Lake Creek Logistics Center

NOISE AND VIBRATION ANALYSIS

TOWN OF APPLE VALLEY

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TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
mph	Miles per hour
NAVISP	North Apple Valley Industrial Specific Plan
PPV	Peak Particle Velocity
Project	Lake Creek Logistics Center
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Lake Creek Logistics Center development (Project) in the Town of Apple Valley. The Project consists of the development of three industrial warehouse and distribution buildings totaling 3,480,736 square feet. This noise study has been prepared to satisfy applicable Town of Apple Valley noise standards and significance criteria based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

The results of this Noise and Vibration Analysis are summarized below based on the significance criteria in Section 4 of this report consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic Noise	7	*Potentially Significant*	*Significant and Unavoidable*
Operational Noise	9	*Less Than Significant*	-
Construction Noise	10	*Less Than Significant*	-
Nighttime Concrete Pour		*Less Than Significant*	-
Construction Vibration		*Less Than Significant*	-

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1 INTRODUCTION

This Noise and Vibration Analysis has been completed to determine the noise impacts associated with the development of the Lake Creek Logistics Center ("Project"). This noise and vibration analysis briefly describes the Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for noise analysis, evaluates the future exterior noise environment, potential off-site traffic impacts, the Project-related long-term stationary-source operational noise, and Project-related short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed Project is located within the North Apple Valley Industrial Specific Plan (NAVISP) and bounded by Gustine Street to the north, Central Road to the east, Corwin Road to the south, and the Apple Valley Airport to the west as shown on Exhibit 1-A. The nearest existing noise-sensitive residential use is located approximately 492 feet east of the Project site.

1.2 PROJECT DESCRIPTION

The Project consists of the development of three industrial warehouse and distribution buildings totaling 3,480,736 square feet. For the purposes of the Noise and Vibration Analysis, it is proposed that the Project mix will assume 10% general light industrial, 10% high-cube cold storage warehouse use, and 80% high-cube fulfillment center warehousing use. A preliminary site plan for the proposed Project is shown on Exhibit 1-B. The Project is anticipated to have an Opening Year of 2029.

1.3 NORTH APPLE VALLEY INDUSTRIAL SPECIFIC PLAN (NAVISP)

On October 24, 2006, the Town of Apple Valley adopted the North Apple Valley Industrial Specific Plan (NAVISP). (2) The NAVISP Environmental Impact Report (EIR) included an assessment of the noise environment in the Specific Plan study area included the preparation of a noise study by Urban Crossroads, Inc. (3) The noise study examined the existing noise environment in the Specific Plan study area and estimated the future noise impacts associated with Specific Plan buildout.

According to the NAVISP EIR (2), the primary sources of noise in the Specific Plan study area include vehicular traffic on highways and major arterials, railroad activities serving the nearby quarry, and general aviation aircraft noise from overhead flights and take-off and landings Apple Valley Airport. Noise is also related to mechanical and industrial activities associated with the currently limited development located within the Specific Plan study area.

EXHIBIT 1-A: LOCATION MAP

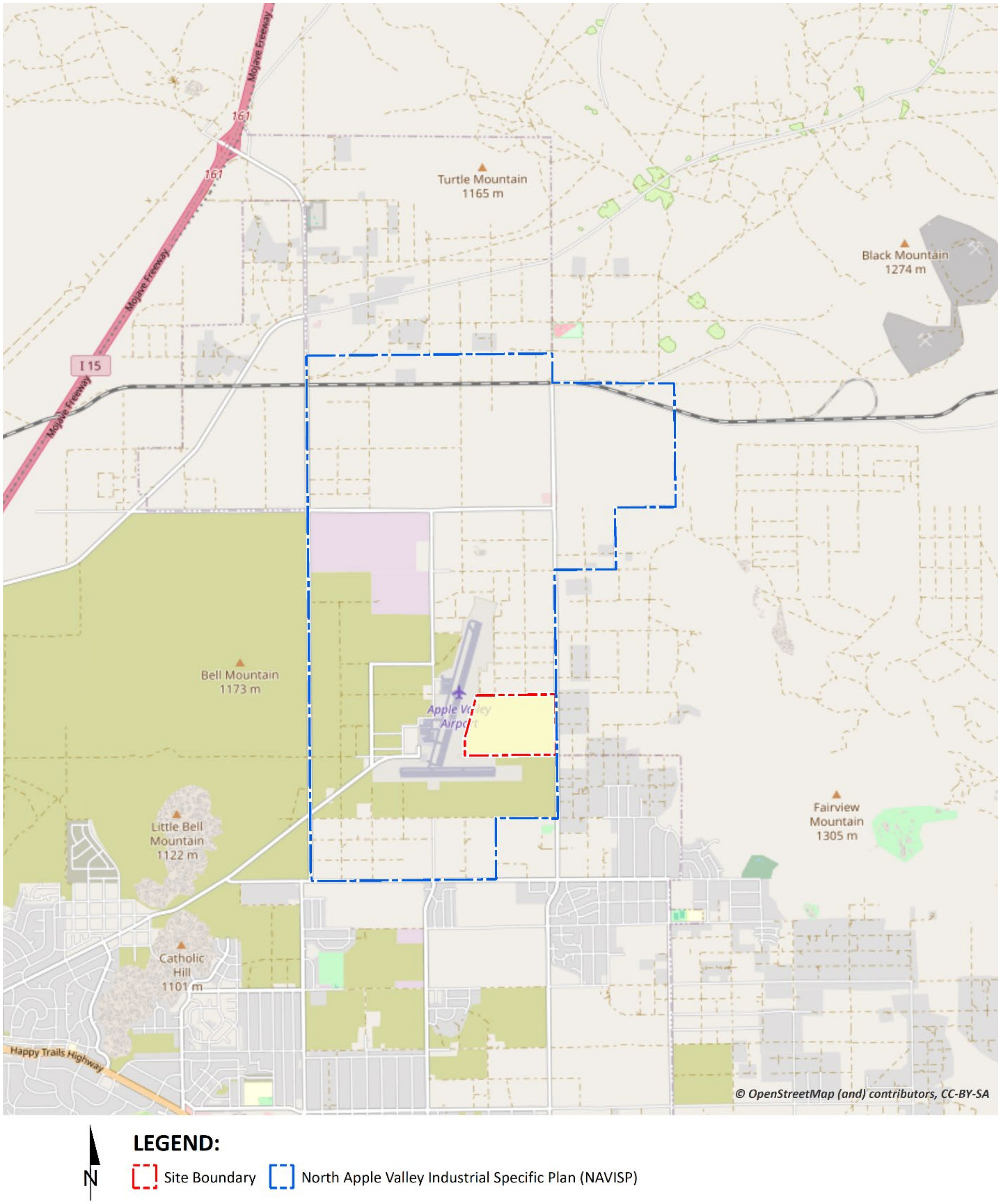
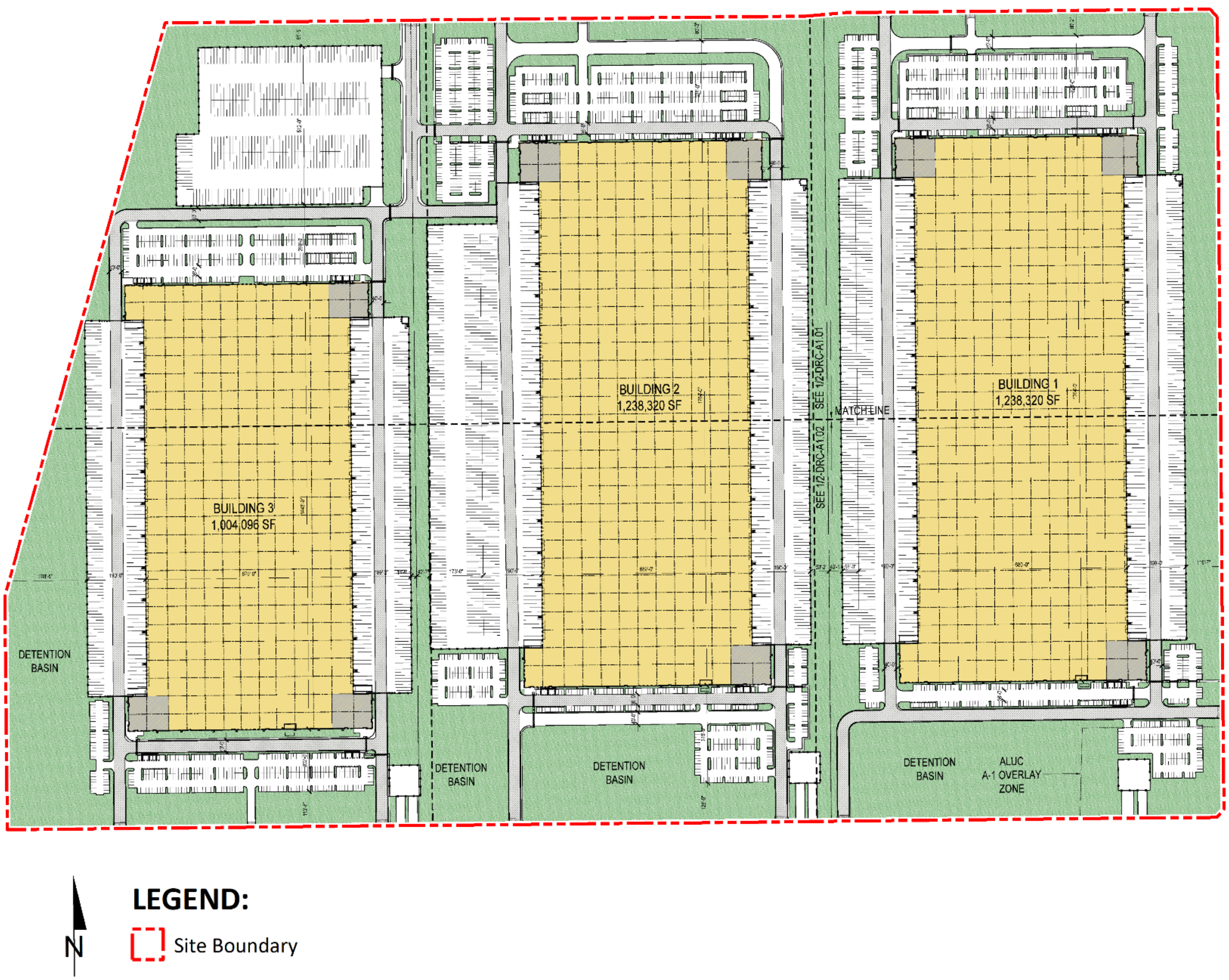


