Appendix M

Acoustical Assessment

Acoustical Assessment
Almond Avenue Warehouse Project
County of San Bernardino, California

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APPENDICES
Appendix A: Existing Ambient Noise Measurements

LIST OF ABBREVIATED TERMS

ADA	American Disability Act
APN	Assessor's Parcel Number
ADT	average daily traffic
dBA	A-weighted sound level
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CSMA	California Subdivision Map Act
CNEL	community equivalent noise level
L_{dn}	day-night noise level
dB	decibel
du/ac	dwelling units per acre
L_{eq}	equivalent noise level
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating ventilation and air conditioning
Hz	hertz
HOA	homeowner's association
in/sec	inches per second
L_{max}	maximum noise level
µPa	micropascals
L_{min}	minimum noise level
PPV	peak particle velocity
RMS	root mean square
sf	square feet
VdB	vibration velocity level

1 INTRODUCTION

This report documents the results of an Acoustical Assessment completed for the Almond Avenue Warehouse Project ("Project" or "proposed Project"). The purpose of this Acoustical Assessment is to evaluate the potential construction and operational noise and vibration levels associated with the Project and determine the level of impact the Project would have on the environment.

1.1 Project Location

The Project site is located directly east of Almond Avenue, directly north of the Whittram Avenue, west of Cherry Avenue, and south of Arrow Route Boulevard in the southwestern area of the San Bernardino County and within the City of Fontana's sphere of influence. The 9.5-acre site is located approximately three miles east of Interstate 10 (I-15), 3.6 miles south of the Foothill Freeway (SR-210), and 2.3 miles north of Christopher Columbus Transcontinental Highway (I-10); refer to **Exhibit 1: Regional Vicinity** and **Exhibit 2: Site Vicinity.**

1.2 Project Description

The Project is proposing to demolish one single family home and construct one warehouse building with ancillary office space and associated parking on approximately 9.5 acres. As shown in **Exhibit 3: Conceptual Site Plan**, the proposed Project would include one warehouse buildings for a total of approximately 185,866 square feet, 109 automobile parking spaces, 5 American Disability Act (ADA) parking spaces, and 42 trailer parking spaces. Vehicular access to the proposed Project would consist of two driveways on Almond Avenue.

Existing General Plan Land Use and Zoning Designations

The Project site and areas to the south, east, and west are zoned as Community Industrial (IC) which allows for light industrial uses and includes storage warehouses, offices, and a service garage. Properties north of the Project site are zoned Multiple Residential (RM). A single-family home is located to the north, adjacent to the Project site (see **Exhibit 2**).

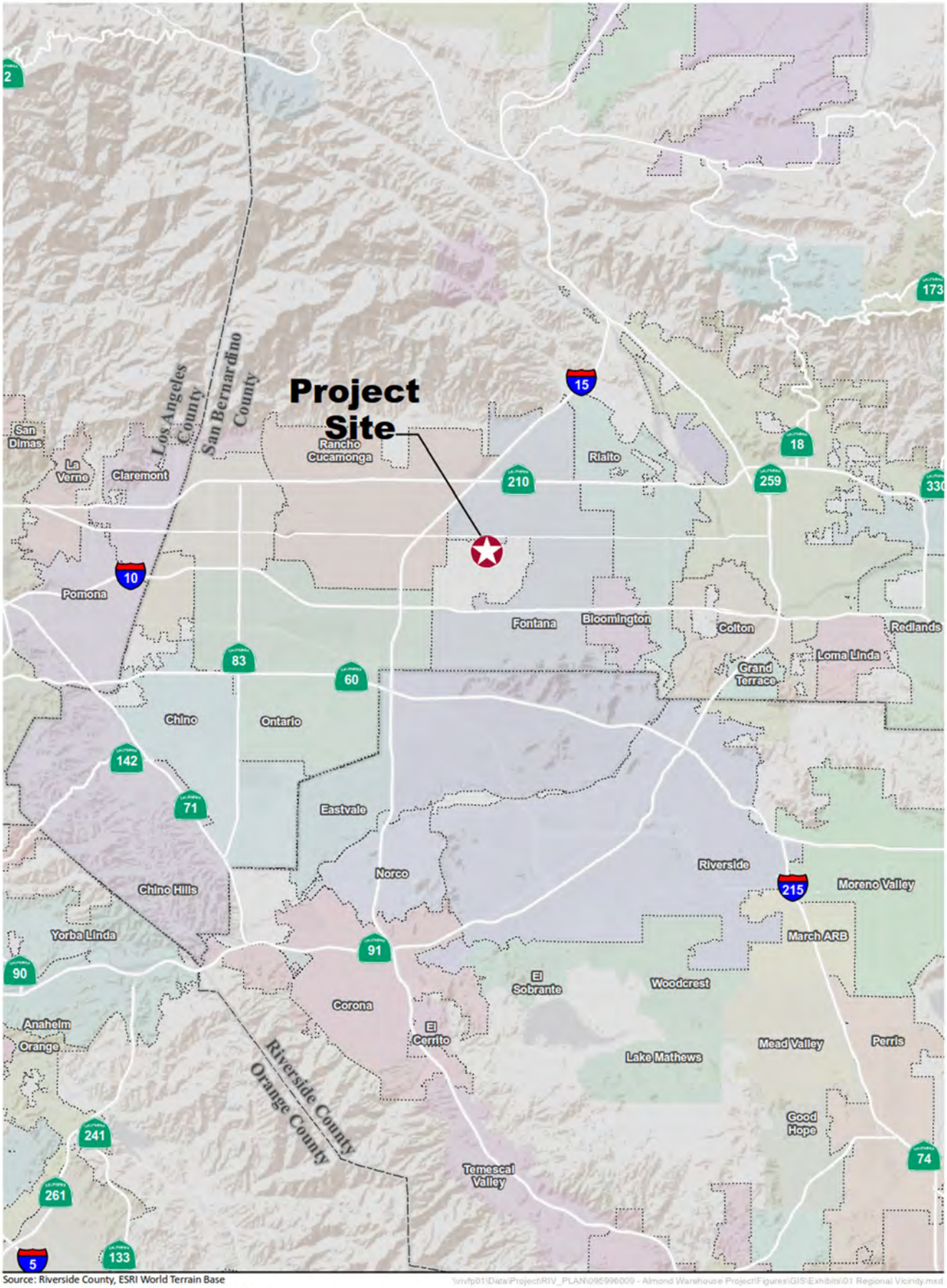
Warehouse Facility

The proposed Project consists of one warehouse building, including approximately 179,866 square feet of warehouse uses and 6,000 square feet of office, for a total of 185,866 square feet; refer to **Table 1: Building Summary**.

Table 1: Building Summary

Warehouse (sf)	Office (sf)	Total Building (sf)	Automobile Parking Stalls		Trailer Parking Stalls
			Required	Provided	Provided
179,866	6,000	185,866	99	114	42

Notes:
Square feet (sf)



Source: Riverside County, ESRI World Terrain Base

\\rivfp01\Data\Project\RIV_PLAN\095996009 - Almond Warehouse Project\Figures\GIS\Exhibits\01 Regional Vicinity.mxd

