NOISE AND VIBRATION IMPACT ANALYSIS

KISS LOGISTICS CENTER PROJECT

HESPERIA, CALIFORNIA

LSA

January 2023

NOISE AND VIBRATION IMPACT ANALYSIS

KISS LOGISTICS CENTER PROJECT

HESPERIA, CALIFORNIA

Submitted to:

EPD Solutions, Inc.
2355 Main Street, Suite 100
Irvine, California 92614

Prepared by:

LSA
20 Executive Park, Suite 200
Irvine, California 92614-4731
(949) 553-0666

Project No. ESL2201.52

January 2023

TABLE OF CONTENTS

TABLE OF CONTENTS i
FIGURES AND TABLES .....
LIST OF ABBREVIATIONS AND ACRONYMS iii
INTRODUCTION 1
PROJECT LOCATION AND DESCRIPTION 1
EXISTING LAND USES IN THE PROJECT AREA 1
NOISE AND VIBRATION FUNDAMENTALS 5
CHARACTERISTICS OF SOUND 5
MEASUREMENT OF SOUND 5
Physiological Effects of Noise 6
FUNDAMENTALS OF VIBRATION 8
REGULATORY SETTING 10
APPLICABLE NOISE AND VIBRATION STANDARDS 10
City of Hesperia General Plan 10
City of Hesperia Municipal Code 12
Federal Transit Administration 12
OVERVIEW OF THE EXISTING NOISE ENVIRONMENT 14
AMBIENT NOISE MEASUREMENTS 14
Long-Term Noise Measurements 14
EXISTING AIRCRAFT NOISE 14
PROJECT IMPACTS 16
SHORT-TERM CONSTRUCTION NOISE IMPACTS 16
LONG-TERM TRAFFIC-RELATED VIBRATION IMPACTS 19
SHORT-TERM CONSTRUCTION VIBRATION IMPACTS 19
LONG-TERM OFF-SITE TRAFFIC NOISE IMPACTS 20
LONG-TERM OFF-SITE STATIONARY NOISE IMPACTS 22
Heating, Ventilation, and Air Conditioning Equipment 22
Truck Deliveries and Truck Loading and Unloading Activities 22
BEST CONSTRUCTION PRACTICES 24
REFERENCES 25

FIGURES AND TABLES

FIGURES

Figure 1: Project Location 2
Figure 2: Site Plan 3
Figure 3: Noise Monitoring Locations 15

TABLES

Table A: Definitions of Acoustical Terms 7
Table B: Common Sound Levels and Their Noise Sources 8
Table C: State of California Land Use Compatibility Plan 11
Table D: City of Hesperia Noise Standards 12
Table E: Detailed Assessment Construction Noise Criteria 13
Table F: Long-Term 24-Hour Ambient Noise Monitoring Results 14
Table G: Typical Construction Equipment Noise Levels 17
Table H: Potential Construction Noise Impacts at Nearest Receptor 18
Table I: Vibration Source Amplitudes for Construction Equipment 19
Table J: Potential Construction Vibration Damage Impacts at Nearest Receptor 20
Table K: Noise Levels Without and With Proposed Project 21
Table L: Daytime Exterior Noise Level Impacts 23
Table M: Nighttime Exterior Noise Level Impacts 23

APPENDICES

A: NOISE MONITORING SHEETS
B: CONSTRUCTION NOISE LEVEL CALCULATIONS
C: FHWA ROAD TRAFFIC NOISE MODEL
D: SOUNDPLAN NOISE MODEL PRINTOUTS

LIST OF ABBREVIATIONS AND ACRONYMS

City	City of Hesperia
CNEL	Community Noise Equivalent Level
County	County of San Bernardino
dBA	A-weighted decibel
EPA	United States Environmental Protection Agency
ft	feet
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air conditioning
in/sec	inches per second
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous sound level
PPV	peak particle velocity
project	KISS Logistics Center Project
RMS	root-mean-square
SPL	sound power level
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 proposed the KISS Logistics Center Project (project) in the City of Hesperia (City), San Bernardino County (County), California. This report is intended to satisfy the City of Hesperia (City) 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 project is located northwest of the intersection of Interstate 395 (I-395) and Main Street, in the City of Hesperia, County of San Bernardino, California. The total project site is approximately 29.61 acres and encompasses three (3) parcels, identified as Assessor's Parcel Numbers (APNs) 3064-401-03,-04, and -05. Regional access to the project site would be provided by I-395 directly to the east and I-15 approximately 1.2 miles further east of the project site. Local access to the site is via Caliente Road (a dirt road), which is accessible from Phelan Road to the south and Main street to the east.

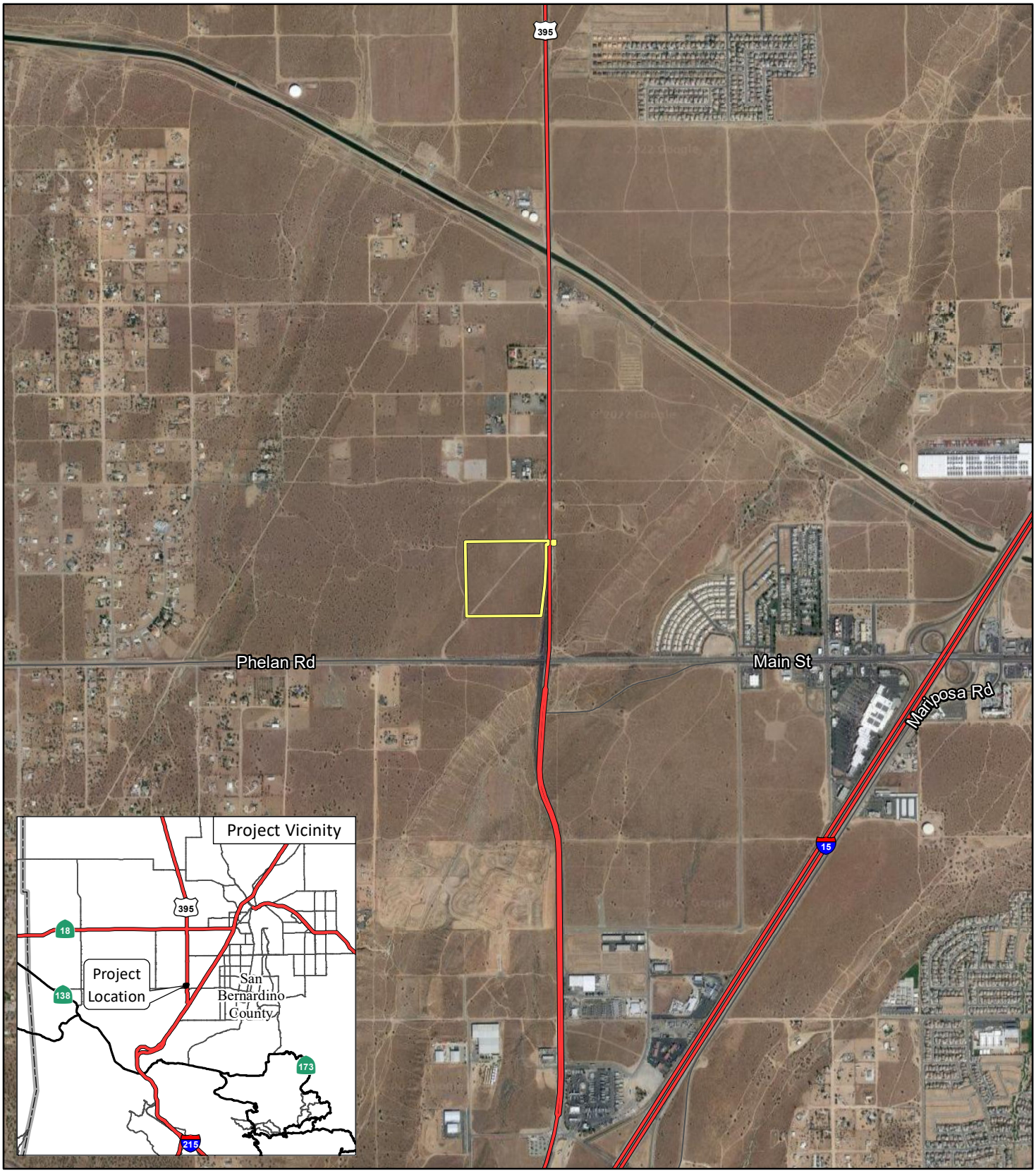
The proposed project will consist of a new warehouse, office, and truck trailer parking with a total building area of 639,468 square feet inclusive of a 11,000 square feet of ground floor office space and 5,000 square feet of mezzanine office space. Additional improvements would include landscaping, sidewalks, utility connections, implementation of stormwater facilities, and pavement of parking areas and drive aisles. Offsite improvements would be required for roadway and utility improvements.