EXHIBIT 1-B: PRELIMINARY SITE PLAN



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2 FUNDAMENTALS

Noise is simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		SLEEP DISTURBANCE
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (4) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA at approximately 1,000 feet, which can cause serious discomfort. (5) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most used metric is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time-of-day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when noise can become more intrusive. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The Town of Apple Valley relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (4)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (6)

2.3.3 Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (4)

2.3.4 Shielding

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of-sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (7)

2.4 Noise Control

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to these three elements.

2.5 Noise Barrier Attenuation

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must block the line-of-sight path of sound from the noise source.

2.6 LAND USE COMPATIBILITY WITH NOISE

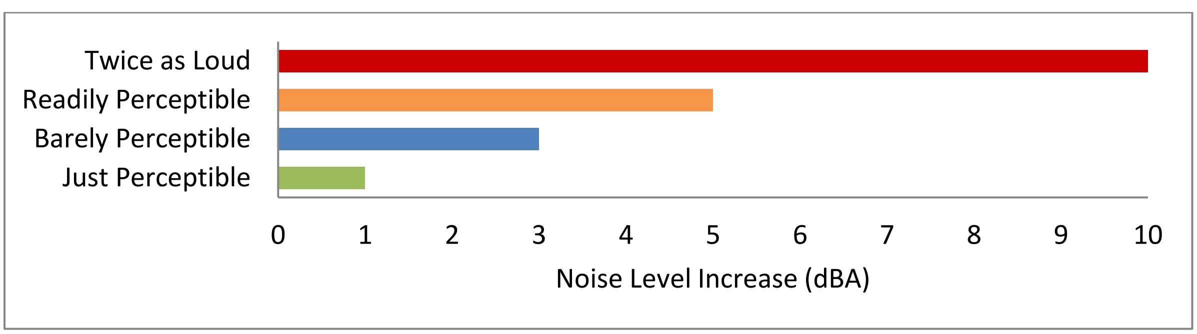
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (8)

2.7 COMMUNITY RESPONSE TO NOISE

Approximately sixteen percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints may occur. Twenty to thirty percent of the population will not complain even in very severe noise environments. (9 pp. 8-6) Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Surveys have shown that community response to noise varies from no reaction to vigorous action for newly introduced noises averaging from 10 dB below existing to 25 dB above existing. (10) According to research originally published in the Noise Effects Handbook (9), the percentage of high annoyance ranges from approximately 0 percent at 45 dB or less, 10 percent are highly annoyed around 60 dB, and increases rapidly to approximately 70 percent being highly annoyed at approximately 85 dB or greater. Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. A change of 3 dBA is considered barely perceptible, and changes of 5 dBA are considered readily perceptible. (6)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



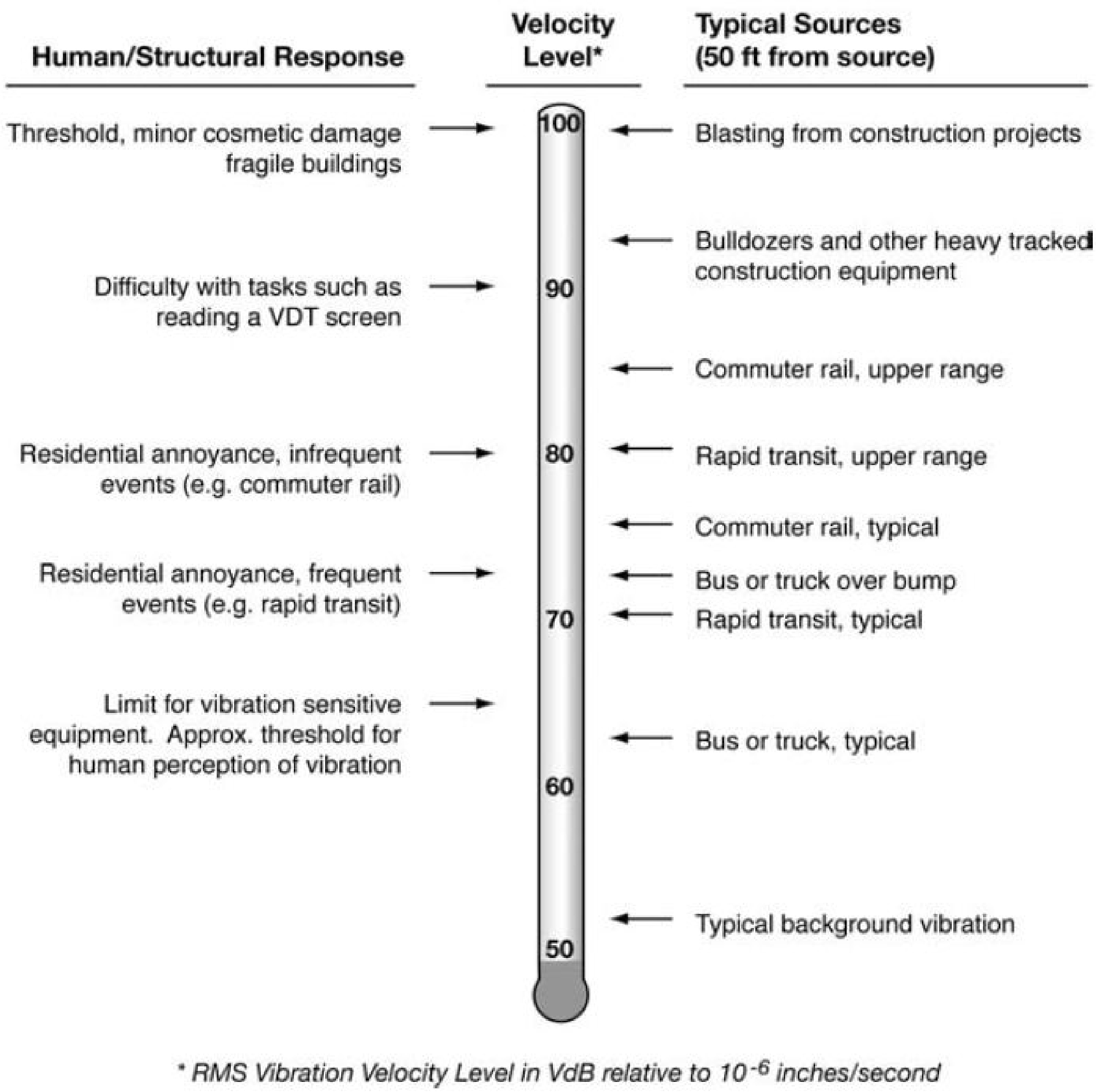
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual*, vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency. Additionally, in contrast to airborne noise, ground-borne vibration outdoors is not a common environmental problem and annoyance from ground-borne vibration is almost exclusively an indoor phenomenon (10). Therefore, the effects of vibrations should only be evaluated at a structure and the effects of the building structure on the vibration should be considered. Wood-frame buildings, such as typical residential structures, are more easily excited by ground vibration than heavier buildings. In contrast, large masonry buildings with spread footings have a low response to ground vibration (10). In general, the heavier a building is, the lower the response will be to the incident vibration energy. However, all structurers reduce vibration levels due to the coupling of the building to the soil.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal (10). The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body (10). However, the RMS amplitude and PPV are related mathematically, and the RMS amplitude of equipment is typically calculated from the PPV reference level. The RMS amplitude is approximately 70% of the PPV (11). Thus, either can be used in the description of vibration impacts.

