NOISE AND VIBRATION IMPACT ANALYSIS

PALMDALE LOGISTICS INDUSTRIAL WAREHOUSE PROJECT

PALMDALE, CALIFORNIA

LSA

April 2024

NOISE AND VIBRATION IMPACT ANALYSIS

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PALMDALE, CALIFORNIA

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LIST OF ABBREVIATIONS AND ACRONYMS

AICUZ	Air Installations Compatible Use Zones
APZ	Accident Potential Zone
CalEEMod	California Emission Estimator Model
CALGreen Code	California Green Building Standards Code
CEQA	California Environmental Quality Act
City	City of Palmdale
CNEL	Community Noise Equivalent Level
County	County of Los Angeles
dB	decibel(s)
dBA	A-weighted decibel(s)
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
ft	foot/feet
FTA	Federal Transit Administration
FTA Manual	Federal Transit Administration's *Transit Noise and Vibration Impact Assessment Manual*
HVAC	heating, ventilation, and air conditioning
in/sec	inches per second
kW	kilowatt
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous sound level
Noise Element	City of Palmdale General Plan Noise Element
PMC	City of Palmdale Municipal Code
PPV	peak particle velocity

project	Palmdale Logistics Industrial Warehouse Project
RMS	root-mean-square
SPL	sound power level
sq ft	square foot/feet
VdB	vibration velocity decibels

INTRODUCTION

This noise and vibration impact analysis has been prepared to evaluate the potential noise and vibration impacts and reduction measures associated with the Palmdale Logistics Industrial Warehouse Project (project) in the City of Palmdale (City), California. This report is intended to satisfy the City's requirement for a project-specific noise impact analysis by examining the impacts of the project site and evaluating noise reduction measures that the project may require.

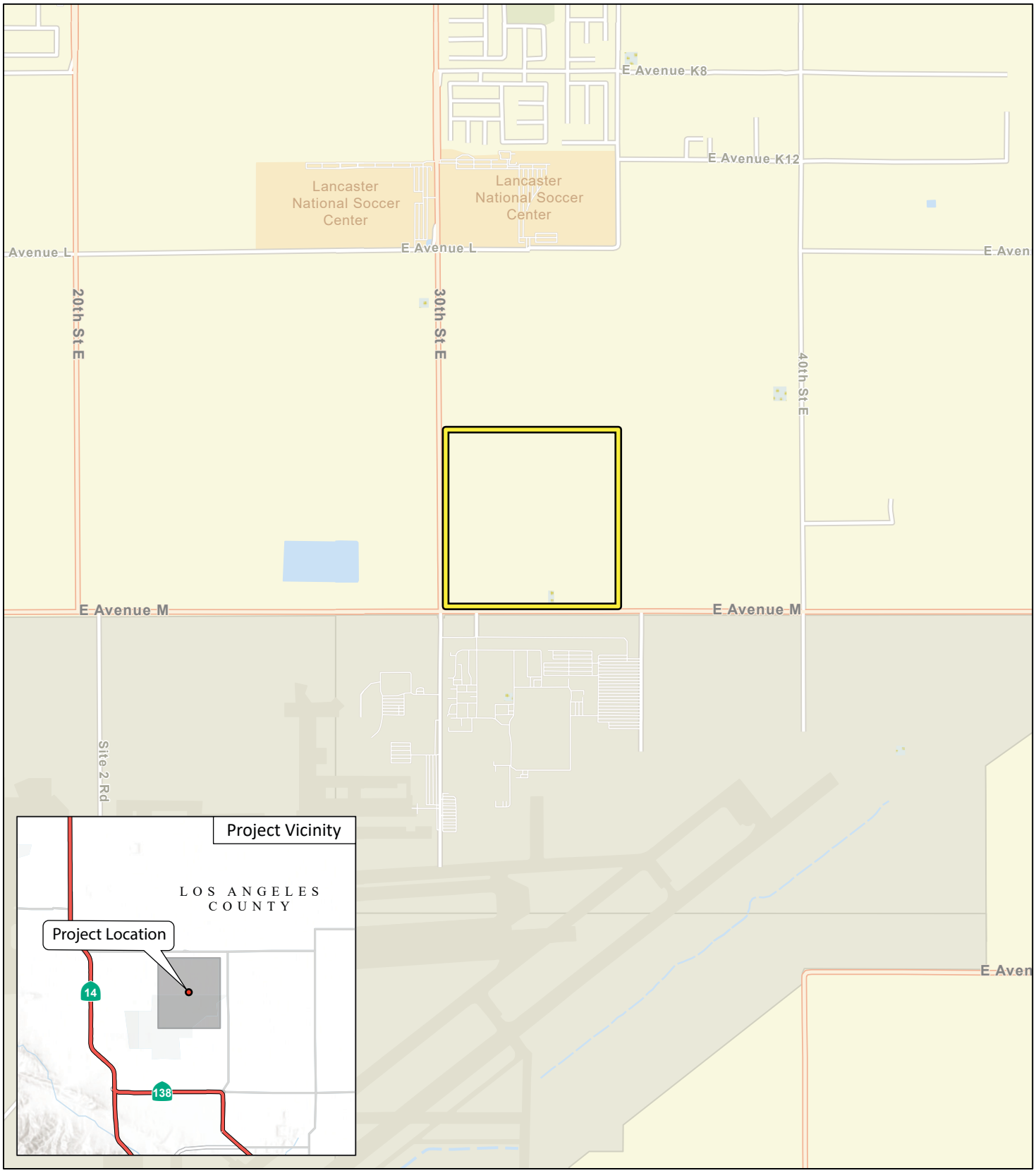
PROJECT LOCATION AND DESCRIPTION

The 150.7-acre project site is located at 3347 East Avenue M, in Palmdale, California. The project site is currently undeveloped. Regional access to the project site is provided by Interstate 5, as well as State Routes 14 and 138. Local access to the site is provided from 30th Street East, a designated major arterial, and the East Avenue M intersection. See Figure 1, Regional Project Location, and Figure 2, Site Plan, below.

The project proposes to construct two single-story warehouse buildings. Each building would provide approximately 1,480,856 square feet (sq ft) of warehouse space, 10,000 sq ft of mezzanine office space, and 10,000 sq ft of ground-floor office space, for a combined total building square footage of 3,001,712 sq ft. Each building would include 258 loading docks, for a total of 516 doors. The proposed project would also provide 990 trailer stalls situated along the southern property line. In addition, the proposed project would provide a total of 1,500 parking stalls, including standard parking stalls, accessible standard stalls, van parking stalls, electric vehicle capable parking stalls, and bike parking. Approximately 27.1 percent of the total project site or 880,912 sq ft would be dedicated to landscape area. The project would also construct a detention basin of approximately 11 acres for stormwater collection, on the last proposed parcel in the northern portion of the site. In addition, approximately 17.65 acres of offsite roadway improvements are proposed. The project would construct two new roadways, Avenue L-8 (north of property line) and 35th Street East (east of property line).

Typical operational characteristics include employees traveling to and from the site, delivery of products to the site, truck loading and unloading, and truck maintenance operations. The project is assumed to operate 24 hours per day, 7 days per week; however, this may shift depending on the tenant, as the hours of operation are unknown. The proposed project would generate approximately 5,209 average daily trips, including 3,776 passenger trips, 240 two-axle truck trips, 297 three-axle truck trips, and 896 four+-axle truck trips (EPD Solutions, Inc. 2023). The proposed project would also include two 1,500–2,000-kilowatt (kW) emergency diesel generators, which are estimated to run 24 hours per year. In addition, the proposed project would be designed to be all electric.

Construction of the proposed project would occur for approximately 11 months, ending in June 2025. Grading of the project site would be balanced, and no export/import of soil would be required. Construction activities for the project include grading and excavation, site preparation, building construction, landscape installation, paving, and architectural coatings. In addition, construction equipment would utilize Tier 4 final engines.



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Project Location

FIGURE 1

N

0 1000 2000
FEET

SOURCE: ESRI Street Map (2023)

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Palmdale Logistics Industrial Warehouse Project