EXHIBIT 1: Regional Vicinity
Almond Avenue Warehouse

0 2.5 5
Miles

Kimley»Horn

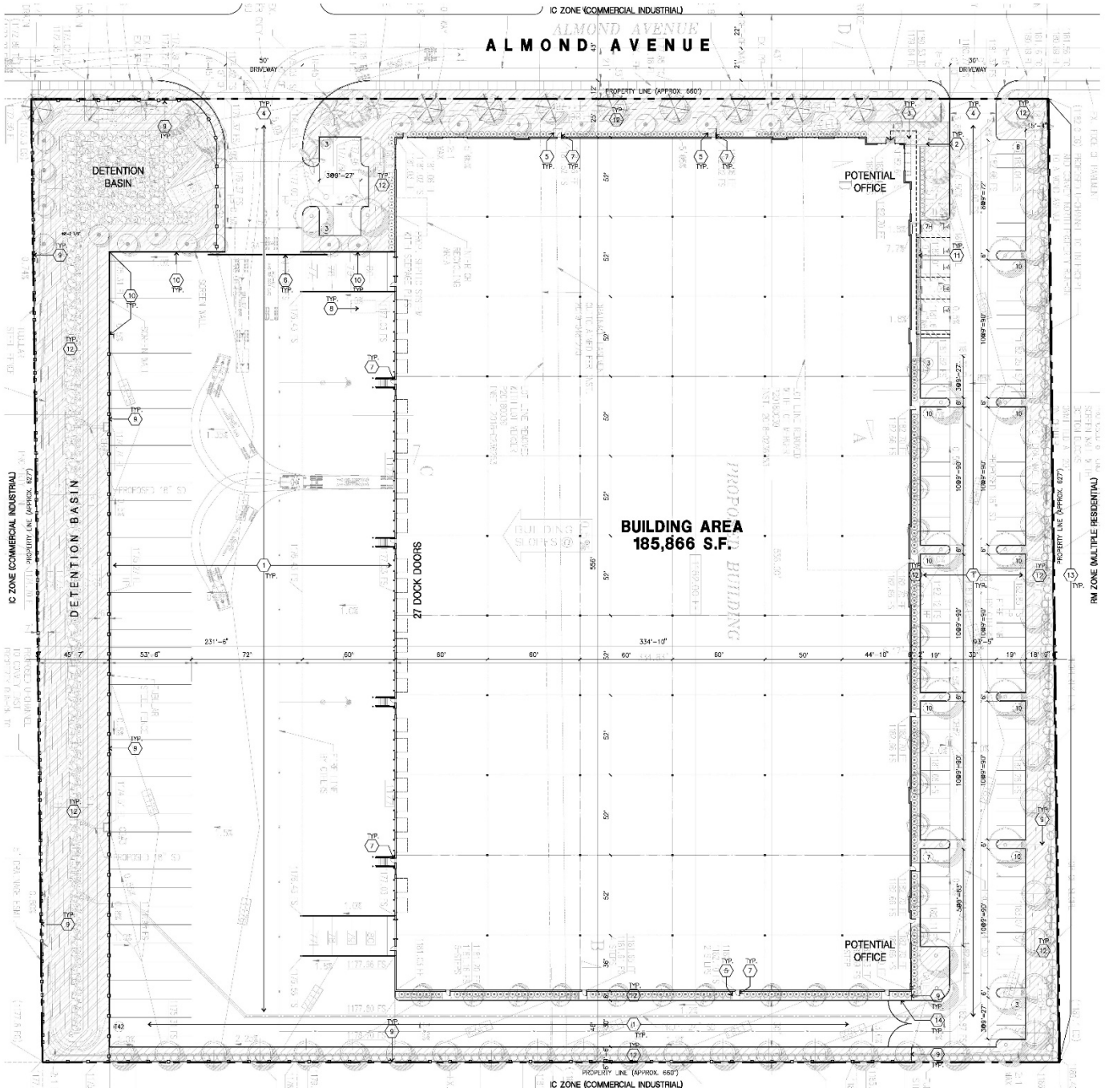
Source: NearMap - image dated 1-15-2020

\\nvtp01\Data\Project\RIV_PLAN\080\96009 - Almond Warehouse Project\Figures\GIS\Exhibits\02 Site Vicinity.mxd

EXHIBIT 2: Site Vicinity
Almond Avenue Warehouse

0 125 250
Feet

Kimley»Horn



Source: HPA Architecture, Scheme 8, 2020

EXHIBIT 3: Conceptual Site Plan
Almond Avenue Warehouse

Not to Scale

Kimley»Horn

Site Access

Vehicular access to the proposed Project would consist of two project driveways on Almond Avenue.

Parking

The Project provides 114 automobile parking stalls, exceeding the requirement of 99 automobile parking stalls. Additionally, 42 trailer parking stalls are provided.

2 ACOUSTIC FUNDAMENTALS

2.1 Sound and Environmental Noise

Acoustics is the science of sound. Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a medium (e.g. air) to human (or animal) ear. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or hertz (Hz).

Noise is defined as loud, unexpected, or annoying sound. In acoustics, the fundamental model consists of a noise source, a receptor, and the propagation path between the two. The loudness of the noise source, obstructions, or atmospheric factors affecting the propagation path, determine the perceived sound level and noise characteristics at the receptor. Acoustics deal primarily with the propagation and control of sound. A typical noise environment consists of a base of steady background noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These sources can vary from an occasional aircraft or train passing by to continuous noise from traffic on a major highway. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a large range of numbers. To avoid this, the decibel (dB) scale was devised. The dB scale uses the hearing threshold of 20 micropascals (µPa) as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels correspond closely to human perception of relative loudness. **Table 2: Typical Noise Levels** provides typical noise levels.

Table 2: Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	– 110 –	Rock Band
Jet fly-over at 1,000 feet		
	– 100 –	
Gas lawnmower at 3 feet		
	– 90 –	
Diesel truck at 50 feet at 50 miles per hour		Food blender at 3 feet
	– 80 –	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	**– 70 –**	Vacuum cleaner at 10 feet
Commercial area		Normal Speech at 3 feet
Heavy traffic at 300 feet	**– 60 –**	
		Large business office
Quiet urban daytime	**– 50 –**	Dishwasher in next room
Quiet urban nighttime	**– 40 –**	Theater, large conference room (background)
Quiet suburban nighttime		
	– 30 –	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	– 20 –	
		Broadcast/recording studio
	– 10 –	
Lowest threshold of human hearing	**– 0 –**	Lowest threshold of human hearing

Source: California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

Noise Descriptors

The dB scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The equivalent noise level (L_{eq}) is the average noise level averaged over the measurement period, while the day-night noise level (L_{dn}) and Community Equivalent Noise Level (CNEL) are measures of energy average during a 24-hour period, with dB weighted sound levels from 7:00 p.m. to 7:00 a.m. Most commonly, environmental sounds are described in terms of L_{eq} that has the same acoustical energy as the summation of all the time-varying events. Each is applicable to this analysis and defined in **Table 3: Definitions of Acoustical Terms**.

Table 3: Definitions of Acoustical Terms

Term	Definitions
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in µPa (or 20 micronewtons per square meter), where 1 pascals is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in dB as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g. 20 µPa). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level (dBA)	The sound pressure level in dB as measured on a sound level meter using the A-weighting filter network. 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.
Equivalent Noise Level (L_{eq})	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
Maximum Noise Level (L_{max}) Minimum Noise Level (L_{min})	The maximum and minimum dBA during the measurement period.
Exceeded Noise Levels (L_{01}, L_{10}, L_{50}, L_{90})	The dBA values that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day-Night Noise Level (L_{dn})	A 24-hour average L_{eq} with a 10 dBA weighting added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity at nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level (CNEL)	A 24-hour average L_{eq} with a 5 dBA weighting during the hours of 7:00 a.m. to 10:00 a.m. and a 10 dBA weighting added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

The A-weighted decibel (dBA) sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source.

A-Weighted Decibels

The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable and can be approximated by dBA values. There is a strong correlation between dBA and the way the human ear perceives sound. For this reason, the dBA has become the standard tool of environmental noise assessment. All noise levels reported in this document are in terms of dBA, but are expressed as dB, unless otherwise noted.

Addition of Decibels

The dB scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic dB is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than one source under the same conditions. Under the dB scale, three sources of equal loudness together would produce an increase of 5 dBA.

Sound Propagation and Attenuation

Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics. No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of 3 dB per doubling of distance is assumed.

Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The way older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in dBA, the following relationships should be noted:

- Except in carefully controlled laboratory experiments, a 1-dBA change cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A minimum 5-dBA change is required before any noticeable change in community response would be expected. A 5-dBA increase is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Effects of Noise on People

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise. The Occupational Safety and Health Administration has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over 8 hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise

and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. A noise level of about 55 dBA L_{dn} is the threshold at which a substantial percentage of people begin to report annoyance.[1]

2.2 Groundborne Vibration

Sources of groundborne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or man-made causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g. factory machinery) or transient (e.g. explosions). Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

Table 4: Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibrations, displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Table 4: Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibrations

Peak Particle Velocity (in/sec)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006-0.019	64-74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Recommended upper level to which ruins and ancient monuments should be subjected
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Virtually no risk of architectural damage to normal buildings
0.2	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
0.4-0.6	98-104	Vibrations considered unpleasant by people that are subjected to continuous vibrations and unacceptable to some people walking on bridges	Architectural damage and possibly minor structural damage

Source: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual*, 2013.

[1] Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, August 1992.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. Common sources for groundborne vibration are planes, trains, and construction activities such as earth-moving which requires the use of heavy-duty earth moving equipment. For the purposes of this analysis, a PPV descriptor with units of inches per second (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints.

3 REGULATORY SETTING

To limit population exposure to physically or psychologically damaging as well as intrusive noise levels, the Federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise.

3.1 State of California

California Government Code

California Government Code Section 65302(f) mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of "normally acceptable", "conditionally acceptable", "normally unacceptable", and "clearly unacceptable" noise levels for various land use types. Single-family homes are "normally acceptable" in exterior noise environments up to 60 CNEL and "conditionally acceptable" up to 70 CNEL. Multiple-family residential uses are "normally acceptable" up to 65 CNEL and "conditionally acceptable" up to 70 CNEL. Schools, libraries, and churches are "normally acceptable" up to 70 CNEL, as are office buildings and business, commercial, and professional uses.

Title 24 – Building Code

The State's noise insulation standards are codified in the California Code of Regulations, Title 24: Part 1, Building Standards Administrative Code, and Part 2, California Building Code. These noise standards are applied to new construction in California for interior noise compatibility from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are located near major transportation noise sources, and where such noise sources create an exterior noise level of 65 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new multi-family residential buildings, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.2 LOCAL

County of San Bernardino General Plan

The County of San Bernardino General Plan (County General Plan) Noise Element identifies noise-sensitive land uses and noise sources, defines areas of noise impact, and establishes goals and policies to ensure that County residents are protected from excessive noise. The following lists applicable noise goals and policies obtained from the General Plan*:*

Goal N 1: The County will abate and avoid excessive noise exposures through noise mitigation measures incorporated into the design of new noise-generating and new noise-sensitive land uses, while protecting areas within the County where the present noise environment is within acceptable limits.

Policy N 1.2: Ensure that new development of residential or other noise-sensitive land uses is not permitted in noise-impacted areas unless effective mitigation measurements are incorporated into the project design to reduce noise levels to the standards of Noise-sensitive land uses include residential uses, schools, hospitals, nursing homes, places of worship and libraries.

Policy N 1.4. Enforce the state noise insulation standards (California Administrative Code, Title 24) and Chapter 35 of the California Building Code (CBC).

Policy N 1.5. Enforce the hourly noise-level performance standards for stationary and other locally regulated sources, such as industrial, recreational, and construction activities as well as mechanical and electrical equipment.

Policy N 2.1. The County will require appropriate and feasible on-site noise attenuating measures that may include noise walls, enclosure of noise-generating equipment, site planning to locate noise sources away from sensitive receptors, and other comparable features.

Codified Ordinances of the County of San Bernardino

Chapter 83.01, Section 83.01.080, Noise, of the Codified Ordinances of the County of San Bernardino (San Bernardino County Code) establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses. The following sections of the San Bernardino County Code are applicable to the proposed project.

§ 83.01.080 – Noise.

(c) Noise Standards for Stationary Noise Sources.

*(1) Noise Standards. Table 83-2 (*Table 5: Noise Standards for Stationary Noise Sources*) describes the noise standards for emanations from a stationary noise source, as it affects adjacent properties:*

Table 5: Noise Standards for Stationary Sources

Affected Land Uses (*Receiving Noise*)	**7:00 a.m. – 10:00 p.m. L_{eq}**	**10:00 p.m. – 7 :00 a.m. L_{eq}**
Residential	55 dB(A)	45 dB(A)
Professional Services	55 dB(A)	55 dB(A)
Other Commercial	60 dB(A)	60 dB(A)
Industrial	70 dB(A)	70 dB(A)

Notes:
L_{eq} = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically one, eight or 24 hours.
dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.
L_{dn} = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10:00 p.m. to 7:00 a.m.). In this way L_{dn} takes into account the lower tolerance of people for noise during nighttime periods.

Source: San Bernardino County Code Section 83.01.080, Table 83-2.

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

(A) The noise standard for the receiving land use as specified in Subdivision (b) (Noise-Impacted Areas), above, for a cumulative period of more than 30 minutes in any hour.

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

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

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

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

*(d) Noise Standards for Adjacent Mobile Noise Sources. Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 83-3 (*Table 6: Noise Standards for Adjacent Mobile Noise Sources*).*

(e) Increases in Allowable Noise Levels. If the measured ambient level exceeds any of the first four noise limit categories in Subdivision (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subdivision (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

(f) Reductions in Allowable Noise Levels. If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 83-2 (Noise Standards for Stationary Noise Sources) shall be reduced by five dB(A).

(g) Exempt Noise. The following sources of noise shall be exempt from the regulations of this Section:

(1) Motor vehicles not under the control of the commercial or industrial use.

(2) Emergency equipment, vehicles, and devices.

(3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

Table 6: Noise Standards for Adjacent Mobile Noise Sources			
Land Use		**L_{dn} (or CNEL) dB(A)[4]**	
Categories	**Uses**	**Interior[1]**	**Exterior[2]**
Residential	Single and multi-family, duplex, mobile homes	45	60[3]
Commercial	Hotel, motel, transient housing	45	60[3]
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

Notes: N/A: Not Applicable; L_{dn}: average day/night sound level; CNEL: Community Noise Equivalent Level; dBA: A-weighted decibel scale

1. The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.
2. The outdoor environment shall be limited to:
   - Hospital/office building patios
   - Hotel and motel recreation areas
   - Mobile home parks
   - Multi-family private patios or balconies
   - Park picnic areas
   - Private yard of single-family dwellings
   - School playgrounds
3. An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.
4. CNEL = (Community Noise Equivalent Level). The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m.

Source: San Bernardino County Code, Section 83.01.080, Table 83-3.

§ 83.01.090 Vibration.

(a) Vibration Standard. 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 inches per second measured at or beyond the lot line.

(b) Vibration Measurement. Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line next to a parcel within a residential, commercial and industrial land use zoning district.

(c) Exempt Vibrations. The following sources of vibration shall be exempt from the regulations of this Section.

(1) Motor vehicles not under the control of the subject use.

(2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

City of Fontana General Plan

Adopted on November 13, 2018, the Fontana Forward General Plan Update 2015-2035 (Fontana General Plan) identifies noise standards that are used as guidelines to evaluate transportation noise level impacts. These standards are also used to assess the long-term traffic noise impacts on specific land uses. According to the Fontana General Plan, land uses such as residences have acceptable exterior noise levels of up to 65 dBA CNEL. Based on the guidelines in the Fontana General Plan, an exterior noise level of 65 dBA CNEL is generally considered the maximum exterior noise level for sensitive receptors.

Land uses near these significant noise-producers can incorporate buffers and noise control techniques including setbacks, landscaping, building transitions, site design, and building construction techniques to reduce the impact of excessive noise. Selection of the appropriate noise control technique would vary depending on the level of noise that needs to be reduced as well as the location and intended land use. The City has adopted the Noise and Safety Element as a part of the updated Fontana General Plan. The Noise and Safety Element specifies the maximum allowable unmitigated exterior noise levels for new developments impacted by transportation noise sources. Additionally, the Noise and Safety Element identifies transportation noise policies designed to protect, create, and maintain an environment free of harmful noise that could impact the health and welfare of sensitive receptors. The following Fontana General Plan goals, policies, and actions for addressing noise are applicable to the Project:

Goal 8: The City of Fontana protects sensitive land uses from excessive noise by diligent planning through 2035.

