approved for one signal family residential use. The project site is currently developed with truck tractor repair facility including office, shop and two maintenance structures (e.g., canopies).

Project Description

The proposed redevelopment project involves demolition of 13,800 square feet of maintenance space and construction of a new 15,000 square foot building with 16 truck repair service bays. In addition, the existing 2,261 square-foot office building and 1,549 square-foot shop are proposed to be rebuilt at the same location and square-footage and maintain the uses of office and storage.

The proposed project also includes 29 (9' x 19 to 20') parking stalls for employees and vendors, and 50 (12' x 25') parking stalls for truck-tractors. Access to the Project Site would be maintained by the existing driveway on Lilac Avenue.

Construction Impacts

On-Site Construction

Modeled unmitigated construction noise levels reach up to 77 dBA L_{eq} at the nearest residential property line to the east, 74.1 dBA L_{eq} at the nearest residential property line to the north, and up to 71 dBA L_{eq} at the nearest residential property line to the northwest of the project site.

Construction noise sources are regulated within Section 83.01.080(g)(3) of the County of San Bernardino's Development Code which exempts temporary construction, maintenance, repair, and demolition activities between 7:00 AM and 7:00 PM, except Sundays and Federal holidays.

Project construction will not occur outside of the hours outlined as "exempt" in County of San Bernardino Development Code Section 83.01.080(g)(3) (as follows) and therefore, will not result in or 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 County of San Bernardino's Development Code which limits the construction hours of operation, the project applicant will include the following Best Management Practices (BMPs) on project plans and in contract specifications 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, shut off all equipment when not in use.

4. To the degree possible, equipment staging will be located in areas that create the greatest distance between construction-related noise and vibration sources, and sensitive receptors surrounding the project site.

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 County of San Bernardino Development Code within Section 83.01.080(g)(3).

Off-Site Construction

Construction truck trips would occur throughout the construction period. Given the project site's proximity to the 10 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps.

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.[1] The estimated existing average daily trips along Jurupa Avenue are 4,709 average daily vehicle trips.[2] As shown in the CalEEMod output files provided in the Air Quality Study prepared for the proposed project (Lilburn Corporation, 2022) the greatest number of construction-related vehicle trips per day would be during paving at up to 15 worker vehicle trips per day. 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.

Project Operational Noise

Project Generated Vehicle Noise (Offsite)

During operation, the proposed project is expected to generate approximately 308 average daily trips with 41 trips during the AM peak-hour and 57 trips during the PM peak-hour. Existing traffic noise level along Jurupa Avenue is 69 dBA CNEL at the right-of-way of the modeled roadway segment; and the modeled Existing Plus Project traffic noise level is 70 dBA CNEL at the right-of-way of the modeled roadway segment. Project generated vehicle traffic is anticipated to increase the noise levels along Jurupa Avenue by approximately 0.91

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

[2] The existing average daily traffic volumes were obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017). https://countywideplan.com/wpcontent/uploads/sites/68/2020/10/Trans_CWP_221_77_ExCon_FinalDraft_032917.pdf

dBA CNEL. Project generated operational vehicle traffic will not result in substantial increases in ambient noise levels. This impact would be less than significant. No mitigation is required.

Project Generated Operational Noise (On-Site)

Project operational noise levels (Leq) are expected to range between 52 and 67 dBA; and maximum (Lmax) noise events are expected to range between 57 and 72 dBA at the nearest property lines. Existing measured ambient noise levels at the sensitive receptor locations range between 54 and 70 dBA Leq and 73 and 86 dBA Lmax.

Project operational noise would not exceed the daytime adjusted Leq or Lmax noise standards at any of the receptors. However, the nighttime Leq noise standard will likely be exceeded at R2 and R3 if vehicle repairs occur between the hours of 10:00 PM and 7:00 AM. As a project design feature/condition of approval, project operational hours should be restricted to the hours between 7:00 AM and 10:00 PM. Restriction of nighttime vehicle repairs and use of pneumatic equipment will avoid violation of nighttime noise standards, the project would be consistent with applicable standards and therefore, increases in ambient noise levels would be less than significant.

Required Project Design Feature/Condition of Approval: *Vehicle repairs and/or use of pneumatic equipment will not occur between the hours of 10:00 PM and 7:00 AM.*

Groundborne Vibration Impacts

The nearest affected structure is the residential dwelling unit located approximately 34 feet to the east of the project's eastern property line. At 34 feet, use of a vibratory roller would be expected to generate a PPV of 0.132 in/sec and a bulldozer would be expected to generate a PPV of 0.056 in/sec. Therefore, temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to older residential structures PPV of 0.3 in/sec PPV. In addition, it is anticipated that project construction will occur within the exempt hours; therefore, Section 83.01.090(c) of the County's Development Code will not apply. The project does not propose any non-construction related sources of ground-borne vibration. Temporary vibration levels associated with project construction would be less than significant. No mitigation is required.

Annoyance - Groundborne vibration becomes strongly perceptible to sensitive receptors at a level of 0.1 in/sec PPV. Therefore, project construction may cause annoyance to the residential uses to the east. However, potential annoyance would only occur when a vibratory roller, or other similar vibratory equipment, is utilized within 10 feet of the property line in proximity to the residential dwelling unit to the east. Therefore, annoyance will be short-term and will occur only during site grading and preparation which will be limited to daytime hours. Impacts are less than significant.

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 Lilac Avenue Truck Repair Facility 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 County of San Bernardino.

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 2.39-acre project site is located at 11317 Lilac Avenue, in the unincorporated area of Bloomington, in the County of San Bernardino, California. The site is approved for one signal family residential use. The project site is currently developed with truck tractor repair facility including office, shop and two maintenance structures (e.g., canopies).

Surrounding Land Use and Zoning:[1]

North (north of Jurupa Avenue)
Land Use: VLDR (Very Low Density Residential, 0-2 dwelling units per acre maximum)
Zoning: BL/RS-1-AA
Zoning Description: Bloomington/Single Residential -1 Acre Minimum-Additional Agriculture

South
Land Use: *(Limited Industrial)*
Zoning: AM/SP-MED IND
Zoning Description: Agua Mansa Industrial Corridor/Specific Plan-Medium Industrial
Jurisdiction: County Land Use Services Office

West
Land Use: LI (Limited Industrial)
Small Parcel Immediately West (Dedicated Road right of way):
Zoning: BL/RS-1-AA
Zoning Description: Bloomington/Single Residential -1 Acre Minimum-Additional Agriculture

Further west:
Land Use: *(Limited Industrial)*
Zoning: IC
Community Industrial Jurisdiction: County Land Use Services Office

[1] Land use designations are provided on the Policy Map LU-1A Land Use Map Valley Region for the County of San Bernardino Countywide Plan Policy Plan (2020)

Southwest
Land Use: *(Limited Industrial)*
Zoning: BL/RS-1-AA
Zoning Description: Bloomington/Single Residential -1 Acre Minimum-Additional Agriculture

East
Land Use: *(Limited Industrial)*
Zoning: BL/RS-1-AA
Zoning Description: Bloomington/Single Residential -1 Acre Minimum-Additional Agriculture

PROJECT DESCRIPTION

The proposed redevelopment project involves demolition of 13,800 square feet of maintenance space and construction of a new 15,000 square foot building with 16 truck repair service bays. In addition, the existing 2,261 square-foot office building and 1,549 square-foot shop are proposed to be rebuilt at the same location and square-footage and maintain the uses of office and storage.

The proposed project also includes 29 (9' x 19 to 20') parking stalls for employees and vendors, and 50 (12' x 25') parking stalls for truck-tractors. Access to the Project Site would be maintained by the existing driveway on Lilac Avenue.

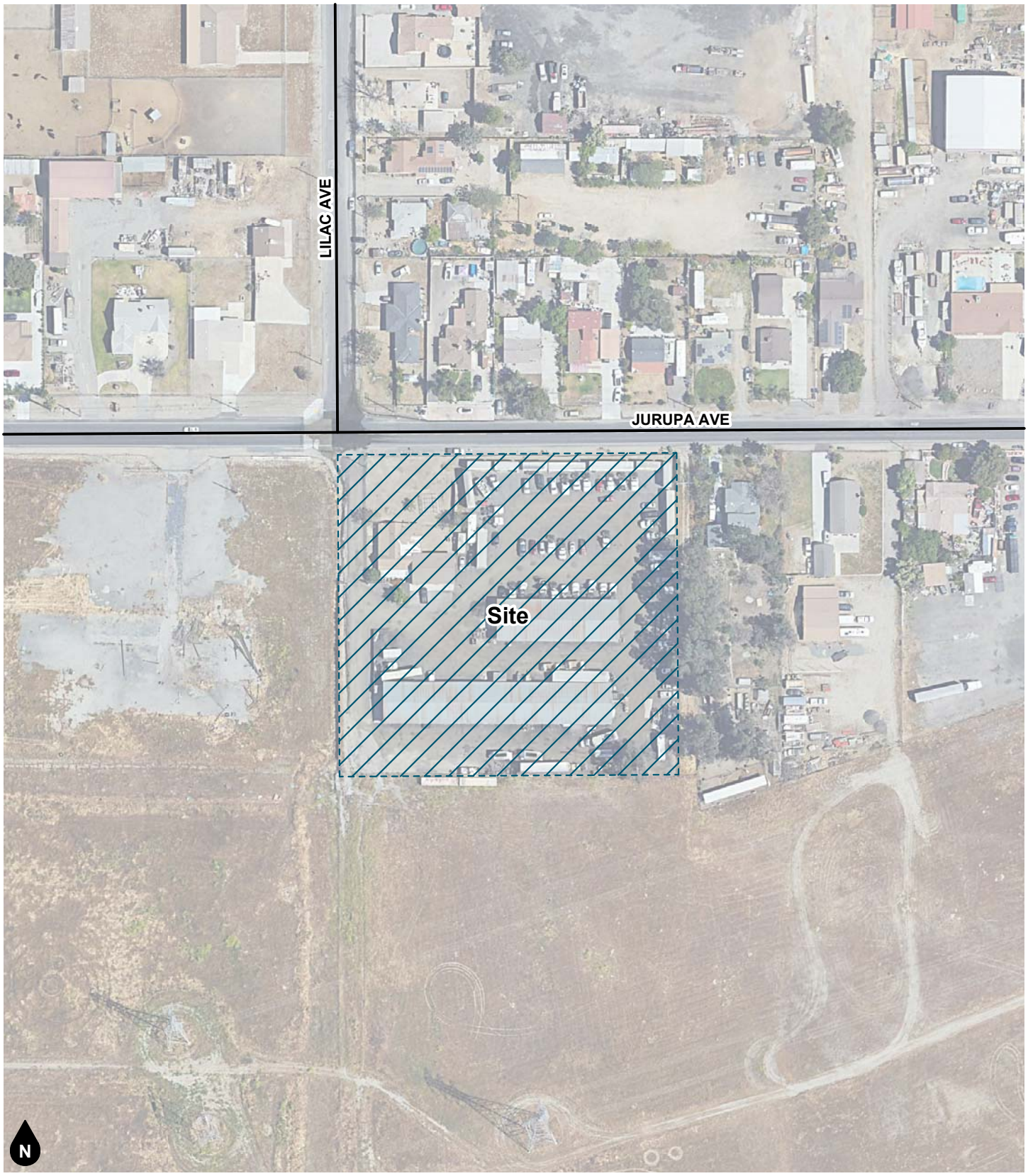

Figure 1
Project Location Map

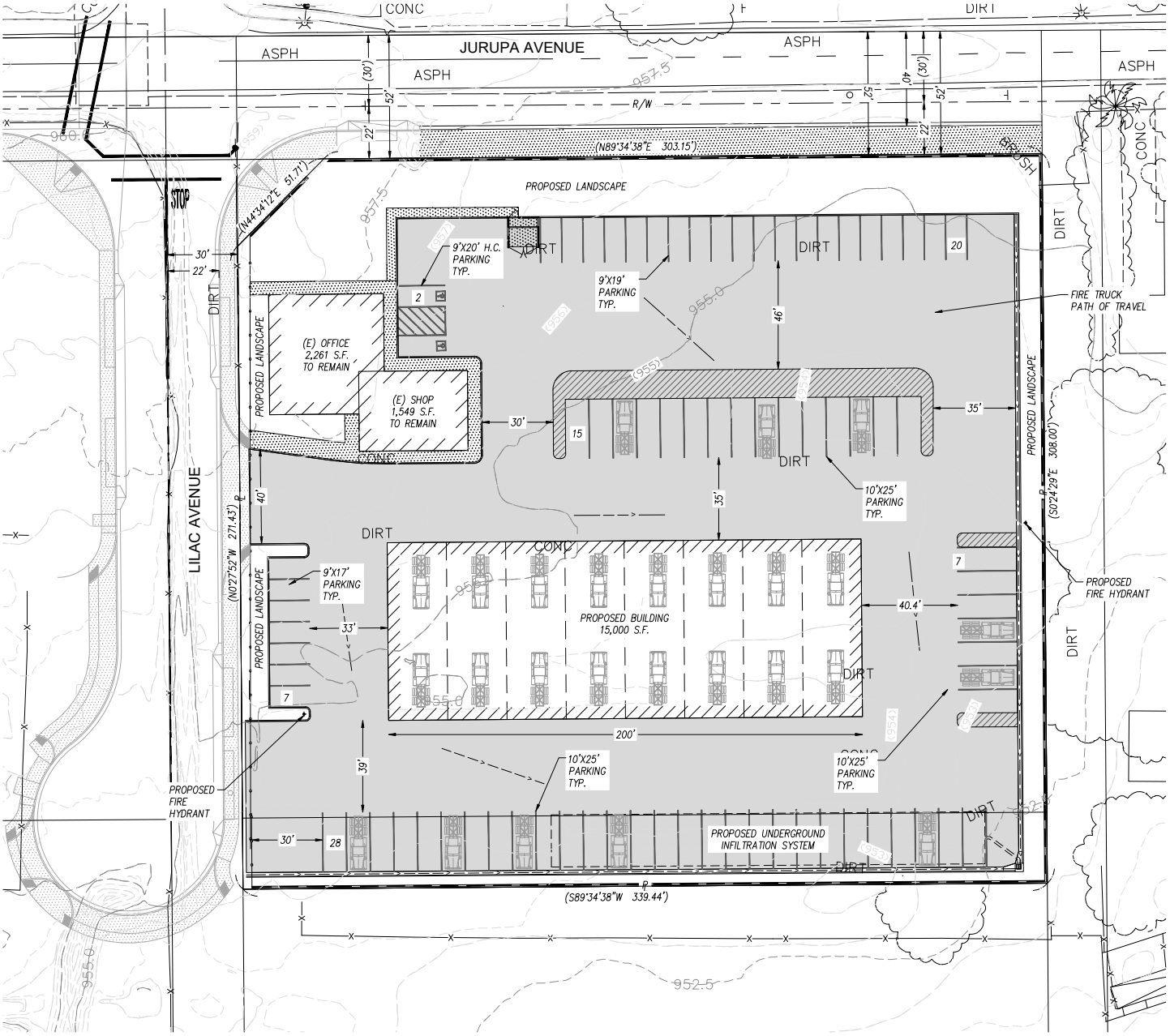

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Figure 2
Site Plan

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.

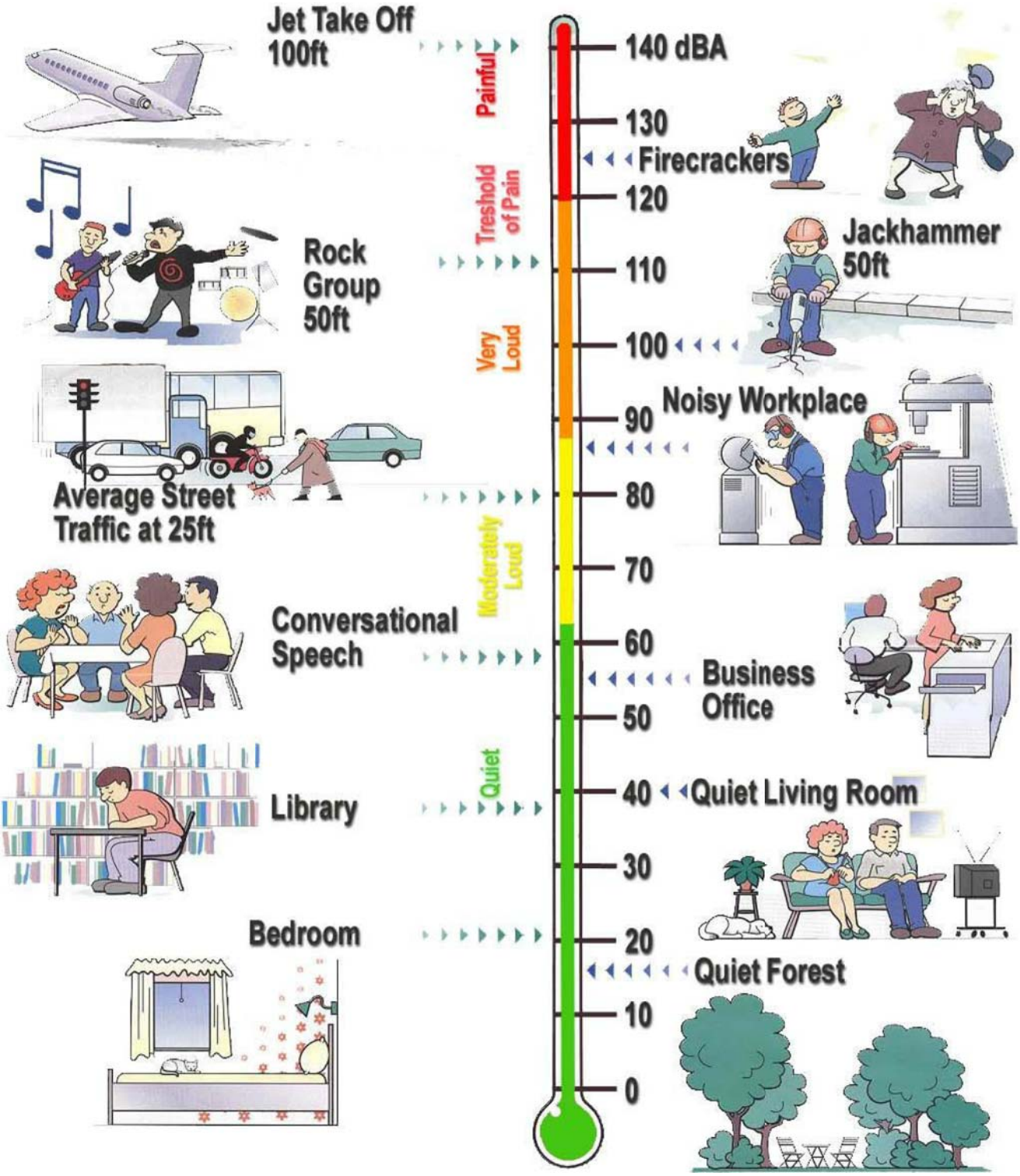
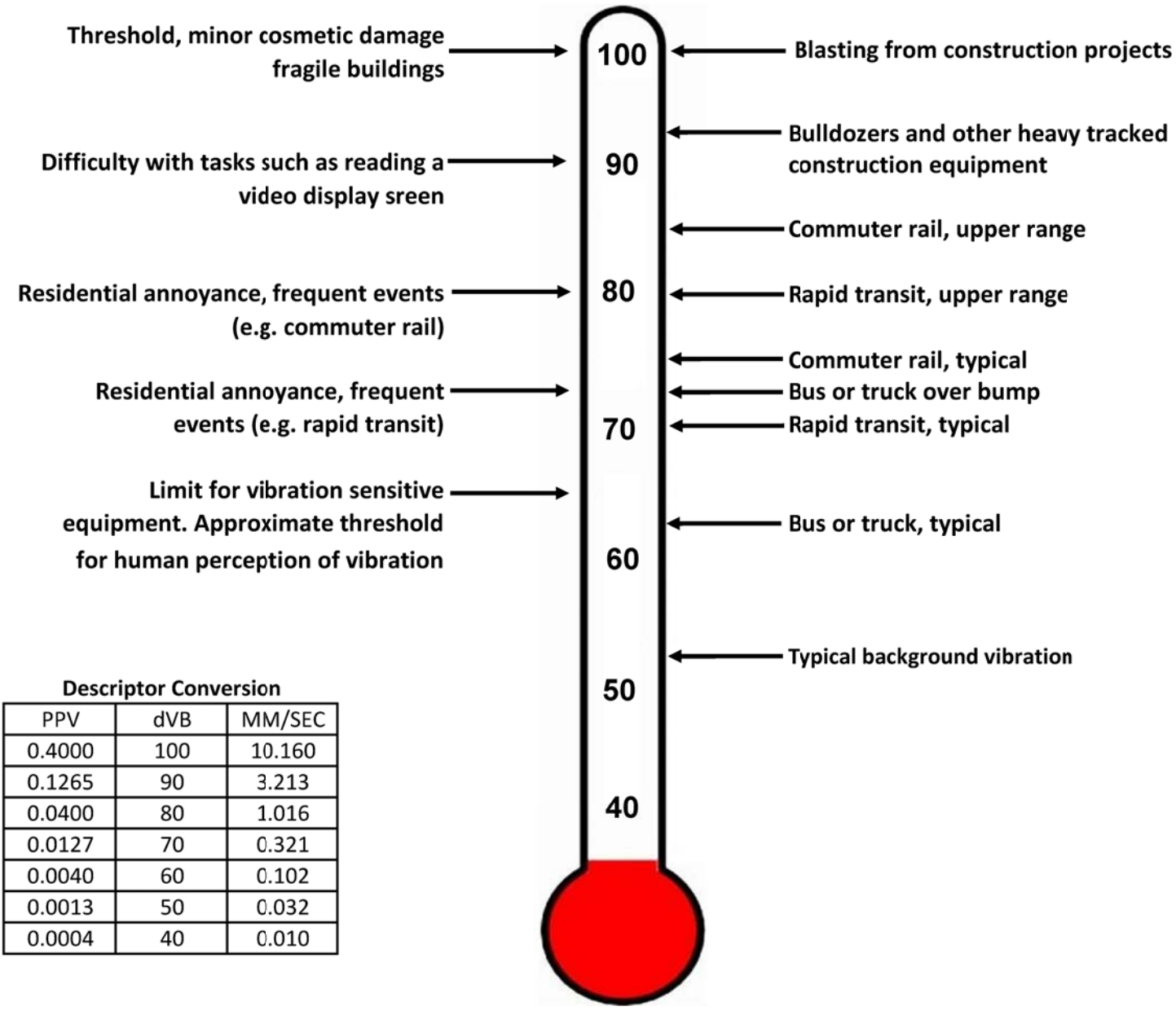


Figure 3
Weighted Sound Levels in Common Environments

Source: Bruel & Kjaer 2001



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 bordered by Jurupa Avenue to the north, single-family residential uses to the east, and vacant land to the south, and Lilac Avenue 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 approximately 55 feet to the north (across Jurupa Avenue) and 92 feet to the northwest (across the intersection of Lilac Avenue and Jurupa Avenue) of the project site.