Project Location

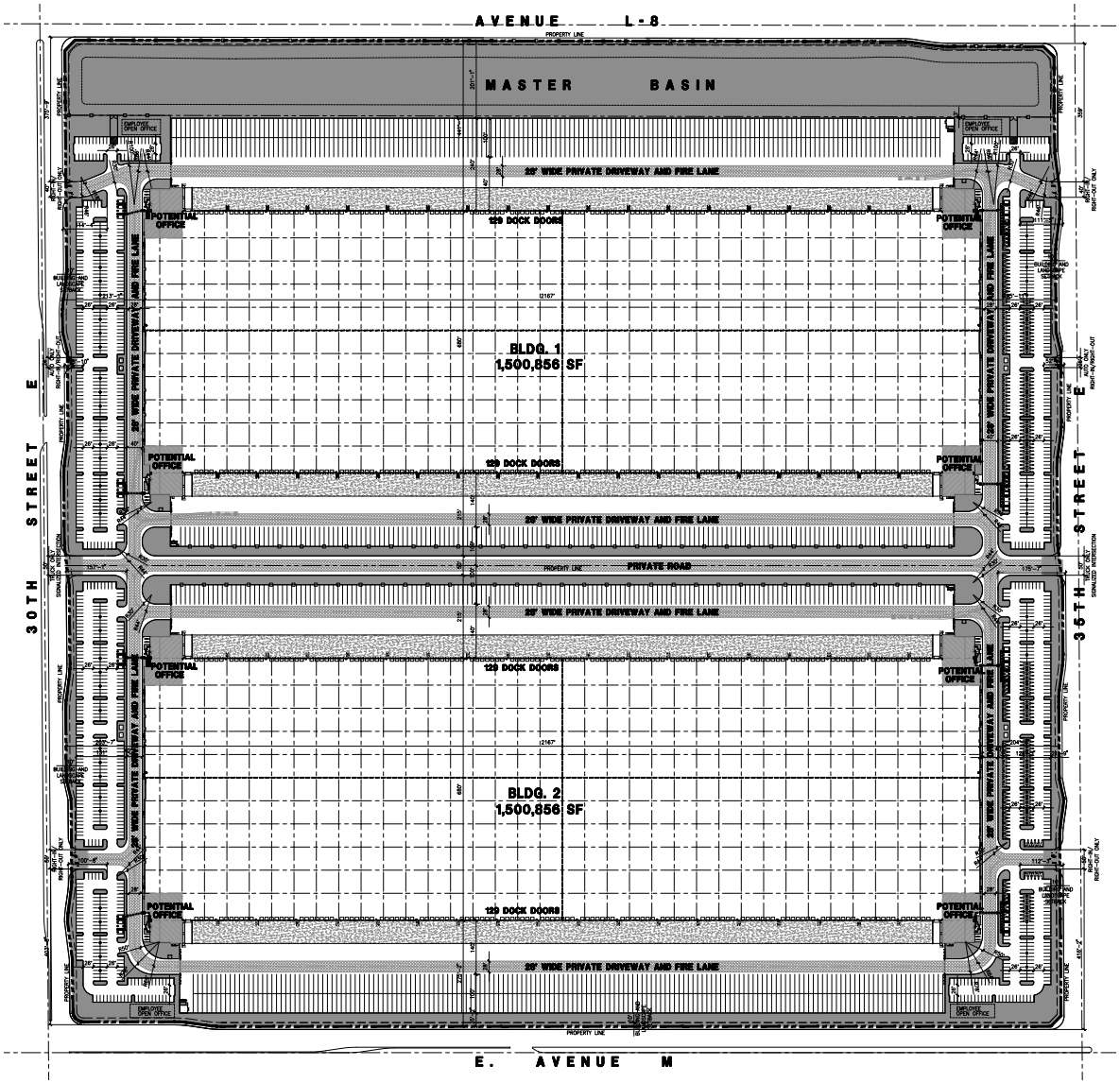

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FIGURE 2

N

0 250 500

FEET

SOURCE: HPA Architecture

Palmdale Logistics Industrial Warehouse Project

Site Plan

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The proposed Project would include construction of an offsite 24-inch water line that would extend approximately 13,400 linear feet west within the Avenue M right-of-way to 5th Street E and connect to the existing 30-inch water line in Avenue M. The proposed 24-inch watermain extension would then continue from 4th Street West to 4th Street East for an additional 4,000 linear feet. In total, the water line extension would be approximately 17,400 linear feet in length.

EXISTING LAND USES IN THE PROJECT AREA

The project site is surrounded primarily by vacant land and industrial uses. The areas adjacent to the project site include the following uses:

- **North:** Existing vacant and undeveloped land
- **East:** Existing vacant and undeveloped land
- **South:** Existing vacant land and airport logistics center
- **West:** Existing solar farm

There are no nearby sensitive receptors within a 1,000-foot (ft) radius of the project site. The nearest sensitive receptors are:

- **East:** Single-family residence approximately 3,900 ft from the project boundary line
- **North:** Single-family residences approximately 4,143 ft from the project boundary line

NOISE AND VIBRATION FUNDAMENTALS

CHARACTERISTICS OF SOUND

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

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

MEASUREMENT OF SOUND

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

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

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound levels dissipate exponentially with distance from their noise sources. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source sound levels decrease 4.5 dB for each doubling of distance in a relatively flat environment with absorptive vegetation.

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

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

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

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to sound levels higher than 85 dBA. Exposure to high sound levels affects the entire system, with prolonged sound exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of sound exposure above 90 dBA would result in permanent cell damage. When the sound level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of sound is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by a feeling of pain in the ear (i.e., the threshold of pain). A sound level of 160–165 dBA will result in dizziness or a

loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas.

Table A lists definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

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

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

Table B: Common Sound Levels and Their Noise Sources

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

Source: Compiled by LSA (2022).

FUNDAMENTALS OF VIBRATION

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may not be discernible, but without the effects associated with the shaking of a building there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items sitting on shelves or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile-driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with both ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 ft from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (FTA 2018). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed for most projects that the roadway surface will be smooth enough that ground-borne

vibration from street traffic will not exceed the impact criteria; however, construction of the project could result in ground-borne vibration that may be perceptible and annoying.

Ground-borne noise is not likely to be a problem because noise arriving via the normal airborne path will usually be greater than ground-borne noise.

Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for train-induced ground-borne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile-driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS is best for characterizing human response to building vibration, and PPV is used to characterize the potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

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

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

REGULATORY SETTING

APPLICABLE NOISE STANDARDS

The applicable noise standards governing the project site include the criteria in the State if California Green Building Standards Code, the City's Noise Element of the General Plan (Noise Element) and the City of Palmdale Municipal Code (PMC).

State of California Green Building Standards Code

The State of California's Green Building Standards Code (CALGreen Code) contains mandatory measures for nonresidential building construction in Section 5.507 on Environmental Comfort. These noise standards are applied to new construction in California for controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when nonresidential structures are developed in areas where the exterior noise levels exceed 65 dBA CNEL, such as within a noise contour of an airport, freeway, railroad, or other noise source. If the development falls within an airport or freeway 65 dBA CNEL noise contour, buildings shall be constructed to provide an interior noise level environment attributable to exterior sources that does not exceed an hourly equivalent level of 50 dBA L_{eq} in occupied areas during any hour of operation.

City of Palmdale

Noise Element of the General Plan

The Noise Element provides the City's goals and strategies related to noise, including the land use compatibility guidelines for community exterior noise environments. Figure 16.1 from the City's General Plan (Table C of this document) outlines the noise standards for land use compatibility. The City has identified the following goals and policies in the Noise Element that are applicable to the project:

- **Goal N-1:** Minimize resident exposure to excessive noise.

  Policies.

  - **N-1.1 Future Noise Levels:** Use the state-recommended noise level guidelines shown in Figure 16.1 (Table C of this document) to determine the compatibility of proposed land uses with the existing and future noise environment of each proposed development site.

  - **N-1.3 Acoustical Analysis for Stationary Noise Sources:** When proposed stationary noise sources could exceed an exterior noise level of 65 dBA CNEL at the property line or could impact future noise sensitive land uses, require preparation of an acoustical analysis and mitigation measures to reduce exterior noise levels to no more than 65 dBA CNEL at the property line.

  - **N-1.4 Noise Abatement Strategies: E**xplore the use of noise abatement strategies such as natural barriers, sound walls, and other buffers to mitigate excessive noise.

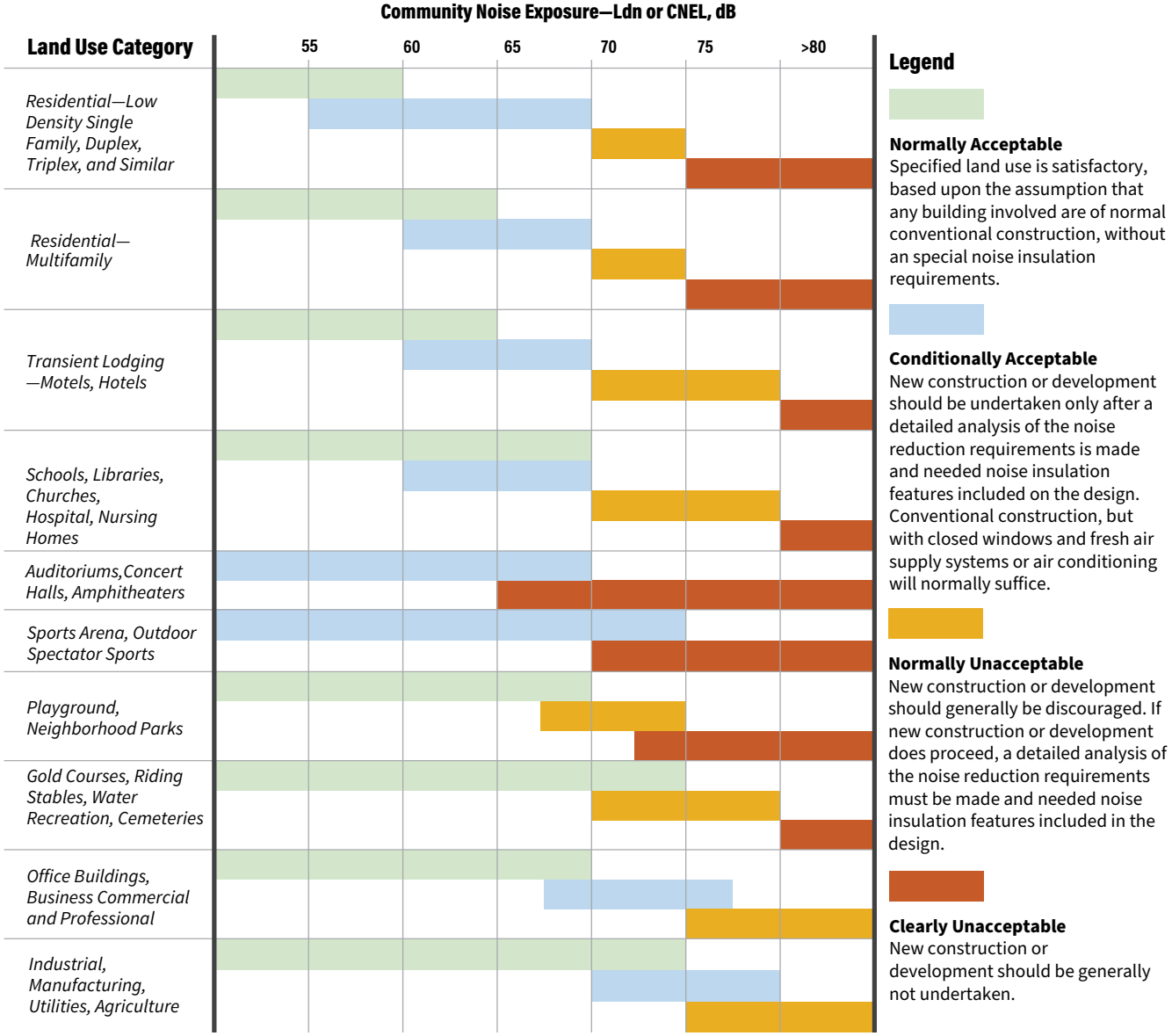
- **Goal N-2:** Maintain acceptable noise environments throughout the City.