While not universally accepted, vibration decibel notation (VdB) is another vibration notation developed and used by the FTA in their guidance manual to describe vibration levels and provide a background of common vibration levels and set vibration limits. (10) Decibel notation (VdB) serves to reduce the range of numbers used to describe vibration levels and is used in this report to describe vibration levels. As stated in the FTA guidance manual, the background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



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

3 REGULATORY SETTING

To limit population exposure to physically and/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. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (12) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 TOWN OF APPLE VALLEY GENERAL PLAN NOISE ELEMENT

The Town of Apple Valley has adopted a Noise Element of the General Plan to consider the land use patterns of the Land Use Element in the context of the noise it will generate. (13) The state and federal government regulate sources of noise from transportation sources or the workplace. Therefore, the Town of Apple Valley works to control noise through the following policies:

Policy 1.A *The Town shall adhere to the standards of "Land Use Compatibility for Community Environments."*

Policy 1.B *New development projects shall assure that exterior noise levels in back yards and/or usable open space do not exceed 65 dBA CNEL, and that interior noise levels are consistent with the requirements of the Building Code.*

Policy 1.C *The Town shall assure low levels of traffic within neighborhoods by assigning truck routes to major roadways only.*

Policy 1.D *The development review and environmental review process shall require all development proposals within the noise impact area of U.S. I-15, State Route 18, the High Desert Corridor or the railroads to mitigate both noise and vibration to acceptable levels through the preparation of focused studies.*

Policy 1.E *The Town shall coordinate with adjoining jurisdictions to ensure noise-compatible land uses across jurisdictional boundaries.*

Policy 1.F *The Town shall ensure that flight paths and airport improvements adhere to all local, state and federal noise regulations.*

Policy 1.G	*The Town shall monitor bus route expansions to assure that any expansion on a collector or local street does not significantly impact the noise levels of adjacent sensitive receptors.*
Policy 1.H	*The Town shall coordinate, to the greatest extent possible, with the owners of the two rail lines to assure that significant increases in train activity do not occur.*

3.2.1 LAND USE COMPATIBILITY

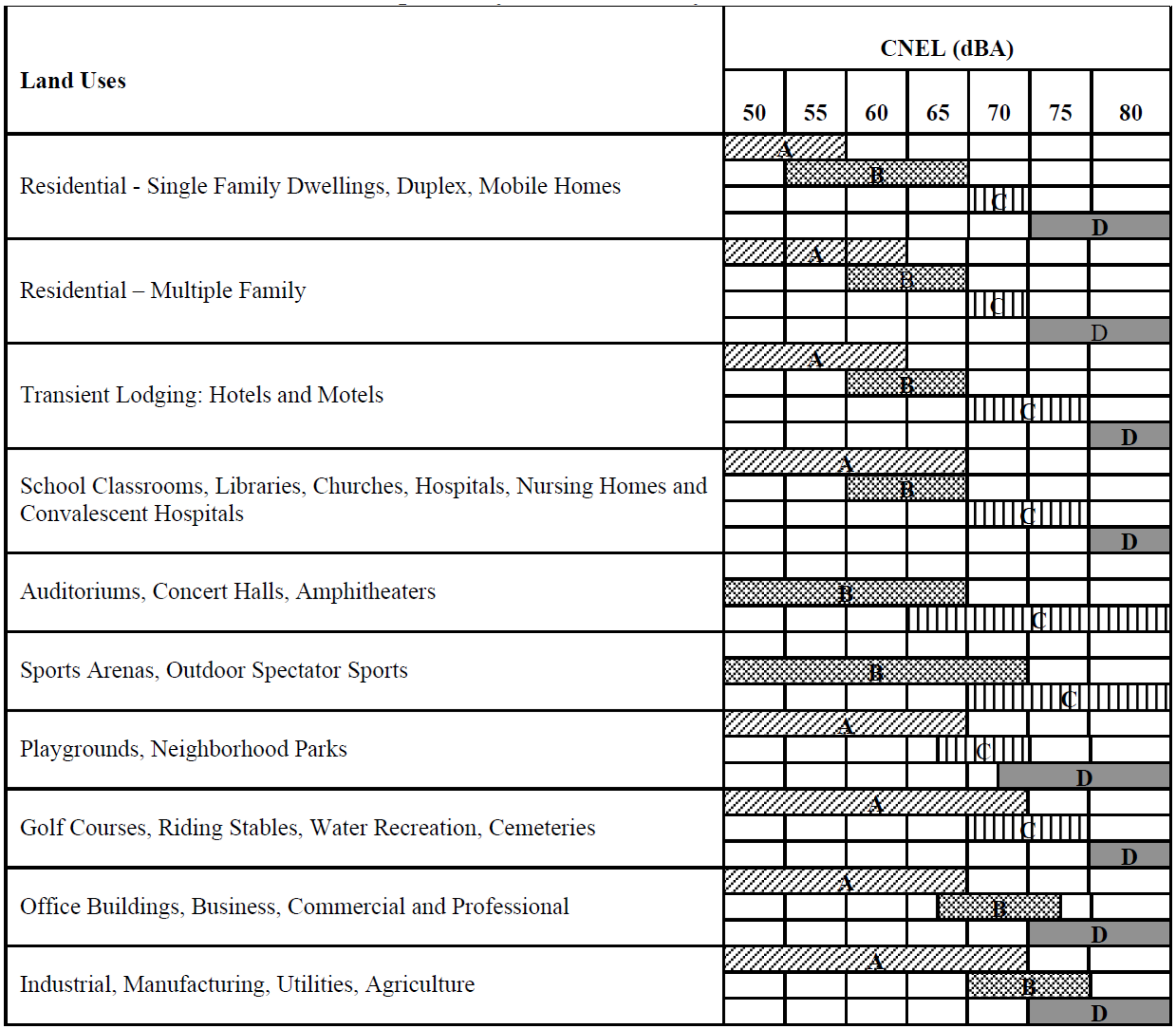
The *Land Use Compatibility for Community Noise Environments* identified in the Town of Apple Valley Noise Element (Table IV-4) are guidelines to evaluate the land use compatibility of transportation related noise. The compatibility criteria, shown on Exhibit 3-A, provides the Town with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels. The *Land Use Compatibility for Community Noise Environments* matrix describes categories of compatibility and not specific noise standards. Noise sensitive residential designated land uses in the Project study area are considered *normally acceptable* with exterior noise levels below 60 dBA CNEL, and *conditionally acceptable* with exterior noise levels of up to 70 dBA CNEL. The non-noise sensitive Project warehouse/industrial land use is considered *normally acceptable* with unmitigated exterior noise levels of less than 75 dBA CNEL and *conditionally acceptable* with exterior noise levels ranging from 70 to 80 dBA CNEL based on the *Industrial, Manufacturing, Utilities, Agriculture* land use as shown on Exhibit 3-A. (13)

3.3 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Lake Creek Logistics Center Project, stationary-source (operational) noise such as the expected cold storage loading dock activity, tractor trailer storage activity, roof-top air conditioning units, parking lot vehicle movements, trash enclosure activity, and truck movements are typically evaluated against standards established under a jurisdiction's Municipal Code or General Plan. The Town of Apple Valley Municipal Code, Table 9.73.050-A, establishes the exterior noise level limits by the receiving land use as shown on Table 3-1.

For noise-sensitive residential properties, the Town of Apple Valley Municipal Code, Table 9.73.050-A, identifies a base daytime (7:00 a.m. to 10:00 p.m.) exterior noise level limit of 50 dBA L_{eq} and 40 dBA L_{eq} during the nighttime (10:00 p.m. to 7:00 a.m.) hours. In addition, Section 9.73.050 [A][1][c], states that in the event the measured ambient noise level exceeds the base exterior noise level limit, the allowable noise exposure standard shall be adjusted in five dBA increments in each category as appropriate to encompass or reflect said ambient noise level. In effect, when the ambient noise levels exceed the base exterior noise level limits, the noise level standard shall be adjusted as appropriate to encompass or reflect the ambient noise level.

EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS



Source: *California Department of Health Services, "Guidelines for the Preparation and Content of the Noise Element of the General Plan," 1990*

A Normally Acceptable: With no special noise reduction requirements assuming standard construction.

B Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design

C **Normally Unacceptable**: New construction is discouraged. If new construction does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

D **Clearly Unacceptable**: New construction or development should generally not be undertaken.

Source: Town of Apple Valley General Plan Noise Element, Table IV-4.

TABLE 3-1: TOWN OF APPLE VALLEY OPERATIONAL NOISE STANDARDS

Receiving Land Use	Time Period	Base Noise Level Limit (dBA L_{eq})[1]	Exterior Noise Standards (dBA)[2]				
			L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (0 min)
Single-Family Residential	Daytime	50	50	55	60	65	70
	Nighttime	40	40	45	50	55	60
Multi-Family Residential	Daytime	50	50	55	60	65	70
	Nighttime	45	45	50	55	60	65
Commercial & Office	Daytime	60	60	65	70	75	80
	Nighttime	55	55	60	65	70	75
General Commercial	Daytime	65	65	70	75	80	85
	Nighttime	60	60	65	70	75	80
Light Industrial	Anytime	70	70	75	80	85	90
Heavy Industrial	Anytime	75	75	80	85	90	95

[1] Section 9.73.050 base exterior noise level limits of the Town of Apple Valley Municipal Code.
[2] Noise levels shall not exceed for the duration periods specified in Town of Apple Valley Municipal Code Section 9.73.050[A][1][b]. The percent noise level is the level exceeded "n" percent of the time during the measurement period. L_{50} is the noise level exceeded 50% of the time. "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

The Town of Apple Valley percentile noise descriptors are provided to ensure that the duration of the noise source is fully considered. However, due to the relatively constant intensity of the Project stationary operational activities, the (base exterior noise level limit) or the average L_{eq} noise level metric best describes the cold storage loading dock activity, tractor trailer storage activity, roof-top air conditioning units, parking lot vehicle movements, trash enclosure activity, and truck movements. The equivalent L_{eq} noise level metric accounts for noise fluctuations over time by averaging the louder and quieter events and giving more weight to the louder events. In addition, a review of the existing ambient noise level measurements shows that the L_{eq} is generally greater than the L_{50}. Therefore, this noise study conservatively relies on the average L_{eq} sound level limits to describe the Project stationary operational noise levels.