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, four (4) 15-minute daytime noise measurements were taken between 12:53 PM and 2:38 PM on August 30, 2022. In addition, one (1) long-term 24-hour noise measurement was also taken from August 30, 2022, to August 31, 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 residential use to the northwest of the project site at the northwestern corner of the intersection of Jurupa Avenue and Lilac Avenue (19488 Jurupa Avenue, Bloomington). The noise meter was placed near the southern boundary of the residence just north of Jurupa Avenue.

- STNM2: represents the existing noise environment of the single-family residential uses to the north of the project site along the northern side of Jurupa Avenue (19530 Jurupa Avenue, Bloomington). The noise meter was placed near the southern boundary of the residence just north of Jurupa Avenue.

- STNM3: represents the existing noise environment of the single-family residential use located to the east of the project site along the southern side of Jurupa Avenue (19565 Jurupa Avenue, Bloomington). The noise meter was placed near the northeastern boundary of the residence just south of Jurupa Avenue.

- STNM4: represents the existing noise environment of the residentially zoned vacant land to southwest of the project site. The noise meter was placed near the southwestern corner of the project site near the residentially zoned vacant land.

- LTNM1: represents the existing noise environment of the project site. The noise meter was placed near the eastern project boundary in close proximity to existing residential uses to the east.

Table 1 provides a summary of the short-term ambient noise data. Table 2 provides hourly interval ambient noise data from the long-term noise measurement. Short-term ambient noise levels were measured between 54.1 and 70.2 dBA L_{eq}. Long-term hourly noise measurement ambient noise levels ranged from 49.5 to 61.6 dBA L_{eq}. The dominant noise source was vehicle traffic associated with Jurupa Avenue, Lilac Avenue, and other surrounding roadways as well as activity associated with the existing truck repair use on the project site (i.e., employees conversating, power tools in use, etc.).

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	12:53 PM	68.9	81.9	43.1	78.3	73.6	68.7	62.4
STNM2	1:18 PM	70.2	85.7	54.9	78.8	75.2	70.1	62.3
STNM3	1:49 PM	65.5	83.6	43.0	74.2	70.4	65.1	55.8
STNM4	2:23 PM	54.1	72.9	50.0	59.9	55.7	53.5	52.5

Notes:
(1) See Figure 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.
(2) Noise measurements performed on August 30, 2022.

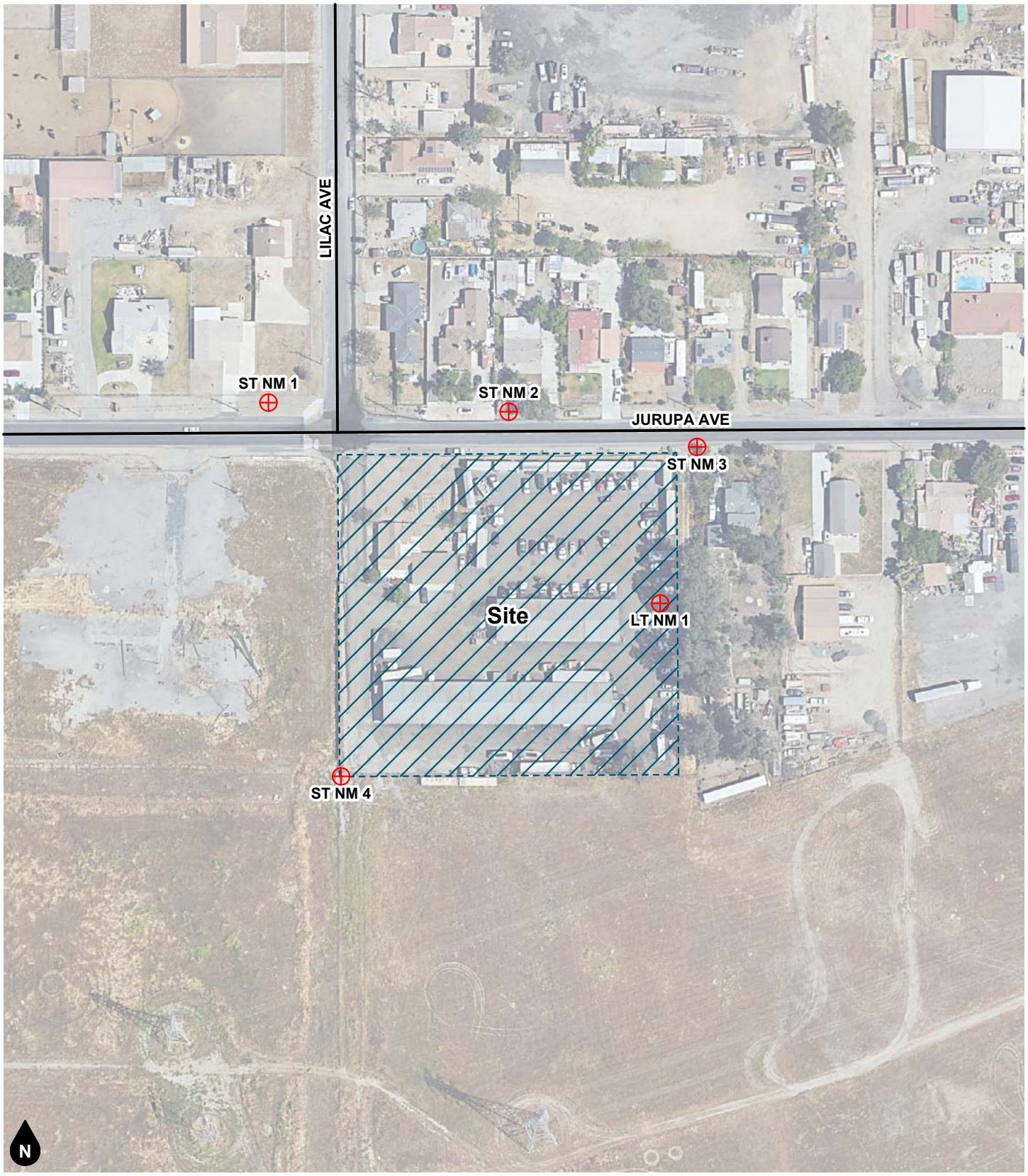
Table 2
Long-Term Noise Measurement Summary (dBA)[1,2]

24-Hour Ambient Noise								
Hourly Measurements	Time Started	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
Overall Summary	4:00 PM	55.7	95.3	39.6	64.7	58.4	53.4	50.3
1	4:00 PM	54.6	67.9	45.9	60.3	57.6	55.3	53.4
2	5:00 PM	54.2	69.6	44.4	62.0	57.2	54.0	51.6
3	6:00 PM	54.8	71.1	43.3	63.3	60.9	53.6	49.9
4	7:00 PM	57.9	82.6	42.8	64.2	61.5	55.9	51.2
5	8:00 PM	61.6	95.3	41.7	66.0	56.7	50.4	46.9
6	9:00 PM	53.6	69.8	41.7	63.1	56.8	51.5	47.6
7	10:00 PM	50.2	66.6	41.2	60.1	53.5	47.8	45.1
8	11:00 PM	50.5	67.4	42.2	58.4	53.0	49.9	47.6
9	12:00 AM	50.4	70.6	42.0	56.5	53.0	50.5	48.6
10	1:00 AM	49.5	62.9	42.5	54.8	51.6	49.6	48.4
11	2:00 AM	49.7	62.6	44.4	54.7	51.6	49.7	48.6
12	3:00 AM	51.9	65.9	45.2	59.7	53.8	51.2	49.9
13	4:00 AM	52.5	67.2	47.1	60.0	54.5	51.8	50.5
14	5:00 AM	53.1	74.1	47.1	59.9	55.4	52.8	51.2
15	6:00 AM	55.1	68.8	47.7	62.3	60.5	53.8	52.0
16	7:00 AM	55.0	77.8	42.7	61.6	57.3	54.6	52.5
17	8:00 AM	61.2	71.5	43.1	68.1	67.7	60.1	51.5
18	9:00 AM	55.8	79.4	40.4	64.1	59.0	55.3	51.0
19	10:00 AM	54.3	75.0	39.6	61.8	58.9	54.3	51.1
20	11:00 AM	50.1	67.5	40.1	57.2	53.1	49.7	47.4
21	12:00 PM	56.4	70.2	42.4	60.6	59.3	58.0	55.9
22	1:00 PM	52.4	70.2	41.5	60.5	55.1	51.1	48.7
23	2:00 PM	58.7	82.9	43.8	68.3	63.3	55.3	52.1
24	3:00 PM	58.6	71.7	45.1	68.2	61.4	58.0	55.1

Notes:

(1) See Figure 5 for noise measurement locations. Noise measurement was performed over a 24-hour duration.

(2) Noise measurement performed from August 30, 2022 to August 31, 2022.



Legend

NM 1 Noise Measurement Location

ST NM Short-Term Noise Measurement

LT NM Long-Term Noise Measurement

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 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 County of San Bernardino has adopted their own version of the State Land Use Compatibility Guidelines (see Tables 3, 4, & 5).

California Department of Transportation (Caltrans)

The California Department of Transportation has published one of the seminal works for the analysis of ground-borne noise and vibration relating to transportation- and construction-induced vibrations and although

the project is not subject to these regulations, it serves as useful tools to evaluate vibration impacts. These guidelines recommend that a level of 0.5 inches per second (in/sec) PPV is the threshold at which there is a risk to "architectural" damage to modern industrial/commercial buildings and a PPV level of 0.3 in/sec for older residential structures (California Department of Transportation, 2013).

LOCAL REGULATIONS

County of San Bernardino General Plan

The County of San Bernardino Countywide Plan (Policy Plan) serves as the County's General Plan and was adopted in October 2020. The County's Policy Plan's Hazards Element provides goals and policies that are intended to protect life, property, and commerce from impacts associated with natural hazards, human-generated hazards, and increased risk due to climate change. The noise related goals and policies from the Hazards Element that are applicable to the proposed project are presented below:

Goal HZ-2 Human-generated Hazards. People and the natural environment protected from exposure to hazardous materials, excessive noise, and other human-generated hazards.

Policies

Policy HZ-2.7 Truck delivery areas. We encourage truck delivery areas to be located away from residential properties and require associated noise impacts to be mitigated.

Policy HZ-2.8 Proximity to noise generating uses. We limit or restrict new noise sensitive land uses in proximity to existing conforming noise generating uses and planned industrial areas.

Policy HZ-2.9 Control sound at the source. We prioritize noise mitigation measures that control sound at the source before buffers, sound walls, and other perimeter measures.

County of San Bernardino Development Code

Section 83.01.080 of the County of San Bernardino Development Code establishes noise criteria not to be exceeded at the property line of adjacent land uses. These criteria would apply to on-site operational noise generated by the project. Nearby residential land uses may be affected by project-generated operational noise. Sections of the code applicable to the proposed project are presented below.

Noise Standards for Stationary Noise Sources

Tables 3 & 4 describe the noise standard for emanations from a stationary noise source, as it affects adjacent properties. Stationary noise sources associated with the proposed project may impact nearby residential land uses. As shown in Table 3, the base exterior noise level standards for residential land uses are 55 dBA L_{eq} during daytime hours and 45 dBA during nighttime hours. As described in Table 3, other criteria apply depending on the duration of the noise event. Typically, if the 30-minute L_{eq} is not exceeded the other shorter criteria, with the exception of the L_{max} would be likely to be exceeded. In addition, as shown in Table 4, base exterior maximum noise levels standards for residential land uses are 75 dBA L_{max} during daytime hours and 65 dBA L_{max} during nighttime hours.

Per the footnotes provided in Tables 3 and 4, if the measured ambient level exceeds any of the first four noise limit categories, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level. Noise measurement locations are shown in Figure 5 and Measured noise levels are provided in Table 1. Adjusted daytime noise level standards for adjacent and nearby residential land uses are shown in Tables 3 and 4 and are as follows:

Receptor 1	68.9 dBA, Leq and 81.9 dBA, Lmax
Receptor 2	70.2 dBA, Leq and 85.7 dBA, Lmax
Receptor 3	65.5 dBA, Leq and 83.6 dBA, Lmax
Receptor 4	70.0 dBA, Leq and 90.0 dBA, Lmax

Noise Standards for Adjacent Mobile Noise Sources

The County of San Bernardino Development Code also sets forth interior and exterior noise level standards for transportation noise impacts to the proposed project (see Table 5). The noise level criteria of 45 dBA CNEL for interior noise and the 65 dBA CNEL apply to the nearby residential buildings.

Noise Standards for Construction Noise

Temporary construction, maintenance, repair, and demolition activities between 7:00 AM and 7:00 PM, except Sundays and Federal holidays are exempt from Section 83.01.080(g)(3) the San Bernardino Development Code. It is assumed that construction noise is exempt only between the hours presented above under Ordinance 83.01.080(g)(3).

Ground Vibration

Section 83.01.090(a) of the County of San Bernardino Development Code prohibits the creation of ground vibration that can be felt without the aid of instruments at or beyond the lot-line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths (0.2) inches per second measured at or beyond the lot-line. Per Section 83.01.090(c), construction and demolition related ground vibration is exempt from this requirement as long as it occurs between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays. It is anticipated that project construction will occur within the exempt hours, therefore this threshold will not apply. The project does not propose any non-construction related sources of ground-borne vibration.

Table 3
County of San Bernardino Noise Standards for Stationary Noise Sources (dBA, Leq)

Affected Land Uses (Receiving Noise)	7:00 AM to 10:00 PM dBA L_{eq} (Daytime)	10:00 PM to 7:00 AM dBA L_{eq}[1] (Nighttime)	Adjusted dBA L_{eq}[2] (Daytime/Nighttime)			
			Receiver 1 (STNM1)	Reciever 2 (STNM2)	Receiver 3 (STNM3)	Receiver 4 (STNM4)
Residential	55	45	69/55	70/55	66/55	55/49[3]
Professional Services	55	55	n/a	n/a	n/a	n/a
Other Commercial	60	60	n/a	n/a	n/a	n/a
Industrial	70	70	n/a	n/a	n/a	n/a

Noise limit categories. No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

(A) The noise standard for the receiving land use as specified in Subsection B (Noise-impacted areas), above, for a cumulative period of more than 30 minutes in any hour.

(B) The noise standard plus 5 dB(A) for a cumulative period of more than 15 minutes in any hour.

(C) The noise standard plus 10 dB(A) for a cumulative period of more than five minutes in any hour.

(D) The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

(E) The noise standard plus 20 dB(A) for any period of time.

If the measured ambient level exceeds any of the first four noise limit categories, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

Notes:

Source: County of San Bernardino Development Code, Development Code Table 83-2.

(1) The proposed project will not operate between the hours of 10:00 PM and 7:00 AM.

(2) Adjusted per existing measured ambient noise levels. LTNM1 was utilized to represent nighttime noise levels at STNMs 1-3.

(3) Estimated assuming an instaneous vehicle noise on Jurupa Avenue as the source, using the Inverse Square Law.

Table 4
County of San Bernardino Noise Standards for Stationary Noise Sources (dBA, Lmax)

Affected Land Uses (Receiving Noise)	7:00 AM to 10:00 PM dBA Lmax (Daytime)	10:00 PM to 7:00 AM dBA Lmax[1] (Nighttime)	Adjusted dBA Lmax[2] (Daytime/Nighttime)			
			Receiver 1 (STNM1)	Reciever 2 (STNM2)	Receiver 3 (STNM3)	Receiver 4 (STNM4)[3]
Residential	75	65	89/74	90/74	86/74	75/69[3]
Professional Services	75	75	n/a	n/a	n/a	n/a
Other Commercial	80	80	n/a	n/a	n/a	n/a
Industrial	90	90	n/a	n/a	n/a	n/a

Noise limit categories. No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

(A) The noise standard for the receiving land use as specified in Subsection B (Noise-impacted areas), above, for a cumulative period of more than 30 minutes in any hour.

(B) The noise standard plus 5 dB(A) for a cumulative period of more than 15 minutes in any hour.

(C) The noise standard plus 10 dB(A) for a cumulative period of more than five minutes in any hour.

(D) The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

(E) The noise standard plus 20 dB(A) for any period of time.

If the measured ambient level exceeds any of the first four noise limit categories, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

Notes:

Source: County of San Bernardino Development Code, Development Code Table 83-2.

(1) The proposed project will not operate between the hours of 10:00 PM and 7:00 AM.

(2) Adjusted per existing measured ambient noise levels. LTNM1 was utilized to represent nighttime noise levels at STNMs 1-3.

(3) Estimated assuming vehicle noise on Jurupa Avenue as the source, using the Inverse Square Law.

Table 5
County of San Bernardino Noise Standards for Mobile Noise Sources

Land Use		L_{dn} (or CNEL) dB(A)	
Category	Type	Interior[1]	Exterior[2]
Residential	Single and multi-family, duplex, mobile homes	45	60[3]
Commercial	Hotel, motel, transient housing	45	60[3]
	Commercial retail, bank, restaurant	50	n/a
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	n/a
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	n/a	65

Notes:

Source: County of San Bernardino Development Code, Development Code Table 83-3.

(1) The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.

(2) The outdoor environment shall be limited to:

Hospital/office building patios
Hotel and motel recreation areas
Mobile home parks
Multi-family private patios or balconies
Park picnic areas
Private yard of single-family dwellings
School playgrounds

(3) An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.

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 Study prepared for the proposed project (Lilburn Corporation, 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 6 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.[2] 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.[3] 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 trips and vehicle mix were obtained from the trip generation provided in the Lilac Avenue Truck Repair Facility Transportation Study Screening Analysis (Ganddini Group October 4, 2022). Existing average daily vehicle traffic for Jurupa Avenue were obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017).[4] Existing Plus Project vehicle mixes were calculated by adding the proposed project trips to existing conditions. FHWA spreadsheets are included in Appendix E.

[2] 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.

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

[4] Existing ADT for Jurupa Avenue east of Cedar Avenue obtained at https://countywideplan.com/wpcontent/uploads/sites/68/2020/10/Trans_CWP_221_77_ExCon_FinalDraft_032917.pdf

SOUNDPLAN NOISE MODEL

The SoundPLAN acoustical modeling software was utilized to model project operational worst-case stationary noise impacts from the proposed project to adjacent sensitive uses (e.g., residences). SoundPLAN is capable of evaluating stationary noise sources (e.g., parking lots, drive-thru menus, carwash equipment, vacuums, etc.). 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 input and outputs assumptions are provided in Appendix F.

Modeled noise sources include parking lot noise, loading and HVAC equipment. All noise sources were modeled to be in full operation. This is a conservative modeling effort, given that in actuality, several of the noise sources are not in operation continuously for an entire hour.

Parking Lot Noise

Parking lot noise was calculated using SoundPLAN methodology. Specifically, the traffic volume of the parking lot is entered with the number of moves per parking, the hour, and the number of parking bays. The user defines whether the parking lots are for automobiles, motorcycles, or trucks, and the emission level of a parking lot is automatically adjusted accordingly. The values for the number of parking moves for each time slice is the number of parking moves per reference unit (most often per parking bay), averaged for the hour[5].

SoundPLAN utilizes parking lot noise emission levels from the 6th revised edition of the parking lot study "Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Story Car Parks and Underground Car Parks" published by the Bavarian Landesamt für Umwelt provides calculation methods to determine the emissions of parking lots.

The parking lot emission table documents the reference level (Lw, ref) from the parking lot study.

Lw, ref = Lw0 + KPA + KI + KD + KStrO + 10 log(B) [dB(A)]

With the following parameters:

Lw0 = Basic sound power, sound power level of one motion / per hour on P+R areas = 63 dB(A)
KPA = Surcharge parking lot type
KI = Surcharge for impulse character
KD = Surcharge for the traffic passaging and searching for parking bays in the driving lanes 2,5 * lg (f * B - 9)
f = Parking bays per unit of the reference value
B = Reference value
KStrO = Surcharge for the road surface
B = Reference value

Mechanical Equipment (HVAC Units) Noise

A noise reference level of 67.7 dBA at 3 feet (sound power level of 78.7 dB) was utilized to represent rooftop 5 Ton Carrier HVAC units[6]. A rooftop HVAC plan is not available at the time of this analysis so the exact location and number of units per building were estimated Two rooftop units were included in the SoundPLAN noise modeling. The noise source height for each HVAC unit was assumed at 1 meter above the roof top. Roof top is assumed to be approximately 6.1 meters (20 feet) above grade.

[5] SoundPLAN Essential 4.0 Manual. SoundPLAN International, LLC. May 2016.

[6] MD Acoustics, LLC Noise Measurement Data for RTU –Carrier 50TFQ0006 and car alarm.

Compressors/Pneumatic Tools

The SoundPLAN noise modeling assumes that one piece of pneumatic equipment would always be in operation somewhere in the proposed truck repair area. A point noise source was modeled at the center of the area to represent the average location. A reference level of 85.2 dBA at a distance of 50 feet was utilized to represent the pneumatic tool (see Table 6).

Table 6 (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 6 (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 County of San Bernardino standards related to construction, transportation, and operational noise related impacts from the proposed project.

NOISE IMPACTS DUE TO CONSTRUCTION ACTIVITIES

On-Site Construction

Construction activities will occur in phases including demolition, site preparation, grading, 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. Construction activities are anticipated to begin no sooner than the beginning of March 2023 and be completed by mid-March 2024.

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 residential uses located to the east, north, and northwest of the project site 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 7. Worksheets for each phase are included as Appendix D.

Modeled unmitigated construction noise levels reach up to 77 dBA L_{eq} at the nearest residential property line to the east, 74.1 dBA L_{eq} at the nearest residential property line to the north, and up to 71 dBA L_{eq} at the nearest residential property line to the northwest of the project site. Table 7 also includes a comparison of existing noise levels and project construction noise levels. STNM3 was chosen to represent noise levels at the property line of the single-family residential uses located east, STNM2 was chosen to represent noise levels at the property line of the single-family residential uses located north, and STNM1 was chosen to represent noise levels at the property line of the single-family residential uses located northwest of the project site.

Construction noise sources are regulated within Section 83.01.080(g)(3) of the County of San Bernardino's Development Code which exempts temporary construction, maintenance, repair, and demolition activities between 7:00 AM and 7:00 PM, except Sundays and Federal holidays.

Project construction will not occur outside of the hours outlined as "exempt" in County of San Bernardino Development Code Section 83.01.080(g)(3) (as follows) and therefore, will not result in or 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 County of San Bernardino's Development Code which limits the construction hours of operation, the project applicant will include the following Best Management Practices (BMPs) on project plans and in contract specifications 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, shut off all equipment when not in use.

4. To the degree possible, equipment staging will be located in areas that create the greatest distance between construction-related noise and vibration sources, and sensitive receptors surrounding the project site.

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 County of San Bernardino Development Code within Section 83.01.080(g)(3).

Off-Site Construction

Construction truck trips would occur throughout the construction period. Given the project site's proximity to the 10 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps.