  Policies.

  - **N-2.1 Extreme Noise Sources:** Avoid locating new extreme noise sources adjacent to noise sensitive land uses unless mitigation measures can mitigate noise impacts to the sensitive uses.

  - **N-2.2 Restrict Construction Activities**: Restrict construction activities in the vicinity of sensitive receptors during the evening, early morning, and weekends and holidays.

Table C: Noise Land Use Compatibility Standards



Source: City of Palmdale General Plan 2045.

- **N-2.3 Maintain Acceptable Noise Environments**: Utilize any or all the following measures to maintain acceptable noise environments throughout the city:
  - Control of noise at its source, including noise barriers and other muffling devices built into the noise source.
  - Provision of buffer areas and/or wide setbacks between the noise source and other development.
  - Reduction of densities, where practical, adjacent to the noise source (freeway, airport, railroad.
  - Use of sound insulation, blank walls, double paned windows and other design or architectural techniques to reduce interior noise levels.
  - Designation of appropriate land uses adjacent to known noise sources.

- **Goal N-3:** Promote noise compatible land uses within the 65 CNEL contour and the Frequent Overflight Area of Air Force Plant 42.

  Policies.

  - **N-3.1 Frequent Overflight Area:** Designate and permit land uses within the 65 CNEL contour and the Frequent Overflight Area which are primarily industrial, business park, commercial and recreational uses which are not noise sensitive; permit other uses only when it is found that no adverse noise impacts will result.
  - **N-3.2 Areas within 65 dBA CNEL:** Restrict noise sensitive land uses (such as residential uses, religious institutions, schools, assisted living facilities, or similar uses) within areas designated within both the 65 dBA CNEL contour and the Frequent Overflight Area, unless mitigation measures prevent adverse health impacts from high noise emissions.
  - **N-3.3 Areas Outside 65 dBA CNEL:** In areas outside of the 65 dBA CNEL contours but within the Frequent Overflight Area, encourage land uses that are not noise-sensitive, to the extent feasible.
  - **N-3.4 Require Disclosure Statement:** Through the development review process, require a disclosure statement indicating that the property is subject to frequent overflight and aircraft noise upon sale of property within the Accident Potential Zone (APZ) and Air Installations Compatible Use Zones (AICUZ).
  - **N-3.5 Aviation Easement**: Through conditions of approval, require that any owner of property within the 65 dBA CNEL noise contour or the low altitude overflight area of Plant 42 seeking a land use action from the City to provide an aviation easement to the Los Angeles Department of Airports, the U.S. Air Force, and the City of Palmdale.

City of Palmdale Municipal Code

The City of Palmdale Noise Ordinance included in the Municipal Code (Chapter 9.18) establishes restrictions on the permissible noise level that may intrude into a neighbor's property. Section 9.18.010, Noise, states that:

> "it shall be unlawful for any person to willfully make or continue, or cause or permit to be made or continued, any loud, unnecessary, or unusual noise which unreasonably disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area. The characteristics and conditions, which may be considered in determining whether such noise violates the provisions of this section, shall include, but not be limited to, the following:
>
> (1) The volume of the noise;
> (2) The intensity of the noise;
> (3) Whether the nature of the noise is usual or unusual;
> (4) Whether the origin of the noise is natural or unnatural;
> (5) The volume and intensity of the background noise, if any;
> (6) The proximity of the noise to sleeping facilities;
> (7) The nature and zoning of the area within which the noise emanates;
> (8) The density of the inhabitation of the area within which the noise emanates;
> (9) The time of the day or night the noise occurs;
> (10) The duration of the noise;
> (11) Whether the noise is recurrent, intermittent, or constant;
> (12) Whether the noise is produced by a commercial or noncommercial activity."

Section 9.18.020, Acts constituting disturbing, excessive, loud, offensive noise, states that "Any of the following shall constitute evidence of a prima facie violation of this subsection; provided, however, that inclusion herein shall not be construed as limiting the activities which may be found to violate this section:

> (2)(a) The operation of any such sound production or reproduction device, radio receiving set, musical instrument, drum, phonograph, television set, machine, loudspeaker and sound amplifier, or similar machine or device between the hours of 10:00 p.m. and 8:00 a.m. in such a manner as to be plainly audible at a distance of 50 ft from the building, structure, or vehicle in which it is located.

Chapter 8.28, Building Construction Hours of Operation and Noise Control, of the PMC contains provisions that restrict construction between the hours of 8:00 p.m. and 6:30 a.m. Construction is not allowed on Sundays in any residential zone or within 500 ft of any residence, hotel, motel, or recreational vehicle park. Construction occurring consistent with these provisions is exempt from regulation.

Federal Transit Administration

Though the City does not have daytime construction noise level limits for activities that occur within the specified hours of the PMC to determine potential California Environmental Quality Act (CEQA) noise impacts, construction noise was assessed using criteria from the Federal Transit Administration's (FTA) 2018 *Transit Noise and Vibration Impact Assessment Manual* (FTA Manual). Table D shows the FTA's Detailed Assessment Construction Noise Criteria based on the composite noise levels per construction phase.

Table D: Detailed Assessment Daytime Construction Noise Criteria

Land Use	Daytime 1-hour L_{eq} (dBA)
Residential	80
Commercial	85
Industrial	90

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

APPLICABLE VIBRATION STANDARDS

Federal Transit Administration

Vibration standards included in the FTA Manual are used in this analysis for ground-borne vibration impacts on human annoyance. The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table E provides the criteria for assessing the potential for interference or annoyance from vibration levels in a building.

Table E: Interpretation of Vibration Criteria for Detailed Analysis

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

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

Table F lists the potential vibration building damage criteria associated with construction activities, as suggested in the FTA Manual. FTA guidelines show that a vibration level of up to 0.5 in/sec in PPV is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For non-engineered timber and masonry buildings, the construction building vibration damage criterion is 0.2 in/sec in PPV.

Table F: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
Reinforced concrete, steel, or timber (no plaster)	0.50
Engineered concrete and masonry (no plaster)	0.30
Non-engineered timber and masonry buildings	0.20
Buildings extremely susceptible to vibration damage	0.12

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
FTA = Federal Transit Administration
PPV = peak particle velocity
in/sec = inch/inches per second

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are traffic on Avenue M, 30th Street, and 40th Street, as well as faint construction noise in the vicinity of the project site.

AMBIENT NOISE MEASUREMENTS

Long-Term Noise Measurements

To assess existing noise levels, LSA conducted two long-term noise measurements in the vicinity of the project site. The long-term (24-hour) noise level measurements were conducted on July 25 through July 26, 2023, using two Larson Davis Spark 706RC Dosimeters. Table G provides a summary of the measured hourly and maximum noise levels from the long-term noise level measurements. As shown in Table G, the calculated hourly noise levels are as low as 49.8 dBA L_{eq} during nighttime hours and 54.5 dBA L_{eq} during daytime hours. Noise measurement sheets are provided in Appendix A. Figure 3 shows the long-term monitoring locations.