3.4 CONSTRUCTION NOISE STANDARDS

The Town of Apple Valley has set restrictions to control noise impacts associated with the construction of the proposed Project. Section 9.73.060[F][1], Construction/Demolition indicates that *operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7 p.m. and 7 a.m., or at any time on weekends or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by variance issued by the Town.*

In addition, Municipal Code Section 9.73.060[F][2] requires construction activities to be conducted in such a manner that the noise levels at affected residential properties will not exceed the daytime (7:00 a.m. to 7:00 p.m.) mobile exterior noise level limit of 75 dBA L_{eq} and 60 dBA L_{eq} during the nighttime hours of 7:00 p.m. to 7:00 a.m. Construction projects involve various stages, and activities frequently shift from one location to another. For example, during the initial stages, noise-generating activities might concentrate in one area, and then move to another section as construction progresses. The mobile construction noise level threshold captures these changes and ensures that noise impacts are assessed accurately throughout the entire Project site.

3.5 CONSTRUCTION VIBRATION STANDARDS

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. (10) To analyze vibration impacts originating from the operation and construction of the Lake Creek Logistics Center, vibration-generating activities are appropriately evaluated against standards established under the Municipal Code.

The Town of Apple Valley Municipal Code, Section 9.73.060[G], states that *operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty (150) feet (46 meters) from the source if on a public space or public right-of-way.* The Town of Apple Valley Municipal Code Section 9.73.020[34] defines the vibration perception threshold to be a motion velocity of 0.01 RMS inches per second (in/sec) over the range of one to 100 Hz. An RMS of 0.01 in/sec is equivalent to a peak particle velocity (PPV) level of 0.04 in/sec.

3.6 APPLE VALLEY AIRPORT (APV)

The Apple Valley Airport (APV) is located west of the Project Site. According to the Town of Apple Valley General Plan Noise Element, aircraft noise associated with the operation of the Apple Valley Airport, which is owned and operated by the County of San Bernardino, is limited to general aviation aircraft. The 60 dBA noise contour boundary for the airport has been identified as occurring within the Airport's property, and noise levels on surrounding lands are not significantly affected. While aircraft overflights may be heard within the Town, aircraft noise does not create significant noise impacts outside the immediate area.

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the State CEQA Guidelines. (14) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

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

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the closest sensitive receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing baseline ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders a noise impact significant.* (15) This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment. In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will typically be judged.

Sensitive receivers are areas where humans are participating in activities that may be subject to the stress of significant interference from noise and often include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities, and libraries. Other receivers include office and industrial buildings, which are not considered as sensitive as single-family homes, but are still protected by the Town of Apple Valley land use compatibility standards, as discussed below.

4.1.1 NOISE-SENSITIVE RECEIVERS

The Federal Interagency Committee on Noise (FICON) (16) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (L_{eq}).

As previously stated, the approach used in this noise study recognizes *that there is no single noise increase that renders a noise impact significant*, based on a 2008 California Court of Appeal ruling on Gray v. County of Madera. (15) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, a *readily perceptible* 5 dBA or greater project-related noise level increase is considered a significant impact when the without project noise levels are below 60 dBA. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance.

The FICON guidance provides an established source of criteria to assess the impacts of substantial temporary or permanent increase in baseline ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the without Project (baseline) noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or *readily perceptible*, 3 dBA or *barely perceptible*, and 1.5 dBA depending on the underlying without Project noise levels for noise-sensitive uses. These levels of increases and their perceived acceptance at noise sensitive receiver locations are consistent with guidance provided by both the Federal Highway Administration (6 p. 9) and Caltrans (17 p. 2_48).

4.1.2 NON-NOISE-SENSITIVE RECEIVERS

The Town of Apple Valley General Plan Noise Element, Table IV-4, *Land Use Compatibility for Community Noise Environments* was used to establish the satisfactory noise levels of significance for non-noise-sensitive land uses in the Project study area. As previously shown on Exhibit 3-A, the *normally acceptable* exterior noise level for non-noise-sensitive land use is 75 dBA CNEL. Non-noise sensitive noise levels greater than 75 dBA CNEL are considered *conditionally acceptable* per the *Land Use Compatibility for Community Noise Environments*. (13)

To determine if Project-related traffic noise level increases are significant at off-site non-noise-sensitive warehouse/industrial land uses, a *barely perceptible* 3 dBA criteria is used. When the without Project noise levels are greater than the *normally acceptable* 75 dBA CNEL land use compatibility criteria, a *barely perceptible* 3 dBA or greater noise level increase is considered a significant impact since the noise level criteria is already exceeded. The noise level increases used to determine significant impacts for non-noise-sensitive land uses is generally consistent with the FICON noise level increase thresholds for noise-sensitive land uses but instead rely on the Town of Apple Valley General Plan Noise Element, Table IV-4, *Land Use Compatibility for Community Noise Environments* 75 dBA CNEL *normally acceptable* exterior noise level criteria for warehouse/industrial land uses.

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.5, the vibration generating activities originating from the construction of Lake Creek Logistics Center, vibration-generating activities are appropriately evaluated using a peak particle velocity (PPV) level of 0.04 in/sec.

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

The closest airport which would require additional noise analysis under CEQA guideline C is the Apple Valley Airport (APV) which is located west of the Project Site. As previously indicated in Section 3.6, the 60 dBA noise contour boundary for the airport has been identified as occurring within the Airport's property, and noise levels on surrounding lands are not significantly affected. While aircraft overflights may be heard within the Town, aircraft noise does not create significant noise impacts outside the immediate area. Therefore, airport noise impacts are considered *less than significant,* and no further noise analysis is provided under Guideline C.

4.4 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix that includes the allowable criteria used to identify potentially significant incremental noise level increases.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Off-Site Traffic	Noise-Sensitive[1]	If ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
		If ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
		If ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
	Non-Noise-Sensitive[2]	If ambient is > 75 dBA CNEL	≥ 3 dBA CNEL Project increase	
Operational	Noise-Sensitive	Exterior Noise Level Standards[3]	50 dBA L_{eq}	40 dBA L_{eq}
		If ambient is < 60 dBA L_{eq}[1]	≥ 5 dBA L_{eq} Project increase	
		If ambient is 60 - 65 dBA L_{eq}[1]	≥ 3 dBA L_{eq} Project increase	
		If ambient is > 65 dBA L_{eq}[1]	≥ 1.5 dBA L_{eq} Project increase	
Construction	Noise-Sensitive	Noise Level Threshold[4]	75 dBA L_{eq}	60 dBA L_{eq}
		Vibration Level Threshold[5]	0.04 PPV (in/sec)	

[1] FICON, 1992.
[2] Town of Apple Valley General Plan Noise Element Table IV-4 (See Exhibit 3-A)
[3] Town of Apple Valley Municipal Code, Table 9.73.050-A, Single-Family Residential (Table 3-1, Appendix 3.1)
[4] Town of Apple Valley Municipal Code Section 9.73.060[F][2], (Appendix 3.1)
[5] Town of Apple Valley Municipal Code 9.73.020[34], (Appendix 3.1)
Operational: "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m. (Table 9.73.050-A)
Construction: "Daytime" = 7:00 a.m. to 7:00 p.m.; "Nighttime" = 7:00 p.m. to 7:00 a.m. (Section 9.73.060[F][2])

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at six locations in the Project study area. The noise level measurement locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Tuesday, August 29, 2023. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

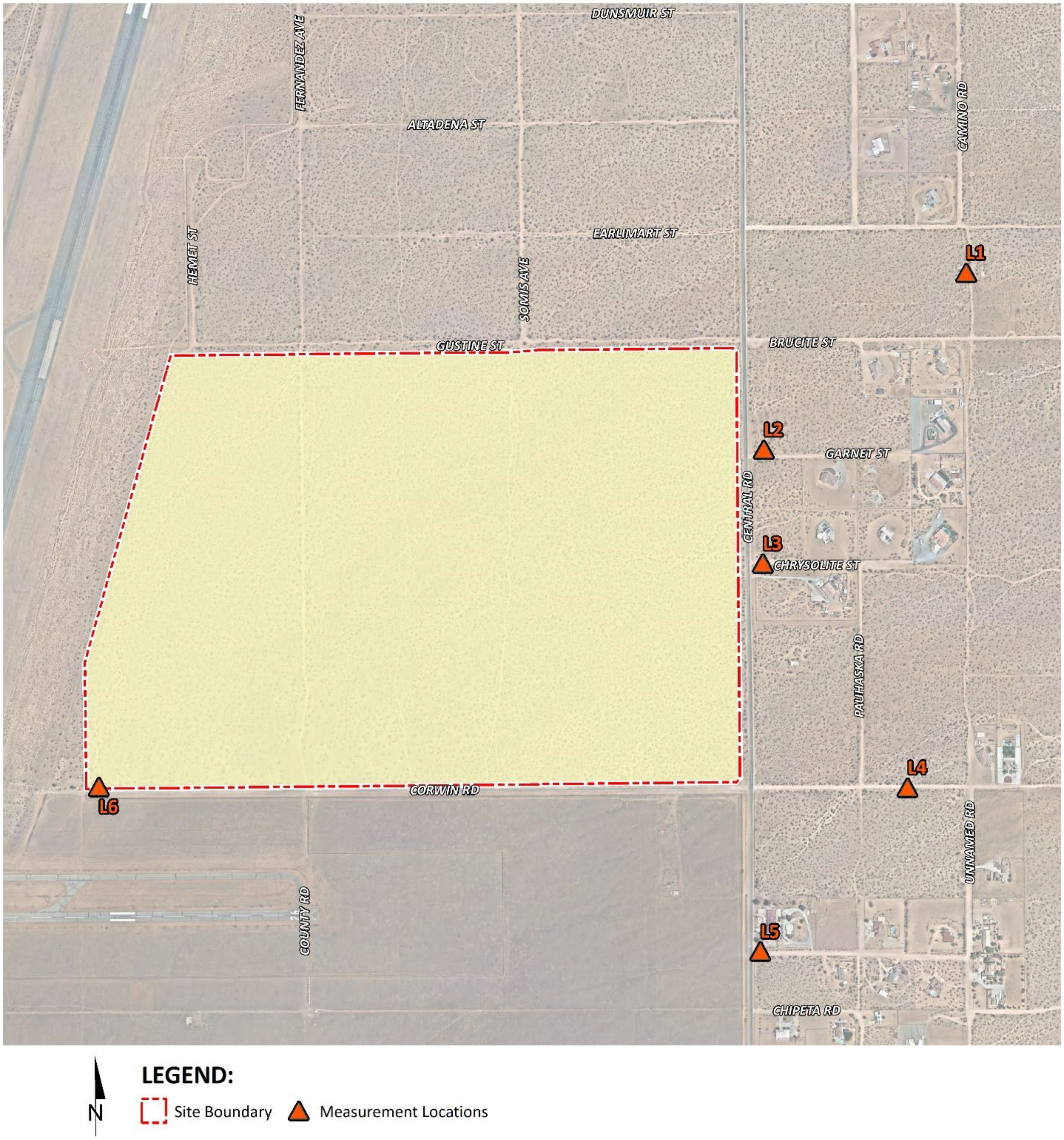
To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (18)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (4) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (10)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (10) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the equivalent or the energy average hourly sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location.