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.[7] The estimated existing average daily trips along Jurupa Avenue are 4,709 average daily vehicle trips.[8] As shown in the CalEEMod output files provided in the Air Quality Study prepared for the proposed project (Lilburn Corporation, 2022) the greatest number of construction-related vehicle trips per day would be during paving at up to 15 worker vehicle trips per day. 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 DUE TO PROJECT OPERATION

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

During operation, the proposed project is expected to generate approximately 308 average daily trips with 41 trips during the AM peak-hour and 57 trips during the PM peak-hour. A worst-case project generated traffic noise level was 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

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

[8] The existing average daily traffic volumes were obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017). https://countywideplan.com/wpcontent/uploads/sites/68/2020/10/Trans_CWP_221_77_ExCon_FinalDraft_032917.pdf

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 8. 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 8.

Existing Year (With Project): This scenario refers to existing year plus project traffic noise conditions and is demonstrated in Table 8.

As shown in Table 9, the modeled Existing traffic noise level along Jurupa Avenue is 69 dBA CNEL at the right-of-way of the modeled roadway segment and the modeled Existing Plus Project traffic noise level along Jurupa Avenue is 70 dBA CNEL at the right-of-way of the modeled roadway segment.

For purposes of this project, increases in ambient noise along affected roadways due to project generated vehicle traffic is considered substantial if they result in an increase of at least 5 dBA CNEL and: (1) the existing noise levels already exceed the applicable mobile source noise standard for the affected sensitive receptors set forth in the County's Development Code; or (2) the project increases noise levels by at least 5 dBA CNEL and raises the ambient noise level from below the applicable standard to above the applicable standard.

Project generated vehicle trips are anticipated to increase roadway noise by approximately 0.91 dBA CNEL along Jurupa Avenue (see Table 9). Therefore, the change in noise level would be considered less than significant. No mitigation is required.

Noise Impacts to Off-Site Receptors Due to On-Site Operational Noise

The SoundPLAN noise model was utilized to estimate peak hour (Leq) and maximum (Lmax) operation of the project in order to determine if it is likely to result in substantial increases in ambient noise levels or exceed applicable stationary noise standards (see paragraph above and Tables 3 and 4). A description of each noise source and the model parameters are discussed in Section 5 of this report.

Adjusted daytime County of San Bernardino stationary noise standards for adjacent residential land uses are shown in Tables 3 and 4 and below, as follows.

Receptor 1 Leq = Daytime 69 dBA and Nighttime 55 dBA.
Maximum (Lmax) = Daytime 89 and Nighttime 74 dBA.

Receptor 2 Leq = Daytime 70 dBA and Nighttime 55 dBA.
Maximum (Lmax) = Daytime 90 dBA and Nighttime 74 dBA

Receptor 3 Leq = Daytime 66 dBA and Nighttime 55 dBA.
Maximum (Lmax) = Daytime 86 dBA and Nighttime 74 dBA.

Receptor 4 Leq = Daytime 70 dBA and Nighttime 70 dBA.
Maximum (Lmax) = Daytime 90 dBA and Nighttime 90 dBA.

As shown in Figures 6 and 7 project operational noise levels (Leq) are expected to range between 52 and 67 dBA; and maximum (Lmax) noise events are expected to range between 57 and 72 dBA at the nearest property lines. Existing measured ambient noise levels at the sensitive receptor locations range between 54 and 70 dBA Leq and 73 and 86 dBA Lmax.

As shown on Figure 6 and summarized in Table 10 project operational noise would not exceed the daytime adjusted Leq or Lmax noise standards at any of the receptors. However, the nighttime Leq noise standard will likely be exceeded at R2 and R3 if vehicle repairs occur between the hours of 10:00 PM and 7:00 AM. As a project design feature/condition of approval, project operational hours should be restricted to the hours between 7:00 AM and 10:00 PM. Restriction of nighttime vehicle repairs and use of pneumatic equipment will avoid violation of nighttime noise standards, the project would be consistent with applicable standards and therefore, increases in ambient noise levels would be less than significant.

Required Project Design Feature/Condition of Approval: *Vehicle repairs and/or use of pneumatic equipment will not occur between the hours of 10:00 PM and 7:00 AM.*

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 12, 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.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref} (100/D_{rec})^{n}$$

Where: PPV_{ref} = *reference PPV at 100ft.*
D_{rec} = *distance from equipment to receiver in ft.*
n = 1.1 (*the value related to the attenuation rate through ground*)

Architectural Damage

Construction activity has the potential to result in 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). Land uses adjacent to the proposed construction are industrial and residential. Table 13 identifies a PPV level of 0.5 in/sec as the threshold at which there is a risk to "architectural" damage to modern industrial/commercial buildings and a PPV level of 0.3 in/sec for older residential structures. Furthermore, Section 83.01.090(a) of the County of San Bernardino Development Code prohibits the creation of ground vibration that can be felt without the aid of instruments at or beyond the lot-line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths (0.2) inches per second measured at or beyond the lot-line. Per Section 83.01.090(c), construction and demolition related ground vibration is exempt from this requirement as long as it occurs between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays.

The nearest off-site structure is the residential dwelling unit located approximately 34 feet to the east of the eastern project property line. At 34 feet, use of a vibratory roller would be expected to generate a PPV of 0.132 in/sec and a bulldozer would be expected to generate a PPV of 0.056 in/sec. Temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to older residential structures PPV of 0.3 in/sec PPV. In addition, it is anticipated that project construction will occur within the exempt hours; therefore, Section 83.01.090(c) of the County's Development Code will not apply. The project does not propose any non-construction related sources of ground-borne vibration. Impacts would be less than significant at the residential uses to the east.

Temporary vibration levels associated with project construction would be less than significant. No mitigation is required. Vibration worksheets are provided in Appendix G.

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 14, groundborne vibration becomes distinctly perceptible to sensitive receptors at a level of 0.04 in/sec PPV and severely perceptible at a level of 0.1 in/sec PPV. Operation of a vibratory roller may result in groundborne vibration levels of up to 0.1 PPV in/sec at a distance of 41 feet and a large bulldozer at a distance of 24 feet. Therefore, use of a vibratory roller could cause annoyance to residents located within the single-family home to the east of the project site. However, potential annoyance would only occur when a vibratory roller, or other similar vibratory equipment, is utilized within 10 feet of the property line in proximity to the residential dwelling unit to the east. Annoyance will be short-term and will occur only during site grading and preparation which will be limited to daytime hours. Impacts are less than significant. Vibration worksheets are provided in Appendix G.

Table 7
Construction Noise Levels (dBA L_{eq})

Phase	Receptor Location	Existing Ambient Noise Levels (dBA Leq)[2]	Construction Noise Levels (dBA Leq)
Demolition	Single-Family Residential Use to East (19565 Jurupa Avenue, Bloomington)	65.5	77.0
	Single-Family Residential Uses to North (19530 Jurupa Avenue, Bloomington)	70.2	74.1
	Single-Family Residential Uses to Northwest (19488 Jurupa Avenue, Bloomington)	68.9	71.0
Site Preparation	Single-Family Residential Use to East (19565 Jurupa Avenue, Bloomington)	65.5	74.6
	Single-Family Residential Uses to North (19530 Jurupa Avenue, Bloomington)	70.2	71.7
	Single-Family Residential Uses to Northwest (19488 Jurupa Avenue, Bloomington)	68.9	68.7
Grading	Single-Family Residential Use to East (19565 Jurupa Avenue, Bloomington)	65.5	75.4
	Single-Family Residential Uses to North (19530 Jurupa Avenue, Bloomington)	70.2	72.5
	Single-Family Residential Uses to Northwest (19488 Jurupa Avenue, Bloomington)	68.9	69.4
Building Construction	Single-Family Residential Use to East (19565 Jurupa Avenue, Bloomington)	65.5	72.8
	Single-Family Residential Uses to North (19530 Jurupa Avenue, Bloomington)	70.2	69.9
	Single-Family Residential Uses to Northwest (19488 Jurupa Avenue, Bloomington)	68.9	66.8
Paving	Single-Family Residential Use to East (19565 Jurupa Avenue, Bloomington)	65.5	72.3
	Single-Family Residential Uses to North (19530 Jurupa Avenue, Bloomington)	70.2	69.4
	Single-Family Residential Uses to Northwest (19488 Jurupa Avenue, Bloomington)	68.9	66.3
Architectural Coating	Single-Family Residential Use to East (19565 Jurupa Avenue, Bloomington)	65.5	63.5
	Single-Family Residential Uses to North (19530 Jurupa Avenue, Bloomington)	70.2	60.6
	Single-Family Residential Uses to Northwest (19488 Jurupa Avenue, Bloomington)	68.9	57.5

Notes:

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

(2) Per measured existing ambient noise levels (see Table 1), STNM3 was used for residential uses to the east, STNM2 was used for residential uses to the north, and STNM1 was used for residnetial uses to the northwest of the project site.

Table 8
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		
Jurupa Avenue	In vicinity of project site	4,709	5,017	40	Soft

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 trips and vehicle mix were obtained from the trip generation provided in the *Lilac Avenue Truck Repair Facility Transportation Study Screening Analysis* (Ganddini Group October 4, 2022). Existing average daily vehicle traffic for Jurupa Avenue obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017).

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

Table 9
Increase 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 5 dB or More?
Jurupa Avenue	In vicinity of project site	52	68.73	69.64	0.91	Yes	No

Notes:
(1) Exterior noise levels calculated 5 feet above pad elevation, perpendicular to subject roadway.
(2) Right of way per the County of San Bernardino Policy Plan, Transportation & Mobility Element Table TM-1 (2020).
(3) Per the County of San Bernardino residential exterior noise standards for mobile noise sources of 60 dBA CNEL (see Table 4).

Table 10
Project Compliance with County of San Bernardino Stationary Noise Sources (Unmitigated)

	dBA, Leq			dBA, Lmax		
	Modeled Operational Noise Level (dBA Leq)[1]	Applicable Noise Standards Day/Night (dBA Leq)[2]	Exceeds Standards? (Day/Night)	Modeled Operational Noise Level (dBA Lmax)[3]	Applicable Noise Standards Day/Night (dBA Lmax)[3]	Exceeds Standards? (Day/Night)
R1	52.0	69/55[4]	No/No	61.0	89/74[4]	No/No
R2	65.0	70/55[4]	No/Yes	64.0	90/74[4]	No/No
R3	63.0	66/55[4]	No/Yes	60.0	86/74[4]	No/No
R4	67.0	70/70	No/No	72.0	90/90	No/No

Notes:

(1) Modeled noise levels are shown in Figure 6.

(2) County Stationary Noise Standards as Adjusted (see Table 3).

(3) County Stationary Noise Standards as Adjusted (see Table 4).

Table 11
Comparison of Existing Noise Levels and Peak Hour Project On-Site Operational Noise Levels (dBA, Leq)

	dBA, Leq				dBA, Lmax		
	Measured Ambient Noise Level[1,2]	Modeled Operational Noise Level[3]	Combined Noise Level	Increase in Noise Level Due to Proposed Project	Measured Ambient Noise Level[1,2]	Modeled Operational Noise Level[3]	Increase in Noise Level Due to Proposed Project
STNM1	68.9	52.0	69.0	0.1	81.9	61.0	none
STNM2	70.2	65.0	71.3	1.1	85.7	64.0	none
STNM3	65.5	63.0	67.4	1.9	83.6	60.0	none
STNM4	54.1	67.0	67.2	13.1	72.9	72.0	none

Notes:
(1) See Figures 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.
(2) Daytime Noise measurements performed on August 30, 2022.
(3) Modeled noise levels are shown in Figures 6 and 8.

Table 12
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 13
Guideline Vibration Damage Potential Threshold Criteria

Structure Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, anceint monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 7 Table 19, April 2020.

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

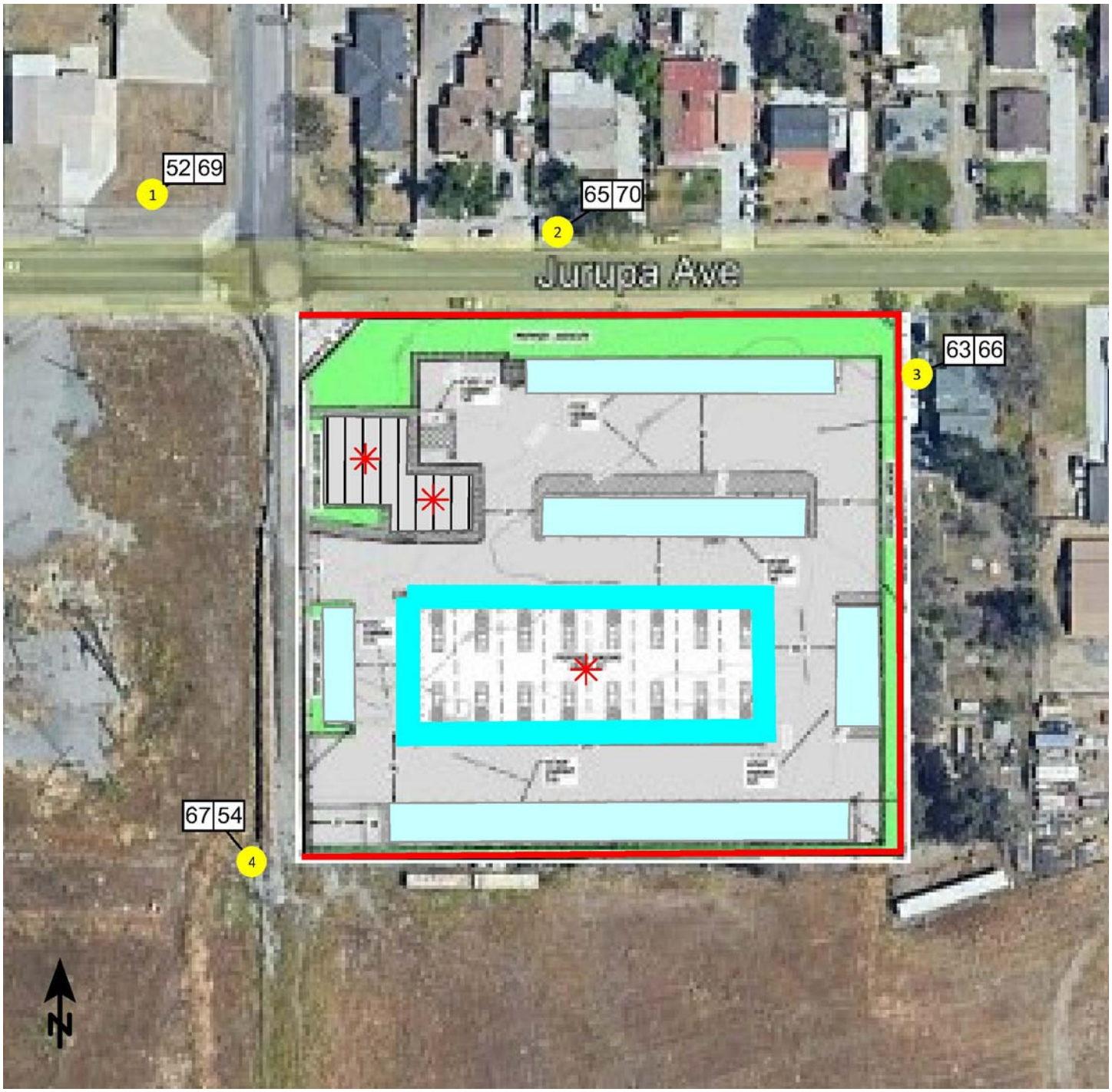
Table 14
Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 7 Table 20, April 2020.

Notes:

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



Signs and symbols

- Truck Repair Area
- Proposed 8-Foot Concrete Wall
- Existing Buildings
- Receiver
- HVAC/Pneumatic Equipment
- Parking lot
- 3 59 52 / 2 58 51 / 1 57 50 — Modeled Noise Level / Measured Noise Level (dBA, Leq)

Figure 6
Peak Hour Project Operational Noise Levels (dBA, Leq)

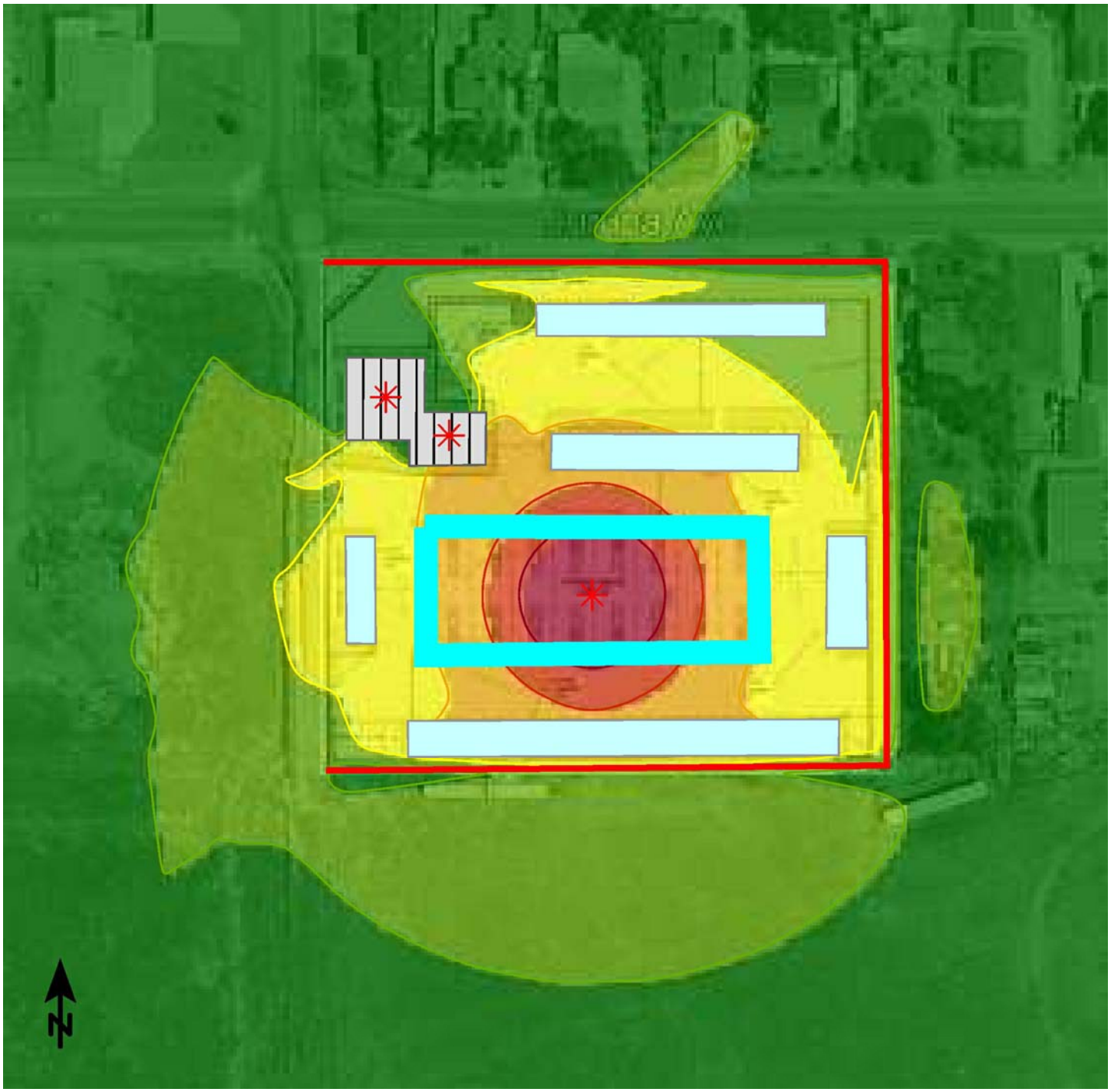


Figure 7
Peak Hour Project Operational Noise Contours (dBA, Leq)

7. CEQA THRESHOLDS & IMPACTS EVALUATION

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

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. Construction activities will occur in phases including demolition, site preparation, grading, 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. Construction activities are anticipated to begin no sooner than the beginning of March 2023 and be completed by mid-March 2024.

Construction noise associated with each phase of project construction 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.

Modeled unmitigated construction noise levels reach up to 77 dBA L_{eq} at the nearest residential property line to the east, 74.1 dBA L_{eq} at the nearest residential property line to the north, and up to 71 dBA L_{eq} at the nearest residential property line to the northwest of the project site. Table 7 also includes a comparison of existing noise levels and project construction noise levels. STNM3 was chosen to represent noise levels at the property line of the single-family residential uses located east, STNM2 was chosen to represent noise levels at the property line of the single-family residential uses located north, and STNM1 was chosen to represent noise levels at the property line of the single-family residential uses located northwest of the project site.

Construction noise sources are regulated within Section 83.01.080(g)(3) of the County of San Bernardino's Development Code which exempts temporary construction, maintenance, repair, and demolition activities between 7:00 AM and 7:00 PM, except Sundays and Federal holidays.

Project construction will not occur outside of the hours outlined as "exempt" in County of San Bernardino Development Code Section 83.01.080(g)(3) (as follows) and therefore, will not result in or 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 County of San Bernardino's Development Code which limits the construction hours of operation, the project applicant will include the following Best Management Practices (BMPs) on project plans and in contract specifications 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, shut off all equipment when not in use.

4. To the degree possible, equipment staging will be located in areas that create the greatest distance between construction-related noise and vibration sources, and sensitive receptors surrounding the project site.

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 County of San Bernardino Development Code within Section 83.01.080(g)(3).

Off-Site Construction Noise

Construction truck trips would occur throughout the construction period. Given the project site's proximity to the 10 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps.

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.[9] The estimated existing average daily trips along Jurupa Avenue are 4,709 average daily vehicle trips.[10] As shown in the CalEEMod output files provided in the Air Quality Study prepared for the proposed project (Lilburn Corporation, 2022) the greatest number of construction-related vehicle trips per day would be during paving at up to 15 worker vehicle trips per day. 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.

On-Site Operational Noise

The SoundPLAN noise model was utilized to estimate peak hour operation (Leq) and maximum (Lmax) noise levels associated with the project in order to determine if it is likely to result in substantial increases in ambient noise levels or exceed applicable stationary noise standards (see paragraph above and Tables 3 and 4). A description of each noise source and the model parameters are discussed in Section 5 of this report.

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

[10] The existing average daily traffic volumes were obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017). https://countywideplan.com/wpcontent/uploads/sites/68/2020/10/Trans_CWP_221_77_ExCon_FinalDraft_032917.pdf

Adjusted daytime County of San Bernardino stationary noise standards for adjacent residential land uses are shown in Tables 3 and 4 and below, as follows.

Receptor 1 Leq = Daytime 69 dBA and Nighttime 55 dBA.
Maximum (Lmax) = Daytime 89 and Nighttime 74 dBA.

Receptor 2 Leq = Daytime 70 dBA and Nighttime 55 dBA.
Maximum (Lmax) = Daytime 90 dBA and Nighttime 74 dBA

Receptor 3 Leq = Daytime 66 dBA and Nighttime 55 dBA.
Maximum (Lmax) = Daytime 86 dBA and Nighttime 74 dBA.