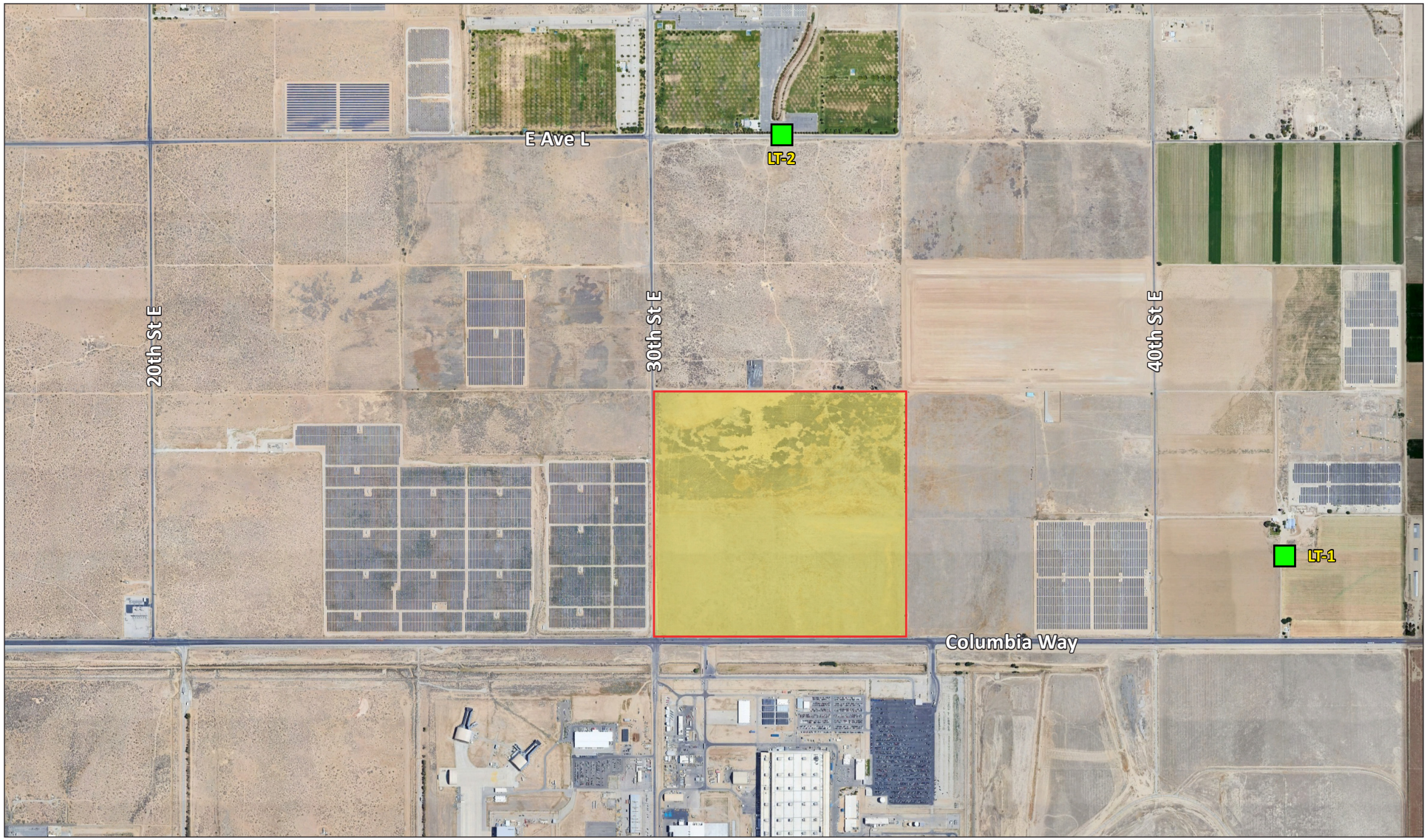
Table G: Long-Term 24-Hour Ambient Noise Monitoring Results

Location		Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{max})	Nighttime Noise Levels[3] (dBA L_{eq})	Average Daily Noise Levels (dBA CNEL)
LT-1	South of single-family residence at 42164 40th St. on a tree, approximately 930 ft away from Avenue M centerline.	54.5 – 80.7	53.2 – 76.1	49.8 – 60.6	74.5
LT-2	East of the entrance to the Lancaster National Soccer center at 43000 30th St., approximately 1,400 ft away from 30th St. centerline.	64.5 – 70.2	61.0 – 64.0	54.3 – 64.5	69.0

Source: Compiled by LSA (2023).
Note: Noise measurements were conducted from July 25 to July 26, 2023, starting at 1:00 p.m.
[1] Daytime Noise Levels = noise levels during the hours of 7:00 a.m. to 7:00 p.m.
[2] Evening Noise Levels = noise levels during the hours of 7:00 p.m. to 10:00 p.m.
[3] Nighttime Noise Levels = noise levels during the hours of 10:00 p.m. to 7:00 a.m.
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet
L_{eq} = equivalent continuous sound level

EXISTING AIRCRAFT NOISE

Aircraft flyovers may be audible on the project site due to aircraft activity in the vicinity. The nearest airport to the project is Air Force Plant 42, approximately 0.6 mile to the south. The project site is within the 65 dBA CNEL airport noise impact zone, consistent with the Airport Influence Area figure of the City's General Plan (Los Angeles County Airport Land Use Commission 2003). Because the project site is within the 65 dBA CNEL noise contour, the proposed buildings shall be constructed to provide an interior noise level environment that does not exceed an hourly equivalent level of 50 dBA L_{eq} in occupied areas during any hour of operation. Once final building plans are available, a Final Acoustical Report shall be completed to confirm that exterior wall and roof construction would supply the necessary noise reduction to achieve compliance with the 50 dBA L_{eq} noise standard.



LSA

LEGEND

Project Location

LT-1 Long-term Noise Monitoring Location

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SOURCES: Google Earth

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FIGURE 3

Palmdale Logistics Industrial Warehouse
Noise Monitoring Locations

PROJECT IMPACTS

SHORT-TERM CONSTRUCTION NOISE IMPACTS

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single-event noise-exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to 84 dBA L_{max}), the effect on longer-term ambient noise levels would be small when compared to existing daily traffic volumes on Avenue M. The results of the California Emissions Estimator Model (CalEEMod) for the proposed project indicate that during the building construction phase, an additional 2,737 vehicles in passenger car equivalent (PCE) volume, consisting of worker and hauling trips, would be added to the roadway adjacent to the project site. Because the existing traffic volume on Avenue M is approximately 8,900, construction-related vehicle trips would generate an approximate 1.2 dBA CNEL noise increase. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, short-term, construction-related impacts associated with worker commute and equipment transport to the project site would be less than significant.

The second type of short-term noise impact is related to noise generated during construction, which includes site preparation, grading, building construction, paving, and architectural coating on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table H lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor, taken from the Federal Highway Administration's (FHWA) *FHWA Roadway Construction Noise Model* (2006).

In addition to the reference maximum noise level, the usage factor provided in Table H is used to calculate the hourly noise level impact for each piece of equipment based on the following equation:

$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: $L_{eq}(equip)$ = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period.

E.L. = noise emission level of the particular piece of equipment at a reference distance of 50 ft.

U.F. = usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time.

D = distance from the receiver to the piece of equipment.

Table H: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)[1]	Maximum Noise Level (L_{max}) at 50 Ft[2]
Auger Drill Rig	20	84
Backhoes	40	80
Compactor (ground)	20	80
Compressor	40	80
Cranes	16	85
Dozers	40	85
Dump Trucks	40	84
Excavators	40	85
Flat Bed Trucks	40	84
Forklift	20	85
Front-end Loaders	40	80
Graders	40	85
Impact Pile Drivers	20	95
Jackhammers	20	85
Paver	50	77
Pickup Truck	40	55
Pneumatic Tools	50	85
Pumps	50	77
Rock Drills	20	85
Rollers	20	85
Scrapers	40	85
Tractors	40	84
Trencher	50	80
Welder	40	73

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

Each piece of construction equipment operates as an individual point source. Using the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Using the equations from the methodology above, the reference information in Table H, and the construction equipment list provided, the composite noise level of each construction phase was calculated. The project construction composite noise levels at a distance of 50 ft would range from

74 dBA L_{eq} to 88 dBA L_{eq}, with the highest noise levels occurring during the site preparation and grading phases.

Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Leq\ (at\ distance\ X) = Leq\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance would decrease noise levels by 6 dBA while halving the distance would increase noise levels by 6 dBA.

Table I shows the nearest sensitive uses to the project site, their distance from the center of construction activities, and composite noise levels expected during construction. These noise level projections do not consider intervening topography or barriers. Construction equipment calculations are provided in Appendix B.

Table I: Potential Construction Noise Impacts at Nearest Receptor

Receptor (Location)	Composite Noise Level at 50 ft[1] (dBA L_{eq})	Distance from Center of Construction Activities (ft)	Composite Noise Level (dBA L_{eq})
Industrial (South)	88	1,900	57
Residence (East)		5,200	48
Residence (North)		5,450	48

Source: Compiled by LSA (2023).
[1] The composite construction noise level represents the site preparation and grading phases which are expected to result in the greatest noise level as compared to other phases.
dBA L_{eq} = average A-weighted hourly noise level
ft = foot/feet

While construction noise will vary, it is expected that composite noise levels during construction at the nearest industrial uses to the south would reach 57 dBA L_{eq} and at the nearest residential uses to the north would reach 48 dBA L_{eq} during daytime hours. These predicted noise levels would only occur when all construction equipment is operating simultaneously and, therefore, are assumed to be rather conservative in nature. While construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, the noise impacts would no longer occur once project construction is completed.

As stated above, the project would include construction of an offsite 24-inch water line that would extend approximately 13,400 linear feet west within the Avenue M right-of-way to 5th Street E and connect to the existing 30-inch water line in Avenue M. The proposed 24-inch watermain extension would then continue from 4th Street West to 4th Street East for an additional 4,000 linear feet. In total, the water line extension would be approximately 17,400 linear feet in length. These activities would not occur in close proximity to any noise sensitive uses.

As stated above, the City's Noise Ordinance regulates noise impacts associated with construction activities. The proposed project would comply with the construction hours specified in the City's Noise Ordinance, which states that construction activities are not allowed between the hours of 8:00 p.m. and 6:30 a.m. and construction is not allowed on Sundays in any residential zone or within 500 ft of any residence, hotel, motel, or recreational vehicle park.

As it relates to off-site uses, construction-related noise impacts would remain well below the 90 dBA L_{eq} and 80 dBA L_{eq} 1-hour construction noise level criteria for daytime construction noise level criteria as established by the FTA for industrial and residential uses, respectively; therefore, the impact would be considered less than significant.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

This construction vibration impact analysis discusses the level of human annoyance using vibration levels in RMS (VdB) and assesses the potential for building damages using vibration levels in PPV (in/sec). This is because vibration levels calculated in RMS are best for characterizing human response to building vibration, while vibration levels calculated in PPV are best for characterizing potential for damage.