The proposed project includes 374 vehicle parking spaces which are located along the northern, eastern, and southern side of the project site. Additionally, 83 trailer parking stalls will also be located along the west and eastern side of the site. The proposed project will include a landscape coverage of 16.8 percent that would be located along street frontages and throughout parking areas. Typical operational characteristics include employees traveling to and from the site, delivery of materials and supplies to the site and truck loading and unloading. The project is assumed to operate 24 hours a day. Figure 1 illustrates the project site location. Figure 2 depicts the proposed project's site plan.

EXISTING LAND USES IN THE PROJECT AREA

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

- **North:** Existing office and residential uses beyond adjacent undeveloped land
- **East:** I-395 and undeveloped land, West Main villas multifamily residential community approximately 0.3 mile
- **South:** Existing undeveloped land and single-family homes
- **West:** Existing undeveloped land



LEGEND

Project Location

FIGURE 1

N

0 1000 2000
FEET

SOURCE: Google Maps (2022)

I:\ESL2201.52\GIS\MXD\Project_Location.mxd (12/30/2022)

KISS Logistics Center Project

Regional Project Location

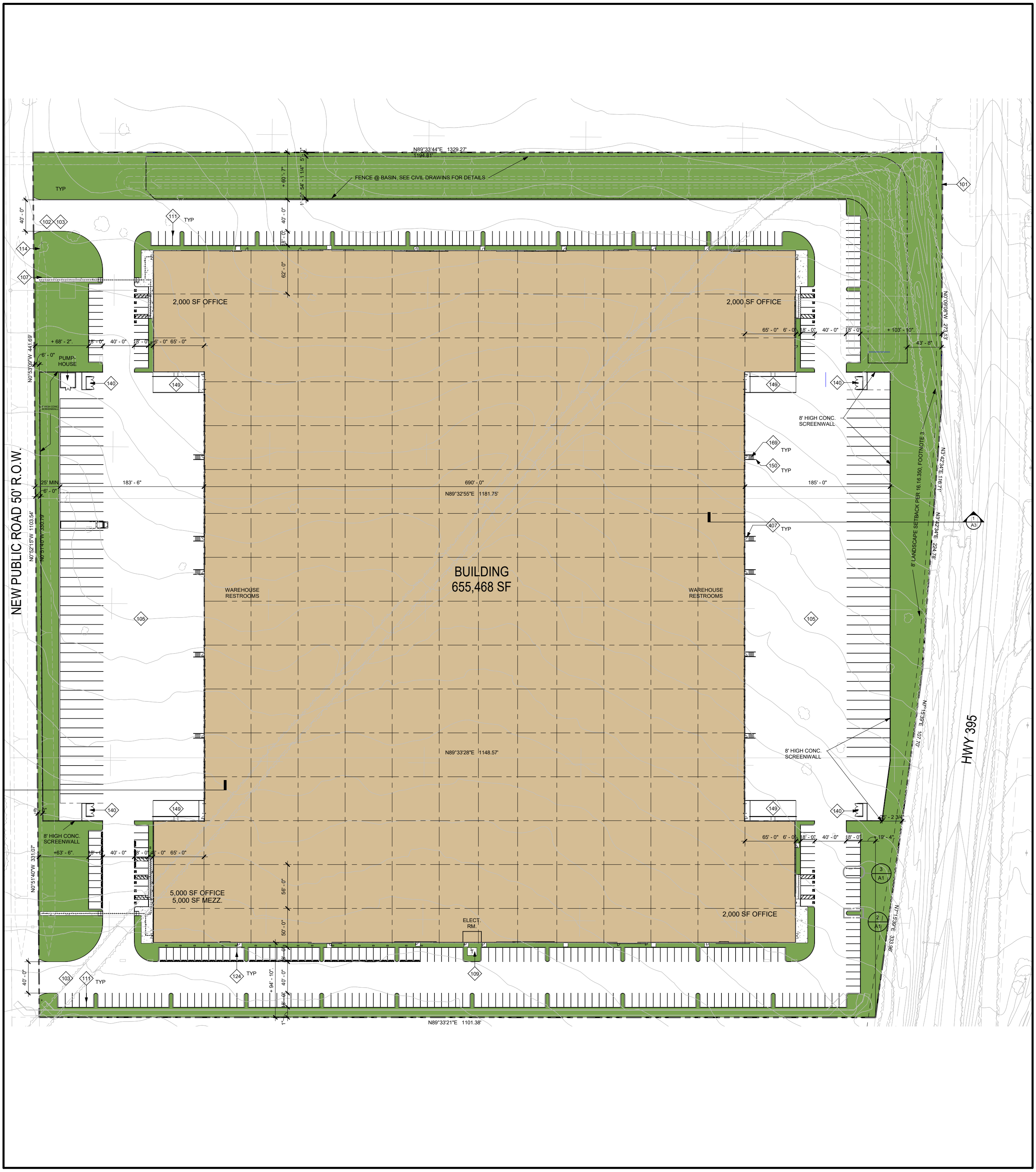
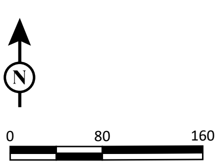


FIGURE 2



SOURCE: Herdman Design

KISS Logistics Center Project

Site Plan

I:\ESL2201.52\G\Site_Plan.ai (12/28/22)

The following lists the closest sensitive receptors to the project site:

- **North:** Existing office and residential uses located approximately 900 ft away
- **East:** Existing West Main Villas multifamily residential community located approximately 1,600 ft away
- **Southwest:** Existing rural single family residential approximately 1,500 ft away opposite Phelan Road

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 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 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 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 AND VIBRATION STANDARDS

The applicable noise and vibration standards governing the project site include the policies and goals within the City's Noise Element of the General Plan (City of Hesperia 2010) as well as criteria in Article V, General Performance Standards, of the City of Hesperia Municipal Code (City of Hesperia. 2023) (HMC).