TABLE 5-1: AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]		CNEL
		Daytime	Nighttime	
L1	Located northeast of the site near the residence at 22672 Earlimart Rd.	52.8	40.9	51.8
L2	Located east of the site near the residence at 22425 Gustine St.	57.9	57.2	63.7
L3	Located east of the site near the residence at 17805 Central Rd.	57.2	57.8	64.2
L4	Located east of the site near the residence at 22522 Corwin Rd.	53.8	43.6	53.9
L5	Located southeast of the site near the residence at 17525 Central Rd.	56.9	59.0	65.2
L6	Located southwest of the site at the end of Corwin Rd. adjacent to the Apple Valley Airport	57.0	43.7	56.1

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Table 5-1 provides the equivalent noise levels used to describe the daytime and nighttime ambient conditions for each of the measurements. A sixth measurement is included on Table 5-1 representing the Project site. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

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6 TRAFFIC NOISE METHODS AND PROCEDURES

The following section outlines the methods and procedures used to estimate and analyze the future traffic noise environment. Consistent with the Town of Apple Valley General Plan Noise Element, Table IV-4, *Land Use Compatibility for Community Noise Environments* (see Exhibit 3-A), all transportation related noise levels are presented in terms of the 24-hour CNEL's. Unlike a simple arithmetic average noise level, CNEL represents the logarithmic summation of the equivalent hourly noise levels with evening and nighttime noise penalties recognizing that noise may have different impacts on people depending on when it occurs.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The expected roadway noise level increases from vehicular traffic were calculated by Urban Crossroads, Inc. using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (19) This methodology is commonly used to describe the off-site traffic noise levels throughout southern California. The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL) by vehicle type. REMEL represents the maximum sound level (L_{max}) of individual vehicle "pass by" events by vehicle type when measured at a "reference distance" of 50 feet from the center of the travel lane.

In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (20) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (21)

6.2 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the 14 off-site study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the Town of Apple Valley General Plan Circulation Element, and the vehicle speeds. It is expected that the Project related off-site traffic noise level contributions on other roadway segments outside the Project study area will dissipate as traffic disperses on the roadway network. The analysis below provides off-site roadway segment analysis for the following traffic scenarios.

- Existing
- Existing with Project
- Opening Year Cumulative (OYC) (2029) without Project
- Opening Year Cumulative (OYC) (2029) with Project

To describe the Project off-site traffic impacts, the receiving land use adjacent to each roadway segment is identified as a sensitive or non-sensitive land use. Sensitive land uses are limited to the existing noise sensitive residential uses based on a review of aerial imagery. It is expected that only the existing receivers will experience a change in the ambient noise levels over time.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Classification[1]	Receiving Land Use[2]	Distance from Centerline to Receiving Land Use (Feet)[3]	Vehicle Speed (mph)
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	Major Parkway	Sensitive	71'	50
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	Major Parkway	Non-Sensitive	71'	50
3	Dale Evans Pkwy.	n/o Johnson Rd.	Major Parkway	Sensitive	71'	50
4	Dale Evans Pkwy.	s/o Waalew Rd.	Major Parkway	Sensitive	71'	50
5	Central Rd.	s/o Johnson Rd.	Major Arterial	Sensitive	64'	50
6	Central Rd.	n/o Waalew Rd.	Major Arterial	Sensitive	64'	50
7	Central Rd.	s/o Waalew Rd.	Major Arterial	Sensitive	64'	50
8	Stoddard Wells Rd.	s/o Johnson Rd.	Major Arterial	Non-Sensitive	64'	50
9	Johnson Rd.	w/o Dale Evans Pkwy.	Major	Non-Sensitive	52'	50
10	Johnson Rd.	e/o Dale Evans Pkwy.	Major	Non-Sensitive	52'	50
11	Johnson Rd.	w/o Central Rd.	Major	Non-Sensitive	52'	50
12	Waalew Rd.	e/o Corwin Rd.	Major	Sensitive	52'	50
13	Waalew Rd.	e/o Dale Evans Pkwy.	Major	Sensitive	52'	50
14	Waalew Rd.	w/o Central Rd.	Major	Sensitive	52'	50

[1] Town of Apple Valley General Plan Circulation Element.
[2] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[3] Distance to receiving land use is based upon the right-of-way distances.

The ADT volumes used in this study area presented on Table 6-2 are based on *Lake Creek Logistics Center Traffic Analysis*, prepared by Urban Crossroads, Inc. (22) The General Plan Buildout ADT volumes were taken from the *Town of Apple Valley General Plan Circulation Element Traffic Study* prepared by Urban Crossroads, Inc. (23) The ADT volumes vary for each roadway segment based on the existing traffic volumes and the combination of project traffic distributions. In addition, the off-site traffic noise analysis maintains a peak hour to average daily traffic (peak-to-daily) relationship of approximately 11.51%. (22) To quantify the off-site noise levels, the Project related truck trips were added to the heavy truck category in the FHWA noise prediction model. The addition of the Project related truck trips increases the percentage of heavy trucks in the vehicle mix. This approach recognizes that the FHWA noise prediction model is significantly influenced by the number of heavy trucks in the vehicle mix.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic Volumes[1]			
			Existing		OYC (2029)	
			Without Project	With Project	Without Project	With Project
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	3,171	5,123	16,059	18,011
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	3,197	5,149	16,088	18,040
3	Dale Evans Pkwy.	n/o Johnson Rd.	2,598	4,549	7,878	9,830
4	Dale Evans Pkwy.	s/o Waalew Rd.	3,284	3,632	4,426	4,774
5	Central Rd.	s/o Johnson Rd.	1,738	8,364	9,763	16,389
6	Central Rd.	n/o Waalew Rd.	1,946	3,690	6,623	8,366
7	Central Rd.	s/o Waalew Rd.	2,546	3,035	6,305	6,794
8	Stoddard Wells Rd.	s/o Johnson Rd.	3,258	7,864	22,575	27,181
9	Johnson Rd.	w/o Dale Evans Pkwy.	2,945	7,551	22,230	26,835
10	Johnson Rd.	e/o Dale Evans Pkwy.	3,632	10,189	30,124	36,681
11	Johnson Rd.	w/o Central Rd.	972	7,529	13,159	19,716
12	Waalew Rd.	e/o Corwin Rd.	3,910	4,399	7,419	7,908
13	Waalew Rd.	e/o Dale Evans Pkwy.	4,353	5,190	7,908	8,745
14	Waalew Rd.	w/o Central Rd.	4,071	5,256	5,335	6,520

[1] Lake Creek Logistics Center Traffic Analysis, Urban Crossroads, Inc.