Table J shows the PPV and VdB values at 25 ft from the construction vibration source. As shown in Table J, bulldozers, and other heavy-tracked construction equipment (expected to be used for this project) generate approximately 0.089 PPV in/sec or 87 VdB of ground-borne vibration when measured at 25 ft, based on the FTA Manual. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project construction boundary (assuming the construction equipment would be used at or near the project setback line).

Table J: Vibration Source Amplitudes for Construction Equipment

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

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

The formulae for vibration transmission are provided below, and Tables K and L, below, provide a summary of off-site construction vibration levels.

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

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

As shown in Table E, above, the threshold at which vibration levels would result in annoyance would be 78 VdB for daytime residential uses. As also shown in Table F, the FTA guidelines indicate that for a non-engineered timber and masonry building, the construction vibration damage criterion is 0.2 in/sec in PPV.

Table K: Potential Construction Vibration Annoyance Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (VdB) at 25 ft[1]	Distance (ft)[2]	Vibration Level (VdB)
Industrial (South)	87	1,900	31
Residence (East)		5,200	17
Residence (North)		5,450	17

Source: Compiled by LSA (2023).
[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.
[2] The reference distance is associated with the average condition, identified by the distance from the center of construction activities to surrounding uses.
ft = foot/feet
VdB = vibration velocity decibels

Table L: Potential Construction Vibration Damage Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (PPV) at 25 ft[1]	Distance (ft)[2]	Vibration Level (PPV)
Industrial (South)	0.089	650	0.001
Residence (East)		3,900	<0.001
Residence (North)		4,143	<0.001

Source: Compiled by LSA (2023).
[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.
[2] The reference distance is associated with the peak condition, identified by the distance from the perimeter of construction activities to surrounding structures.
ft = foot/feet
PPV = peak particle velocity

Based on the information provided in Table K, vibration levels are expected to approach 17 VdB at the closest residence to the north and would not exceed the annoyance thresholds.

Based on the information provided in Table L, vibration levels are expected to approach 0.001 PPV in/sec at the nearest surrounding structures and would be below the 0.2 PPV in/sec damage

threshold. Other building structures surrounding the project site are farther away and would experience further reduced vibration. The impact would be considered less than significant, and no construction vibration impacts would occur. No vibration reduction measures are required.

Because construction activities are regulated by the City's Municipal Code, which states that construction activities are not allowed between the hours of 8:00 p.m. and 6:30 a.m. and construction is not allowed on Sundays in any residential zone or within 500 ft of any residence, hotel, motel, or recreational vehicle park, vibration impacts would not occur during the more sensitive nighttime hours.

LONG-TERM OFF-SITE TRAFFIC NOISE IMPACTS

The guidelines included in the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77 108) were used to evaluate highway traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. Table M provides the traffic noise levels for the opening year with and without project scenarios. These noise levels represent the worst-case scenario, which assumes no shielding is provided between the traffic and the location where the noise contours are drawn.

The without and with project scenario traffic volumes were obtained from the *Traffic Impact Analysis Report for Palmdale Logistics Center* (EPD Solutions Inc. 2023). Appendix C provides the specific assumptions used in developing these noise levels and model printouts. Table M shows that the increase in project-related traffic noise would be no greater than 1.9 dBA. Noise level increases less than 3.0 dBA are not perceptible to the human ear. Therefore, traffic noise impacts from project-related traffic on off-site sensitive receptors would be less than significant, and no mitigation measures are required.

LONG-TERM TRAFFIC-RELATED VIBRATION IMPACTS

The proposed project would not generate vibration levels related to on-site operations. In addition, vibration levels generated from project-related traffic on the adjacent roadways are unusual for on-road vehicles because the rubber tires and suspension systems of on-road vehicles provide vibration isolation. Based on a reference vibration level of 0.076 in/sec PPV, structures greater than 20 ft from the roadways that contain project trips would experience vibration levels below the most conservative standard of 0.12 in/sec PPV; therefore, vibration levels generated from project-related traffic on the adjacent roadways would be less than significant, and no mitigation measures are required.

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Table M: Traffic Noise Levels Without and With Proposed Project—Opening Year 2026

Roadway Segment	Opening Year 2026 – Without Project		Opening Year 2026 – With Project		
	ADT	CNEL (dBA) 50 ft from Centerline of Nearest Lane	ADT	CNEL (dBA) 50 ft from Centerline of Nearest Lane	Increase from Existing Conditions (dBA)
Columbia Way west of 30th Street	17,490	70.6	23,290	71.8	1.2
Columbia Way east of 30th Street	17,700	71.0	19,870	71.5	0.5
30th Street north of Columbia Way	6,690	67.9	10,320	69.8	1.9

Source: Compiled by LSA (April 2024).
Note: Shaded cells indicate roadway segments adjacent to the project site.
ADT = average daily traffic
CNEL= Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet

LONG-TERM OFF-SITE STATIONARY NOISE IMPACTS

Adjacent off-site land uses would be potentially exposed to stationary-source noise impacts from the proposed on-site heating, ventilation, and air conditioning (HVAC) equipment, and truck deliveries and loading and unloading activities. The potential noise impacts to off-site sensitive land uses from the proposed operational activities are discussed below. To provide a conservative analysis, it is assumed that operations would occur equally during all daytime hours of the day and that half of the 258 loading docks at each proposed building would be active at all times. Additionally, it is assumed that within any given hour, 80 heavy trucks would maneuver to park near or back into one of the proposed loading docks. To determine the future noise impacts from project operations to the noise sensitive uses, a 3-D noise model, SoundPLAN, was used to incorporate the site topography as well as the shielding from the proposed building on site. A graphic representation of the operational noise impacts is presented in Appendix D.

Heating, Ventilation, and Air Conditioning Equipment

The project would have various rooftop mechanical equipment, including HVAC units, on the proposed building. Based on the project site plan, the project is assumed to have 8 rooftop HVAC units on each building (16 in total) and assumed to operate 24 hours per day. The HVAC equipment could operate 24 hours per day and would generate sound power levels (SPL) of up to 87 dBA SPL or 72 dBA L_{eq} at 5 ft, based on manufacturer data (Trane n.d.).

Trash Bin Emptying Activities

The project is estimated to have 4 trash dumpsters near the corners of the proposed buildings. The trash emptying activities would take place for a period of less than 1 minute and would generate SPLs of up to 118.6 dBA SPL or 84 dBA L_{eq} at 50 ft, based on reference information within SoundPLAN. Trash bin emptying activities would only occur during daytime hours.

Truck Deliveries and Truck Loading and Unloading Activities

Noise levels generated by delivery trucks would be similar to noise readings from truck loading and unloading activities, which generate a noise level of 75 dBA L_{eq} at 20 ft based on measurements taken by LSA (*Operational Noise Impact Analysis for Richmond Wholesale Meat Distribution Center* [LSA 2016]). Shorter term noise levels that occur during the docking process taken by LSA were measured to be 76.3 dBA L_8 at 20 ft. Delivery trucks would arrive on site and maneuver their trailers so that trailers would be parked within the loading docks. During this process, noise levels are associated with the truck engine noise, air brakes, and back-up alarms while the truck is backing into the dock. These noise levels would occur for a shorter period of time (less than 5 minutes). After a truck enters the loading dock, the doors would be closed, and the remainder of the truck loading activities would be enclosed and therefore much less perceptible. To present a conservative assessment, it is assumed that truck arrivals and departure activities could occur at 80 spaces for a period of less than 5 minutes each and unloading activities could occur at 258 docks simultaneously for a period of more than 30 minutes in a given hour.

Cumulative Operations Noise Assessment

The results on Sheet 1, presented in Appendix D, show that the noise levels at the existing commercial uses to the south and residential uses to the east and north of the project site would experience noise level impacts that would not exceed the exterior noise level standard of 65 dBA CNEL. Therefore, the impact would be less than significant, and no noise reduction measures are required.