Receptor 4 Leq = Daytime 70 dBA and Nighttime 70 dBA.
Maximum (Lmax) = Daytime 90 dBA and Nighttime 90 dBA.

As shown in Figures 6 and 7 peak hour project operation (Leq) is expected to range between 52 and 67 dBA Leq; and maximum noise events are expected to range between 57 and 72 dBA Lmax at the nearest property lines. Existing measured ambient noise levels at the sensitive receptor locations range between 54 and 70 dBA Leq and 73 and 86 dBA Lmax.

As shown on Figure 6 and summarized in Table 10 project operational noise would not exceed the daytime adjusted Leq or Lmax noise standards at any of the receptors. However, the nighttime Leq noise standard will likely be exceeded at R2 and R3 if vehicle repairs occur between the hours of 10:00 PM and 7:00 AM. As a project design feature/condition of approval, project operational hours should be restricted to the hours between 7:00 AM and 10:00 PM. Restriction of nighttime vehicle repairs and use of pneumatic equipment will avoid violation of nighttime noise standards and impacts would be less than significant.

Required Project Design Feature/Condition of Approval: *Vehicle repairs and/or use of pneumatic equipment will not occur between the hours of 10:00 PM and 7:00 AM.*

Off-Site Project Generated Noise

During operation, the proposed project is expected to generate approximately 308 average daily trips with 41 trips during the AM peak-hour and 57 trips during the PM peak-hour. A Project generated vehicle noise along affected roadways was 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 noise levels along Jurupa Avenue by approximately 0.91 dBA CNEL and would not result in significant increases in ambient noise levels. The impact would be less than significant. No mitigation is required.

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

Less Than Significant Impact:

The Caltrans Transportation and Construction Vibration Guidance Manual (2020) provides a comprehensive discussion regarding groundborne vibration and the appropriate thresholds to use to assess the potential for damage. As shown in Table 13, the threshold at which there is a risk of "architectural" damage to historic structures is a peak particle velocity (PPV) of 0.25 in/sec, and a PPV of 0.3 in/sec at older residential structures. There is a risk of architectural damage at newer residential structures and modern commercial/industrial buildings at a PPV of 0.5 in/sec. In addition, the Caltrans Noise and Vibration Manual identifies 0.1 PPV in./sec. as the level that is "strongly perceptible" (Table 14). Furthermore, Section 83.01.090(a) of the County of San Bernardino Development Code prohibits the creation of ground vibration that can be felt without the aid of instruments at or beyond the lot-line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths (0.2) inches per second measured at or beyond the lot-line. Per Section 83.01.090(c), construction and demolition related ground vibration is exempt from this requirement as long

as it occurs between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays.

The closest existing off-site structure is the residential dwelling unit located approximately 34 feet to the east of the project's eastern property line. Groundborne vibration associated with project construction may reach up to a PPV of 0.132 in/sec at the nearest residential structure to the east of the project site and will not exceed the 0.3 PPV (in./sec.) damage potential threshold for residential structures. In addition, it is anticipated that project construction will occur within the exempt hours; therefore, Section 83.01.090(c) of the County's Development Code will not apply. The project does not propose any non-construction related sources of ground-borne vibration. Impacts would be less than significant at the residential uses to the east.

As shown in Table 14, groundborne vibration associated with project construction may result in annoyance if it exceeds 0.1 PPV in./sec. at a sensitive receptor. Operation of a vibratory roller may result in groundborne vibration levels of up to 0.1 at a distance of 41 feet and a large bulldozer at a distance of 24 feet. The closest sensitive receptors to the project site are the residential dwelling units located as close as approximately 34 feet to the east of the project property line. Therefore, the use of a vibratory roller could cause annoyance to the residential uses to the east. However, potential annoyance would only occur when a vibratory roller, or other similar vibratory equipment, is utilized within 10 feet of the property line in proximity to the residential dwelling unit to the east. Therefore, annoyance will be short-term and will occur only during site grading and preparation which will be limited to daytime hours. Impacts are less than significant.

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?*

No Impact:

The closest airport to the project site is the San Bernardino International Airport with associated airport runways located as close as approximately 7.67 miles northeast of the project site. The San Bernardino International Airport noise contours provided in the Technical Memorandum prepared for the San Bernardino International Airport – Eastgate Air Cargo Facility – Aircraft Noise Contour Development (July 2019) shows that the proposed project is well outside the 60 dBA CNEL noise contour for the airport.[11] In addition, Policy Map HZ-9 Airport Safety and Planning of the County's Policy Plan shows that the project site is well outside the 60 Ldn noise contour as well as the Airport Safety Review Area of the San Bernardino International Airport. 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.

[11] http://www.sbiaa.org/wp-content/uploads/2019/07/7_Appendix-F_Noise-Technical-Memo.pdf

8. REFERENCES

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APPENDICES

Appendix A List of Acronyms
Appendix B Definitions of Acoustical Terms
Appendix C Noise Measurement Field Worksheets
Appendix D Construction Noise Modeling
Appendix E FHWA Worksheets
Appendix F SoundPLAN Worksheets
Appendix G Vibration Worksheets

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.
Lp	Sound pressure level. The sound pressure level is a measure for the effect of the energy of an acoustic source (or a collection of sources) and depends on the distance to the source(s) and acoustic properties of the surroundings of the source. Given a well-defined operation condition, the sound power level of a machine is a fixed value, were the sound pressure level always depends on position and environment.
Lw	Sound power level. The sound power level indicates the total acoustic energy that a machine, or piece of equipment, radiates to its environment.

Term	Definition
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: Lilac Avenue Truck Repair Facility, County of San Bernardino **Date:** August 30, 2022

Project #: 19495

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

Nearest Address or Cross Street: 19488 Jurupa Avenue Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Project Site: Office/shop uses at 11317 Lilac Ave in NW corner site w/ rest of site used for the storage of trucks/trailors. Site bounded by edison access road/single-family residence to east, Jurupa Ave to north, Lilac Ave to west, and vacant land to south. Noise Measurement Site: Single-family residential to north, Jurupa Ave to south, & Lilac Ave to east.

Weather: Sunny, <5% white cloud **Settings:** SLOW FAST

Temperature: 102 deg F **Wind:** 10mph **Humidity:** 25% **Terrain:** Flat

Start Time: 12:53 PM **End Time:** 1:08 PM **Run Time:**

Leq: 68.9 dB

Lmax 81.9 dB

L2 78.3 dB

L8 73.6 dB

L25 68.7 dB

L50 62.4 dB

Primary Noise Source: Traffic noise from 72 vehicles passing microphone traveling along Jurupa Avenue. Road traffic noise from Lilac Ave to east.

Secondary Noise Sources: Leaf rustle from breeze. Occasional distant overhead air traffic. Truck repair yard ambiance. Some residential ambiance. Some bird song.

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:	8/30/2022		

Noise Measurement
Field Data

PHOTOS:

STNM1 looking N towards front yard of residence 19488 Jurupa Avenue, Bloomington.

STNM1 looking E towards Lilac Avenue. Residence 19488 Jurupa Avenue, Bloomington on the left of image.

Summary	
File Name on Meter	LxT_Data.054.s
File Name on PC	LxT_0003099-20220830 125323-LxT_Data.054.ldbin
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM1 34° 2'54.16"N 117°22'45.14"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, County of San Bernardino.

Measurement	
Start	2022-08-30 12:53:23
Stop	2022-08-30 13:08:23
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-08-30 12:52:59
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	123.2 dB

Results			
LA_{eq}		68.9	
LAE		98.4	
EA		776.280	µPa²h
EA8		24.841	mPa²h
EA40		124.205	mPa²h
$LA_{peak\ (max)}$	2022-08-30 12:55:06	105.3	dB
LAS_{max}	2022-08-30 13:00:02	81.9	dB
LAS_{min}	2022-08-30 12:55:38	43.1	dB

		Statistics	
LC_{eq}	75.9 dB	**LA2.00**	78.3 dB
LA_{eq}	68.9 dB	**LA8.00**	73.6 dB
LC_{eq} - LA_{eq}	7.0 dB	**LA25.00**	68.7 dB
LAI_{eq}	71.4 dB	**LA50.00**	62.4 dB
LA_{eq}	68.9 dB	**LA66.60**	57.2 dB
LAI_{eq} - LA_{eq}	2.5 dB	**LA90.00**	48.1 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.054.s	Computer's File Name	LxT_0003099-20220830 125323-LxT_Data.054.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM1 34° 2'54.16"N 117°22'45.14"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, City of Bloomington.		
Start Time	2022-08-30 12:53:23	Duration	0:15:00.0
End Time	2022-08-30 13:08:23	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	68.9 dB		
LAE	98.4 dB	SEA	--- dB
EA	776.3 µPa²h	LAFTM5	74.4 dB
EA8	24.8 mPa²h		
EA40	124.2 mPa²h		
LA_{peak}	105.3 dB	2022-08-30 12:55:06	
LAS_{max}	81.9 dB	2022-08-30 13:00:02	
LAS_{min}	43.1 dB	2022-08-30 12:55:38	
LA_{eq}	68.9 dB		
LC_{eq}	75.9 dB	LC_{eq} - LA_{eq}	7.0 dB
LAI_{eq}	71.4 dB	LAI_{eq} - LA_{eq}	2.5 dB

Exceedances	Count	Duration
LAS > 65.0 dB	37	0:06:56.0
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 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

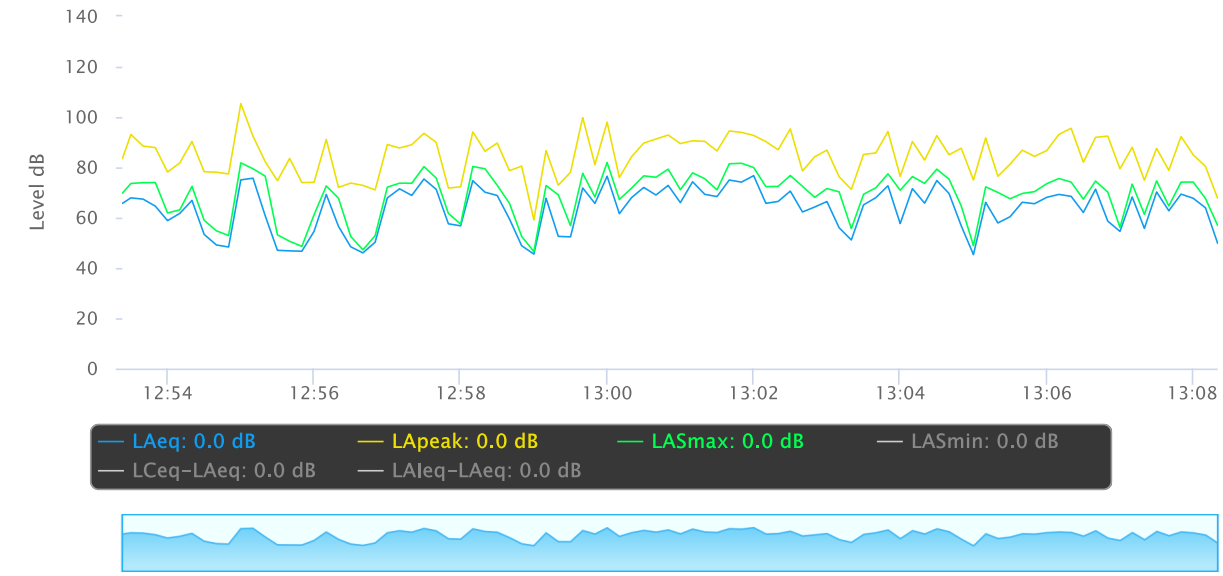
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	68.9 dB		75.9 dB		--- dB	
$L_{S(max)}$	81.9 dB	2022-08-30 13:00:02	--- dB		--- dB	
$L_{S(min)}$	43.1 dB	2022-08-30 12:55:38	--- dB		--- dB	
$L_{Peak(max)}$	105.3 dB	2022-08-30 12:55:06	--- dB		--- dB	

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

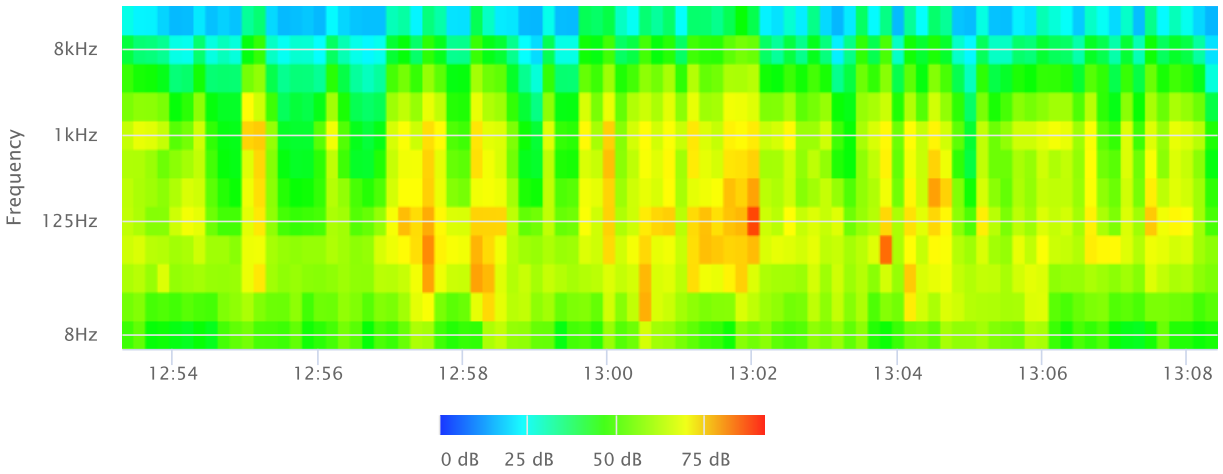
Statistics

LAS 2.0	78.3 dB
LAS 8.0	73.6 dB
LAS 25.0	68.7 dB
LAS 50.0	62.4 dB
LAS 66.6	57.2 dB
LAS 90.0	48.1 dB

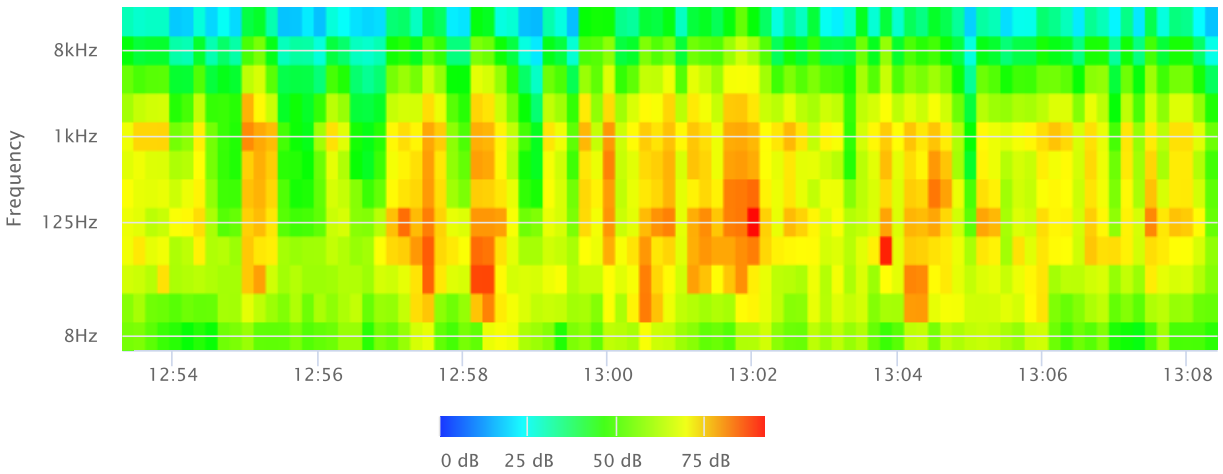
Time History



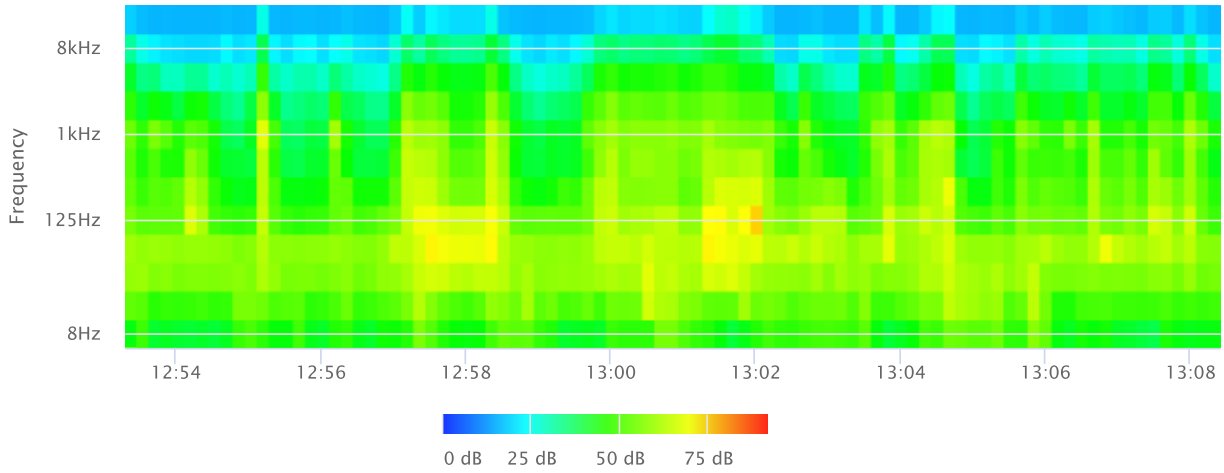
OBA 1/1 Leq



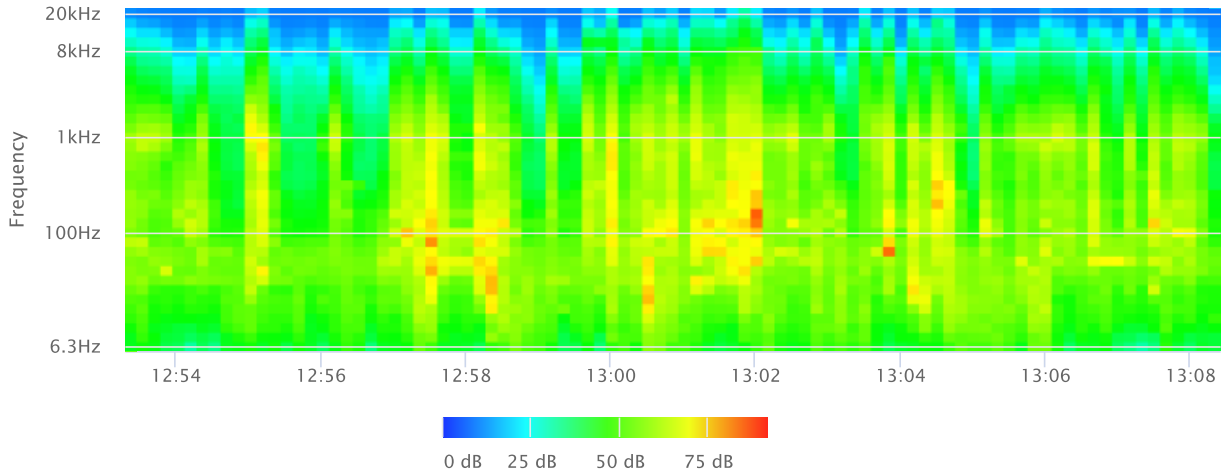
OBA 1/1 Lmax



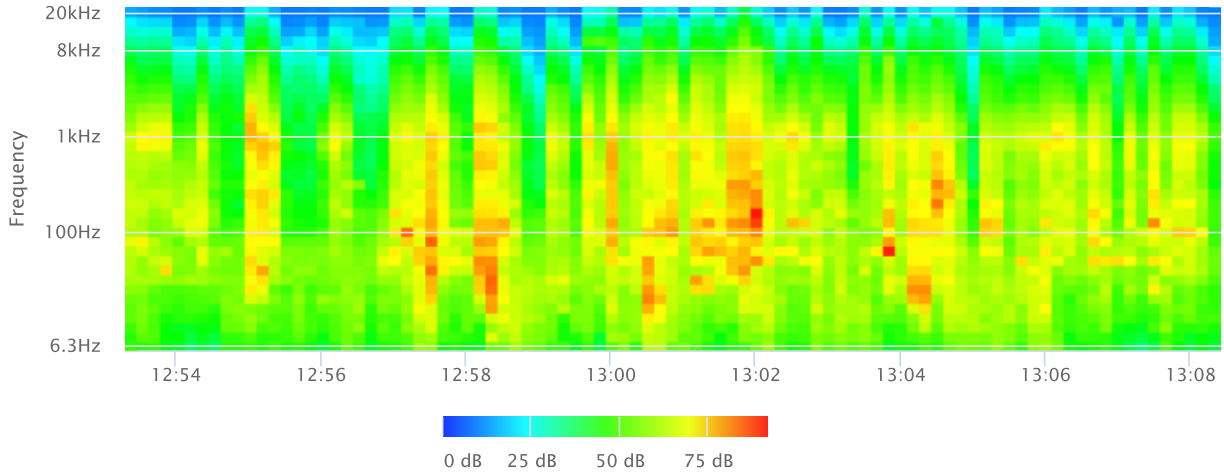
OBA 1/1 Lmin



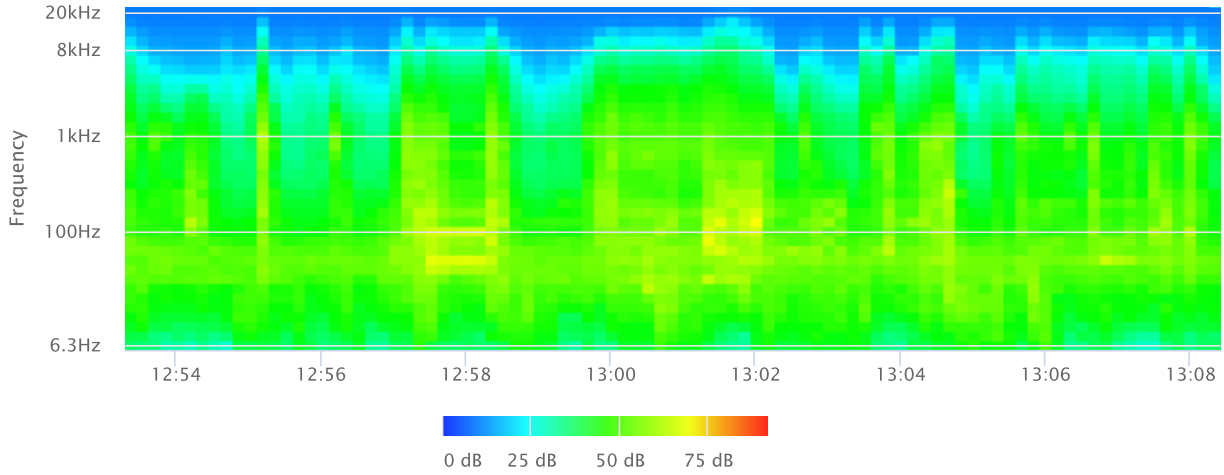
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
12:54
12:56
12:58
13:00
13:02
13:04
13:06
13:08
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Lilac Avenue Truck Repair Facility, County of San Bernardino **Date:** August 30, 2022

Project #: 19495

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

Nearest Address or Cross Street: 19530 Jurupa Avenue Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Project Site: Office/shop uses at 11317 Lilac Ave in NW corner site w/ rest of site used for the storage of trucks/trailors. Site bounded by edison access road/single-family residence to east, Jurupa Ave to north, Lilac Ave to west, and vacant land to south. Noise Measurement Site: Single-family to north, Jurupa Ave to south w/ project site further south, and Lilac Ave to west.