Table 6-3 provides the time of day (daytime, evening, and nighttime) vehicle splits. The daily Project truck trip-ends were assigned to the individual off-site study area roadway segments based on the Project truck trip distribution percentages documented in the *Lake Creek Logistics Center Traffic Analysis*. Table 6-3 presents the traffic flow by vehicle type (vehicle mix) used for all without Project traffic scenarios, and Tables 6-4 to 6-5 show the vehicle mixes used for the with Project traffic scenarios.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Time of Day	Vehicle Mix			Time of Day Split
	Autos	Medium Trucks	Heavy Trucks	
Daytime	78.21%	1.57%	0.39%	80.17%
Evening	7.57%	0.02%	0.01%	7.60%
Nighttime	11.94%	0.15%	0.15%	12.23%
Daily	97.72%	1.74%	0.54%	100.00%

[1] Based on the January 30, 2024, 24-hour directional vehicle classification count collected on Waalew Road west of Central Road.
"Daytime" = 7:00 a.m. to 7:00 p.m.; "Evening" = 7:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

TABLE 6-4: EXISTING WITH PROJECT VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	94.46%	1.40%	4.15%	100.00%
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	94.47%	1.40%	4.13%	100.00%
3	Dale Evans Pkwy.	n/o Johnson Rd.	94.05%	1.35%	4.60%	100.00%
4	Dale Evans Pkwy.	s/o Waalew Rd.	97.93%	1.58%	0.49%	100.00%
5	Central Rd.	s/o Johnson Rd.	86.04%	1.40%	12.57%	100.00%
6	Central Rd.	n/o Waalew Rd.	91.15%	1.51%	7.34%	100.00%
7	Central Rd.	s/o Waalew Rd.	93.44%	1.82%	4.74%	100.00%
8	Stoddard Wells Rd.	s/o Johnson Rd.	87.40%	1.62%	10.99%	100.00%
9	Johnson Rd.	w/o Dale Evans Pkwy.	86.97%	1.61%	11.42%	100.00%
10	Johnson Rd.	e/o Dale Evans Pkwy.	88.11%	1.47%	10.42%	100.00%
11	Johnson Rd.	w/o Central Rd.	84.72%	1.37%	13.90%	100.00%
12	Waalew Rd.	e/o Corwin Rd.	94.76%	1.80%	3.44%	100.00%
13	Waalew Rd.	e/o Dale Evans Pkwy.	95.37%	1.67%	2.96%	100.00%
14	Waalew Rd.	w/o Central Rd.	95.55%	1.56%	2.90%	100.00%

[1] Total of vehicle mix percentage values rounded to the nearest one-hundredth.

TABLE 6-5: OYCP (2029) WITH PROJECT VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	96.79%	1.64%	1.57%	100.00%
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	96.79%	1.65%	1.56%	100.00%
3	Dale Evans Pkwy.	n/o Johnson Rd.	96.02%	1.56%	2.42%	100.00%
4	Dale Evans Pkwy.	s/o Waalew Rd.	97.88%	1.62%	0.50%	100.00%
5	Central Rd.	s/o Johnson Rd.	91.76%	1.57%	6.68%	100.00%
6	Central Rd.	n/o Waalew Rd.	94.82%	1.64%	3.54%	100.00%
7	Central Rd.	s/o Waalew Rd.	95.80%	1.78%	2.42%	100.00%
8	Stoddard Wells Rd.	s/o Johnson Rd.	94.73%	1.71%	3.56%	100.00%
9	Johnson Rd.	w/o Dale Evans Pkwy.	94.69%	1.71%	3.60%	100.00%
10	Johnson Rd.	e/o Dale Evans Pkwy.	95.05%	1.67%	3.28%	100.00%
11	Johnson Rd.	w/o Central Rd.	92.75%	1.60%	5.64%	100.00%
12	Waalew Rd.	e/o Corwin Rd.	96.07%	1.77%	2.15%	100.00%
13	Waalew Rd.	e/o Dale Evans Pkwy.	96.32%	1.70%	1.98%	100.00%
14	Waalew Rd.	w/o Central Rd.	95.97%	1.59%	2.44%	100.00%

[1] Total of vehicle mix percentage values rounded to the nearest one-hundredth.

7 OFF-SITE TRAFFIC NOISE ANALYSIS

As described in Section 4.1, the off-site traffic noise impacts are evaluated based on noise level increases resulting from the Project. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. To assess the off-site transportation CNEL noise level impacts associated with development of the Project, noise contours were developed for each of the Project conditions outlined in the *Lake Creek Logistics Center Traffic Analysis* prepared by Urban Crossroads, Inc. (24)

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental 24-hour dBA CNEL traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours included in Appendix 7.1 represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA CNEL noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not include noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 to 7-5 present a summary of the exterior traffic noise levels for each traffic condition.

7.2 OFF-SITE TRUCK TRAFFIC

Consistent with the *Lake Creek Logistics Center Traffic Analysis,* the Project truck trips will be primarily limited to the major roadways that include Dale Evans Parkway, Central Road, Stoddard Wells Road, Johnson Road and Waalew Road. The noise level calculations included in Appendix 7.1, present the maximum sound levels (L_{max}) of individual “pass by” events (REMEL) by vehicle type for each of the study area roadway segments. To demonstrate compliance with the Town of Apple Valley *Land Use Compatibility for Community Noise Environments* guidelines, all exterior noise levels are first expressed using the equivalent hourly noise levels for the peak, daytime, evening, and nighttime hours. This approach permits the calculation of the 24-hour CNEL necessary to demonstrate compliance with the established thresholds of significance.

CNEL is commonly used for planning purposes and to assess changes in the long-term traffic noise exposure in a way that reflects its impact on communities over time, considering both daytime and nighttime periods when people may be more sensitive to noise. Since the CNEL noise levels include penalties for the evening and nighttime hours, the CNEL level will always be higher than any of the equivalent hourly noise levels. Both the Town of Apple Valley Noise Element and the *General Plan Guidelines* published by the Governor’s Office of Planning and Research (OPR) (12) rely on the CNEL noise metric to assess land use noise compatibility.

TABLE 7-1: EXISTING WITHOUT PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	Sensitive	62.0	RW	RW	96
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	Non-Sensitive	62.0	RW	RW	97
3	Dale Evans Pkwy.	n/o Johnson Rd.	Sensitive	61.1	RW	RW	84
4	Dale Evans Pkwy.	s/o Waalew Rd.	Sensitive	62.1	RW	RW	98
5	Central Rd.	s/o Johnson Rd.	Sensitive	60.0	RW	RW	64
6	Central Rd.	n/o Waalew Rd.	Sensitive	60.5	RW	RW	70
7	Central Rd.	s/o Waalew Rd.	Sensitive	61.7	RW	RW	83
8	Stoddard Wells Rd.	s/o Johnson Rd.	Non-Sensitive	62.8	RW	RW	98
9	Johnson Rd.	w/o Dale Evans Pkwy.	Non-Sensitive	63.2	18	39	85
10	Johnson Rd.	e/o Dale Evans Pkwy.	Non-Sensitive	64.1	RW	RW	98
11	Johnson Rd.	w/o Central Rd.	Non-Sensitive	58.4	RW	RW	RW
12	Waalew Rd.	e/o Corwin Rd.	Sensitive	64.4	RW	RW	103
13	Waalew Rd.	e/o Dale Evans Pkwy.	Sensitive	64.9	RW	RW	110
14	Waalew Rd.	w/o Central Rd.	Sensitive	64.6	RW	RW	106

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	Sensitive	67.6	RW	105	227
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	Non-Sensitive	67.6	RW	105	227
3	Dale Evans Pkwy.	n/o Johnson Rd.	Sensitive	67.3	RW	102	219
4	Dale Evans Pkwy.	s/o Waalew Rd.	Sensitive	62.4	RW	RW	103
5	Central Rd.	s/o Johnson Rd.	Sensitive	74.0	119	256	552
6	Central Rd.	n/o Waalew Rd.	Sensitive	68.6	RW	111	240
7	Central Rd.	s/o Waalew Rd.	Sensitive	66.4	RW	80	171
8	Stoddard Wells Rd.	s/o Johnson Rd.	Non-Sensitive	73.3	106	228	492
9	Johnson Rd.	w/o Dale Evans Pkwy.	Non-Sensitive	74.1	98	211	454
10	Johnson Rd.	e/o Dale Evans Pkwy.	Non-Sensitive	75.1	113	244	526
11	Johnson Rd.	w/o Central Rd.	Non-Sensitive	74.8	109	235	506
12	Waalew Rd.	e/o Corwin Rd.	Sensitive	68.0	RW	82	178
13	Waalew Rd.	e/o Dale Evans Pkwy.	Sensitive	68.3	RW	87	187
14	Waalew Rd.	w/o Central Rd.	Sensitive	68.3	RW	86	186

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: OYC (2029) WITHOUT PROJECT NOISE CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	Sensitive	69.0	RW	132	284
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	Non-Sensitive	69.0	RW	132	284
3	Dale Evans Pkwy.	n/o Johnson Rd.	Sensitive	65.9	RW	82	176
4	Dale Evans Pkwy.	s/o Waalew Rd.	Sensitive	63.4	RW	RW	120
5	Central Rd.	s/o Johnson Rd.	Sensitive	67.5	RW	95	204
6	Central Rd.	n/o Waalew Rd.	Sensitive	65.9	RW	73	157
7	Central Rd.	s/o Waalew Rd.	Sensitive	65.6	RW	71	152
8	Stoddard Wells Rd.	s/o Johnson Rd.	Non-Sensitive	71.2	77	165	356
9	Johnson Rd.	w/o Dale Evans Pkwy.	Non-Sensitive	72.0	71	152	327
10	Johnson Rd.	e/o Dale Evans Pkwy.	Non-Sensitive	73.3	86	186	401
11	Johnson Rd.	w/o Central Rd.	Non-Sensitive	69.7	RW	107	231
12	Waalew Rd.	e/o Corwin Rd.	Sensitive	67.2	RW	73	158
13	Waalew Rd.	e/o Dale Evans Pkwy.	Sensitive	67.5	RW	76	164
14	Waalew Rd.	w/o Central Rd.	Sensitive	65.8	RW	59	126