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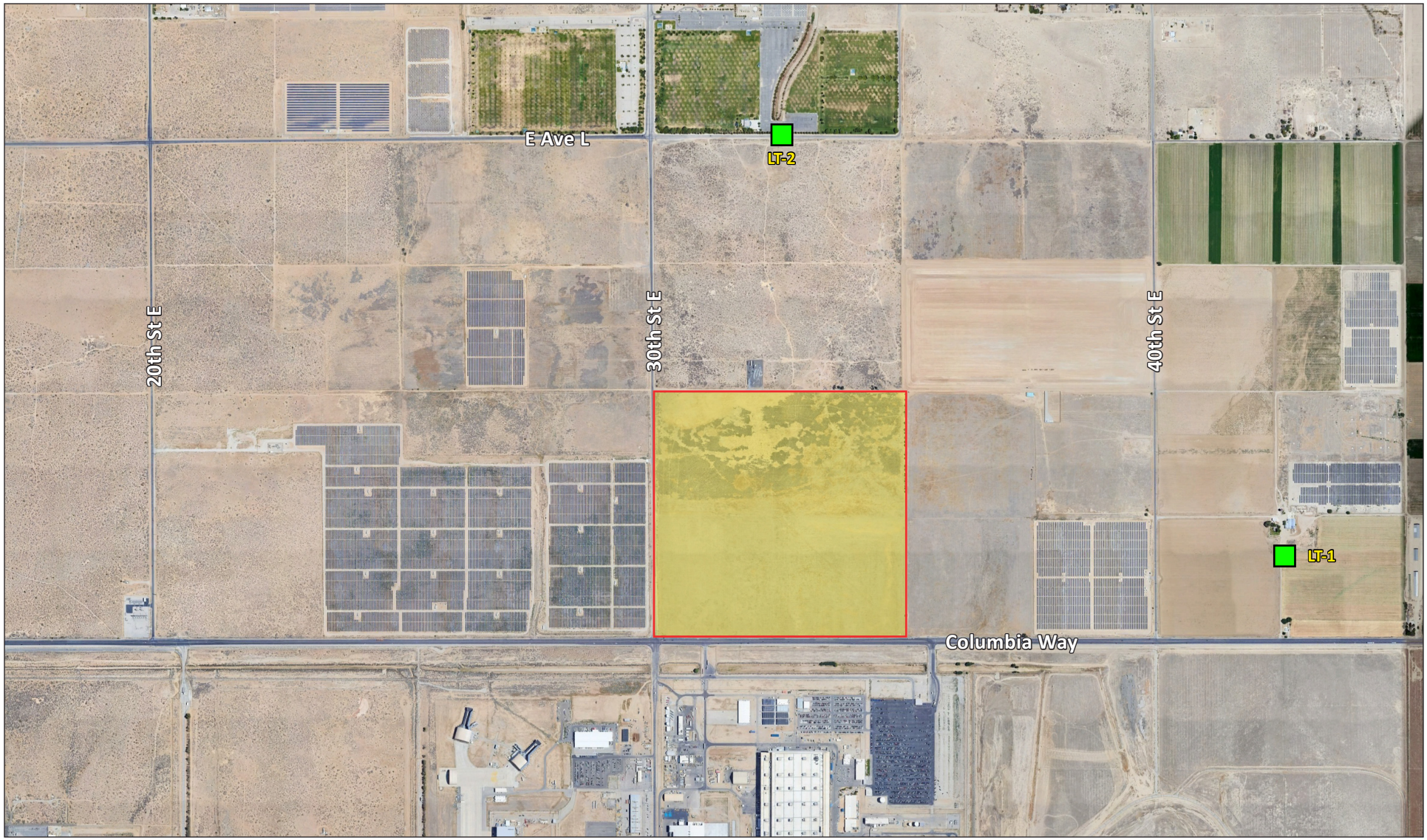
APPENDIX A

NOISE MONITORING DATA



LSA

LEGEND

Project Location

LT-1 Long-term Noise Monitoring Location

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MILES

SOURCES: Google Earth

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FIGURE 3

Palmdale Logistics Industrial Warehouse
Noise Monitoring Locations

PROJECT IMPACTS

SHORT-TERM CONSTRUCTION NOISE IMPACTS

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single-event noise-exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to 84 dBA L_{max}), the effect on longer-term ambient noise levels would be small when compared to existing daily traffic volumes on Avenue M. The results of the California Emissions Estimator Model (CalEEMod) for the proposed project indicate that during the building construction phase, an additional 2,737 vehicles in passenger car equivalent (PCE) volume, consisting of worker and hauling trips, would be added to the roadway adjacent to the project site. Because the existing traffic volume on Avenue M is approximately 8,900, construction-related vehicle trips would generate an approximate 1.2 dBA CNEL noise increase. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, short-term, construction-related impacts associated with worker commute and equipment transport to the project site would be less than significant.

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$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: $L_{eq}(equip)$ = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period.

E.L. = noise emission level of the particular piece of equipment at a reference distance of 50 ft.

U.F. = usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time.

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Table H: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)[1]	Maximum Noise Level (L_{max}) at 50 Ft[2]
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Excavators	40	85
Flat Bed Trucks	40	84
Forklift	20	85
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Graders	40	85
Impact Pile Drivers	20	95
Jackhammers	20	85
Paver	50	77
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Pneumatic Tools	50	85
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Source: *FHWA Roadway Construction Noise Model* User's Guide, Table 1 (FHWA 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
[1] Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power.
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FHWA = Federal Highway Administration
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L_{max} = maximum instantaneous sound level

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$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Using the equations from the methodology above, the reference information in Table H, and the construction equipment list provided, the composite noise level of each construction phase was calculated. The project construction composite noise levels at a distance of 50 ft would range from

74 dBA L_{eq} to 88 dBA L_{eq}, with the highest noise levels occurring during the site preparation and grading phases.

Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Leq\ (at\ distance\ X) = Leq\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance would decrease noise levels by 6 dBA while halving the distance would increase noise levels by 6 dBA.

Table I shows the nearest sensitive uses to the project site, their distance from the center of construction activities, and composite noise levels expected during construction. These noise level projections do not consider intervening topography or barriers. Construction equipment calculations are provided in Appendix B.

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Residence (East)		5,200	48
Residence (North)		5,450	48

Source: Compiled by LSA (2023).
[1] The composite construction noise level represents the site preparation and grading phases which are expected to result in the greatest noise level as compared to other phases.
dBA L_{eq} = average A-weighted hourly noise level
ft = foot/feet

While construction noise will vary, it is expected that composite noise levels during construction at the nearest industrial uses to the south would reach 57 dBA L_{eq} and at the nearest residential uses to the north would reach 48 dBA L_{eq} during daytime hours. These predicted noise levels would only occur when all construction equipment is operating simultaneously and, therefore, are assumed to be rather conservative in nature. While construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, the noise impacts would no longer occur once project construction is completed.

As stated above, the City's Noise Ordinance regulates noise impacts associated with construction activities. The proposed project would comply with the construction hours specified in the City's Noise Ordinance, which states that construction activities are not allowed between the hours of 8:00 p.m. and 6:30 a.m. and construction is not allowed on Sundays in any residential zone or within 500 ft of any residence, hotel, motel, or recreational vehicle park.

As it relates to off-site uses, construction-related noise impacts would remain well below the 90 dBA L_{eq} and 80 dBA L_{eq} 1-hour construction noise level criteria for daytime construction noise level

criteria as established by the FTA for industrial and residential uses, respectively; therefore, the impact would be considered less than significant.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

This construction vibration impact analysis discusses the level of human annoyance using vibration levels in RMS (VdB) and assesses the potential for building damages using vibration levels in PPV (in/sec). This is because vibration levels calculated in RMS are best for characterizing human response to building vibration, while vibration levels calculated in PPV are best for characterizing potential for damage.

Table J shows the PPV and VdB values at 25 ft from the construction vibration source. As shown in Table J, bulldozers, and other heavy-tracked construction equipment (expected to be used for this project) generate approximately 0.089 PPV in/sec or 87 VdB of ground-borne vibration when measured at 25 ft, based on the FTA Manual. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project construction boundary (assuming the construction equipment would be used at or near the project setback line).

Table J: Vibration Source Amplitudes for Construction Equipment

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

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
[2] Equipment shown in **bold** is expected to be used on site.

µin/sec = microinches per second
ft = foot/feet
FTA = Federal Transit Administration
in/sec = inch/inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The formulae for vibration transmission are provided below, and Tables K and L, below, provide a summary of off-site construction vibration levels.

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

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

As shown in Table E, above, the threshold at which vibration levels would result in annoyance would be 78 VdB for daytime residential uses. As also shown in Table F, the FTA guidelines indicate that for

a non-engineered timber and masonry building, the construction vibration damage criterion is 0.2 in/sec in PPV.

Table K: Potential Construction Vibration Annoyance Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (VdB) at 25 ft[1]	Distance (ft)[2]	Vibration Level (VdB)
Industrial (South)	87	1,900	31
Residence (East)		5,200	17
Residence (North)		5,450	17

Source: Compiled by LSA (2023).
[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.
[2] The reference distance is associated with the average condition, identified by the distance from the center of construction activities to surrounding uses.
ft = foot/feet
VdB = vibration velocity decibels

Table L: Potential Construction Vibration Damage Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (PPV) at 25 ft[1]	Distance (ft)[2]	Vibration Level (PPV)
Industrial (South)	0.089	650	0.001
Residence (East)		3,900	<0.001
Residence (North)		4,143	<0.001

Source: Compiled by LSA (2023).
[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.
[2] The reference distance is associated with the peak condition, identified by the distance from the perimeter of construction activities to surrounding structures.
ft = foot/feet
PPV = peak particle velocity

Based on the information provided in Table K, vibration levels are expected to approach 17 VdB at the closest residence to the north and would not exceed the annoyance thresholds.

Based on the information provided in Table L, vibration levels are expected to approach 0.001 PPV in/sec at the nearest surrounding structures and would be below the 0.2 PPV in/sec damage threshold. Other building structures surrounding the project site are farther away and would experience further reduced vibration. The impact would be considered less than significant, and no construction vibration impacts would occur. No vibration reduction measures are required.

Because construction activities are regulated by the City's Municipal Code, which states that construction activities are not allowed between the hours of 8:00 p.m. and 6:30 a.m. and construction is not allowed on Sundays in any residential zone or within 500 ft of any residence,

hotel, motel, or recreational vehicle park, vibration impacts would not occur during the more sensitive nighttime hours.

LONG-TERM OFF-SITE TRAFFIC NOISE IMPACTS

The guidelines included in the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77 108) were used to evaluate highway traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. Table M provides the traffic noise levels for the opening year with and without project scenarios. These noise levels represent the worst-case scenario, which assumes no shielding is provided between the traffic and the location where the noise contours are drawn.

The without and with project scenario traffic volumes were obtained from the *Traffic Impact Analysis Report for Palmdale Logistics Center* (EPD Solutions Inc. 2023). Appendix C provides the specific assumptions used in developing these noise levels and model printouts. Table M shows that the increase in project-related traffic noise would be no greater than 1.9 dBA. Noise level increases less than 3.0 dBA are not perceptible to the human ear. Therefore, traffic noise impacts from project-related traffic on off-site sensitive receptors would be less than significant, and no mitigation measures are required.