Policy 8.2: Noise-tolerant land uses shall be guided into areas irrevocably committed to land uses that are noise-producing, such as transportation corridors.

Policy 8.4: Noise spillover or encroachment from commercial, industrial and educational land uses shall be minimized into adjoining residential neighborhoods or noise-sensitive uses.

Action C: The State of California Office of Planning and Research General Plan Guidelines shall be followed with respect to acoustical study requirements.

Goal 9: The City of Fontana provides a diverse and efficiently operated ground transportation system that generates the minimum feasible noise on its residents through 2035.

Policy 9.1: All noise sections of the State Motor Vehicle Code shall be enforced.

Policy 9.2: Roads shall be maintained such that the paving is in good condition and free of cracks, bumps, and potholes.

Action A: On-road trucking activities shall continue to be regulated in the City to ensure noise impacts are minimized, including the implementation of truck-routes based on traffic studies.

Action B: Development that generates increased traffic and subsequent increases in the ambient noise level adjacent to noise-sensitive land uses shall provide appropriate mitigation measures.

Action D: Explore the use of "quiet pavement" materials for street improvements.

Goal 10: Fontana's residents are protected from the negative effects of "spillover" noise.

Policy 10.1: Residential land uses and areas identified as noise-sensitive shall be protected from excessive noise from non-transportation sources including industrial, commercial, and residential activities and equipment.

Action A: Projects located in commercial areas shall not exceed stationary-source noise standards at the property line of proximate residential or commercial uses.

Action B: Industrial uses shall not exceed commercial or residential stationary source noise standards at the most proximate land uses.

Action C: Non-transportation noise shall be considered in land use planning decisions.

Action D: Construction shall be performed as quietly as feasible when performed in proximity to residential or other noise sensitive land uses.

City of Fontana Municipal Code

Standards established under the City of Fontana Municipal Code (Fontana Municipal Code) are used to analyze noise impacts originating from the Project. Operational noise impacts are typically governed by Fontana Municipal Code Sections 18-61 through 18-67. However, the City currently relies on delineated general industrial areas. According to the General Plan Noise and Safety section, these areas are buffered from residential uses through land use zoning that places either light industrial or commercial uses between the major manufacturers involved in heavy industrial uses and local residents. This separation of land uses meaning noise intrusion on conforming land uses is not a problem at this time.

Guidelines for non-transportation and stationary noise source impacts from operations at private properties are found in the Zoning and Development Code in Chapter 30 of the Fontana Municipal Code. Applicable guidelines indicate that no person shall create or cause any sound exceeding the City's stated noise performance standards measured at the property line of any residentially zoned property. Per Fontana Municipal Code Section 30-543(A), the performance standards for exterior noise emanating from industrial uses are 65 dBA between the hours of 7:00 a.m. and 10:00 p.m. and 70 dBA during the noise-sensitive hours of 10:00 p.m. to 7:00 a.m. at residential uses. However, the nighttime performance standard in Section 30-543(A) should actually reference 65 dBA instead of the 70 dBA that is listed. For this analysis, a 65-dBA nighttime noise level standard is conservatively used to analyze potential noise impacts at off-site residential receptors within the City of Fontana.

The City has also set restrictions to control noise impacts from construction activities. Section 18-63(b)(7) states that the erection (including excavation), demolition, alteration, or repair of any structure shall only occur between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays, except in the case of urgent necessity or otherwise approved by the City of Fontana. Although the Fontana Municipal Code limits the hours of construction, it does not provide specific noise level performance standards for construction.

4 EXISTING CONDITIONS

4.1 Existing Noise Sources

Mobile Sources

Surrounding land uses include residential uses and vacant land to the north; industrial uses to the east; industrial uses and vacant land to the south; and industrial and residential uses to the west. The existing mobile noise sources in the Project area are mostly generated by motor vehicles traveling along Arrow Route to the north and Cherry Avenue to the east, as well as along Almond Avenue and Whittram Avenue to the west and south, respectively. The Fontana General Plan has identified vehicular transportation as the most significant source of noise within the City. The Community Mobility Circulation Element of the Fontana General Plan has identified Arrow Route as a Primary Highway, Cherry Avenue as a Modified Major Highway, Almond Avenue as an Industrial Collector, and Whittram Avenue as a Secondary Highway. The City's Noise and Safety Element says the City's major streets, such as Arrow Route and Cherry Avenue, have higher noise levels than residential blocks. According to the Fontana General Plan, the highest levels of noise are less than 60 dBA, which is below the City's 65 dBA threshold for external noise impacts on residential areas. Other mobile noise sources in the Project vicinity include train pass-bys and horns from the Metrolink Passenger Rail.

Stationary Sources

The primary sources of stationary noise in the Project vicinity are those associated with the operations of adjacent warehouse uses to the east, south, and west of the Project site as well as race events at the Auto Club Speedway to the south of the Project site. The noise associated with these sources may represent a single-event noise occurrence or short-term noise. Other noises include mechanical equipment (e.g., heating ventilation and air conditioning [HVAC] equipment), domestic animals (e.g., dogs barking, etc.), idling vehicles, and residents talking.