City of Hesperia General Plan

The Noise Element of the City of Hesperia General Plan was established to control and abate environmental noise, and to protect the citizens of the City of Hesperia from excessive exposure to noise. The General Plan Noise Element specifies the maximum allowable unmitigated exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports, and railroads. In addition, the City of Hesperia General Plan Noise Element identifies several goals and policies to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. To limit the exposure of City residents to excessive noise, the City of Hesperia General Plan Noise Element contains the following two goals:

NS-1: To achieve and maintain an environment which is free from excessive or harmful noise through identification, control, and abatement.

NS-2: To achieve and maintain an environment which is free from excessive vibration.

To satisfy these two overarching goals, the General Plan Noise Element identifies the following implementation policies to reduce noise levels associated with the development of the Project:

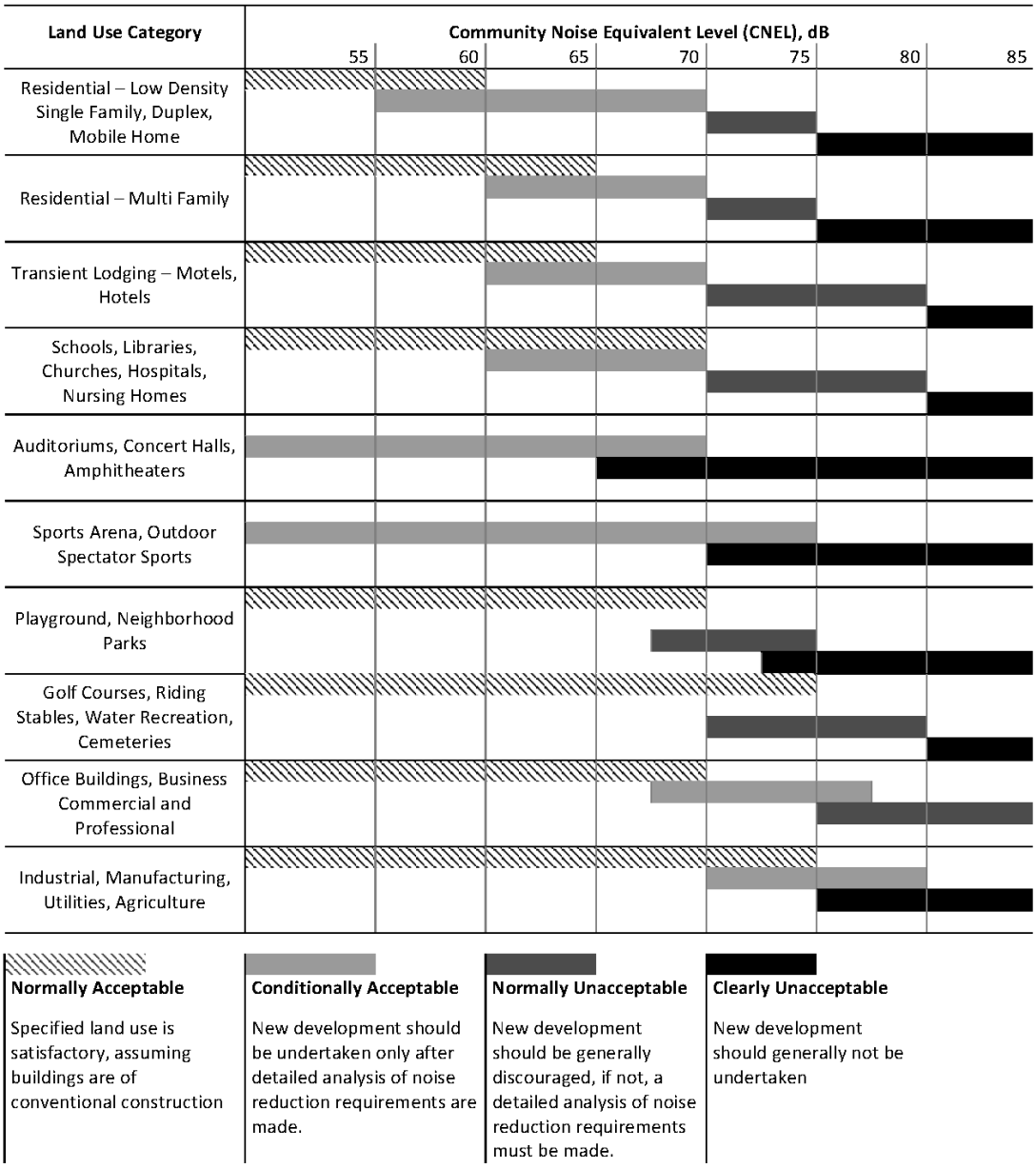
NS-1.2: Control and abate undesirable sounds through the use of the land use compatibility criteria shown in Exhibit NS-1 [Table C of this analysis] and the Municipal Code Section 16.20.125(B).

NS-1.5: Require the design and construction of commercial, industrial, office and mixed-use structures developments with noise attenuation methods to minimize excessive noise upon noise-sensitive land uses.

NS-1.9: Encourage commercial, industrial, office and mixed-use developments to locate loading areas, parking lots, driveways, trash enclosures, mechanical equipment, and other noisier components away from noise-sensitive land uses.

NS-1.10: Limit the hours of construction activity in, and around, residential areas in order to reduce the intrusion of noise in the early morning and late evening hours and on weekends and holidays.

Table C: State of California Land Use Compatibility Plan



Source: City of Hesperia General Plan, Exhibit NS-1 (2010).

NS-1.11: Limit delivery hours for businesses with loading areas or docks fronting, siding, or bordering or gaining access on driveways adjacent to noise-sensitive areas.

NS-1.12: Implement nighttime and daytime on-site noise level limits to address noise generated by commercial and industrial uses where it affects abutting residential and other noise-sensitive land uses.

City of Hesperia Municipal Code

Section 16.20.125, Noise, of the HMC sets noise standards for specific land uses by type of noise source. Noise standards for stationary noise sources are summarized in Table D. As shown, the noise standard for residential properties is 60 dBA L_{eq} from 7 a.m. to 10 p.m. and 55 dBA L_{eq} from 10 p.m. to 7 a.m. For commercial properties, the noise standard from stationary noise sources is 65 dBA L_{eq} at any time of the day or night. For industrial properties, the noise standard from stationary noise sources is 70 dBA L_{eq} at any time of the day or night. Areas exposed to noise levels exceeding these standards are considered noise-impacted areas.