LONG-TERM TRAFFIC-RELATED VIBRATION IMPACTS

The proposed project would not generate vibration levels related to on-site operations. In addition, vibration levels generated from project-related traffic on the adjacent roadways are unusual for on-road vehicles because the rubber tires and suspension systems of on-road vehicles provide vibration isolation. Based on a reference vibration level of 0.076 in/sec PPV, structures greater than 20 ft from the roadways that contain project trips would experience vibration levels below the most conservative standard of 0.12 in/sec PPV; therefore, vibration levels generated from project-related traffic on the adjacent roadways would be less than significant, and no mitigation measures are required.

LONG-TERM OFF-SITE STATIONARY NOISE IMPACTS

Adjacent off-site land uses would be potentially exposed to stationary-source noise impacts from the proposed on-site heating, ventilation, and air conditioning (HVAC) equipment, and truck deliveries and loading and unloading activities. The potential noise impacts to off-site sensitive land uses from the proposed operational activities are discussed below. To provide a conservative analysis, it is assumed that operations would occur equally during all daytime hours of the day and that half of the 258 loading docks at each proposed building would be active at all times. Additionally, it is assumed that within any given hour, 80 heavy trucks would maneuver to park near or back into one of the proposed loading docks. To determine the future noise impacts from project operations to the noise sensitive uses, a 3-D noise model, SoundPLAN, was used to incorporate the site topography as well as the shielding from the proposed building on site. A graphic representation of the operational noise impacts is presented in Appendix D.

Table M: Traffic Noise Levels Without and With Proposed Project—Opening Year 2026

Roadway Segment	Opening Year 2026 – Without Project		Opening Year 2026 – With Project		
	ADT	CNEL (dBA) 50 ft from Centerline of Nearest Lane	ADT	CNEL (dBA) 50 ft from Centerline of Nearest Lane	Increase from Existing Conditions (dBA)
Columbia Way west of 30th Street	17,490	70.6	23,290	71.8	1.2
Columbia Way east of 30th Street	17,700	71.0	19,870	71.5	0.5
30th Street north of Columbia Way	6,690	67.9	10,320	69.8	1.9

Source: Compiled by LSA (December 2023).
Note: Shaded cells indicate roadway segments adjacent to the project site.
ADT = average daily traffic
CNEL= Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet

Heating, Ventilation, and Air Conditioning Equipment

The project would have various rooftop mechanical equipment, including HVAC units, on the proposed building. Based on the project site plan, the project is assumed to have 8 rooftop HVAC units on each building (16 in total) and assumed to operate 24 hours per day. The HVAC equipment could operate 24 hours per day and would generate sound power levels (SPL) of up to 87 dBA SPL or 72 dBA L_{eq} at 5 ft, based on manufacturer data (Trane n.d.).

Trash Bin Emptying Activities

The project is estimated to have 4 trash dumpsters near the corners of the proposed buildings. The trash emptying activities would take place for a period of less than 1 minute and would generate SPLs of up to 118.6 dBA SPL or 84 dBA L_{eq} at 50 ft, based on reference information within SoundPLAN. Trash bin emptying activities would only occur during daytime hours.

Truck Deliveries and Truck Loading and Unloading Activities

Noise levels generated by delivery trucks would be similar to noise readings from truck loading and unloading activities, which generate a noise level of 75 dBA L_{eq} at 20 ft based on measurements taken by LSA (*Operational Noise Impact Analysis for Richmond Wholesale Meat Distribution Center* [LSA 2016]). Shorter term noise levels that occur during the docking process taken by LSA were measured to be 76.3 dBA L_8 at 20 ft. Delivery trucks would arrive on site and maneuver their trailers so that trailers would be parked within the loading docks. During this process, noise levels are associated with the truck engine noise, air brakes, and back-up alarms while the truck is backing into the dock. These noise levels would occur for a shorter period of time (less than 5 minutes). After a truck enters the loading dock, the doors would be closed, and the remainder of the truck loading activities would be enclosed and therefore much less perceptible. To present a conservative assessment, it is assumed that truck arrivals and departure activities could occur at 80 spaces for a period of less than 5 minutes each and unloading activities could occur at 258 docks simultaneously for a period of more than 30 minutes in a given hour.

Cumulative Operations Noise Assessment

The results on Sheet 1, presented in Appendix D, show that the noise levels at the existing commercial uses to the south and residential uses to the east and north of the project site would experience noise level impacts that would not exceed the exterior noise level standard of 65 dBA CNEL. Therefore, the impact would be less than significant, and no noise reduction measures are required.

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APPENDIX A

NOISE MONITORING DATA

Noise Measurement Survey – 24 HR

Project Number: ESL2201.62
Project Name: Palmdale Logistics

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:119)

Site Number: LT-1 Date: 7/25/23

Time: From 1:00 p.m. To 1:00 p.m.

Site Location: Located on the nearest tree south of a single-family home at 42164 40th St E, Palmdale, CA 93552.

Primary Noise Sources: Vehicle traffic noise on E Avenue M. Faint construction noise Northeast of 40th Street and Columbia Way.

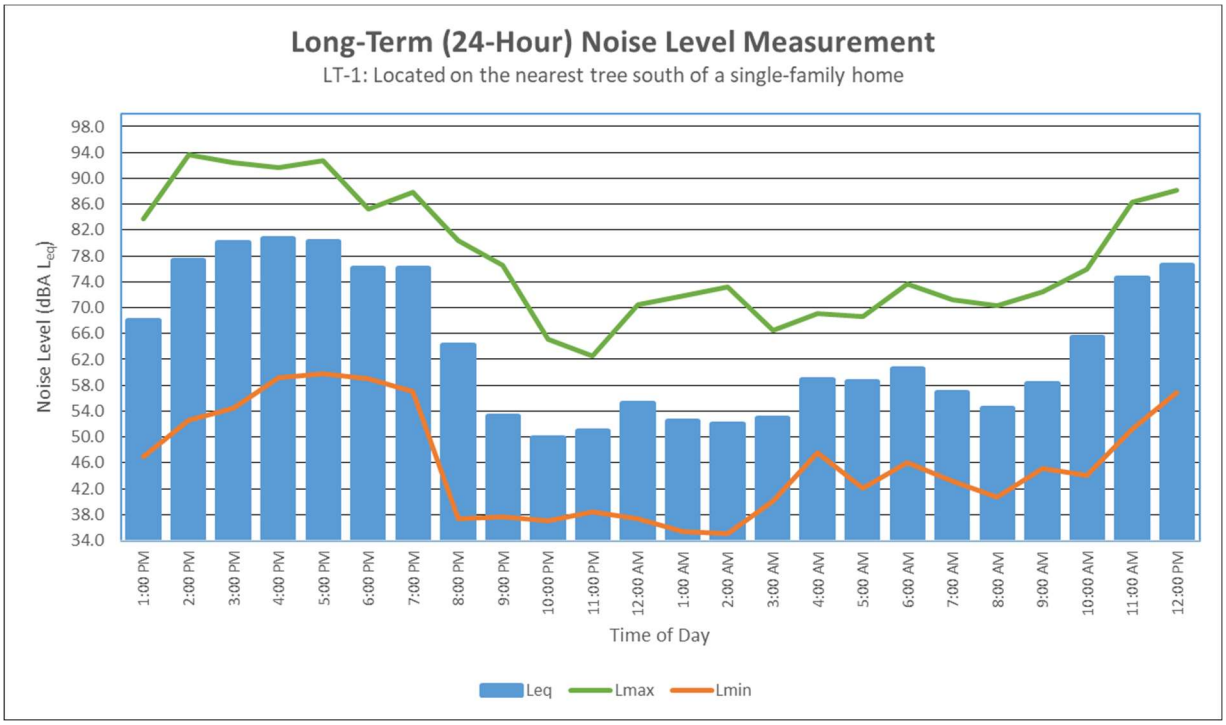
Comments:

Photo:

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

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	7/25/23	68.1	83.7	46.9
2:00 PM	7/25/23	77.3	93.6	52.6
3:00 PM	7/25/23	80.1	92.5	54.4
4:00 PM	7/25/23	80.7	91.6	59.1
5:00 PM	7/25/23	80.3	92.8	59.8
6:00 PM	7/25/23	76.2	85.3	59.0
7:00 PM	7/25/23	76.1	87.8	57.0
8:00 PM	7/25/23	64.2	80.3	37.3
9:00 PM	7/25/23	53.2	76.6	37.7
10:00 PM	7/25/23	49.8	65.1	37.0
11:00 PM	7/25/23	50.9	62.5	38.5
12:00 AM	7/26/23	55.2	70.5	37.4
1:00 AM	7/26/23	52.4	71.8	35.4
2:00 AM	7/26/23	52.0	73.2	35.0
3:00 AM	7/26/23	52.9	66.5	40.1
4:00 AM	7/26/23	58.8	69.1	47.6
5:00 AM	7/26/23	58.5	68.7	42.1
6:00 AM	7/26/23	60.6	73.7	46.1
7:00 AM	7/26/23	56.9	71.2	43.2
8:00 AM	7/26/23	54.5	70.3	40.7
9:00 AM	7/26/23	58.2	72.5	45.2
10:00 AM	7/26/23	65.4	75.9	44.0
11:00 AM	7/26/23	74.6	86.3	51.2
12:00 PM	7/26/23	76.6	88.1	56.9

Source: Compiled by LSA Associates, Inc. (2023).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: ESL2201.62
Project Name: Palmdale Logistics

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:814)

Site Number: LT-2 Date: 7/25/23

Time: From 1:00 p.m. To 1:00 p.m.