Weather: Sunny, <5% white cloud **Settings:** SLOW FAST

Temperature: 102 deg F **Wind:** 10mph **Humidity:** 25% **Terrain:** Flat

Start Time: 1:18 PM **End Time:** 1:33 PM **Run Time:**

Leq: 70.2 dB **Primary Noise Source:** Traffic noise from 74 vehicles passing microphone traveling along Jurupa Avenue.

Lmax 85.7 dB Road traffic ambiance from Lilac Ave intersection to west.

L2 78.8 dB **Secondary Noise Sources:** Leaf rustle from breeze. Occasional distant overhead air traffic. Truck repair yard

L8 75.2 dB ambiance. Some residential ambiance. Some bird song.

L25 70.1 dB

L50 62.3 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:	8/30/2022		

Noise Measurement
Field Data

PHOTOS:

STNM2 looking N towards front yard of residence 19530 Jurupa Avenue, Bloomington.

STNM2 looking W down Jurupa Avenue towards interection with Lilac Avenue. Residence 19530 Jurupa Avenue, Bloomington on the right side of the image.

Summary	
File Name on Meter	LxT_Data.055.s
File Name on PC	LxT_0003099-20220830 131812-LxT_Data.055.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM2 34° 2'54.08"N 117°22'42.06"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, County of San Bernardino.

Measurement	
Start	2022-08-30 13:18:12
Stop	2022-08-30 13:33:12
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-08-30 13:17:56
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	123.3 dB

Results			
LA_{eq}	70.2		
LAE	99.8		
EA	1.055273	mPa^2h	
EA8	33.76875	mPa^2h	
EA40	168.8438	mPa^2h	
$LA_{peak\ (max)}$	2022-08-30 13:26:45	98.5	dB
LAS_{max}	2022-08-30 13:26:47	85.7	dB
LAS_{min}	2022-08-30 13:22:10	54.9	dB

		Statistics	
LC_{eq}	76.7 dB	**LA2.00**	78.8 dB
LA_{eq}	70.2 dB	**LA8.00**	75.2 dB
LC_{eq} - LA_{eq}	6.5 dB	**LA25.00**	70.1 dB
LAI_{eq}	72.1 dB	**LA50.00**	62.3 dB
LA_{eq}	70.2 dB	**LA66.60**	59.7 dB
LAI_{eq} - LA_{eq}	1.9 dB	**LA90.00**	56.8 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.055.s	Computer's File Name	LxT_0003099-20220830 131812-LxT_Data.055.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM2 34° 2'54.08"N 117°22'42.06"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, City of Bloomington.		
Start Time	2022-08-30 13:18:12	Duration	0:15:00.0
End Time	2022-08-30 13:33:12	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	70.2 dB		
LAE	99.8 dB	SEA	--- dB
EA	1.1 mPa²h	LAFTM5	75.6 dB
EA8	33.8 mPa²h		
EA40	168.8 mPa²h		
LA_{peak}	98.5 dB	2022-08-30 13:26:45	
LAS_{max}	85.7 dB	2022-08-30 13:26:47	
LAS_{min}	54.9 dB	2022-08-30 13:22:10	
LA_{eq}	70.2 dB		
LC_{eq}	76.7 dB	LC_{eq} - LA_{eq}	6.5 dB
LAI_{eq}	72.1 dB	LAI_{eq} - LA_{eq}	1.9 dB

Exceedances	Count	Duration
LAS > 65.0 dB	29	0:06:52.9
LAS > 85.0 dB	1	0:00:02.3
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 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

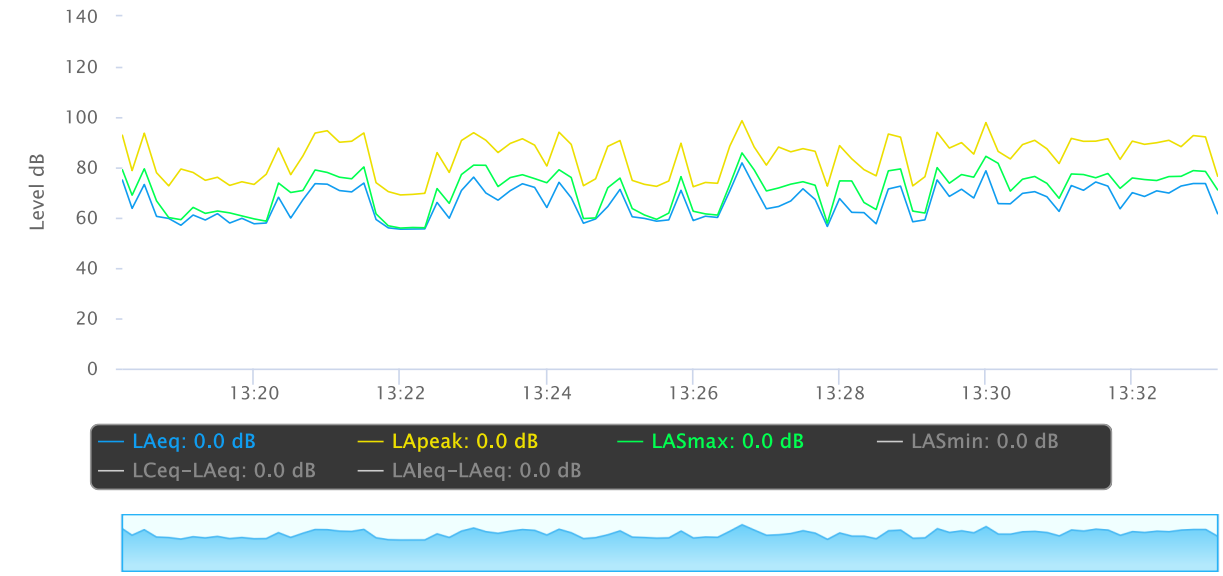
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	70.2 dB		76.7 dB		--- dB	
$L_{S(max)}$	85.7 dB	2022-08-30 13:26:47	--- dB		--- dB	
$L_{S(min)}$	54.9 dB	2022-08-30 13:22:10	--- dB		--- dB	
$L_{Peak(max)}$	98.5 dB	2022-08-30 13:26:45	--- dB		--- dB	

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

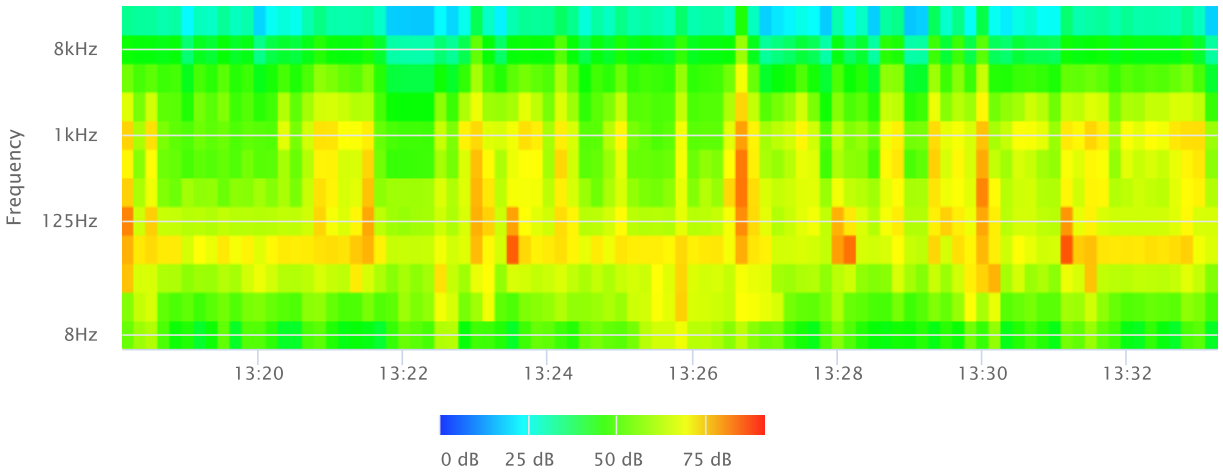
Statistics

LAS 2.0	78.8 dB
LAS 8.0	75.2 dB
LAS 25.0	70.1 dB
LAS 50.0	62.3 dB
LAS 66.6	59.7 dB
LAS 90.0	56.8 dB

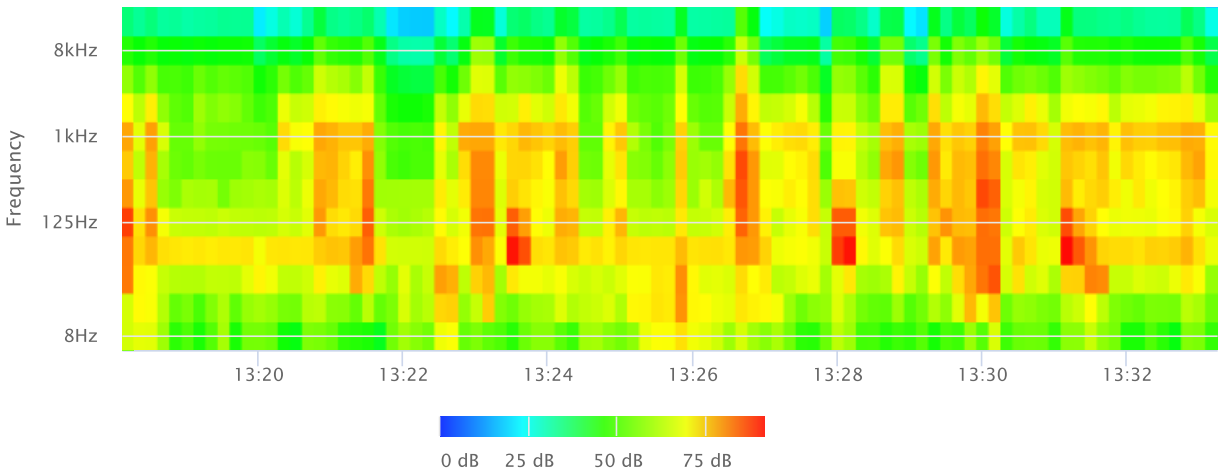
Time History



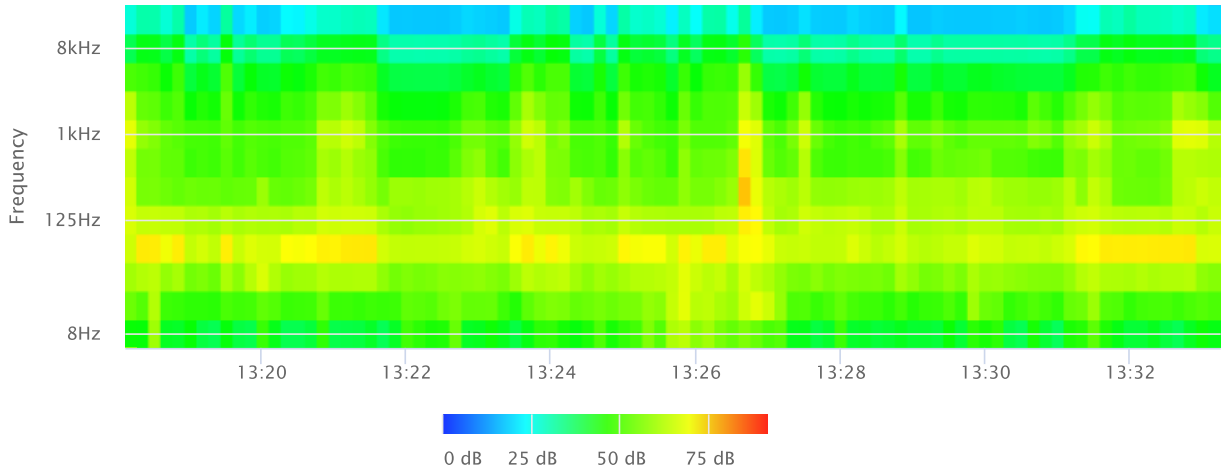
OBA 1/1 Leq



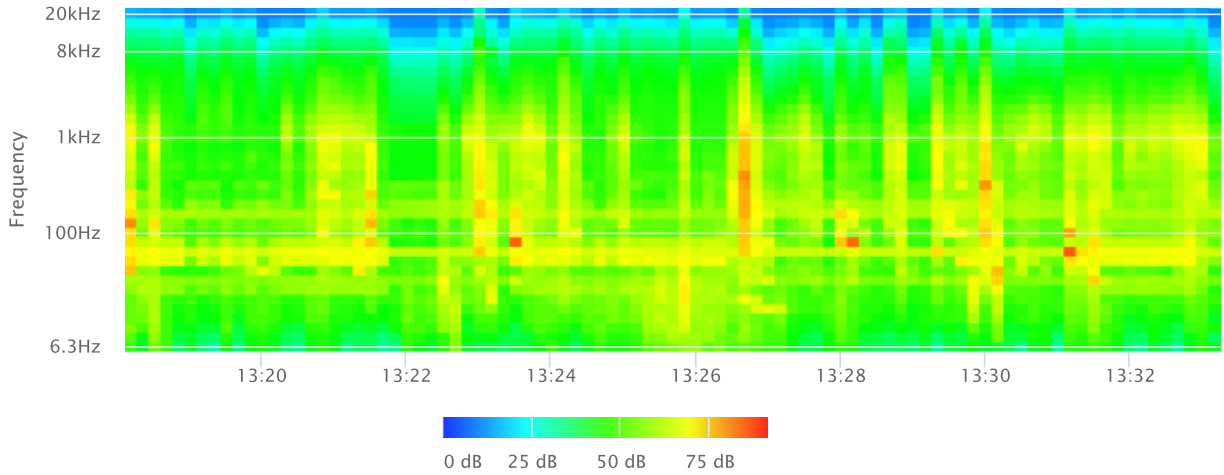
OBA 1/1 Lmax



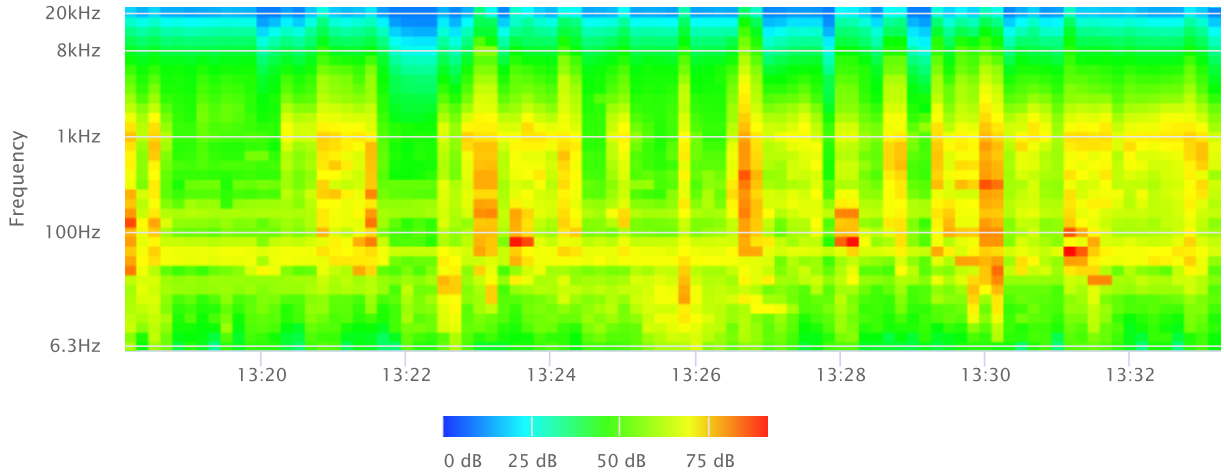
OBA 1/1 Lmin



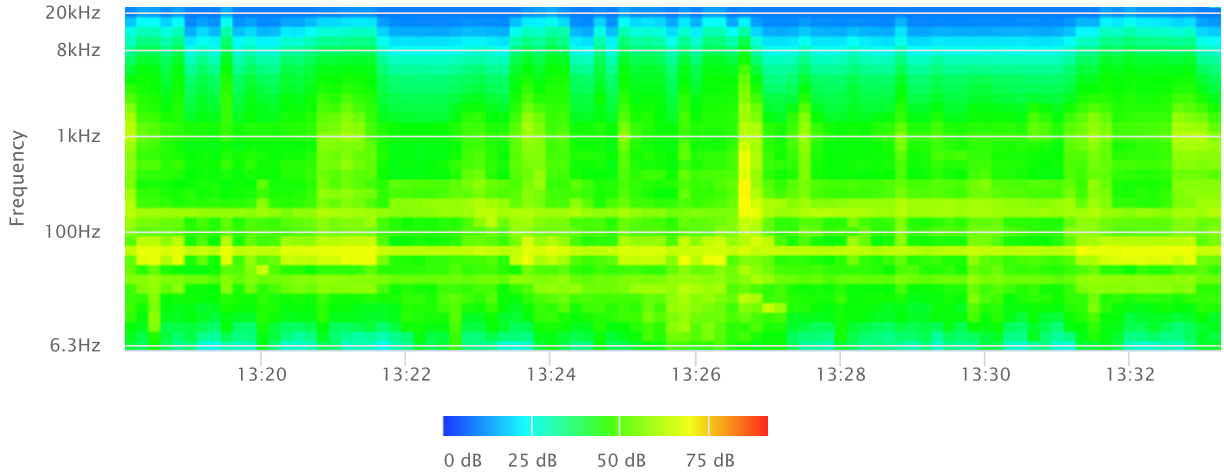
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:20
13:22
13:24
13:26
13:28
13:30
13:32
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Lilac Avenue Truck Repair Facility, County of San Bernardino **Date:** August 30, 2022

Project #: 19495

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

Nearest Address or Cross Street: 19565 Jurupa Avenue Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Project Site: Office/shop uses at 11317 Lilac Ave in NW corner site w/ rest of site used for the storage of trucks/trailors. Site bounded by edison access road/single-family residence to east, Jurupa Ave to north, Lilac Ave to west, and vacant land to south. Noise Measurement Site: Single-family to east, Jurupa Ave to north, & edison access road and project site to west.

Weather: Sunny, <5% white cloud **Settings:** SLOW FAST

Temperature: 102 deg F **Wind:** 10mph **Humidity:** 25% **Terrain:** Flat

Start Time: 1:49 PM **End Time:** **Run Time:**

Leq:	65.5	dB	**Primary Noise Source:** Traffic noise from 62 vehicles passing microphone traveling along Jurupa Avenue.
Lmax	83.6	dB	Road traffic ambiance from other surrounding roads.
L2	74.2	dB	**Secondary Noise Sources:** Leaf rustle from breeze. Occasional distant overhead air traffic. Truck repair yard
L8	70.4	dB	ambiance. Some residential ambiance. Some bird song.
L25	65.1	dB	
L50	55.8	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:	8/30/2022		

Noise Measurement
Field Data

PHOTOS:

STNM3 looking N along Edison Access road towards Jurupa Ave. Residence 19565 Jurupa Avenue, Bloomington on the right side of the image. Eastern boundary of Lilac Avenue Truck Repair site on the left of the image.

STNM3 looking E through chain-link fence towards front yard of residence 19565 Jurupa Avenue, Bloomington.

Summary	
File Name on Meter	LxT_Data.056.s
File Name on PC	LxT_0003099-20220830 134958-LxT_Data.056.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM3 34° 2'53.50"N 117°22'39.64"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, County of San Bernardino.