Table D: City of Hesperia Noise Standards

Affected Land Use (Receiving Noise)	Maximum Noise Level (dBA)	Time Period
Residential	55	10:00 PM – 7:00 AM
Residential	60[1]	7:00 AM – 10:00 PM
Commercial	65[1]	Anytime
Industrial	70[1]	Anytime

Source: *Section 16.20.125 of the City of Hesperia Municipal Code (2022).*

[1] Due to wind noise, the maximum permissible noise level may be adjusted so that it is no greater than five dBA above the ambient noise level.

dBA = A-weighted decibels

The HMC Section 16.20.125.E.3 exempts noise from construction noise, provided that construction is limited to the hours between 7 a.m. and 7 p.m., except on Sundays or federal holidays, when construction is not allowed.

Section 16.20.130, Vibration, establishes standards for acceptable vibration levels. The section states that no ground vibration shall be allowed 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 (0.20) inches per second measured at or beyond the lot line. Temporary construction, maintenance, repair, or demolition activities between 7 a.m. and 7 p.m. are exempt from this vibration limit, except on Sundays and federal holidays, when construction is prohibited.

Federal Transit Administration

Because the City does not have construction noise level limits, construction noise was assessed using criteria from the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). Table E shows the FTA's Detailed Assessment Construction Noise Criteria based on the composite noise levels per construction phase.

Table E: Detailed Assessment Construction Noise Criteria

Land Use	Daytime 8-hour L_{eq} (dBA)	Nighttime 8-hour L_{eq} (dBA)
Residential	80	70
Commercial	85	85
Industrial	90	90

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

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are transportation facilities such as I-395, Main Street, and Phelan Road.

AMBIENT NOISE MEASUREMENTS

Long-Term Noise Measurements

Long-term (24-hour) noise level measurements were conducted on November 21 and 22, 2022, using two (2) Larson Davis Spark 706RC Dosimeters. Table F provides a summary of the measured hourly noise levels and calculated CNEL level from the long-term noise level measurements. As shown in Table F, the calculated CNEL levels range from 62.3 dBA CNEL to 73.1 dBA CNEL. Hourly noise levels in the project vicinity are as low as 48.7 dBA L_{eq} at a distance of 1,500 feet from I-395, the dominate noise source in the area. Long-term noise monitoring survey sheets are provided in Appendix A. Figure 3 shows the long-term monitoring locations.

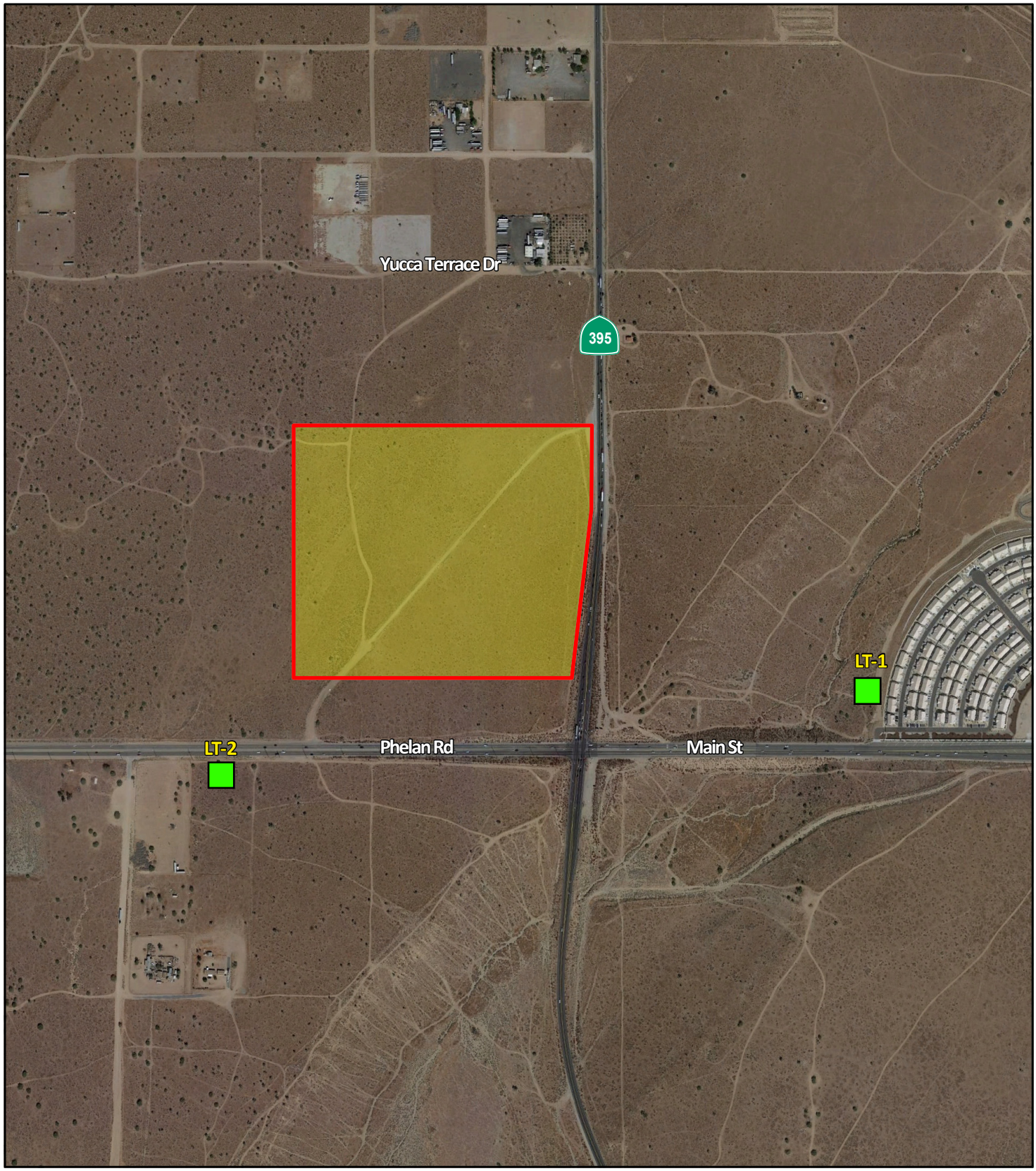
Table F: Long-Term 24-Hour Ambient Noise Monitoring Results

Location		Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Daily Noise Levels (dBA CNEL)
LT-1	Southwest corner of the West Main Villas Apartment complex, approximately 230 feet away from Main Street centerline.	48.8 – 59.7	58.2 – 60.4	48.7 – 58.1	62.3
LT-2	Southwest of project site opposite Phelan Road. Approximately 115 feet away from Phelan Road centerline	68.5 – 70.7	67.3 – 69.3	59.6 – 68.4	73.1

Source: Compiled by LSA (2022).
Note: Noise measurements were conducted from November 21 to November 22, 2022, starting at 5:00 p.m.
[1] Daytime Noise Levels = noise levels during the hours from 7:00 a.m. to 7:00 p.m.
[2] Evening Noise Levels = noise levels during the hours from 7:00 p.m. to 10:00 p.m.
[3] Nighttime Noise Levels = noise levels during the hours from 10:00 p.m. to 7:00 a.m.
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level
CNEL = Community Noise Equivalent Level

EXISTING AIRCRAFT NOISE

Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. Hesperia Airport is the closest airport use located approximately 6.15 miles southeast of the project site. Because the project site is not located within the 65 dBA CNEL and 60 dBA CNEL noise contours, no further analysis associated with aircraft noise impacts is necessary. Additionally, there are no helipads or private airstrips within 2 miles from the project area.