Site Location: Located on a tree just east of the gated entrance to the Lancaster National Soccer Center on 43000 30th St E, Lancaster, CA 93535.

Primary Noise Sources: Vehicle traffic noise on E Avenue L.

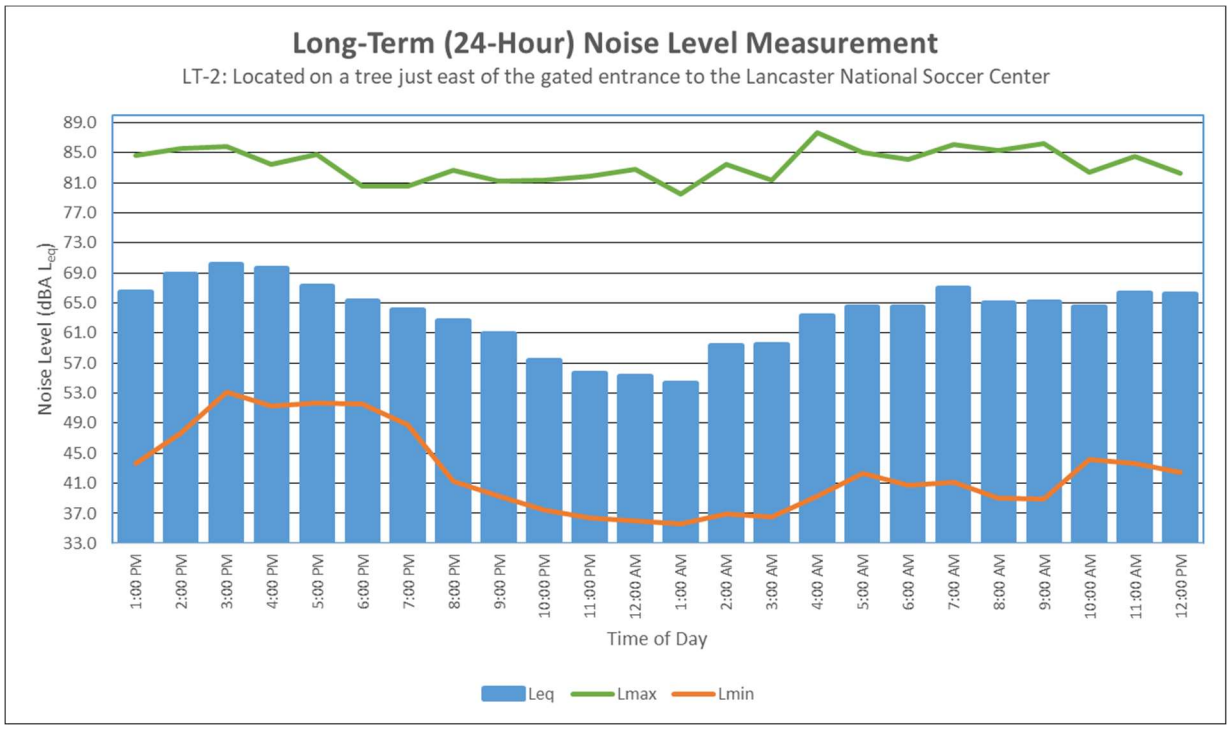
Comments:

Photo:

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

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	7/25/23	66.4	84.6	43.6
2:00 PM	7/25/23	68.8	85.6	47.7
3:00 PM	7/25/23	70.2	85.8	53.2
4:00 PM	7/25/23	69.6	83.5	51.3
5:00 PM	7/25/23	67.2	84.7	51.7
6:00 PM	7/25/23	65.3	80.6	51.6
7:00 PM	7/25/23	64.0	80.5	48.8
8:00 PM	7/25/23	62.6	82.7	41.3
9:00 PM	7/25/23	61.0	81.2	39.3
10:00 PM	7/25/23	57.4	81.3	37.5
11:00 PM	7/25/23	55.6	81.9	36.4
12:00 AM	7/26/23	55.2	82.8	36.0
1:00 AM	7/26/23	54.3	79.5	35.6
2:00 AM	7/26/23	59.3	83.5	36.9
3:00 AM	7/26/23	59.5	81.4	36.6
4:00 AM	7/26/23	63.3	87.7	39.3
5:00 AM	7/26/23	64.5	85.0	42.3
6:00 AM	7/26/23	64.5	84.1	40.8
7:00 AM	7/26/23	67.0	86.1	41.2
8:00 AM	7/26/23	65.1	85.3	39.0
9:00 AM	7/26/23	65.2	86.2	38.9
10:00 AM	7/26/23	64.5	82.4	44.2
11:00 AM	7/26/23	66.3	84.5	43.6
12:00 PM	7/26/23	66.1	82.3	42.5

Source: Compiled by LSA Associates, Inc. (2023).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



APPENDIX B

CONSTRUCTION NOISE LEVEL CALCULATIONS

Construction Calculations

Phase: Site Preparation

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA) Lmax	Noise Level (dBA) Leq
Tractor	4	84	40	50	0.5	84	86
Dozer	3	82	40	50	0.5	82	83
					Combined at 50 feet	**86**	**88**
					Combined at Receptor 1900 feet	**55**	**56**
					Combined at Receptor 5200 feet	**46**	**47**
					Combined at Receptor 5450 feet	**45**	**47**

Phase: Grading

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA) Lmax	Noise Level (dBA) Leq
Grader	1	85	40	50	0.5	85	81
Scraper	2	84	40	50	0.5	84	83
Dozer	1	82	40	50	0.5	82	78
Tractor	2	84	40	50	0.5	84	83
Excavator	2	81	40	50	0.5	81	80
					Combined at 50 feet	**90**	**88**
					Combined at Receptor 1900 feet	**59**	**57**
					Combined at Receptor 5200 feet	**50**	**48**
					Combined at Receptor 5450 feet	**50**	**48**

Phase:Building Construction

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA) Lmax	Noise Level (dBA) Leq
Crane	1	81	16	50	0.5	81	73
Man Lift	3	75	20	50	0.5	75	73
Generator	1	81	50	50	0.5	81	78
Tractor	3	84	40	50	0.5	84	85
Welder / Torch	1	74	40	50	0.5	74	70
					Combined at 50 feet	**87**	**86**
					Combined at Receptor 1900 feet	**56**	**55**

Phase:Paving

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA) Lmax	Noise Level (dBA) Leq
Paver	2	77	50	50	0.5	77	77
All Other Equipment > 5 HP	2	85	50	50	0.5	85	85
Roller	2	80	20	50	0.5	80	76
					Combined at 50 feet	**87**	**86**
					Combined at Receptor 1900 feet	**55**	**54**

Phase:Architectural Coating

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA) Lmax	Noise Level (dBA) Leq
Compressor (air)	1	78	40	50	0.5	78	74
					Combined at 50 feet	**78**	**74**
					Combined at Receptor 1900 feet	**46**	**42**

Sources: RCNM

[1]- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

APPENDIX C

FHWA TRAFFIC NOISE PRINTOUTS

TABLE Existing -01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: Columbia Way West of 30th Street
NOTES: Palmdale Logistics Industrial Warehouse Project - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 16500 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 30 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
83.7	171.0	363.9	781.7

TABLE Existing -02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: Columbia Way East of 30th Street
NOTES: Palmdale Logistics Industrial Warehouse Project - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 16690 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 25 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.71

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
82.7	171.6	366.5	787.9

TABLE Existing -03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: 30th Street North of Columbia Way
NOTES: Palmdale Logistics Industrial Warehouse Project - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6310 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 10 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.65

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	89.5	191.7	412.6

TABLE Opening Year 2026 - Without Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: Columbia Way West of 30th Street
NOTES: Palmdale Logistics Industrial Warehouse Project - Opening Year 2026 - Without Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 17490 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 30 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.60

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
86.6	177.6	378.2	812.7

TABLE Opening Year 2026 - Without Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: Columbia Way East of 30th Street
NOTES: Palmdale Logistics Industrial Warehouse Project - Opening Year 2026 - Without Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 17700 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 25 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.96

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
85.7	178.3	381.0	819.3

TABLE Opening Year 2026 - Without Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: 30th Street North of Columbia Way
NOTES: Palmdale Logistics Industrial Warehouse Project - Opening Year 2026 - Without Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6690 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 10 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.91

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	93.0	199.3	429.0

TABLE Opening Year 2026 - With Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: Columbia Way West of 30th Street
NOTES: Palmdale Logistics Industrial Warehouse Project - Opening Year 2026 - With Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 23290 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 30 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.84

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
102.8	214.0	457.3	983.4

TABLE Opening Year 2026 - With Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: Columbia Way East of 30th Street
NOTES: Palmdale Logistics Industrial Warehouse Project - Opening Year 2026 - With Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 19870 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

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

ACTIVE HALF-WIDTH (FT): 25 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
92.0	192.3	411.4	884.9

TABLE Opening Year 2026 - With Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 07/20/2023
ROADWAY SEGMENT: 30th Street North of Columbia Way
NOTES: Palmdale Logistics Industrial Warehouse Project - Opening Year 2026 - With Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10320 SPEED (MPH): 60 GRADE: .5

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

ACTIVE HALF-WIDTH (FT): 10 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.79

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
58.1	123.8	265.9	572.5

APPENDIX D

SOUNDPLAN NOISE MODEL PRINTOUTS

Palmdale Logistics Industrial Warehouse

Project No. ESL2201.62

Project Operational Noise Levels