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: OYCP (2029) WITH PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	Sensitive	70.8	81	174	375
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	Non-Sensitive	70.8	81	174	375
3	Dale Evans Pkwy.	n/o Johnson Rd.	Sensitive	69.1	RW	132	285
4	Dale Evans Pkwy.	s/o Waalew Rd.	Sensitive	63.7	RW	RW	125
5	Central Rd.	s/o Johnson Rd.	Sensitive	74.8	133	287	617
6	Central Rd.	n/o Waalew Rd.	Sensitive	70.0	64	138	296
7	Central Rd.	s/o Waalew Rd.	Sensitive	68.2	RW	104	224
8	Stoddard Wells Rd.	s/o Johnson Rd.	Non-Sensitive	75.1	141	303	652
9	Johnson Rd.	w/o Dale Evans Pkwy.	Non-Sensitive	76.0	130	280	603
10	Johnson Rd.	e/o Dale Evans Pkwy.	Non-Sensitive	77.1	154	332	716
11	Johnson Rd.	w/o Central Rd.	Non-Sensitive	75.9	129	278	598
12	Waalew Rd.	e/o Corwin Rd.	Sensitive	69.4	RW	103	222
13	Waalew Rd.	e/o Dale Evans Pkwy.	Sensitive	69.7	RW	107	230
14	Waalew Rd.	w/o Central Rd.	Sensitive	68.9	RW	94	202

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING PROJECT NOISE LEVEL INCREASES

An analysis of existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report to fully analyze all the existing traffic scenarios identified in the *Lake Creek Logistics Center Traffic Impact Analysis*. This condition is provided solely for informational purposes and will not occur, since the Project will not be fully developed and occupied under Existing conditions. Table 7-1 shows the Existing without Project conditions CNEL noise levels. The Existing without Project exterior noise levels are expected to range from 58.4 to 64.9 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing with Project conditions will range from 62.4 to 75.1 dBA CNEL. Table 7-5 shows that the Project off-site traffic noise level impacts will range from 0.3 to 16.4 dBA CNEL.

Based on the significance criteria for off-site traffic noise presented in Table 4-1, eight of the study area roadway segments are shown to experience *potentially significant* off-site traffic noise level increases due to the proposed Project. The segments are described below.

- Dale Evans Parkway north of Stoddard Wells Road (Segment #1)
- Dale Evans Parkway north of Johnson Road (Segment #3)
- Central Road south of Johnson Road (Segment #5)
- Central Road north of Waalew Road (Segment #6)

- Central Road south of Waalew Road (Segment #7)
- Waalew Road east of Corwin Road (Segment #12)
- Waalew Road east of Dale Evans Parkway (Segment #13)
- Waalew Road west of Central Road (Segment #14)

Section 7.4 describes the off-site traffic noise mitigation measures considered in this analysis. All other roadway segments would experience *less than significant* noise level increases due to the proposed with Project traffic conditions.

7.3 OYC (2029) PROJECT TRAFFIC NOISE LEVEL INCREASES

Table 7-3 shows the OYC without Project conditions CNEL noise levels. The OYC without Project exterior noise levels are expected to range from 63.4 to 73.3 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows that the OYC with Project conditions will range from 63.7 to 77.1 dBA CNEL. Table 7-6 shows that the OYC Project off-site traffic noise level impacts will range from 0.3 to 7.3 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Table 4-1, eight of the study area roadway segments are shown to experience *potentially significant* off-site traffic noise level increases due to the proposed Project conditions. The segments are described below.

- Dale Evans Parkway north of Stoddard Wells Road (Segment #1)
- Dale Evans Parkway north of Johnson Road (Segment #3)
- Central Road south of Johnson Road (Segment #5)
- Central Road north of Waalew Road (Segment #6)
- Central Road south of Waalew Road (Segment #7)
- Waalew Road east of Corwin Road (Segment #12)
- Waalew Road east of Dale Evans Parkway (Segment #13)
- Waalew Road west of Central Road (Segment #14)

Section 7.4 describes the off-site traffic noise mitigation measures considered in this analysis. All other roadway segments would experience *less than significant* noise level increases due to the proposed with Project traffic conditions.

7.4 OFF-SITE TRAFFIC NOISE MITIGATION

To reduce the *potentially significant* Project traffic noise level increases on the impacted study area for Existing with Project and Opening Year Cumulative with Project conditions, potential noise mitigation measures are identified in this analysis. Potential mitigation measures discussed below include rubberized asphalt hot mix pavement and off-site noise barriers for the existing non-conforming residential use adjacent to impacted roadway segments.

TABLE 7-5: EXISTING WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	Sensitive	62.0	67.6	5.6	3.0	**Yes**
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	Non-Sensitive	62.0	67.6	5.6	n/a	No
3	Dale Evans Pkwy.	n/o Johnson Rd.	Sensitive	61.1	67.3	6.2	3.0	**Yes**
4	Dale Evans Pkwy.	s/o Waalew Rd.	Sensitive	62.1	62.4	0.3	3.0	No
5	Central Rd.	s/o Johnson Rd.	Sensitive	60.0	74.0	14.0	1.5	**Yes**
6	Central Rd.	n/o Waalew Rd.	Sensitive	60.5	68.6	8.1	3.0	**Yes**
7	Central Rd.	s/o Waalew Rd.	Sensitive	61.7	66.4	4.7	3.0	**Yes**
8	Stoddard Wells Rd.	s/o Johnson Rd.	Non-Sensitive	62.8	73.3	10.5	n/a	No
9	Johnson Rd.	w/o Dale Evans Pkwy.	Non-Sensitive	63.2	74.1	10.9	n/a	No
10	Johnson Rd.	e/o Dale Evans Pkwy.	Non-Sensitive	64.1	75.1	11.0	n/a	No
11	Johnson Rd.	w/o Central Rd.	Non-Sensitive	58.4	74.8	16.4	n/a	No
12	Waalew Rd.	e/o Corwin Rd.	Sensitive	64.4	68.0	3.6	3.0	**Yes**
13	Waalew Rd.	e/o Dale Evans Pkwy.	Sensitive	64.9	68.3	3.4	3.0	**Yes**
14	Waalew Rd.	w/o Central Rd.	Sensitive	64.6	68.3	3.7	3.0	**Yes**

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

TABLE 7-6: OYC (2029) WITH PROJECT TRAFFIC NOISE INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Dale Evans Pkwy.	n/o Stoddard Wells Rd.	Sensitive	69.0	70.8	1.8	1.5	**Yes**
2	Dale Evans Pkwy.	s/o Stoddard Wells Rd.	Non-Sensitive	69.0	70.8	1.8	n/a	No
3	Dale Evans Pkwy.	n/o Johnson Rd.	Sensitive	65.9	69.1	3.2	1.5	**Yes**
4	Dale Evans Pkwy.	s/o Waalew Rd.	Sensitive	63.4	63.7	0.3	3.0	No
5	Central Rd.	s/o Johnson Rd.	Sensitive	67.5	74.8	7.3	1.5	**Yes**
6	Central Rd.	n/o Waalew Rd.	Sensitive	65.9	70.0	4.1	1.5	**Yes**
7	Central Rd.	s/o Waalew Rd.	Sensitive	65.6	68.2	2.6	1.5	**Yes**
8	Stoddard Wells Rd.	s/o Johnson Rd.	Non-Sensitive	71.2	75.1	3.9	n/a	No
9	Johnson Rd.	w/o Dale Evans Pkwy.	Non-Sensitive	72.0	76.0	4.0	n/a	No
10	Johnson Rd.	e/o Dale Evans Pkwy.	Non-Sensitive	73.3	77.1	3.8	n/a	No
11	Johnson Rd.	w/o Central Rd.	Non-Sensitive	69.7	75.9	6.2	n/a	No
12	Waalew Rd.	e/o Corwin Rd.	Sensitive	67.2	69.4	2.2	1.5	**Yes**
13	Waalew Rd.	e/o Dale Evans Pkwy.	Sensitive	67.5	69.7	2.2	1.5	**Yes**
14	Waalew Rd.	w/o Central Rd.	Sensitive	65.8	68.9	3.1	1.5	**Yes**

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

7.4.1 Rubberized Asphalt

Due to the potential noise attenuation benefits, rubberized asphalt is considered as a mitigation measure for the Project-related roadway improvements associated with Project construction. To reduce traffic noise levels at the noise source, Caltrans research has shown that rubberized asphalt can provide noise attenuation of approximately 4 dBA for automobile traffic noise levels. (23) Changing the pavement type of a roadway has been shown to reduce the amount of tire/pavement noise produced at the source under both near-term and long-term conditions. Traffic noise is generated primarily by the interaction of the tires and pavement, the engine, and exhaust systems. For automobiles noise, as much as 75 to 90-percent of traffic noise is generated by the interaction of the tires and pavement, especially when traveling at higher and constant speeds. (4) According to research conducted by Caltrans (23) and the Canadian Ministry of Transportation and Highways (24) a 4 dBA reduction in tire/pavement noise is attainable using rubberized asphalt under typical operating conditions.

The effectiveness of reducing traffic noise levels is higher on roadways with low percentages of heavy trucks, since the heavy truck engine and exhaust noise is not affected by rubberized alternative pavement due to the truck engine and exhaust stack height above the pavement itself. (23) Per Caltrans guidance a truck stack height is modeled using a height of 11.5 feet above the road. (6) (25) With the primary off-site traffic noise source consisting of heavy trucks with a stack height of 11.5 feet off the ground, the tire/pavement noise reduction benefits associated rubberized asphalt will be primarily limited to autos.