LSA

FIGURE 3

LEGEND

Project Site Boundary

LT-1 Long-Term Noise Monitoring Location

N

0 100 200
FEET

SOURCE: Google Earth 2021

I:\ESL2201.52\G\Noise_Locs.ai (12/30/22)

KISS Logistics Center Project

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. Based on the results of the construction assessment with the *Air Quality, Health Risk, Greenhouse Gas, and Energy Impact Report for the KISS Logistics Center Project* (LSA 2022), during building construction, approximately 107 ADT would be generated by vendor trips and 275 ADT by work trips, totaling 382 ADT. Although there could 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 the adjacent roads. With an increase of 382 ADT as compared to the estimated existing ADT of 24,590 on Highway 395 based on data within the *KISS Logistic Center Warehouse Traffic Impact Analysis* (EPD 2022), an increase of less than 0.1 dBA CNEL is expected. A noise level increase of less than 1 dBA would not be perceptible to the human ear. 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 G 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 FHWA *Roadway Construction Noise Model*.

In addition to the reference maximum noise level, the usage factor provided in Table G 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 G: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)[1]	Maximum Noise Level (L_{max}) at 50 Feet[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
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 G, 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 feet 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 H 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 take into account intervening topography or barriers. Construction equipment calculations are provided in Appendix B.

Table H: Potential Construction Noise Impacts at Nearest Receptor

Receptor (Location)	Composite Noise Level (dBA L_{eq}) at 50 feet[1]	Distance (feet)	Composite Noise Level (dBA L_{eq})
Residential/ Office Uses (North)	88	1,610	58
Residences (East)		2,575	54
Residences (Southwest)		2,575	54

Source: Compiled by LSA (2022).

[1] The composite construction noise level represents the grading phase which is expected to result in the greatest noise level as compared to other phases.

dBA L_{eq} = average A-weighted hourly noise level

While construction noise will vary, it is expected that composite noise levels during construction at the nearest residential uses southwest of the project would reach 58 dBA L_{eq}. 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, noise impacts associated with construction activities are regulated by the City's HMC. The proposed project will be required to comply with the construction hours specified in the HMC, which states that construction activities are allowed between 7 a.m. and 7 p.m., except on Sundays or federal holidays.

As it relates to off-site uses, construction-related noise impacts would remain below the 80 dBA L_{eq} and 90 dBA L_{eq} 8-hour construction noise level criteria as established by the FTA for residential and industrial land uses, respectively, for the average daily condition as modeled from the center of the project site and therefore would be considered less than significant. Best construction practices presented at the end of this analysis shall be implemented to minimize noise impacts to surrounding receptors.

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. Vibration levels generated from project-related traffic on the adjacent roadways would be less than significant and no mitigation measures are required.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

This construction vibration impact analysis assesses the potential for building damages using vibration levels in PPV (in/sec). Table I shows the PPV and VdB values at 25 ft from the construction vibration source. As shown in Table I, 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 I: 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 formula for vibration transmission is provided below and Table J below provides a summary of off-site construction vibration levels.

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

As specified in the City's Municipal Code, the vibration criterion is 0.2 in/sec in PPV.

Based on the information provide in Table J, vibration levels are expected to approach 0.0004 PPV in/sec at the surrounding structures and would be well below the 0.2 PPV in/sec threshold.

Table J: Potential Construction Vibration Damage Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (PPV) at 25 feet[1]	Distance (feet)[2]	Vibration Level (PPV)
Residential/ Office Uses (North)	0.089	885	0.0004
Residences (East)		1,685	0.0002
Residences (Southwest)		1,620	0.0002

Source: Compiled by LSA (2022).

[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

PPV = peak particle velocity

Because construction activities are regulated by the HMC which states temporary construction, maintenance, or demolition activities are not allowed between the 7:00 p.m. on one day and 7:00 a.m. of the following day, vibration impacts would not occur during the more sensitive nighttime hours.

Other building structures surrounding the project site are farther away and would experience further reduced vibration. Therefore, no construction vibration impacts would occur. No vibration reduction measures are required.

LONG-TERM OFF-SITE TRAFFIC NOISE IMPACTS

The guidelines included in the Federal Highway Administration (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 K provides the traffic noise levels for the existing with and without project, and 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 *KISS Logistics Center Warehouse Traffic Impact Analysis* (EPD 2022). Appendix C provides the specific assumptions used in developing these noise levels and model printouts.

Table K shows that the increase in project-related traffic noise would be no greater than 1.6 dBA at existing industrial uses and no greater than 1.4 dBA at existing noise-sensitive residential uses. Noise level increases above 3.0 dBA may be perceptible to some people in an outdoor environment, but the expected increase is less than the readily perceptible threshold of 5.0 dBA. Therefore, traffic noise impacts from project-related traffic on off-site sensitive receptors would be less than significant, and no mitigation measures are required.

Table K: Noise Levels Without and With Proposed Project

Roadway Segment	Existing Without Project		Existing With Project			Opening Year		Opening Year With Project		
	ADT	CNEL (dBA) 50 feet from Centerline of Nearest Lane	ADT	CNEL (dBA) 50 feet from Centerline of Nearest Lane	Increase from Existing Conditions	ADT	CNEL (dBA) 50 feet from Centerline of Nearest Lane	ADT	CNEL (dBA) 50 feet from Centerline of Nearest Lane	Increase from Near-Term Conditions
Phelan Road West of US-395	16,930	77.3	18,950	78.9	1.6	26,670	79.2	28,690	80.7	1.5
Main Street East of US-395	18,520	77.6	19,160	79.0	1.4	31,920	80.0	32,140	81.2	1.2
US-395 North of Main Street	24,590	79.6	24,800	80.8	1.2	34,810	81.1	34,600	82.2	1.1
US-395 South of Main Street	22,060	79.1	22,320	79.3	0.2	29,320	80.3	30,490	81.7	1.4

Source: Compiled by LSA (January 2023).
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
Shaded cells indicate roadway segments adjacent to the project site.
ADT = average daily traffic
CNEL= Community Noise Equivalent Level
dBA = A-weighted decibels

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 HVAC equipment and truck delivery activities are discussed below. To provide a conservative analysis, it is assumed that operations would occur equally during all hours of the day and that half the 60 loading docks would be active at all times. Additionally, it is assumed that within the peak hour, consistent with the project's trip generation, 20 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 8-foot high screen walls and the building on-site. A graphic representation of the operational noise impacts is presented in Appendix D.

Heating, Ventilation, and Air Conditioning Equipment

The project is estimated to have eight (8) rooftop HVAC units on the proposed building to provide ventilation to the proposed office spaces. 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 feet, based on manufacturer data (Trane).

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]). 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 unloading activities could occur at half of the sixty (60) docks simultaneously for a period of more than 30 minutes in a given hour. Maximum noise levels that occur during the docking process taken by LSA were measured to be 86 dBA L_{max} at a distance of 20 feet.