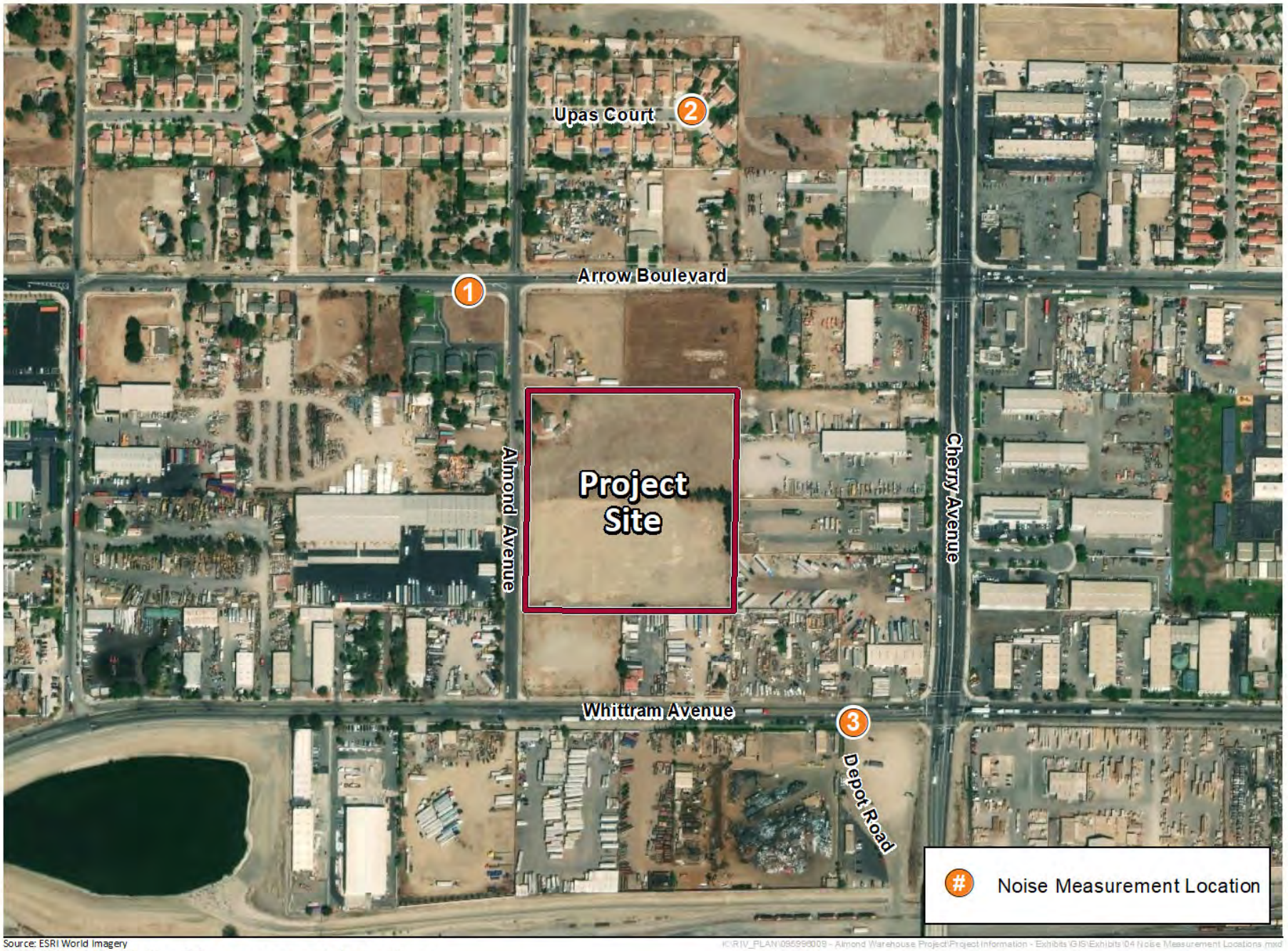
4.2 Noise Measurements

To quantify existing ambient noise levels in the Project area, Kimley-Horn conducted three short-term noise measurements on February 20, r2020; see **Appendix A: Existing Ambient Noise Measurements**. The noise measurement sites were representative of typical existing noise exposure within and immediately adjacent to the Project site. The 10-minute measurements were taken between 11:05 a.m. and 12:03 p.m. near potential sensitive receptors. Short-term L_{eq} measurements are considered representative of the noise levels throughout the day. The average noise levels and sources of noise measured at each location are listed in **Table 7: Existing Noise Measurements** and shown on **Exhibit 4: Noise Measurement Locations**.

Table 7: Existing Noise Measurements

Site	Location	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Time
1	Adjacent to the southwest corner of the Arrow Route and Almond Avenue intersection, near single-family residential uses.	66.4	44.0	78.0	11:05 a.m.
2	Residential cul-de-sac along Upas Court.	49.7	38.5	64.7	11:35 a.m.
3	Along Whittram Avenue to the southeast of the Project site.	67.5	62.7	76.8	11:53 a.m.

Source: Noise measurements taken by Kimley-Horn, February 20, 2020. See Appendix A for noise measurement results.



Source: ESRI World Imagery

K:\RIV_PLAN\096996009 - Almond Warehouse Project\Project Information - Exhibits\GIS\Exhibits\04 Noise Measurement Locations.mxd

EXHIBIT 4: Noise Measurement Locations
Almond Avenue Warehouse

0 200 400
Feet

Kimley»Horn

4.3 Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. Noise sensitive uses typically include residences, hospitals, schools, childcare facilities, and places of assembly. Vibration sensitive receivers are generally similar to noise sensitive receivers but may also include businesses, such as research facilities and laboratories that use vibration-sensitive equipment. Sensitive receptors near the Project site consist mostly of single-family and multi-family residences, religious institutions, and educational institutions. Sensitive land uses nearest to the Project are shown in **Table 8: Sensitive Receptors**.

Table 8: Sensitive Receptors

Receptor Description	Distance and Direction from the Project
Single-Family Residential Home	Adjacent to the north
Single-Family Residential Home	75 feet to the west
Single-Family Residential Community	450 feet to the northwest
Miniserios Tesoros Escondidos	750 feet to the northeast
Single-Family Residential Community	1,000 feet to the north
Redwood Elementary School	1,500 feet to the east
Hacienda Mobile Park	2,000 feet to the north
Almond Elementary School	2,100 feet to the north
Single-Family Residential Community	2,300 feet to the east
Red Arrow Kennels	2,400 feet to the east
Fontana Christian Center	2,400 feet to the east

Source: Google Earth, 2020

5 SIGNIFICANCE CRITERIA AND METHODOLOGY

5.1 CEQA Thresholds

Appendix G of the California Environmental Quality Act (CEQA) Guidelines contains analysis guidelines related to noise impacts. These guidelines have been used by the City to develop thresholds of significance for this analysis. A project would create a significant environmental impact if it would:

- Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

- Generate excessive groundborne vibration or groundborne noise levels; and

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

5.2 Methodology

This analysis of the Existing and With Project noise environments is based on noise prediction modeling and empirical observations. Construction noise levels were based on typical noise levels generated by construction equipment published by the Federal Transit Administration. Reference noise levels are used to estimate operational noise levels at nearby sensitive receptors based on a standard noise attenuation rate of 6 dB per doubling of distance (line-of-sight method of sound attenuation for point sources of noise). Noise level estimates do not account for the presence of intervening structures or topography, which may reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a conservative, reasonable worst-case estimate of actual temporary construction noise.

Groundborne vibration levels associated with construction-related activities for the Project were evaluated utilizing typical groundborne vibration levels associated with construction equipment, obtained from Federal Transit Administration (FTA) published data for construction equipment. Potential groundborne vibration impacts related to structural damage and human annoyance were evaluated, considering the distance from construction activities to nearby land uses and typically applied criteria for structural damage and human annoyance.

6 POTENTIAL IMPACTS AND MITIGATION

6.1 Acoustical Impacts

Threshold 6.1 Would the Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction

Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g. land clearing, grading, excavation, paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. During construction, exterior noise levels could affect the residential neighborhoods surrounding the construction site. Project construction would occur adjacent to an existing single-family residence to the north and multi-family residential uses to the west, with the closest receptors being approximately 60 feet away from the Project construction area. However, it is acknowledged that construction activities would occur throughout the Project site and would not be concentrated at a single point near sensitive receptors.

Construction activities would include demolition, site preparation, grading, building construction, paving, and architectural coating. Such activities would require concrete/industrial saws, excavators, and dozers during demolition; dozers and tractors during site preparation; excavators, graders, and dozers during grading; cranes, forklifts, generators, tractors, and welders during building construction; pavers, rollers, mixers, and paving equipment during paving; and air compressors during architectural coating. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 to 4 minutes at lower power settings. Other primary sources of acoustical disturbance would be random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Typical noise levels associated with individual construction equipment are listed in **Table 9: Typical Construction Noise Levels**.

As shown in **Table 9**, exterior noise levels could affect the nearest existing sensitive receptors in the vicinity. Sensitive uses in the Project site vicinity include existing residential uses to the north and west. These sensitive receptors may be exposed to elevated noise levels during Project construction. However, construction noise would be acoustically dispersed throughout the Project site and not concentrated in one area near surrounding sensitive uses. Neither the County nor City (the project is within the City of Fontana's sphere of influence) establish quantitative construction noise standards. Instead, both jurisdictions establish limited hours of construction activities. San Bernardino County Code Section 83.01.080(g)(3) states that construction activities are exempt from the County's noise standards between the hours of 7:00 a.m. and 7:00 p.m. except Sunday sand Federal holidays, and Section 18-63(b)(7) of the Fontana Municipal Code allows construction between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays, except in the case of urgent necessity or otherwise approved by the City. All motorized equipment used in such activity shall be equipped with functioning mufflers as mandated by the state.

Table 9: Typical Construction Noise Levels		
Equipment	**Typical Noise Level (dBA) at 50 feet from Source**	**Typical Noise Level (dBA) at 100 feet from Source[1]**
Air Compressor	80	74
Backhoe	80	74
Compactor	82	76
Concrete Mixer	85	77
Concrete Pump	82	76
Concrete Vibrator	76	79
Crane, Derrick	88	76
Crane, Mobile	83	70
Dozer	85	82
Generator	82	77
Grader	85	79
Impact Wrench	85	76
Jack Hammer	88	79
Loader	80	79
Paver	85	82
Pile-driver (Impact)	101	74
Pile-driver (Sonic)	95	79
Pneumatic Tool	85	95
Pump	77	89
Roller	85	79
Saw	76	71
Scraper	85	84
Shovel	82	89
Truck	84	79
[1] Calculated using the inverse square law formula for sound attenuation: $dBA_2 = dBA_1+20Log(d_1/d_2)$ dBA_2 = estimated noise level at receptor; dBA_1 = reference noise level; d_1 = reference distance; d_2 = receptor location distance		
Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.		