Measurement	
Start	2022-08-30 13:49:58
Stop	2022-08-30 14:04:58
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-08-30 13:47:42
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	123.2 dB

Results			
LA_{eq}	65.5		
LAE	95.1		
EA	358.8331	µPa²h	
EA8	11.48266	mPa²h	
EA40	57.4133	mPa²h	
$LA_{peak\ (max)}$	2022-08-30 14:01:36	96.9	dB
LAS_{max}	2022-08-30 14:01:37	83.6	dB
LAS_{min}	2022-08-30 13:54:38	43.0	dB

		Statistics	
LC_{eq}	72.3 dB	**LA2.00**	74.2 dB
LA_{eq}	65.5 dB	**LA8.00**	70.4 dB
LC_{eq} - LA_{eq}	6.7 dB	**LA25.00**	65.1 dB
LAI_{eq}	68.0 dB	**LA50.00**	55.8 dB
LA_{eq}	65.5 dB	**LA66.60**	50.3 dB
LAI_{eq} - LA_{eq}	2.5 dB	**LA90.00**	46.3 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.056.s	Computer's File Name	LxT_0003099-20220830 134958-LxT_Data.056.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM3 34° 2'53.50"N 117°22'39.64"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, City of Bloomington.		
Start Time	2022-08-30 13:49:58	Duration	0:15:00.0
End Time	2022-08-30 14:04:58	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	65.5 dB		
LAE	95.1 dB	SEA	--- dB
EA	358.8 µPa²h	LAFTM5	71.7 dB
EA8	11.5 mPa²h		
EA40	57.4 mPa²h		
LA_{peak}	96.9 dB	2022-08-30 14:01:36	
LAS_{max}	83.6 dB	2022-08-30 14:01:37	
LAS_{min}	43.0 dB	2022-08-30 13:54:38	
LA_{eq}	65.5 dB		
LC_{eq}	72.3 dB	LC_{eq} - LA_{eq}	6.7 dB
LAI_{eq}	68.0 dB	LAI_{eq} - LA_{eq}	2.5 dB

Exceedances	Count	Duration
LAS > 65.0 dB	51	0:04:26.9
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 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

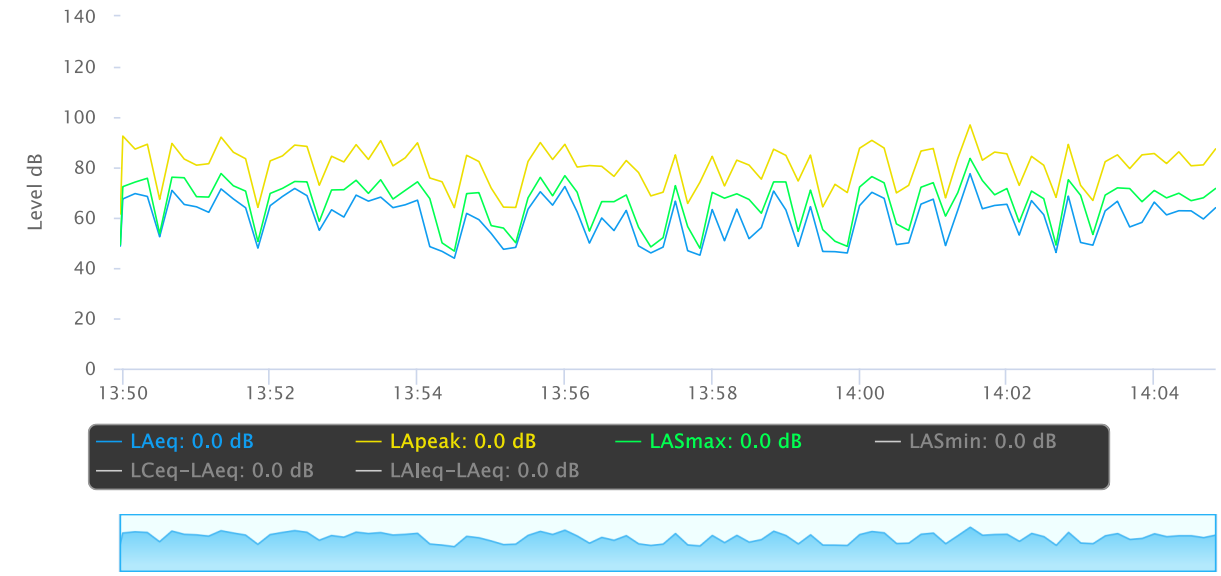
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	65.5 dB		72.3 dB		--- dB	
$L_{S(max)}$	83.6 dB	2022-08-30 14:01:37	--- dB		--- dB	
$L_{S(min)}$	43.0 dB	2022-08-30 13:54:38	--- dB		--- dB	
$L_{Peak(max)}$	96.9 dB	2022-08-30 14:01:36	--- dB		--- dB	

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

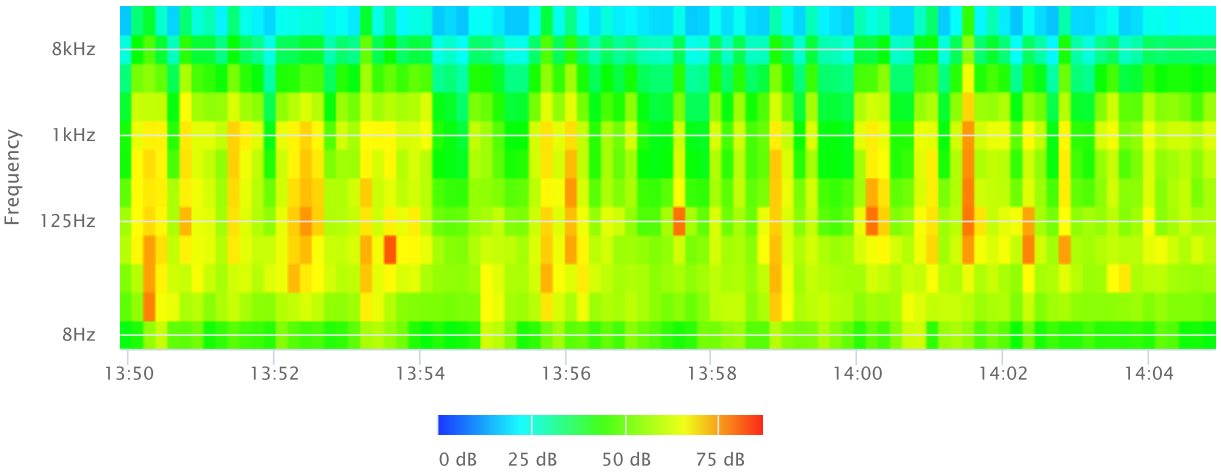
Statistics

LAS 2.0	74.2 dB
LAS 8.0	70.4 dB
LAS 25.0	65.1 dB
LAS 50.0	55.8 dB
LAS 66.6	50.3 dB
LAS 90.0	46.3 dB

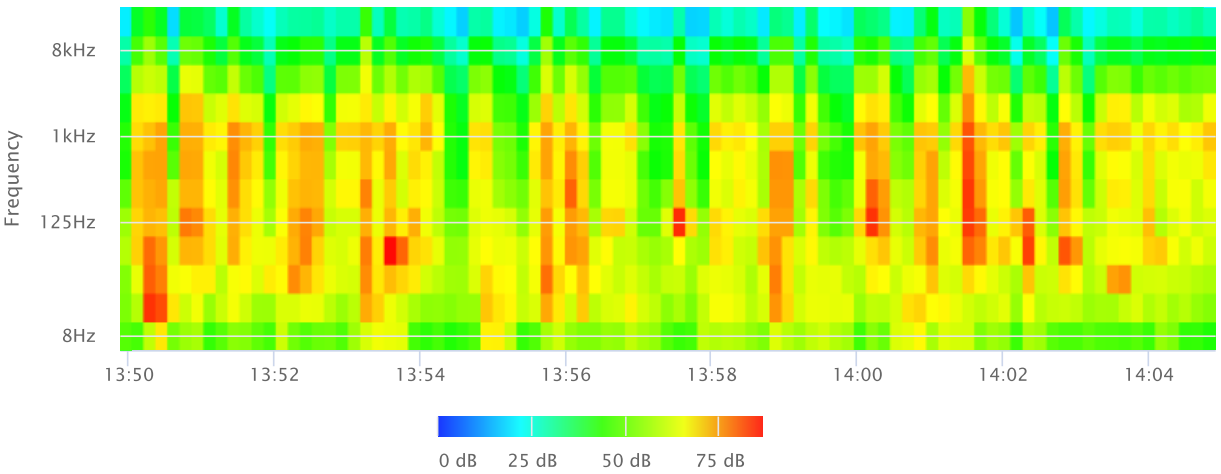
Time History



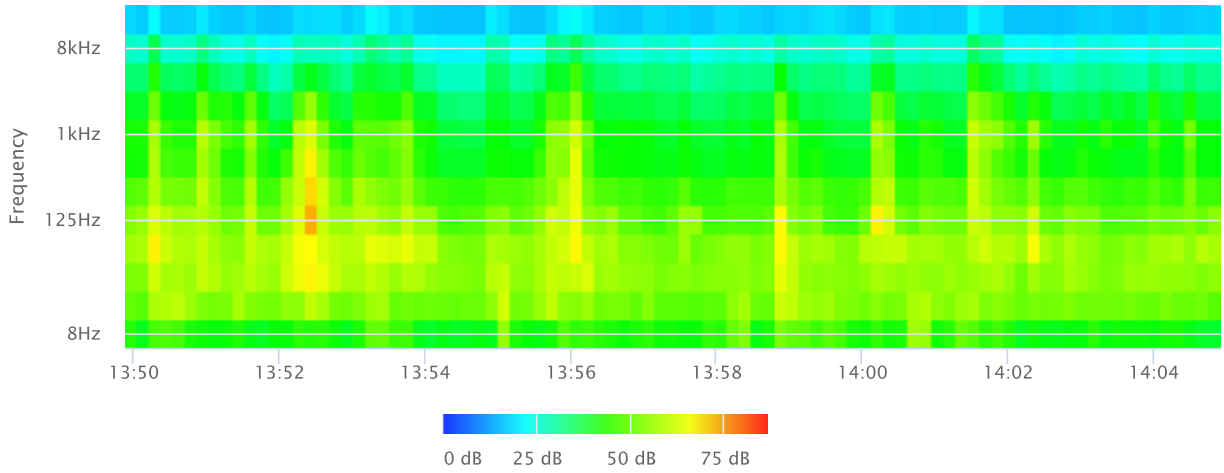
OBA 1/1 Leq



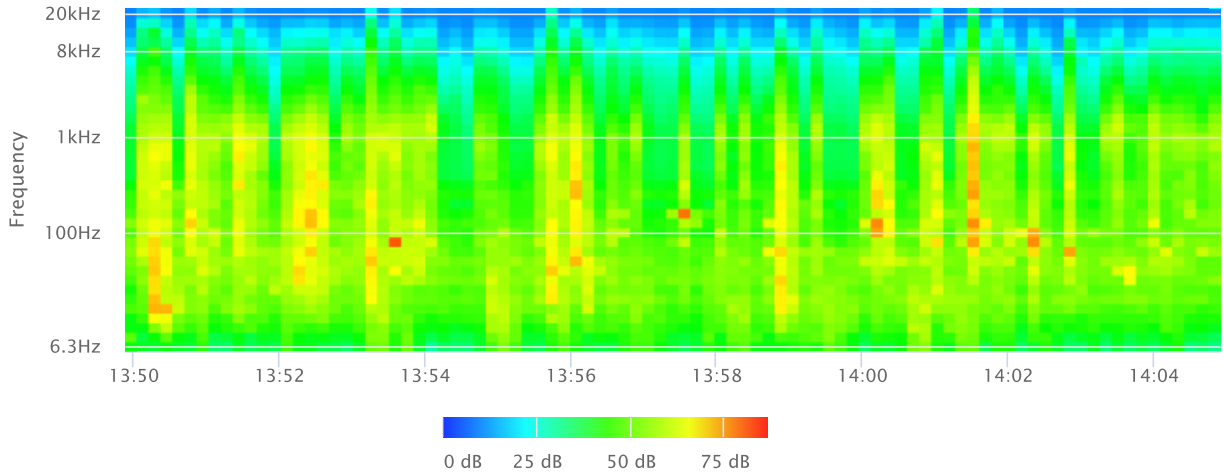
OBA 1/1 Lmax



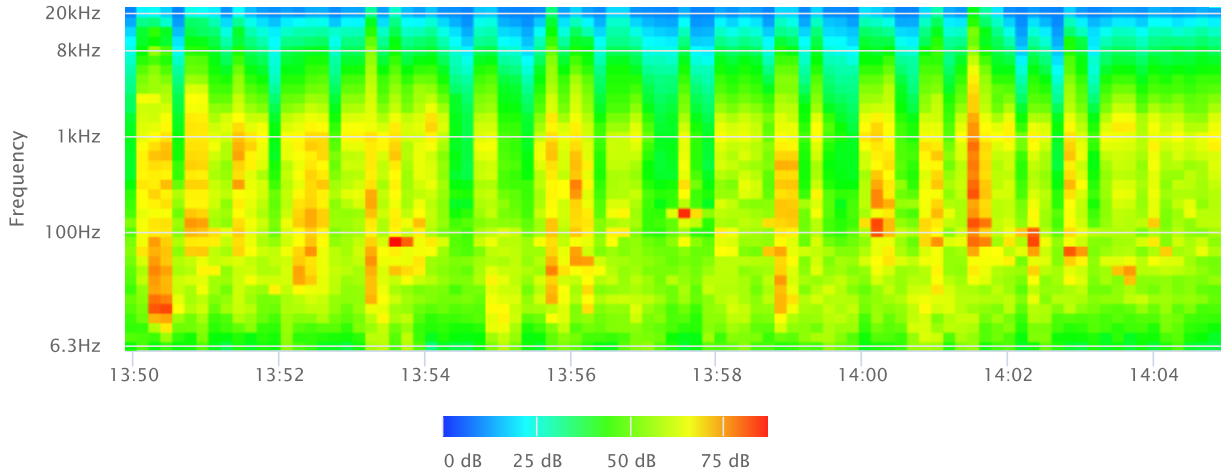
OBA 1/1 Lmin



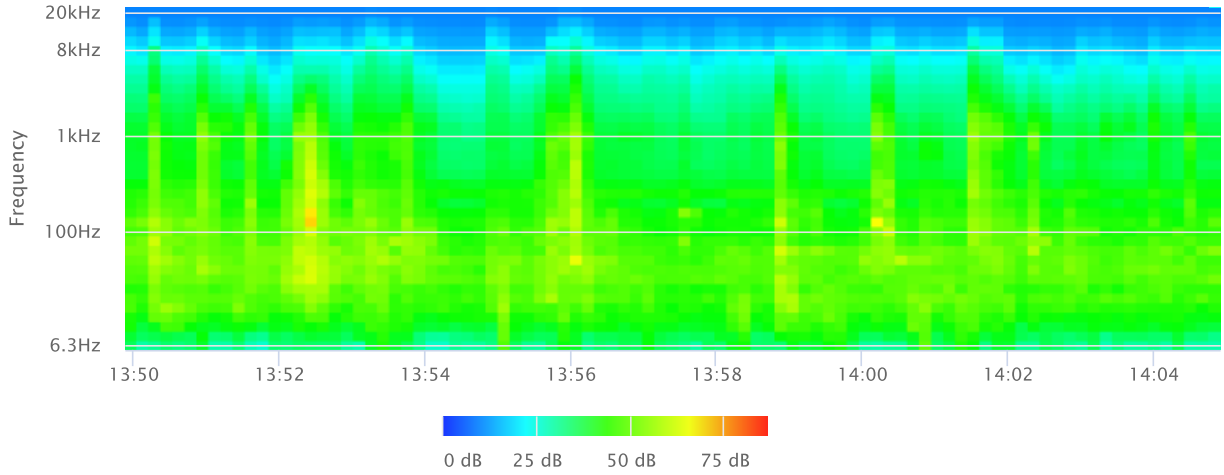
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:50
13:52
13:54
13:56
13:58
14:00
14:02
14:04
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Lilac Avenue Truck Repair Facility, County of San Bernardino **Date:** August 30, 2022

Project #: 19495

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

Nearest Address or Cross Street: 11317 Lilac Avenue Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Project Site: Office/shop uses at 11317 Lilac Ave in NW corner site w/ rest of site used for the storage of trucks/trailors. Site bounded by edison access road/single-family residence to east, Jurupa Ave to north, Lilac Ave to west, and vacant land to south. Noise Measurement Site: Project site to N/NE, vacant land to south & west, & Lilac Ave to north.

Weather: Sunny, <5% white cloud **Settings:** SLOW FAST

Temperature: 102 deg F **Wind:** 10mph **Humidity:** 25% **Terrain:** Flat

Start Time: 2:23 PM **End Time:** 2:38 PM **Run Time:**

Leq: 54.1 dB

Lmax 72.9 dB

L2 59.9 dB

L8 55.7 dB

L25 53.5 dB

L50 52.5 dB

Primary Noise Source: Lilac Ave Truck Repair yard ambiance, employees conversating and power tools in use. Traffic ambiance from Jurupa Ave, Lilac Avenue & other roads.

Secondary Noise Sources: Leaf rustle from breeze. Occasional distant overhead air traffic. Some bird song.

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:	8/30/2022		

Noise Measurement
Field Data

PHOTOS:

STNM4 looking N from SW corner of Lilac Avenue Truck repair site/Lilac Avenue towards Jurupa Avenue.

STNM4 looking E along southern edge of Lilac Ave Truck Repair Site (left side of image) Vacant land with overhead electrical high power lines on the right side of the image.

Summary				
File Name on Meter	LxT_Data.057.s			
File Name on PC	LxT_0003099-20220830 142337-LxT_Data.057.ldbin			
Serial Number	3099			
Model	SoundTrack LxT®			
Firmware Version	2.404			
User	Ian Edward Gallagher			
Location	STNM4 34° 2'50.16"N 117°22'44.14"W			
Job Description	15 minute noise measurement (1 x 15 minutes)			
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, County of San Bernardino.			
Measurement				
Start	2022-08-30 14:23:37			
Stop	2022-08-30 14:38:37			
Duration	00:15:00.0			
Run Time	00:15:00.0			
Pause	00:00:00.0			
Pre-Calibration	2022-08-30 14:23:14			
Post-Calibration	None			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamplifier	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Frequency Weighting	C Weighting			
OBA Max Spectrum	At LMax			
Overload	123.2 dB			
Results				
LA_{eq}	54.1			
LAE	83.6			
EA	25.52954 µPa²h			
EA8	816.9452 µPa²h			
EA40	4.084726 mPa²h			
$LA_{peak\ (max)}$	2022-08-30 14:24:58	93.6 dB		
LAS_{max}	2022-08-30 14:34:07	72.9 dB		
LAS_{min}	2022-08-30 14:34:41	50.0 dB		
			Statistics	
LC_{eq}	75.6 dB		**LA2.00**	59.9 dB
LA_{eq}	54.1 dB		**LA8.00**	55.7 dB
LC_{eq} - LA_{eq}	21.5 dB		**LA25.00**	53.5 dB
LAI_{eq}	59.0 dB		**LA50.00**	52.5 dB
LA_{eq}	54.1 dB		**LA66.60**	52.0 dB
LAI_{eq} - LA_{eq}	4.9 dB		**LA90.00**	51.3 dB
Overload Count	0			

Measurement Report

Report Summary

Meter's File Name	LxT_Data.057.s	Computer's File Name	LxT_0003099-20220830 142337-LxT_Data.057.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM4 34° 2'50.16"N 117°22'44.14"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, City of Bloomington.		
Start Time	2022-08-30 14:23:37	Duration	0:15:00.0
End Time	2022-08-30 14:38:37	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	54.1 dB		
LAE	83.6 dB	SEA	--- dB
EA	25.5 µPa²h	LAFTM5	61.1 dB
EA8	816.9 µPa²h		
EA40	4.1 mPa²h		
LA_{peak}	93.6 dB	2022-08-30 14:24:58	
LAS_{max}	72.9 dB	2022-08-30 14:34:07	
LAS_{min}	50.0 dB	2022-08-30 14:34:41	
LA_{eq}	54.1 dB		
LC_{eq}	75.6 dB	LC_{eq} - LA_{eq}	21.5 dB
LAI_{eq}	59.0 dB	LAI_{eq} - LA_{eq}	4.9 dB

Exceedances	Count	Duration
LAS > 65.0 dB	2	0:00:04.4
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 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

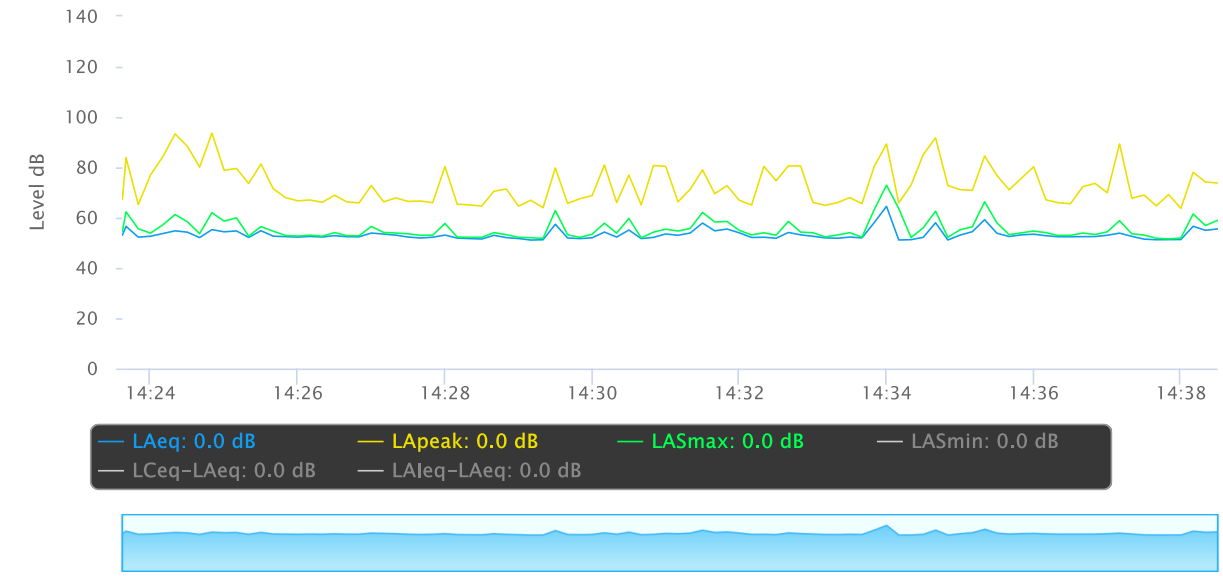
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	54.1 dB		75.6 dB		--- dB	
$L_{S(max)}$	72.9 dB	2022-08-30 14:34:07	--- dB		--- dB	
$L_{S(min)}$	50.0 dB	2022-08-30 14:34:41	--- dB		--- dB	
$L_{Peak(max)}$	93.6 dB	2022-08-30 14:24:58	--- dB		--- dB	

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

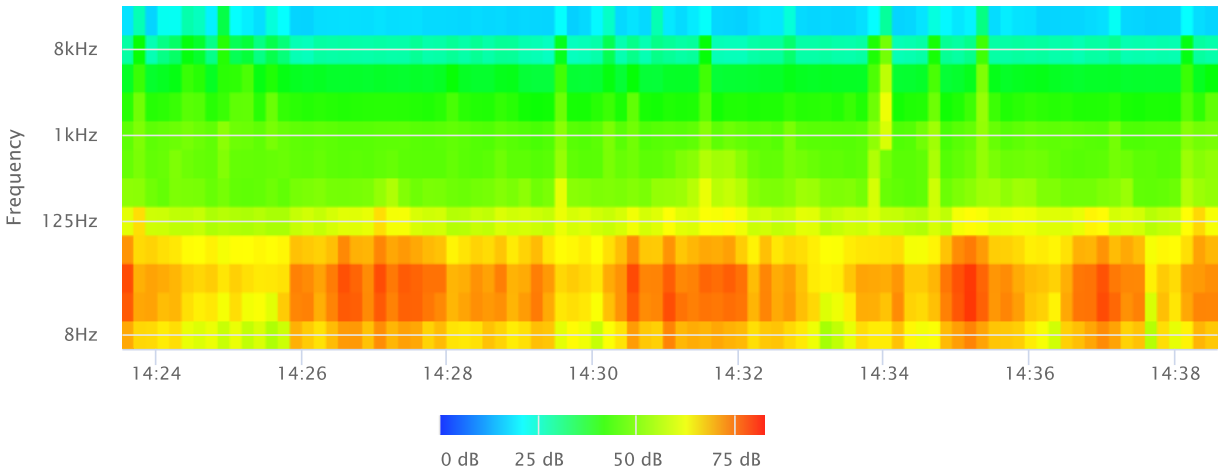
Statistics

LAS 2.0	59.9 dB
LAS 8.0	55.7 dB
LAS 25.0	53.5 dB
LAS 50.0	52.5 dB
LAS 66.6	52.0 dB
LAS 90.0	51.3 dB