Tables L and M below show the combined hourly noise levels generated by HVAC equipment and truck delivery activities at the closest off-site land uses. The project-related noise level impacts would range from 32.4 dBA L_{eq} to 35.4 dBA L_{eq} at the surrounding receptors. These levels would be below the City's exterior daytime and nighttime noise standards of 60 dBA L_{eq} and 55 dBA L_{eq} the residential land uses, respectively, as well as the 65 dBA L_{eq} standard for office uses anytime of day. Furthermore, because project noise levels would not exceed the current ambient noise level by 3 dBA or more, the impact would be less than significant, and no noise reduction measures are required.

Table L: Daytime Exterior Noise Level Impacts

Receptor	Direction	Daytime Noise Level Standard (dBA L_{eq})	Existing Quietest Daytime Noise Level (dBA L_{eq})	Project Generated Noise Levels (dBA L_{eq})	Potential Operational Noise Impact?[1]
Residential	East	60	48.8	35.4	No
Residential	Southwest	60	48.8	35.3	No
Residential / Office	North	60	48.8	32.5	No

Source: Compiled by LSA (2022).

[1] A potential operational noise impact would occur if (1) the quietest daytime ambient hour is less than 60 dBA L_{eq} and project noise impacts are greater than the applicable noise standard, OR (2) the quietest daytime ambient hour is greater than 60 dBA L_{eq} and project noise impacts are 3 dBA greater than the quietest daytime ambient hour.

dBA = A-weighted decibels

L_{eq} = equivalent noise level

Table M: Nighttime Exterior Noise Level Impacts

Receptor	Direction	Nighttime Noise Level Standard (dBA Leq)	Existing Quietest Nighttime Noise Level (dBA L_{eq})	Project Generated Noise Levels (dBA L_{eq})	Potential Operational Noise Impact?[1]
Residential	East	55	48.7	35.4	No
Residential	Southwest	55	48.7	35.3	No
Residential / Office	North	55	48.7	32.5	No

Source: Compiled by LSA (2022).

[1] A potential operational noise impact would occur if (1) the quietest nighttime ambient hour is less than 55 dBA Leq and project noise impacts are greater than 55 dBA Leq, OR (2) the quietest nighttime ambient hour is greater than 55 dBA Leq and project noise impacts are 3 dBA greater than the quietest nighttime ambient hour.

dBA = A-weighted decibels

L_{eq} = equivalent noise level

BEST CONSTRUCTION PRACTICES

In addition to compliance with the HMC allowed hours of construction of 7:00 a.m. to 7:00 p.m., the following best construction practices would further minimize construction noise impacts:

- The project construction contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained noise mufflers consistent with manufacturer's standards.
- The project construction contractor shall locate staging areas away from off-site sensitive uses during the later phases of project development.
- The project construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site whenever feasible.

REFERENCES

City of Hesperia. 2010. *City of Hesperia General Plan*.

_____. 2023. *Municipal Code*. January.

EPD Solutions, Inc. 2022. *KISS Logistics Center Warehouse Traffic Impact Analysis.* November.

Federal Highway Administration (FHWA). 2006. *Roadway Construction Noise Model User's Guide.* January. Washington, D.C. Website: https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf (accessed January 2023).

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual*. Office of Planning and Environment. Report No. 0123. September.

Harris, Cyril M., editor. 1991. *Handbook of Acoustical Measurements and Noise Control*. Third Edition.

LSA Associates, Inc. (LSA). 2016. *Operational Noise Impact Analysis for Richmond Wholesale Meat Distribution Center*. May.

Trane. n.d. *Fan Performance - Product Specifications RT-PRC023AU-EN.*

United States Environmental Protection Agency (EPA). 1978. *Protective Noise Levels, Condensed Version of EPA Levels Document*, EPA 550/9-79-100. November.

APPENDIX A

NOISE MONITORING SHEETS

Noise Measurement Survey – 24 HR

Project Number: ESL2201.52
Project Name: Kiss Logistics

Test Personnel: Kevin Nguyendo
Equipment: Spark 703 (SN:224)

Site Number: LT-1 Date: 11/21/22

Time: From 5:00 p.m. To 5:00 p.m.

Site Location: Located on the southwest corner of the West Main Villas apartment complex On 9800 Mesa Linda St, Hesperia, CA 92345 near a cactus.

Primary Noise Sources: Vehicle traffic noise on Main Street.

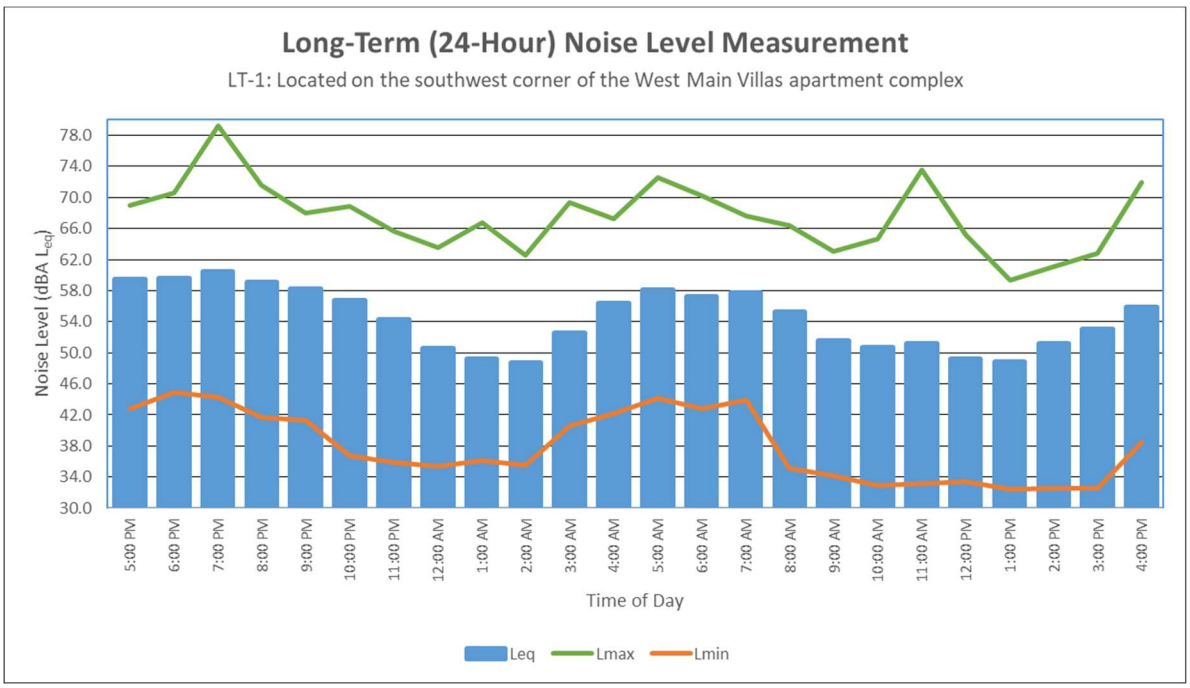
Comments:

Photo:

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

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
5:00 PM	11/21/22	59.5	69.0	42.8
6:00 PM	11/21/22	59.7	70.6	44.9
7:00 PM	11/21/22	60.4	79.2	44.3
8:00 PM	11/21/22	59.1	71.6	41.7
9:00 PM	11/21/22	58.2	68.0	41.3
10:00 PM	11/21/22	56.8	68.8	36.8
11:00 PM	11/21/22	54.3	65.6	35.9
12:00 AM	11/22/22	50.5	63.6	35.4
1:00 AM	11/22/22	49.2	66.7	36.1
2:00 AM	11/22/22	48.7	62.5	35.5
3:00 AM	11/22/22	52.5	69.4	40.6
4:00 AM	11/22/22	56.4	67.2	42.2
5:00 AM	11/22/22	58.1	72.5	44.2
6:00 AM	11/22/22	57.3	70.2	42.8
7:00 AM	11/22/22	57.7	67.6	43.9
8:00 AM	11/22/22	55.3	66.4	35.2
9:00 AM	11/22/22	51.6	63.0	34.2
10:00 AM	11/22/22	50.7	64.6	32.9
11:00 AM	11/22/22	51.2	73.5	33.2
12:00 PM	11/22/22	49.3	65.1	33.4
1:00 PM	11/22/22	48.8	59.3	32.4
2:00 PM	11/22/22	51.2	61.1	32.5
3:00 PM	11/22/22	53.0	62.8	32.5
4:00 PM	11/22/22	56.0	72.0	38.5

Source: Compiled by LSA Associates, Inc. (2022).
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: ESL2201.52
Project Name: Kiss Logistics

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

Site Number: LT-2 Date: 11/21/22

Time: From 5:00 p.m. To 5:00 p.m.

Site Location: Located southwest of the project site immediately across Phelan Road on a On a cactus.

Primary Noise Sources: Vehicle traffic noise on Phelan Road.

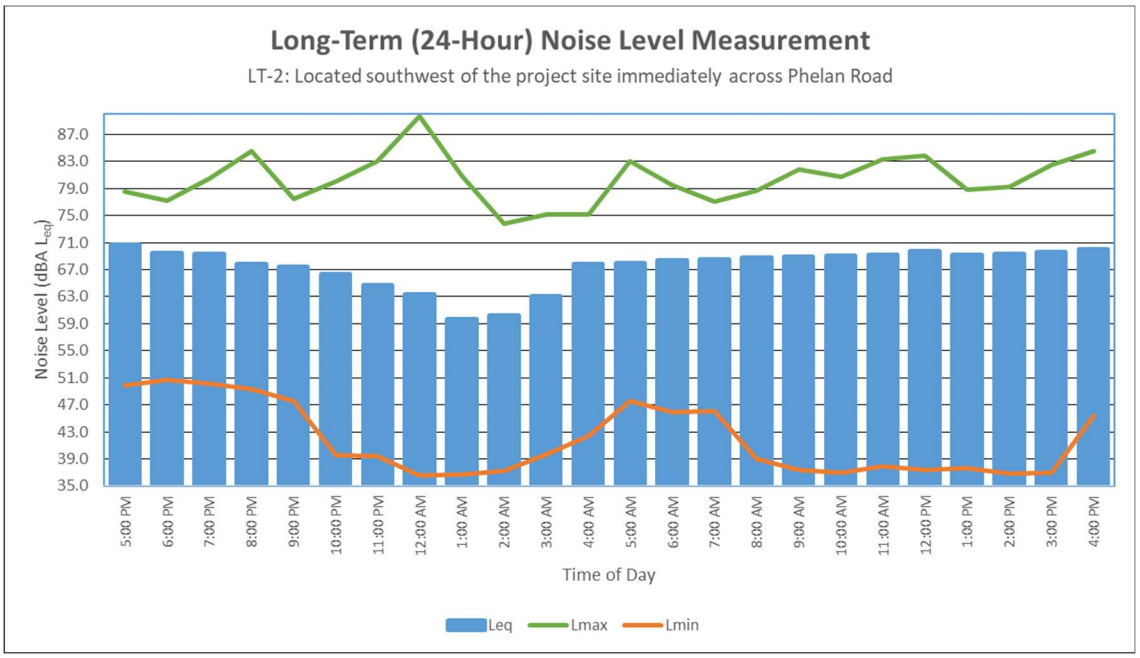
Comments:

Photo:

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

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
5:00 PM	11/21/22	70.7	78.5	49.9
6:00 PM	11/21/22	69.4	77.2	50.7
7:00 PM	11/21/22	69.3	80.4	50.2
8:00 PM	11/21/22	67.9	84.6	49.3
9:00 PM	11/21/22	67.3	77.4	47.5
10:00 PM	11/21/22	66.3	80.0	39.6
11:00 PM	11/21/22	64.7	83.1	39.4
12:00 AM	11/22/22	63.4	89.7	36.6
1:00 AM	11/22/22	59.6	80.8	36.7
2:00 AM	11/22/22	60.2	73.8	37.2
3:00 AM	11/22/22	63.0	75.1	39.7
4:00 AM	11/22/22	67.8	75.1	42.4
5:00 AM	11/22/22	68.0	83.1	47.6
6:00 AM	11/22/22	68.4	79.5	45.9
7:00 AM	11/22/22	68.5	77.0	46.1
8:00 AM	11/22/22	68.7	78.7	39.0
9:00 AM	11/22/22	68.9	81.8	37.3
10:00 AM	11/22/22	69.1	80.7	37.0
11:00 AM	11/22/22	69.2	83.3	37.9
12:00 PM	11/22/22	69.7	83.9	37.4
1:00 PM	11/22/22	69.2	78.8	37.6
2:00 PM	11/22/22	69.3	79.3	36.8
3:00 PM	11/22/22	69.5	82.5	36.9
4:00 PM	11/22/22	70.0	84.6	45.4

Source: Compiled by LSA Associates, Inc. (2022).
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	Leq
Dozer	3	82	40	50	0.5	82	83
Tractor	4	84	40	50	0.5	84	86
					Combined at 50 feet	**86**	**88**

Phase: Grading

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Excavator	2	81	40	50	0.5	81	80
Grader	1	85	40	50	0.5	85	81
Dozer	1	82	40	50	0.5	82	78
Scraper	2	84	40	50	0.5	84	83
Tractor	2	84	40	50	0.5	84	83
					Combined at 50 feet	**90**	**88**
					Combined at Receptor 1610 feet	**60**	**58**
					Combined at Receptor 2575 feet	**56**	**54**

Phase:Building Construstion

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	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**

Phase:Paving

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	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**

Phase:Architectural Coating

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

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 ROAD TRAFFIC NOISE MODEL

TABLE Existing -01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Phelan Road West of US-395
NOTES: KISS Logistics Center Warehouse Project - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 16930 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 77.26

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
395.5	1247.4	3943.3	12468.5

TABLE Existing -02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Main Street East of US-395
NOTES: KISS Logistics Center Warehouse Project - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18520 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 77.65

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
432.5	1364.5	4313.6	13639.4

TABLE Existing -03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 North of Main Street
NOTES: KISS Logistics Center Warehouse Project - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 24590 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 79.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
574.2	1815.2	5739.5	18148.4

TABLE Existing -04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 South of Main Street
NOTES: KISS Logistics Center Warehouse Project - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 22060 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 79.11