Construction activities may also cause increased noise along site access routes due to movement of equipment and workers. Compliance with the San Bernardino County Code and Fontana Municipal Code would minimize impacts from construction noise, as construction would be limited to the County's and City's allowable construction hours. By following the local noise standards, Project construction activities would result in a less than significant noise impact.

Operations

Implementation of the proposed Project would create new sources of noise in the Project vicinity. The major noise sources associated with the Project that could potentially impact existing and future nearby residences include mechanical equipment (i.e. trash compactors, air conditioners, etc.); truck and loading dock operations (i.e. slow moving trucks on the site, maneuvering and idling trucks, equipment noise); parking areas (i.e. car door slamming, car radios, engine start-up, and car pass-by); and off-site traffic noise.

Mechanical Equipment

The Project site is surrounded by industrial uses to the east, south, and west. The nearest sensitive receptors are residences located approximately 50 feet north and 75 feet west of the Project site. Stationary noise sources from the proposed Project that could affect the nearby residential uses include mechanical equipment. Mechanical equipment (e.g., heating ventilation and air conditioning [HVAC]

equipment) typically generates noise levels of approximately 52 dBA at 50 feet.[2] As such, noise levels at the nearest sensitive receptor (a single-family residence 50 feet to the north of the Project site) would be approximately 52 dBA, which is below the County's and City's noise standards of 55 dBA and 65 dBA, respectively, for residential uses. Operation of mechanical equipment would not increase ambient noise levels beyond the acceptable compatible land use noise levels. Therefore, the proposed Project would result in a less than significant impact related to mechanical equipment noise levels.

Truck and Loading Dock Noise

During loading and unloading activities, noise would be generated by the trucks' diesel engines, exhaust systems, and brakes during low gear shifting' braking activities; backing up toward the docks; dropping down the dock ramps; and maneuvering away from the docks. Loading/unloading activities would occur on the southern portion of the proposed warehouse building in the southern portion of the Project site. Driveways and access to the site would occur along Almond Avenue. As noted above, Section 30-543(A) of the Fontana Municipal Code limits noise from industrial uses.

The proposed warehouse building includes dock-high doors for truck loading/unloading and manufacturing/light industrial operations. The dock-high doors are set back approximately 135 feet from the western property line and 400 feet from the nearest residences to the west of the Project site. Loading dock noise is approximately 68 dB at 50 feet.[3] Loading dock noise levels would be approximately 50 dB at the nearest receptors conservatively assuming a clear line of sight and no attenuation from intervening walls or structures. Furthermore, loading dock doors would also be surrounded with protective aprons, gaskets, or similar improvements that, when a trailer is docked, would serve as a noise barrier between the interior warehouse activities and the exterior loading area. This would attenuate noise emanating from interior activities, and as such, interior loading and associated activities would be permissible during all hours of the day. Therefore, noise levels associated with truck loading/unloading activities would not exceed the County's and City's noise standards of 55 dBA and 65 dBA, respectively, for residential uses.

Trucks at the Project site would also utilize backup alarms during loading/unloading activities. Backup alarms produce a typical noise level of 79 dB at 30 feet.[4] At 400 feet, backup alarm noise levels would be approximately 51.5 dB[5] and would be below the County's and City's noise standards of 55 dBA and 65 dBA, respectively, for residential uses. Therefore, noise levels from trucks and loading/unloading activities would not exceed any local noise standards and a less than significant impact would occur.

Parking Noise

The Project provides 110 automobile parking stalls, including five handicap stalls. The Project includes 37 trailer parking stalls. Parking is located on the northern and southern portions of the Project site. Nominal parking noise would occur within the on-site parking facilities. Traffic associated with parking lots is typically not of sufficient volume to exceed community noise standards, which are based on a time-averaged scale such as the CNEL scale. The instantaneous maximum sound levels generated by a car door

[2] Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, 2015.
[3] Charles M. Salter Associates, Inc., *Midpoint at 237 Loading Dock Noise Study,* March 27, 2014.
[4] Ibid.
[5] Based on the inverse square law for sound attenuation, and assuming a minimum of 5 dB noise reduction from the intervening warehouse building on the proposed Project site (FHWA, 2006).

slamming, engine starting up, and car pass-bys range from 53 to 61 dBA[6] and may be an annoyance to adjacent noise-sensitive receptors. Conversations in parking areas may also be an annoyance to adjacent sensitive receptors. Sound levels of speech typically range from 33 dBA at 50 feet for normal speech to 50 dBA at 50 feet for very loud speech.[7] It should be noted that parking lot noises are instantaneous noise levels compared to noise standards in the hourly L_{eq} metric, which are averaged over the entire duration of a time period.

Additionally, parking noise also occurs at the adjacent properties to the east, south, and west under existing conditions. Parking and driveway noise would be consistent with existing noise in the vicinity and would be partially masked by background traffic noise from motor vehicles traveling along Arrow Route, Cherry Avenue, Almond Avenue, and Whittram Avenue. Actual noise levels over time resulting from parking activities are anticipated to be far below the local noise standards. Therefore, noise impacts associated with parking would be less than significant.

Off-Site Traffic Noise

Implementation of the Project would generate increased traffic volumes along nearby roadway segments. According to the *Almond Avenue Warehouse Vehicle Miles Traveled (VMT) Evaluation* prepared by Translutions (January 20, 2020), the proposed Project would generate 324 daily trips. The Project's increase in traffic would result in noise increases on Project area roadways. In general, a traffic noise increase of 3 dBA is barely perceptible to people, while a 5-dBA increase is readily noticeable. Traffic volumes on Project area roadways would have to approximately double for the resulting traffic noise levels to increase by 3 dBA.[8] According to the Community Mobility Circulation Element of the Fontana General Plan, average daily traffic (ADT) volumes along Foothill Boulevard (the nearest roadway with available ADT volumes) are 25,300 ADT. As such, the Project's vehicle trip generation (324 daily trips) would represent an increase of less than two percent in vehicle trips along Foothill Boulevard compared to existing conditions. Therefore, the proposed Project would not generate enough traffic to result in a permanent 3-dBA increase in ambient noise levels and traffic noise would not exceed any local standards. Impacts would be less than significant in this regard.

Mitigation Measures: No mitigation is required.

Level of Significance: Less than significant impact.

Threshold 6.2 Would the Project generate excessive groundborne vibration or groundborne noise levels?

Increases in groundborne vibration levels attributable to the proposed Project would be primarily associated with short-term construction-related activities. The Federal Transit Administration (FTA) has published standard vibration velocities for construction equipment operations in their 2018 *Transit Noise and Vibration Impact Assessment Manual*. The types of construction vibration impacts include human annoyance and building damage.

[6] Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), 3-10, 1991.

[7] Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, 2015.

[8] According to the California Department of Transportation, *Technical Noise Supplement to Traffic Noise Analysis Protocol* (September 2013), it takes a doubling of traffic to create a noticeable (i.e., 3 dBA) noise increase.

The FTA has published standard vibration velocities for construction equipment operations. The types of construction vibration impacts include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Ordinary buildings that are not particularly fragile would not experience any cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. For example, for buildings extremely susceptible to vibration damage (e.g., historic brick buildings, ruins, and ancient monuments, etc.) the FTA guidelines show that a vibration level of up to 0.12 in/sec is considered safe and would not result in any construction vibration damage. Based on the construction vibration guidance and criterion from the FTA Noise and Vibration Manual, a vibration level of 0.3 inch-per-second (in/sec) peak particle velocity (PPV) is used in this analysis to analyze potential significant vibration impacts for construction damage at off-site structures in the Project vicinity. A human annoyance criterion of 0.4 in/sec PPV is also utilized in accordance with California Department of Transportation (Caltrans) guidance.[9]

Table 10: Typical Construction Equipment Vibration Levels, lists vibration levels at 25 feet and 50 feet for typical construction equipment. Groundborne vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. As indicated in **Table 10**, based on FTA data, vibration velocities from typical heavy construction equipment operations that would be used during Project construction range from 0.003 to 0.089 in/sec PPV at 25 feet from the source of activity.