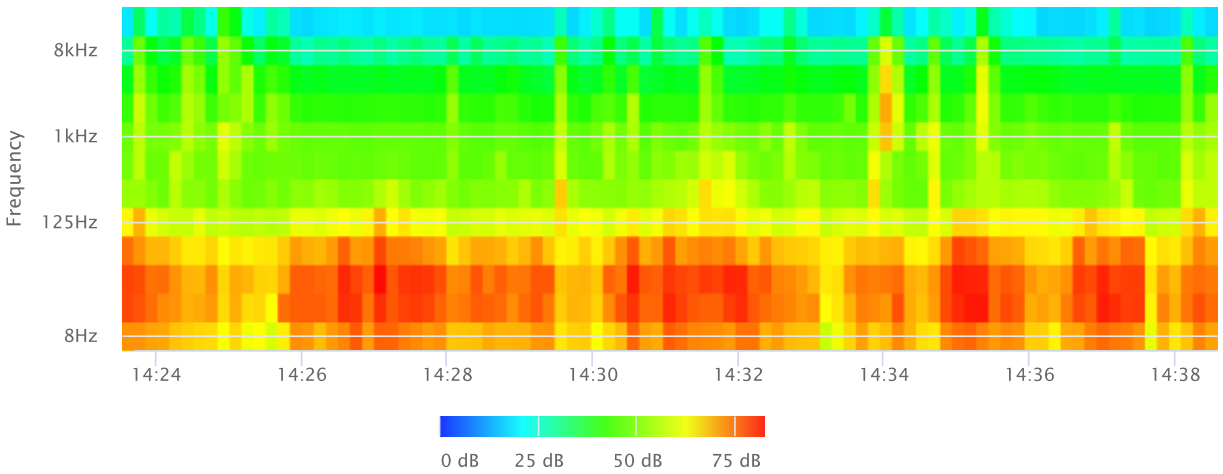
Time History



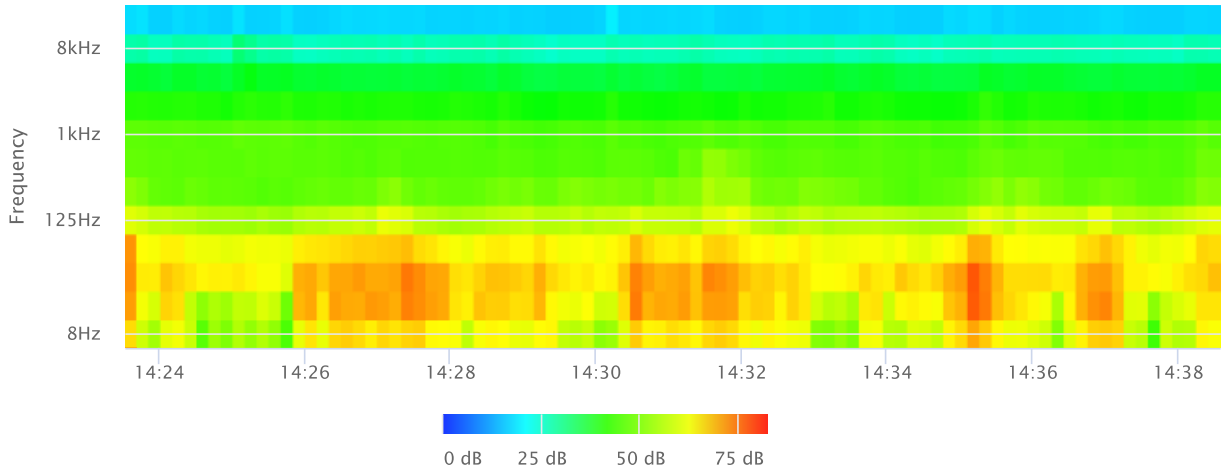
OBA 1/1 Leq



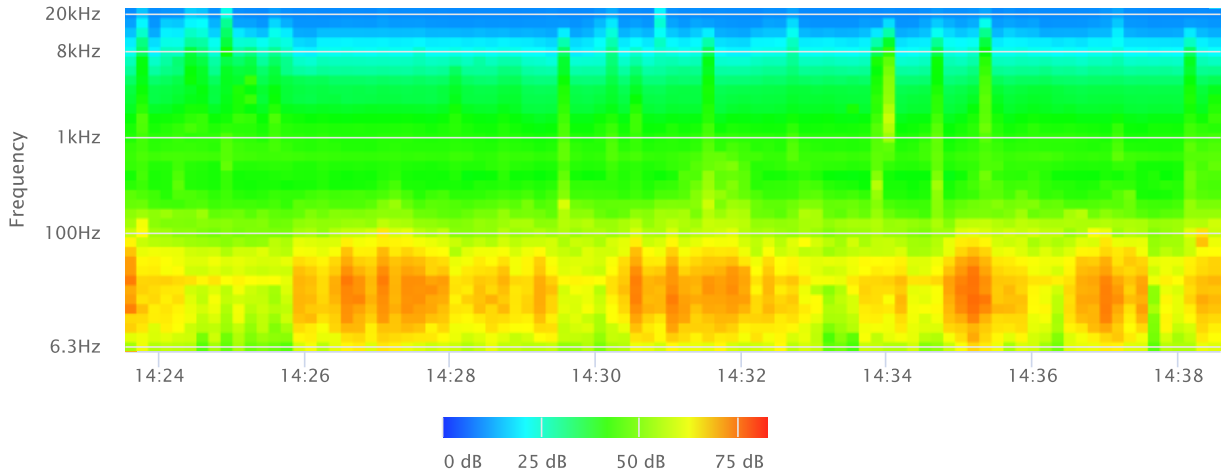
OBA 1/1 Lmax



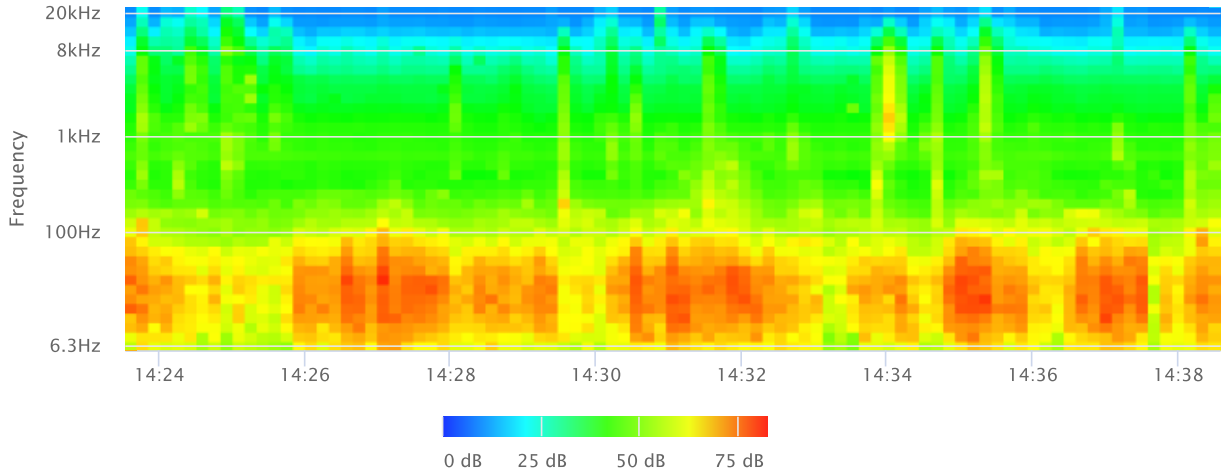
OBA 1/1 Lmin



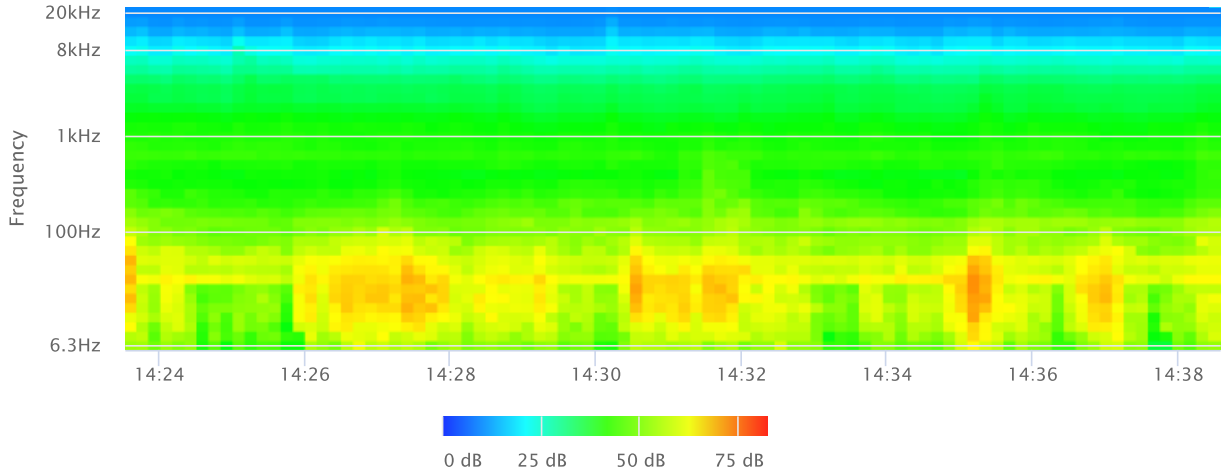
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
14:24
14:26
14:28
14:30
14:32
14:34
14:36
14:38
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Lilac Avenue Truck Repair Facility, County of San Bernardino **Date:** Augusst 30-31, 2022

Project #: 19495

Noise Measurement #: LTNM1 Run Time: 24 hours (24 x 1 hours) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 19565 Jurupa Avenue, Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Project Site: Office/shop uses at 11317 Lilac Ave in NW corner site w/ rest of site used for the storage of trucks/trailors. Site bounded by edison access road/single-family residence to east, Jurupa Ave to north, Lilac Ave to west, and vacant land to south. Noise Measurement Site: Along eastern project boundary w/ project site to west and edison access road and single-family residential use to east.

Weather: Almost clear skies <5% cloud. Sunset/rise: 7:18PM/6:22AM **Settings:** SLOW FAST

Temperature: 74-104 deg F **Wind:** 1-12 mph **Humidity:** 23-40% **Terrain:** Flat

Start Time: 4:00 PM **End Time:** 4:00 PM **Run Time:**

Leq: 55.7 dB **Primary Noise Source:** Traffic ambiance from vehicles traveling along Jurupa Avenue, Lilac Avenue &

Lmax 95.3 dB other surrounding roads. Truck repair yard ambiance.

L2 64.7 dB **Secondary Noise Sources:** Leaf rustle from breeze. Occasional overhead air traffic. Some residential

L8 58.4 dB ambiance. Some bird song.

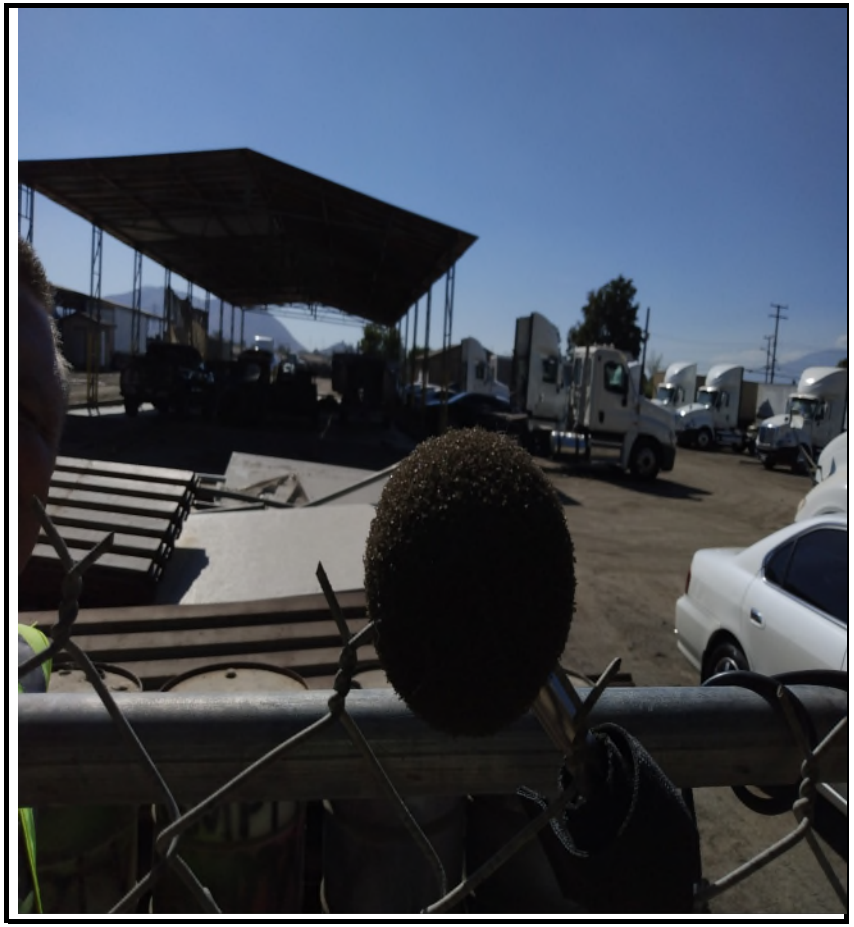
L25 53.4 dB

L50 50.3 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:	8/30/2022		

Noise Measurement
Field Data

PHOTOS:



LTNM1 looking W towards Lilac Ave Truck Repair Facility site.

LTNM1 at eastern site boundary looking to N along Edison access road towards Jurupa Avenue. Residence 19565 Jurupa Avenue, Bloomington to NE.

Summary	
File Name on Meter	LxT_Data.058.s
File Name on PC	LxT_0003099-20220830 160000-LxT_Data.058.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	LTNM1 34° 2'52.00"N 117°22'40.02"W
Job Description	24 hour noise measurement (24 x 1 hourss)
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, County of San

Measurement	
Start	2022-08-30 16:00:00
Stop	2022-08-31 16:00:00
Duration	24:00:00.0
Run Time	24:00:00.0
Pause	00:00:00.0
Pre-Calibration	2022-08-30 15:11:27
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	A Weighting
OBA Max Spectrum	Bin Max
Overload	123.3 dB

Results			
LAeq	55.7		
LAE	105.1		
EA	3.581931	mPa²h	
EA8	1.193977	mPa²h	
EA40	5.969885	mPa²h	
LApeak (max)	2022-08-30 20:44:58	116.5	dB
LASmax	2022-08-30 20:44:58	95.3	dB
LASmin	2022-08-31 10:18:21	39.6	dB

			Statistics		
LCeq	66.5	dB	**LA2.00**	64.7	dB
LAeq	55.7	dB	**LA8.00**	58.4	dB
LCeq - LAeq	10.8	dB	**LA25.00**	53.4	dB
LAIeq	61.0	dB	**LA50.00**	50.3	dB
LAeq	55.7	dB	**LA90.00**	45.2	dB
LAIeq - LAeq	5.3	dB	**LA99.00**	42.7	dB
Overload Count	0				

Record #	Date	Time	Run Duration	Run Time	Pause	LAeq	LASmin	LASmin Time	LASmax	LASmax Time	LAS2.00	LAS8.00	LAS25.00	LAS50.00	LAS90.00	LAS99.00
1	2022-08-30	16:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.6	45.9	16:57:20	67.9	16:48:41	60.3	57.6	55.3	53.4	49.7	46.8
2	2022-08-30	17:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.2	44.4	17:58:26	69.6	17:50:43	62.0	57.2	54.0	51.6	47.9	45.7
3	2022-08-30	18:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.8	43.3	18:23:50	71.1	18:06:39	63.3	60.9	53.6	49.9	46.1	44.3
4	2022-08-30	19:00:00	01:00:00.0	01:00:00.0	00:00:00.0	57.9	42.8	19:19:16	82.6	19:39:51	64.2	61.5	55.9	51.2	45.3	43.7
5	2022-08-30	20:00:00	01:00:00.0	01:00:00.0	00:00:00.0	61.6	41.7	20:41:29	95.3	20:44:58	66.0	56.7	50.4	46.9	44.0	42.6
6	2022-08-30	21:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.6	41.7	21:26:19	69.8	21:57:34	63.1	56.8	51.5	47.6	43.3	42.4
7	2022-08-30	22:00:00	01:00:00.0	01:00:00.0	00:00:00.0	50.2	41.2	22:38:26	66.6	22:10:11	60.1	53.5	47.8	45.1	43.0	42.0
8	2022-08-30	23:00:00	01:00:00.0	01:00:00.0	00:00:00.0	50.5	42.2	23:23:31	67.4	23:39:11	58.4	53.0	49.9	47.6	44.1	42.9
9	2022-08-31	00:00:00	01:00:00.0	01:00:00.0	00:00:00.0	50.4	42.0	00:46:38	70.6	00:20:44	56.5	53.0	50.5	48.6	44.9	42.8
10	2022-08-31	01:00:00	01:00:00.0	01:00:00.0	00:00:00.0	49.5	42.5	01:02:06	62.9	01:35:06	54.8	51.6	49.6	48.4	45.2	43.5
11	2022-08-31	02:00:00	01:00:00.0	01:00:00.0	00:00:00.0	49.7	44.4	02:46:11	62.6	02:28:00	54.7	51.6	49.7	48.6	46.7	45.4
12	2022-08-31	03:00:00	01:00:00.0	01:00:00.0	00:00:00.0	51.9	45.2	03:19:56	65.9	03:57:55	59.7	53.8	51.2	49.9	47.6	46.2
13	2022-08-31	04:00:00	01:00:00.0	01:00:00.0	00:00:00.0	52.5	47.1	04:45:39	67.2	04:47:54	60.0	54.5	51.8	50.5	48.8	47.8
14	2022-08-31	05:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.1	47.1	05:00:59	74.1	05:45:23	59.9	55.4	52.8	51.2	49.2	48.0
15	2022-08-31	06:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.1	47.7	06:01:24	68.8	06:24:09	62.3	60.5	53.8	52.0	49.6	48.3
16	2022-08-31	07:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.0	42.7	07:49:02	77.8	07:50:48	61.6	57.3	54.6	52.5	48.7	45.2
17	2022-08-31	08:00:00	01:00:00.0	01:00:00.0	00:00:00.0	61.2	43.1	08:25:38	71.5	08:54:08	68.1	67.7	60.1	51.5	47.2	44.3
18	2022-08-31	09:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.8	40.4	09:53:39	79.4	09:12:23	64.1	59.0	55.3	51.0	44.6	41.4
19	2022-08-31	10:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.3	39.6	10:18:21	75.0	10:21:17	61.8	58.9	54.3	51.1	44.1	41.2
20	2022-08-31	11:00:00	01:00:00.0	01:00:00.0	00:00:00.0	50.1	40.1	11:09:12	67.5	11:14:31	57.2	53.1	49.7	47.4	43.4	41.2
21	2022-08-31	12:00:00	01:00:00.0	01:00:00.0	00:00:00.0	56.4	42.4	12:59:58	70.2	12:34:45	60.6	59.3	58.0	55.9	48.4	44.5
22	2022-08-31	13:00:00	01:00:00.0	01:00:00.0	00:00:00.0	52.4	41.5	13:07:35	70.2	13:49:57	60.5	55.1	51.1	48.7	45.1	43.0
23	2022-08-31	14:00:00	01:00:00.0	01:00:00.0	00:00:00.0	58.7	43.8	14:04:24	82.9	14:35:26	68.3	63.3	55.3	52.1	47.6	45.1
24	2022-08-31	15:00:00	01:00:00.0	01:00:00.0	00:00:00.0	58.6	45.1	15:05:15	71.7	15:23:48	68.2	61.4	58.0	55.1	50.7	47.3

Measurement Report

Report Summary

Meter's File Name	LxT_Data.058.s	Computer's File Name	LxT_0003099-20220830 160000-LxT_Data.058.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	LTNM1 34° 2'52.00"N 117°22'40.02"W
Job Description	24 hour noise measurement (24 x 1 hours)		
Note	Ganddini Project 19495 Lilac Avenue Truck Repair, City of Bloomington.		
Start Time	2022-08-30 16:00:00	Duration	24:00:00.0
End Time	2022-08-31 16:00:00	Run Time	24:00:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	55.7 dB		
LAE	105.1 dB	SEA	--- dB
EA	3.6 mPa²h	LAFTM5	62.5 dB
EA8	1.2 mPa²h		
EA40	6.0 mPa²h		
LA_{peak}	116.5 dB	2022-08-30 20:44:58	
LAS_{max}	95.3 dB	2022-08-30 20:44:58	
LAS_{min}	39.6 dB	2022-08-31 10:18:21	
LA_{eq}	55.7 dB		
LC_{eq}	66.5 dB	LC_{eq} - LA_{eq}	10.8 dB
LAI_{eq}	61.0 dB	LAI_{eq} - LA_{eq}	5.3 dB

Exceedances	Count	Duration
LAS > 65.0 dB	169	0:32:07.1
LAS > 85.0 dB	1	0:00:03.4
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 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

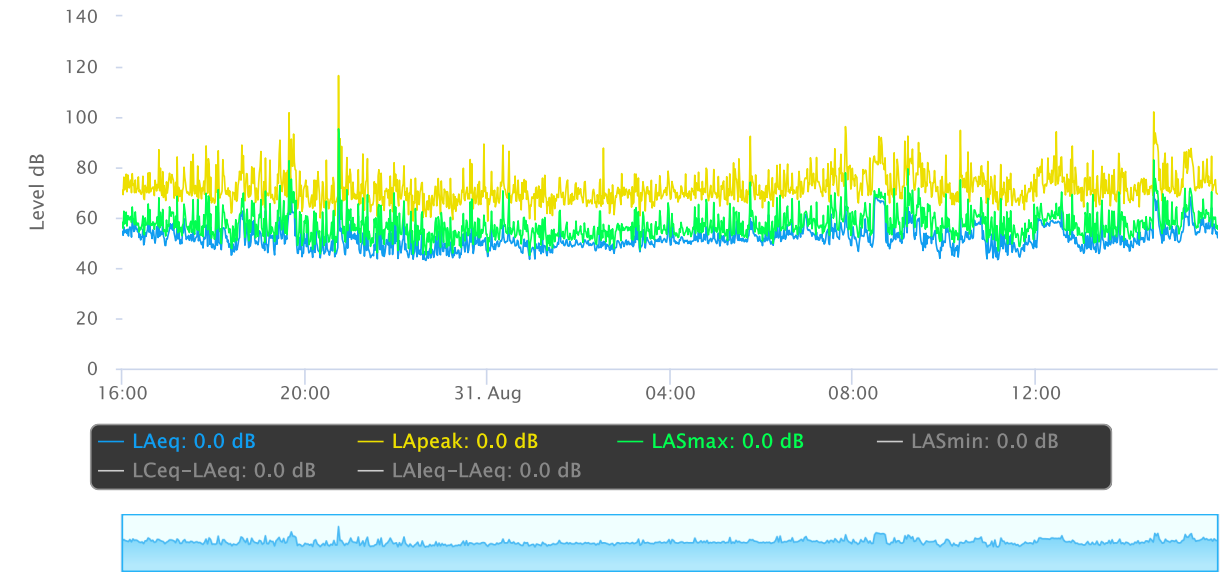
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	55.7 dB		66.5 dB		--- dB	
$L_{S(max)}$	95.3 dB	2022-08-30 20:44:58	--- dB		--- dB	
$L_{S(min)}$	39.6 dB	2022-08-31 10:18:21	--- dB		--- dB	
$L_{Peak(max)}$	116.5 dB	2022-08-30 20:44:58	--- dB		--- dB	