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
515.2	1628.5	5149.0	16281.2

TABLE Existing With Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Phelan Road West of US-395
NOTES: KISS Logistics Center Warehouse Project - Existing With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18950 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 78.91

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
578.1	1825.9	5772.7	18253.0

TABLE Existing With Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Main Street East of US-395
NOTES: KISS Logistics Center Warehouse Project - Existing With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 19160 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 78.96

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
584.5	1846.1	5836.6	18455.2

TABLE Existing With Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 North of Main Street
NOTES: KISS Logistics Center Warehouse Project - Existing With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 24800 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 80.78

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
757.4	2394.3	7570.8	23938.7

TABLE Existing With Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 South of Main Street
NOTES: KISS Logistics Center Warehouse Project - Existing With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2320 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.49

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
72.4	224.5	708.5	2239.7

TABLE Opening Year No Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Phelan Road West of US-395
NOTES: KISS Logistics Center Warehouse Project - Opening Year No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 26670 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 79.23

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
622.0	1964.7	6211.7	19641.3

TABLE Opening Year No Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Main Street East of US-395
NOTES: KISS Logistics Center Warehouse Project - Opening Year No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 31920 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 80.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
744.2	2351.4	7434.5	23507.6

TABLE Opening Year No Project-03

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 North of Main Street
NOTES: KISS Logistics Center Warehouse Project - Opening Year No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 34810 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 81.09

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
812.8	2569.6	8124.9	25690.8

TABLE Opening Year No Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 South of Main Street
NOTES: KISS Logistics Center Warehouse Project - Opening Year No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 29320 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	57.00	7.60	11.40
M-TRUCKS	9.00	1.20	1.80
H-TRUCKS	9.00	1.20	1.80

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 80.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
684.6	2164.3	6843.5	21639.1

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

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Phelan Road West of US-395
NOTES: KISS Logistics Center Warehouse Project - Opening Year With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 28690 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 80.71

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
874.6	2764.1	8739.5	27634.2

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

RUN DATE: 12/14/2022
ROADWAY SEGMENT: Main Street East of US-395
NOTES: KISS Logistics Center Warehouse Project - Opening Year With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 32140 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

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

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 81.21

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
979.7	3096.4	9790.4	30957.2

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

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 North of Main Street
NOTES: KISS Logistics Center Warehouse Project - Opening Year With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 34600 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 82.23

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
1056.5	3340.4	10562.3	33397.9

TABLE Opening Year With Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 12/14/2022
ROADWAY SEGMENT: US-395 South of Main Street
NOTES: KISS Logistics Center Warehouse Project - Opening Year With Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 30490 SPEED (MPH): 55 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	49.14	11.94	14.81
M-TRUCKS	7.23	1.37	1.84
H-TRUCKS	8.32	2.44	2.91

ACTIVE HALF-WIDTH (FT): 15 SITE CHARACTERISTICS: HARD

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 81.68

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
931.1	2943.6	9307.7	29430.9

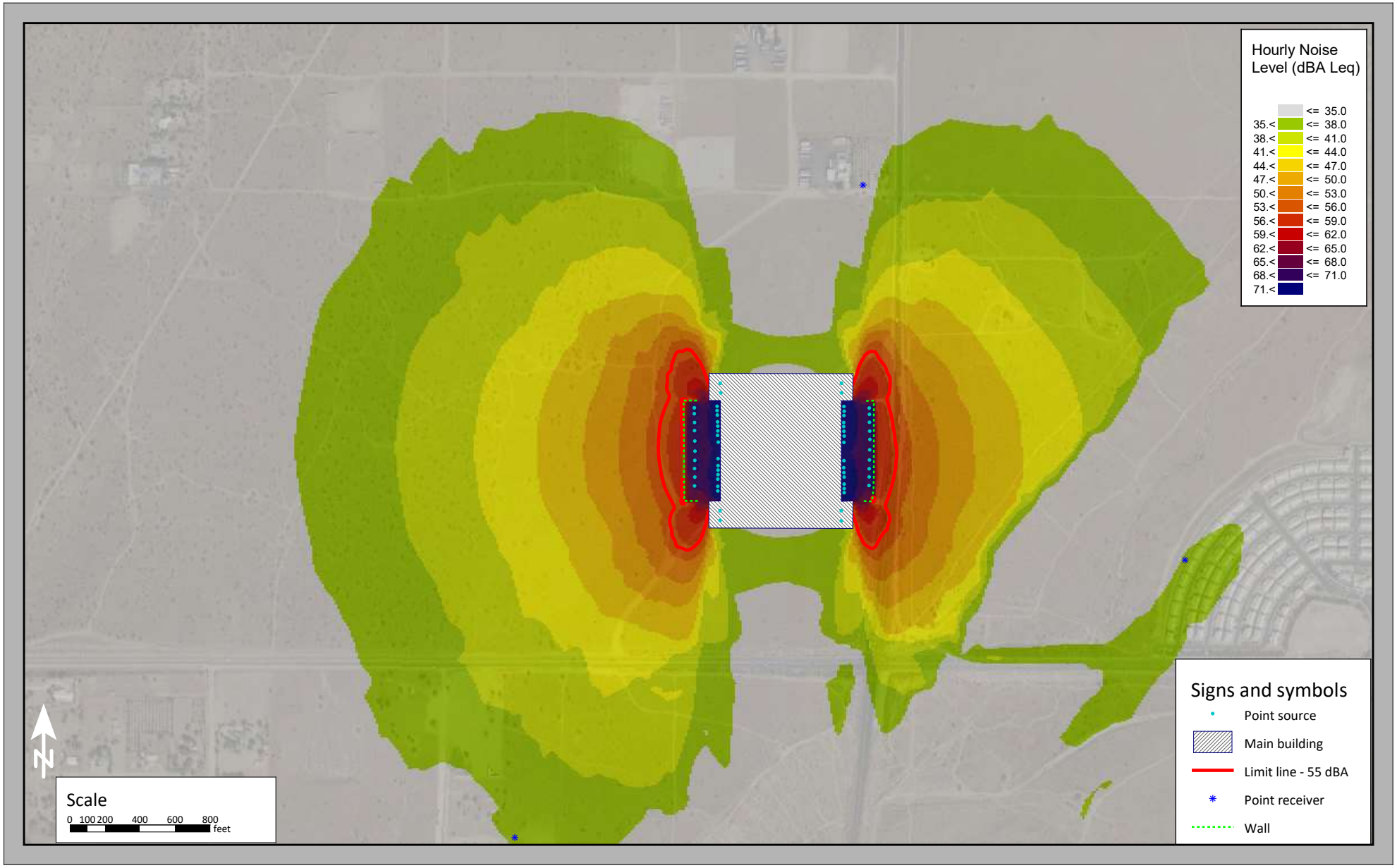
APPENDIX D

SOUNDPLAN NOISE MODEL PRINTOUTS

KISS Logistics

Project No. ESL2201.52

Project Operational Noise Levels



C:\Users\JStephens\OneDrive - LSA Associates\DESKTOP\SOUNDPLAN\ESL2201.52 - KISS Logistics\Sheet1.sgs - last edit 12/30/2022