Table 10: Typical Construction Equipment Vibration Levels

Equipment	Peak Particle Velocity at 25 Feet (in/sec)	Peak Particle Velocity at 50 Feet (in/sec)[1]
Large Bulldozer	0.089	0.032
Caisson Drilling	0.089	0.032
Loaded Trucks	0.076	0.027
Jackhammer	0.035	0.012
Small Bulldozer/Tractors	0.003	0.001

[1] Calculated using the following formula: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$, where: PPV_{equip}=the peak particle velocity in in/sec of the equipment adjusted for the distance; PPV_{ref} = the reference vibration level in in/sec; D = the distance from the equipment to the receiver.

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

The nearest off-site structure is a building located approximately 50 feet south of the Project site on an industrial property. As shown in **Table 10**, at 50 feet, construction equipment vibration velocities would not exceed 0.032 in/sec PPV, which is below the FTA's 0.2 PPV threshold and Caltrans' 0.4 in/sec PPV threshold for human annoyance. It is also acknowledged that construction activities would occur throughout the Project site and would not be concentrated at the point closest to the nearest off-site structure. Therefore, vibration impacts associated with the proposed Project would be less than significant.

[9] California Department of Transportation, *Transportation and Construction Vibration Guidance Manual, Table 20*, September 2013.

Mitigation Measures: No mitigation is required.

Level of Significance: Less than significant impact.

Threshold 6.3 For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?

The closest airport to the Project site is the Ontario International Airport located approximately 5.3 miles to the southwest. The Project is not within 2.0 miles of a public airport or within an airport land use plan. Additionally, there are no private airstrips located within the Project vicinity. Therefore, the Project would not expose people residing or working in the Project area to excessive airport- or airstrip-related noise levels and no mitigation is required.

Mitigation Measures: No mitigation is required.

Level of Significance: Less than significant impact.

6.2 Cumulative Noise Impacts

The Project's construction activities would not result in a substantial temporary increase in ambient noise levels. Construction activities are permitted between the allowable hours specified by the City and County and are prohibited on Sundays and Federal holidays. There would be periodic, temporary, noise impacts that would cease upon completion of construction activities. The Project would contribute to other proximate construction Project noise impacts if construction activities were conducted concurrently. However, based on the noise analysis above, the Project's construction-related noise impacts would be less than significant following compliance with the County General Plan and San Bernardino County Code. Given that noise dissipates as it travels away from its source, operational noise impacts from on-site activities and other stationary sources would be limited to the Project site and vicinity. Thus, cumulative operational noise impacts from related projects, in conjunction with Project specific noise impacts, would not be cumulatively significant.

Mitigation Measures: No mitigation is required.

Level of Significance: Less than significant impact.

7 REFERENCES

1. California Department of Transportation, *California Vehicle Noise Emission Levels*, 1987.
2. California Department of Transportation, *Traffic Noise Analysis Protocol*, 2011.
3. California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, 2013.
4. California Department of Transportation, *Transportation and Construction Vibration Guidance Manual*, 2013.
5. Charles M. Salter Associates, Inc., *Midpoint at 237 Loading Dock Noise Study,* March 27, 2014.
6. City of Fontana, *Fontana Forward General Plan Update 2015-2035*, November 13, 2018.
7. City of Fontana, *Municipal Code*, current through Ordinance No. 1820, adopted December 10, 2019. (Supp. No. 46).
8. County of San Bernardino, *County of San Bernardino 2007 General Plan*, amended April 24, 2014.
9. County of San Bernardino, *San Bernardino County, California Code of Ordinances*, current through Ord. 4230, passed February 25, 2014.
10. Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, 2015.
11. Federal Highway Administration, *Roadway Construction Noise Model*, 2006.
12. Federal Highway Administration, *Roadway Construction Noise Model User's Guide Final Report*, 2006.
13. Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, 1992.
14. Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.
15. Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), 3-10, 1991.
16. Translutions, Inc., *Almond Avenue Warehouse Vehicle Miles Traveled (VMT) Evaluation*, January 20, 2020.
17. United States Environmental Protection Agency, *Protective Noise Levels (EPA 550/9-79-100)*, 1979.

Appendix A

Existing Ambient Noise Measurements

Noise Measurement Field Data

Project:	Almond Warehouse Project San Bernardino	**Job Number:**	095996009
Site No.:	1	**Date:**	2/20/2020
Analyst:	Alex Howard	**Time:**	11:05 - 11:15 AM
Location:	Arrow St., Fontana		
Noise Sources:	Road noise		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
66.4	44.0	78.0	102.3

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	64
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	30.04" Hg
Humidity:	39%

Photo:

Kimley»Horn

Measurement Report

Report Summary

Meter's File Name	FONT_.001	Computer's File Name	SLM_0005586_FONT__001.00.ldbin
Meter	LxT SE		
Firmware	2.402		
User	Alex Howard	Location	
Description	Fontana		
Note			
Start Time	2020-02-20 11:05:34	Duration	0:10:00.0
End Time	2020-02-20 11:15:34	Run Time	0:10:00.0
		Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	66.4 dB		
LAE	94.2 dB	SEA	--- dB
EA	289.9 µPa²h		
LZ_{peak}	102.3 dB	2020-02-20 11:06:44	
LAS_{max}	78.0 dB	2020-02-20 11:15:21	
LAS_{min}	44.0 dB	2020-02-20 11:11:29	
LA_{eq}	66.4 dB		
LC_{eq}	71.8 dB	LC_{eq} - LA_{eq}	5.5 dB
LAI_{eq}	68.5 dB	LAI_{eq} - LA_{eq}	2.1 dB

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	66.4 dB	66.4 dB	0.0 dB

	LDEN	LDay	LEve	LNight
	66.4 dB	66.4 dB	--- dB	--- dB

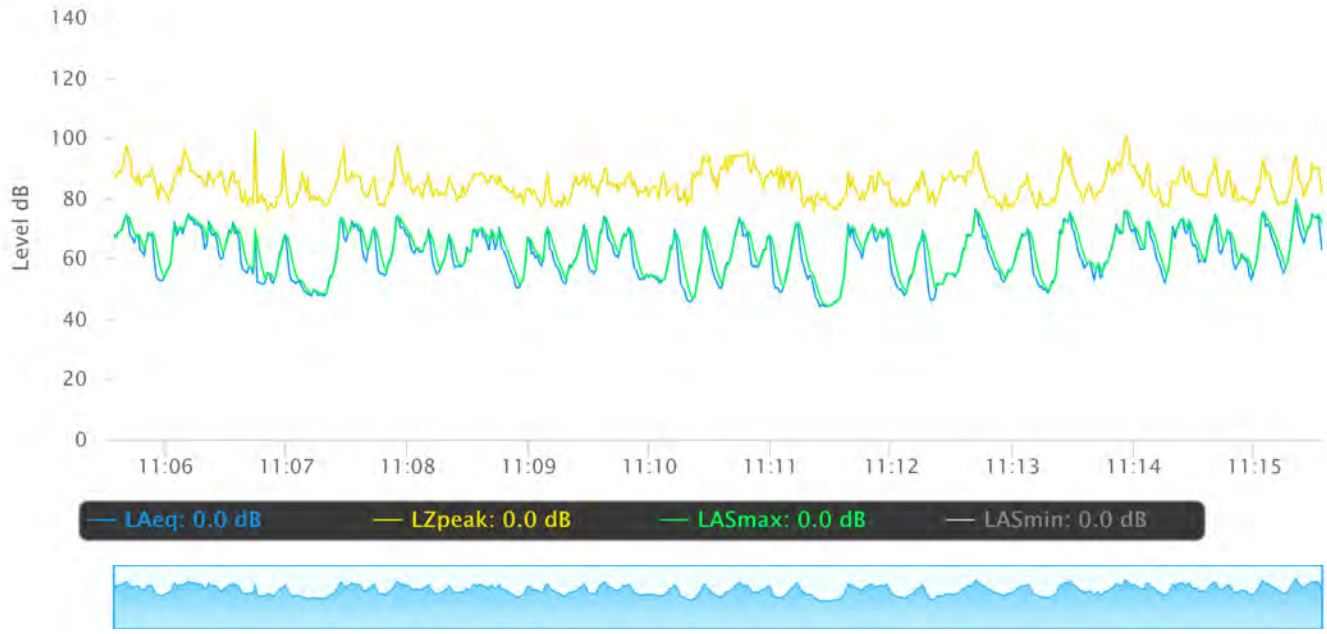
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	66.4 dB		71.8 dB		--- dB	
$LS_{(max)}$	78.0 dB	2020-02-20 11:15:21	--- dB		--- dB	
$LS_{(min)}$	44.0 dB	2020-02-20 11:11:29	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		102.3 dB	2020-02-20 11:06:44