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

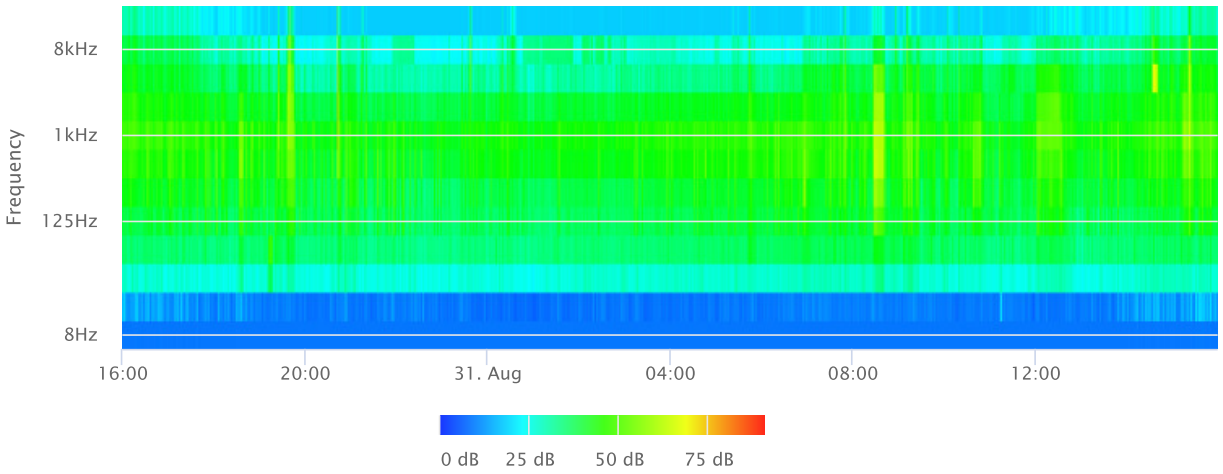
Statistics

LAS 2.0	64.7 dB
LAS 8.0	58.4 dB
LAS 25.0	53.4 dB
LAS 50.0	50.3 dB
LAS 90.0	45.2 dB
LAS 99.0	42.7 dB

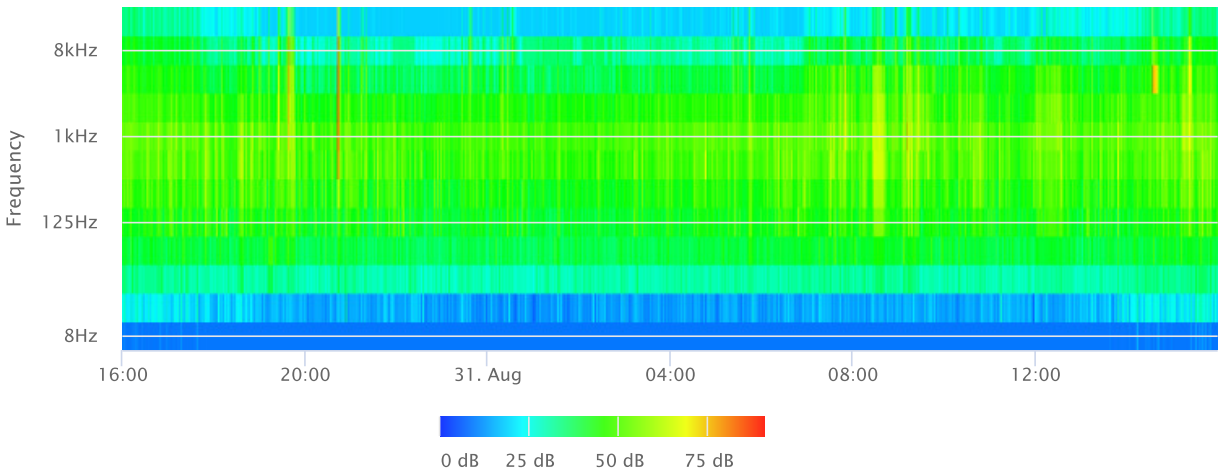
Time History



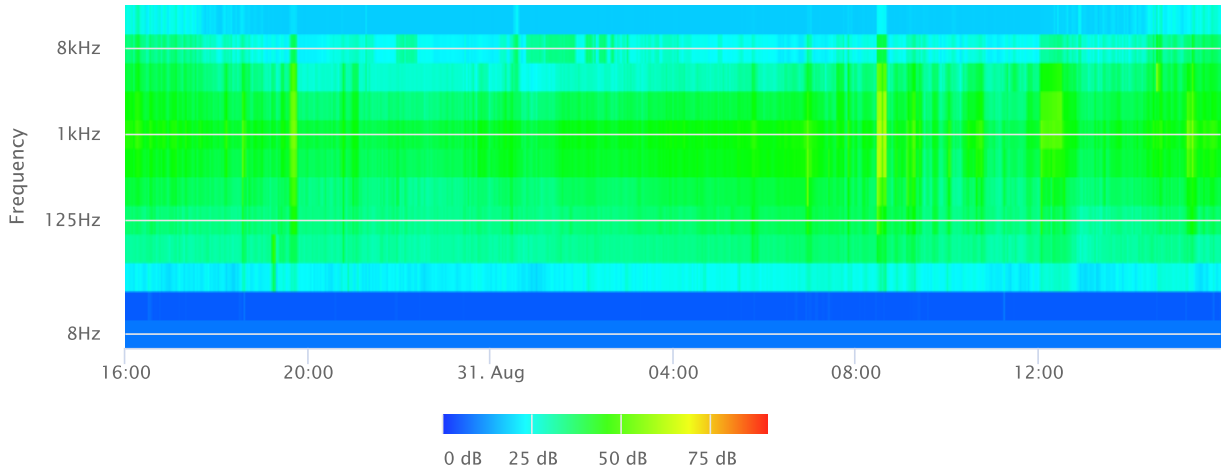
OBA 1/1 Leq



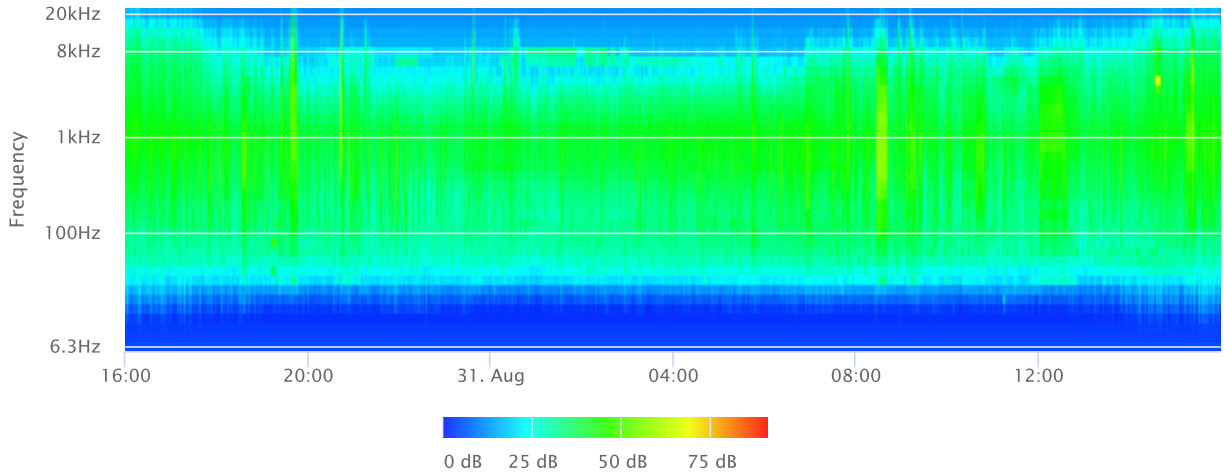
OBA 1/1 Lmax



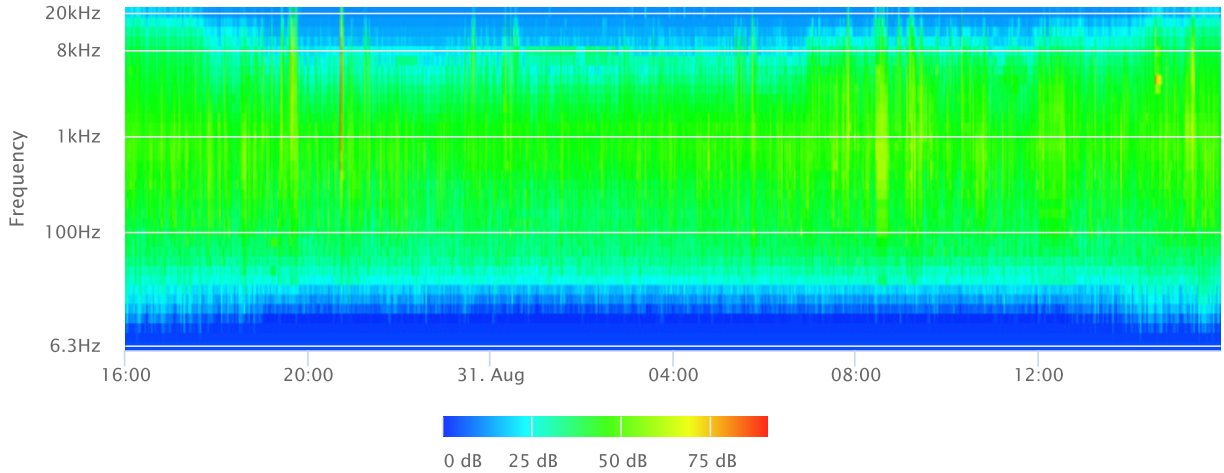
OBA 1/1 Lmin



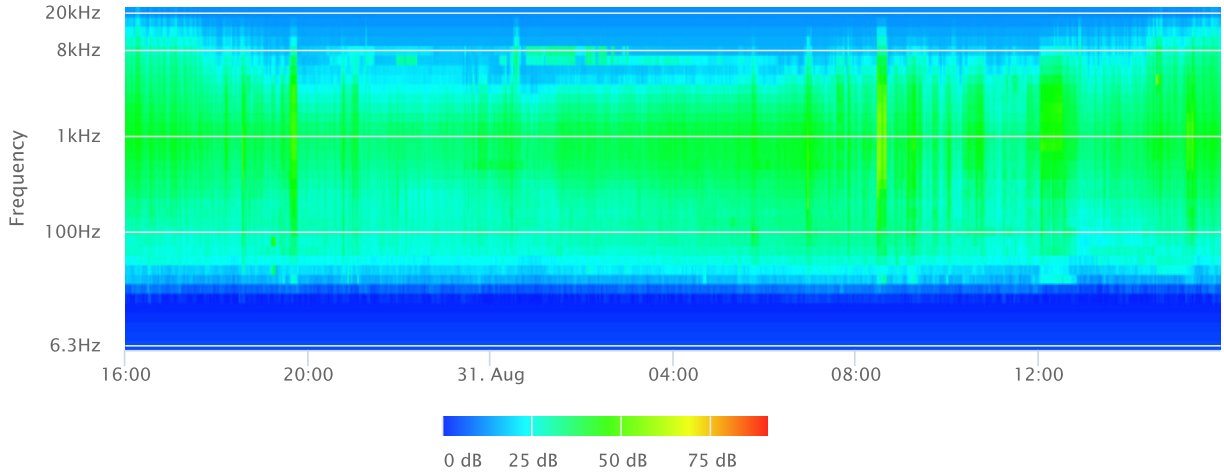
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
16:00
20:00
31. Aug
04:00
08:00
12:00
0 dB
25 dB
50 dB
75 dB

APPENDIX D

CONSTRUCTION NOISE MODELING

Receptor - Single-Family Residential Use to East (19565 Jurupa Avenue, Bloomington)

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
Demolition									
Concrete/Industrial Saws	1	90	168	20	0.20	-10.5	-7.0	79.5	72.5
Rubber Tired Dozers	1	82	168	40	0.40	-10.5	-4.0	71.5	67.5
Tractors/Loaders/Backhoes	3	84	168	40	1.20	-10.5	0.8	73.5	74.3
								Log Sum	77.0
Site Preparation									
Graders	1	85	168	40	0.40	-10.5	-4.0	74.5	70.5
Scrapers	1	84	168	40	0.40	-10.5	-4.0	73.5	69.5
Tractors/Loaders/Backhoes	1	84	168	40	0.40	-10.5	-4.0	73.5	69.5
								Log Sum	74.6
Grading									
Rubber Tired Dozers	1	82	168	40	0.40	-10.5	-4.0	71.5	67.5
Tractors/Loaders/Backhoes	2	84	168	40	0.80	-10.5	-1.0	73.5	72.5
Graders	1	85	168	40	0.40	-10.5	-4.0	74.5	70.5
								Log Sum	75.4
Building Construction									
Cranes	1	81	168	16	0.16	-10.5	-8.0	70.5	62.5
Forklifts[2]	2	48	168	40	0.80	-10.5	-1.0	37.5	36.5
Generator Sets	1	81	168	50	0.50	-10.5	-3.0	70.5	67.5
Welders	3	74	168	40	1.20	-10.5	0.8	63.5	64.3
Tractors/Loaders/Backhoes	1	84	168	40	0.40	-10.5	-4.0	73.5	69.5
								Log Sum	72.8
Paving									
Pavers	1	77	168	50	0.50	-10.5	-3.0	66.5	63.5
Paving Equipment	1	77	168	50	0.50	-10.5	-3.0	66.5	63.5
Rollers	2	80	168	20	0.40	-10.5	-4.0	69.5	65.5
Tractors/Loaders/Backhoes	1	84	168	40	0.40	-10.5	-4.0	73.5	69.5
								Log Sum	72.3
Architectural Coating									
Air Compressors	1	78	168	40	0.40	-10.5	-4.0	67.5	63.5
								Log Sum	63.5

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 Construciton Noise Model User's Guide (January 2006)

(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).

Receptor - Single-Family Residential Uses to North (19530 Jurupa Avenue, Bloomington)

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
Demolition									
Concrete/Industrial Saws	1	90	235	20	0.20	-13.4	-7.0	76.6	69.6
Rubber Tired Dozers	1	82	235	40	0.40	-13.4	-4.0	68.6	64.6
Tractors/Loaders/Backhoes	3	84	235	40	1.20	-13.4	0.8	70.6	71.3
								Log Sum	74.1
Site Preparation									
Graders	1	85	235	40	0.40	-13.4	-4.0	71.6	67.6
Scrapers	1	84	235	40	0.40	-13.4	-4.0	70.6	66.6
Tractors/Loaders/Backhoes	1	84	235	40	0.40	-13.4	-4.0	70.6	66.6
								Log Sum	71.7
Grading									
Rubber Tired Dozers	1	82	235	40	0.40	-13.4	-4.0	68.6	64.6
Tractors/Loaders/Backhoes	2	84	235	40	0.80	-13.4	-1.0	70.6	69.6
Graders	1	85	235	40	0.40	-13.4	-4.0	71.6	67.6
								Log Sum	72.5
Building Construction									
Cranes	1	81	235	16	0.16	-13.4	-8.0	67.6	59.6
Forklifts[2]	2	48	235	40	0.80	-13.4	-1.0	34.6	33.6
Generator Sets	1	81	235	50	0.50	-13.4	-3.0	67.6	64.5
Welders	3	74	235	40	1.20	-13.4	0.8	60.6	61.3
Tractors/Loaders/Backhoes	1	84	235	40	0.40	-13.4	-4.0	70.6	66.6
								Log Sum	69.9
Paving									
Pavers	1	77	235	50	0.50	-13.4	-3.0	63.6	60.5
Paving Equipment	1	77	235	50	0.50	-13.4	-3.0	63.6	60.5
Rollers	2	80	235	20	0.40	-13.4	-4.0	66.6	62.6
Tractors/Loaders/Backhoes	1	84	235	40	0.40	-13.4	-4.0	70.6	66.6
								Log Sum	69.4
Architectural Coating									
Air Compressors	1	78	235	40	0.40	-13.4	-4.0	64.6	60.6
								Log Sum	60.6

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 Construciton Noise Model User's Guide (January 2006)

(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).

Receptor - Single-Family Residential Uses to Northwest (19488 Jurupa Avenue, Bloomington)

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
Demolition									
Concrete/Industrial Saws	1	90	334	20	0.20	-16.5	-7.0	73.5	66.5
Rubber Tired Dozers	1	82	334	40	0.40	-16.5	-4.0	65.5	61.5
Tractors/Loaders/Backhoes	3	84	334	40	1.20	-16.5	0.8	67.5	68.3
								Log Sum	71.0
Site Preparation									
Graders	1	85	334	40	0.40	-16.5	-4.0	68.5	64.5
Scrapers	1	84	334	40	0.40	-16.5	-4.0	67.5	63.5
Tractors/Loaders/Backhoes	1	84	334	40	0.40	-16.5	-4.0	67.5	63.5
								Log Sum	68.7
Grading									
Rubber Tired Dozers	1	82	334	40	0.40	-16.5	-4.0	65.5	61.5
Tractors/Loaders/Backhoes	2	84	334	40	0.80	-16.5	-1.0	67.5	66.5
Graders	1	85	334	40	0.40	-16.5	-4.0	68.5	64.5
								Log Sum	69.4
Building Construction									
Cranes	1	81	334	16	0.16	-16.5	-8.0	64.5	56.5
Forklifts[2]	2	48	334	40	0.80	-16.5	-1.0	31.5	30.5
Generator Sets	1	81	334	50	0.50	-16.5	-3.0	64.5	61.5
Welders	3	74	334	40	1.20	-16.5	0.8	57.5	58.3
Tractors/Loaders/Backhoes	1	84	334	40	0.40	-16.5	-4.0	67.5	63.5
								Log Sum	66.8
Paving									
Pavers	1	77	334	50	0.50	-16.5	-3.0	60.5	57.5
Paving Equipment	1	77	334	50	0.50	-16.5	-3.0	60.5	57.5
Rollers	2	80	334	20	0.40	-16.5	-4.0	63.5	59.5
Tractors/Loaders/Backhoes	1	84	334	40	0.40	-16.5	-4.0	67.5	63.5
								Log Sum	66.3
Architectural Coating									
Air Compressors	1	78	334	40	0.40	-16.5	-4.0	61.5	57.5
								Log Sum	57.5

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 Construciton Noise Model User's Guide (January 2006)

(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).

APPENDIX E

FHWA WORKSHEETS

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **19495 Lilac Truck Facility**

Road: **Jurupa Avenue**

Segment: **In vicinity of project site**

	DAYTIME			EVENING			NIGHTTIME			ADT	4709.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	52.00
INPUT PARAMETERS											
Vehicles per hour	272.73	5.65	9.42	202.49	0.94	1.57	50.23	7.85	13.08	% A	92
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	% MT	3
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	5
ADJUSTMENTS											
Flow	18.03	1.19	3.41	16.74	-6.59	-4.37	10.68	2.62	4.84		
Distance	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
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	CNEL	68.73
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.14
LEQ	60.15	52.27	59.33	58.86	44.49	51.55	52.80	53.69	60.76	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.14		EVENING LEQ	59.73		NIGHT LEQ	62.08		Use hour?	no
										GRADE dB	0.00
		CNEL	**68.73**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **19495 Lilac Truck Facility**

Road: **Jurupa Avenue**

Segment: **In vicinity of project site**

	DAYTIME			EVENING			NIGHTTIME			ADT	5017.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	52.00
INPUT PARAMETERS											
Vehicles per hour	276.45	15.61	9.42	205.25	2.60	1.57	50.91	21.67	13.08	% A	87.53
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	% MT	7.78
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.69
ADJUSTMENTS											
Flow	18.09	5.61	3.41	16.80	-2.18	-4.37	10.74	7.03	4.84		
Distance	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
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	CNEL	69.64
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.75
LEQ	60.21	56.68	59.33	58.92	48.90	51.55	52.86	58.11	60.76	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.75		EVENING LEQ	60.00		NIGHT LEQ	63.08		Use hour?	no
										GRADE dB	0.00
		CNEL	**69.64**								

APPENDIX F

SOUNDPLAN WORKSHEETS

Noise emissions of industry sources

Source name	Referer	Level		Frequency spectrum [dB(A)]																												Correctio		
				31 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.3 kHz	1.6 kHz	2 kHz	2.5 kHz	3.2 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	12.5 kHz	16 kHz	Cwa dB	CI dB	CT dB
Compressed A	Lw/unit	Day	116.	-	-	-	-	-	-	-	-	-	-	-	-	116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Nig	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HVAC1	Lw/unit	Day	78.7	-	-	-	-	-	-	-	-	-	-	-	-	78.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Nig	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HVAC2	Lw/unit	Day	78.7	42.	47.	42.	46.	50.	56.	59.	62.	62.	64.	66.	56.	58.5	59.	68.	69.	70.	71.	71.	71.	70.	70.	70.	73.	72.	71.	74.	72.	-	-	-
		Nig	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Noise emissions of parking lot traffic

Name	Parking lot type	Size	Movements per hour		Road surface	Separated method	Lw,ref
			Day	Night			dB(A)
Parking	Visitors and staff	20 Parking bays	1.300	0.000	Asphaltic driving lanes	no	78.6
Parking2	Visitors and staff	7 Parking bays	1.300	0.000	Asphaltic driving lanes	no	71.5
Parking3	Motorway station (resting trucks)	15 Parking bays	1.500	1.200	Asphaltic driving lanes	no	90.7
Parking4	Motorway station (resting cars)	7 Parking bays	3.500	1.400	Asphaltic driving lanes	no	71.5
Parking5	Motorway station (resting trucks)	28 Parking bays	1.500	1.200	Asphaltic driving lanes	no	94.7

Receiver list

No.	Receiver name	Building side	Floor	Limit		Level		Conflict	
				Day	Night	Day	Night	Day	Night
				dB(A)		dB(A)		dB	
1	1	-	EG	-	-	52.4	43.5	-	-
2	2	-	EG	-	-	64.7	45.0	-	-
3	3	-	EG	-	-	62.9	45.6	-	-
4	4	-	EG	-	-	67.2	53.1	-	-

Noise emissions of industry sources

Source name	Reference	Level		Frequency spectrum [dB(A)] 500 Hz	Corrections Cwall dB	CI dB	CT dB
			dB(A)				
Compressed Air Drill4	Lw/unit	Day	116.6	116.6	-	-	-

Receiver list

No.	Receiver name	Building side	Floor	Limit Day dB(A)	Level Day dB(A)	Conflict Day dB
1	1	-	EG	-	60.5	-
2	2	-	EG	-	63.6	-
3	3	-	EG	-	60.3	-
4	4	-	EG	-	72.2	-

APPENDIX G

VIBRATION WORKSHEETS

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19495 Lilac Avenue Industrial		Date: 9/26/22
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 =	34.00	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 =	0.132	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19495 Lilac Avenue Industrial		Date: 9/26/22
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 =	34.00	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 =	0.056	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19495 Lilac Avenue Industrial		Date: 9/26/22
Source:	Vibratory Roller		
Scenario:	Annoyance Threshold		
Location:			
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 =	41.00	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 =	0.100	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19495 Lilac Avenue Industrial	Date:	9/26/22
Source:	Large Bulldozer		
Scenario:	Annoyance Threshold		
Location:			
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 =	24.00	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 =	0.095	IN/SEC	OUTPUT IN BLUE

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