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

Statistics

LAS 5.0	72.2 dB
LAS 10.0	70.6 dB
LAS 33.3	66.6 dB
LAS 50.0	62.6 dB
LAS 66.6	58.4 dB
LAS 90.0	52.2 dB

Time History



Noise Measurement Field Data

Project:	Almond Warehouse Project San Bernardino	**Job Number:**	095996009
Site No.:	2	**Date:**	2/20/2020
Analyst:	Alex Howard	**Time:**	11:35 - 11:45 AM
Location:	14383 Upas Court., Fontana		
Noise Sources:	Road noise, Chickens		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
49.7	38.5	64.7	101.4

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	68
Wind (mph):	< 5
Sky:	Partly Cloudy
Bar. Pressure:	30.08" Hg
Humidity:	39%

Photo:

Kimley»Horn

Measurement Report

Report Summary

Meter's File Name	FONT_.003	Computer's File Name	SLM_0005586_FONT__003.00.ldbin
Meter	LxT SE		
Firmware	2.402		
User	Alex Howard	Location	
Description	Fontana		
Note			
Start Time	2020-02-20 11:35:01	Duration	0:10:00.0
End Time	2020-02-20 11:45:01	Run Time	0:10:00.0
		Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	49.7 dB		
LAE	77.4 dB	SEA	--- dB
EA	6.2 µPa²h		
LZ_{peak}	101.4 dB	2020-02-20 11:35:28	
LAS_{max}	64.7 dB	2020-02-20 11:35:06	
LAS_{min}	36.5 dB	2020-02-20 11:42:54	
LA_{eq}	49.7 dB		
LC_{eq}	62.2 dB	LC_{eq} - LA_{eq}	12.5 dB
LAI_{eq}	54.8 dB	LAI_{eq} - LA_{eq}	5.1 dB

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	49.7 dB	49.7 dB	0.0 dB

	LDEN	LDay	LEve	LNight
	49.7 dB	49.7 dB	--- dB	--- dB

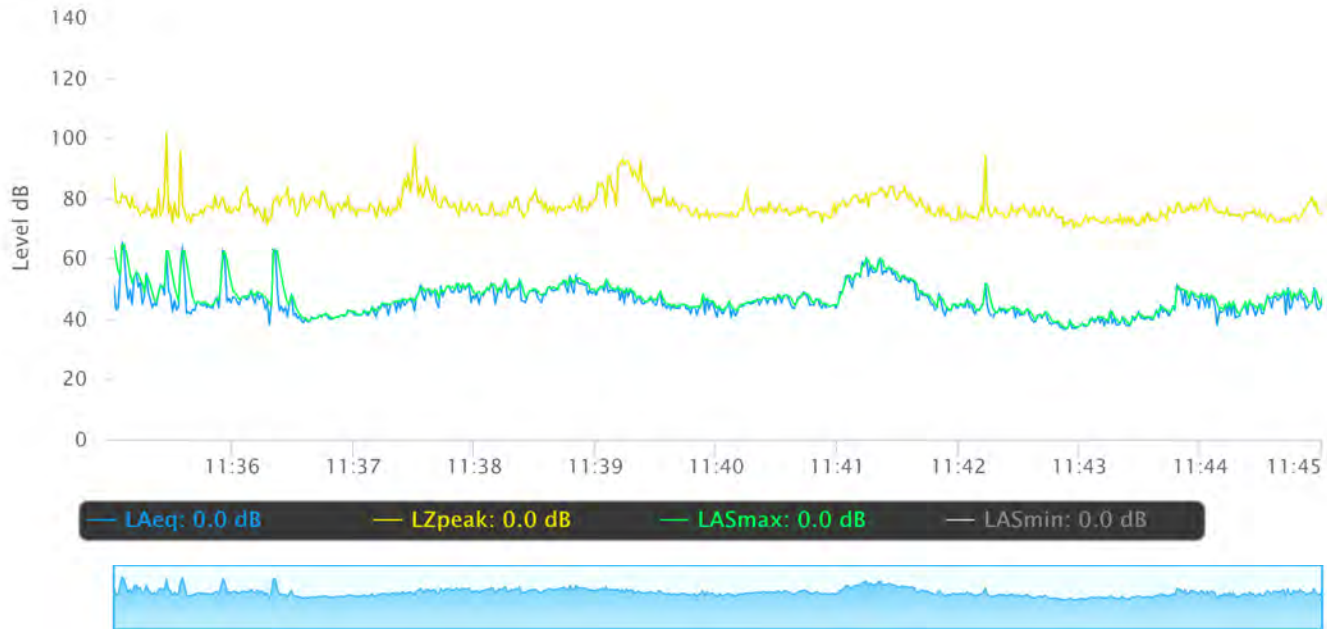
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	49.7 dB		62.2 dB		--- dB	
$LS_{(max)}$	64.7 dB	2020-02-20 11:35:06	--- dB		--- dB	
$LS_{(min)}$	36.5 dB	2020-02-20 11:42:54	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		101.4 dB	2020-02-20 11:35:28

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

Statistics

LAS 5.0	55.8 dB
LAS 10.0	52.6 dB
LAS 33.3	47.8 dB
LAS 50.0	45.7 dB
LAS 66.6	44.1 dB
LAS 90.0	40.4 dB

Time History



Noise Measurement Field Data

Project:	Almond Warehouse Project San Bernardino	**Job Number:**	095996009
Site No.:	3	**Date:**	2/20/2020
Analyst:	Alex Howard	**Time:**	11:53 AM - 12:03 PM
Location:	14480 Whittram Avenue		
Noise Sources:	Road noise, Truck engines running		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
67.5	62.7	76.8	102.3

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	69
Wind (mph):	< 5
Sky:	Partly Cloudy
Bar. Pressure:	30.08" Hg
Humidity:	39%

Photo:

Kimley»Horn

Measurement Report

Report Summary

Meter's File Name	FONT_.004	Computer's File Name	SLM_0005586_FONT__004.00.ldbin
Meter	LxT SE		
Firmware	2.402		
User	Alex Howard	Location	
Description	Fontana		
Note			
Start Time	2020-02-20 11:53:17	Duration	0:10:00.0
End Time	2020-02-20 12:03:17	Run Time	0:10:00.0
		Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	67.5 dB		
LAE	95.3 dB	SEA	--- dB
EA	372.3 µPa²h		
LZ_{peak}	102.3 dB	2020-02-20 11:57:16	
LAS_{max}	76.8 dB	2020-02-20 12:00:00	
LAS_{min}	62.7 dB	2020-02-20 11:55:34	
LA_{eq}	67.5 dB		
LC_{eq}	78.1 dB	LC_{eq} - LA_{eq}	10.6 dB
LAI_{eq}	68.4 dB	LAI_{eq} - LA_{eq}	0.9 dB

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	67.5 dB	67.5 dB	0.0 dB

	LDEN	LDay	LEve	LNight
	67.5 dB	67.5 dB	--- dB	--- dB

Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	67.5 dB		78.1 dB		--- dB	
$LS_{(max)}$	76.8 dB	2020-02-20 12:00:00	--- dB		--- dB	
$LS_{(min)}$	62.7 dB	2020-02-20 11:55:34	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		102.3 dB	2020-02-20 11:57:16

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

Statistics

LAS 5.0	72.8 dB
LAS 10.0	69.5 dB
LAS 33.3	66.5 dB
LAS 50.0	65.6 dB
LAS 66.6	65.0 dB
LAS 90.0	64.3 dB

Time History