While the off-site Project-related traffic noise level increases would theoretically be reduced with the 4 dBA reduction provided by rubberized asphalt, the reduction would not provide reliable benefits for the noise levels generated by heavy truck traffic. This is, as previously stated, due to the noise source height difference between automobiles and trucks. While rubberized asphalt will provide some noise reduction, this noise study recognizes that this is only effective for tire-on-pavement noise at higher speeds and would not reduce truck-related off-site traffic noise levels associated with truck engine and exhaust stacks to less than significant impacts. Since the use of rubberized asphalt would not lower the off-site traffic noise levels below a level of significance, rubberized asphalt is not proposed as mitigation for the Project and the off-site Project-related traffic noise level increases at adjacent land uses would remain *significant.*

7.4.2 Off-Site Noise Barriers

Since existing and future noise-sensitive receiving land uses are located adjacent to the impacted roadway segments in the Project study area, off-site noise barriers were considered in this analysis as a potential traffic noise mitigation measure to reduce the impacts. Off-site noise barriers are estimated to provide a *readily perceptible* 5 dBA reduction which, according to the FHWA, is *simple* to attain when blocking the line-of-sight from the noise source to the receiver. (6). As previously discussed, Caltrans guidance in the Highway Design Manual, Section 1102.3(3), indicates that for design purposes, *the noise barrier should intercept the line of sight from the exhaust stack of a truck to the receptor*, and an 11.5-foot-high truck stack height is assumed to represent the truck engine and exhaust noise source. (25) Therefore, any exterior noise barriers at receiving noise sensitive land uses experiencing Project-related traffic noise level increases would need to be high enough and long enough to block the line-of-sight from the noise source (at 11.5 feet high per Caltrans) to the receiver (at 5 feet high per FHWA guidance) in order to provide a 5 dBA reduction per FHWA guidance. (25)

In addition, according to FHWA guidance, outdoor living areas are generally limited to outdoor living areas of frequent human use (e.g., backyards of single-family homes). Therefore, front and side yards of residential homes adjacent to off-site roadway segments do not represent noise sensitive areas of frequent human use that require exterior noise mitigation. (6) Exterior noise mitigation in the form of noise barriers is not anticipated to provide the FHWA attainable reduction of 5 dBA required to reduce the off-site traffic noise level increases and would also require potential openings for driveway access to individual residential lots fronting the road. As such, off-site noise barriers would not be feasible and would not lower the off-site traffic noise levels below a level of significance, and therefore, noise barriers are not proposed as mitigation for the Project.

7.4.3 SIGNIFICANT OFF-SITE TRAFFIC NOISE IMPACTS

Both rubberized asphalt and off-site noise barriers are considered as potential noise mitigation measures to reduce the *potentially significant* off-site traffic noise level increases shown on Tables 7-5 to 7-6. However, neither form of mitigation would eliminate the off-site traffic noise level increases at the adjacent land uses to the impacted roadway segments. Therefore, the Project-related off-site traffic noise level increases at adjacent noise-sensitive land are considered a *significant and unavoidable* impact. This is consistent with the potentially significant findings outlined in the NAVISP EIR. (2)

8 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following sensitive receiver locations, as shown on Exhibit 8-A, were identified as representative locations for analysis. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, five receiver locations in the vicinity of the Project site were identified. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. Distance is measured in a straight line from the Project boundary to each receiver location.

R1: Location R1 represents the existing noise sensitive residence at 22672 Earlimart, approximately 1,456 feet northeast of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R1 is placed at the building façade. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

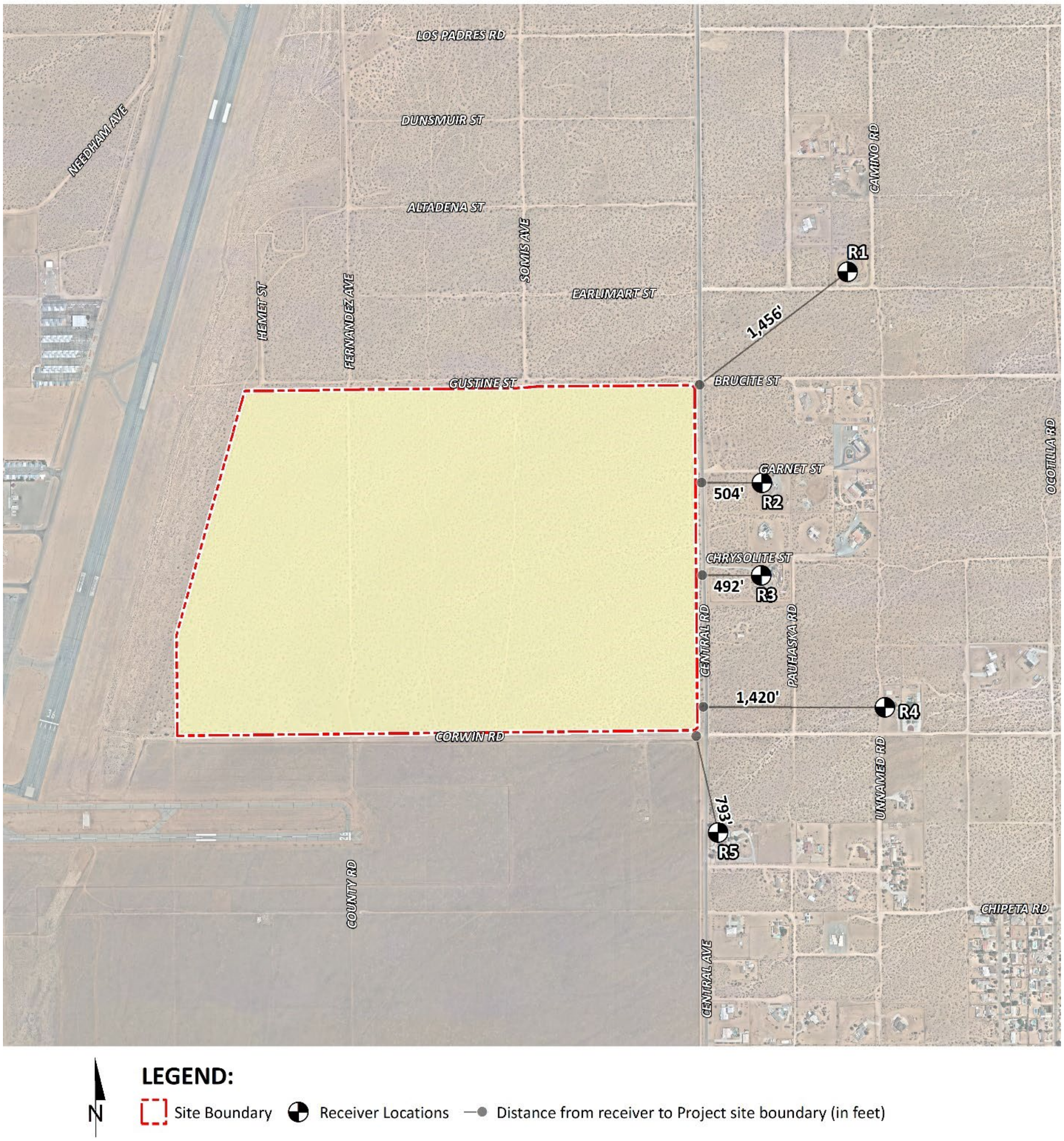
R2: Location R2 represents the existing noise sensitive residence at 22425 Gustine Street, approximately 504 feet east of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R2 is placed at the building façade. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the existing noise sensitive residence at 17805 Central Road, approximately 492 feet east of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R3 is placed at the building façade. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents the existing noise sensitive residence at 22522 Corwin Road Sherman Rd., approximately 1,420 feet east of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R4 is placed at the building façade. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

R5: Location R5 represents the existing noise sensitive residence at 17525 Central Road, approximately 793 feet southeast of the Project site. Since there are no private outdoor living areas (backyards) facing the Project site, receiver R5 is placed at the building façade. A 24-hour noise measurement was taken near this location, L5, to describe the existing ambient noise environment.

EXHIBIT 8-A: RECEIVER LOCATIONS



9 OPERATIONAL NOISE ANALYSIS

This section analyzes the potential stationary-source operational noise impacts at the nearby receiver locations, identified in Section 8, resulting from the operation of the proposed Lake Creek Logistics Center Project. To conservatively describe the potential worst-case noise environment, Exhibit 9-A presents the 159 individual noise sources used to assess the operational noise levels.

9.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical of daytime and nighttime activities at the Project site. To present the potential worst-case noise conditions, this analysis assumes the Project would be operational 24 hours per day, seven days per week. Consistent with similar warehouse and industrial uses, the Project business operations would primarily be conducted within the enclosed buildings, except for traffic movement, parking, as well as loading and unloading of trucks at designated loading bays. The on-site Project-related noise sources are expected to include: cold storage loading dock activity, tractor trailer storage activity, roof-top air conditioning units, parking lot vehicle movements, trash enclosure activity, and truck movements.

9.2 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 9-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with the cold storage loading dock activity, tractor trailer storage activity, roof-top air conditioning units, parking lot vehicle movements, trash enclosure activity, and truck movements all operating at the same time. These sources of noise activity will likely vary throughout the day.

9.2.1 MEASUREMENT PROCEDURES

The reference noise level measurements presented in this section were collected using a Larson Davis LxT Type 1 precisions sound level meter (serial number 01146). The LxT sound level meter was calibrated using a Larson-Davis calibrator, Model CAL 200, was programmed in "slow" mode to record noise levels in "A" weighted form and was located at approximately five feet above the ground elevation for each measurement. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (18)

EXHIBIT 9-A: OPERATIONAL NOISE SOURCE LOCATIONS

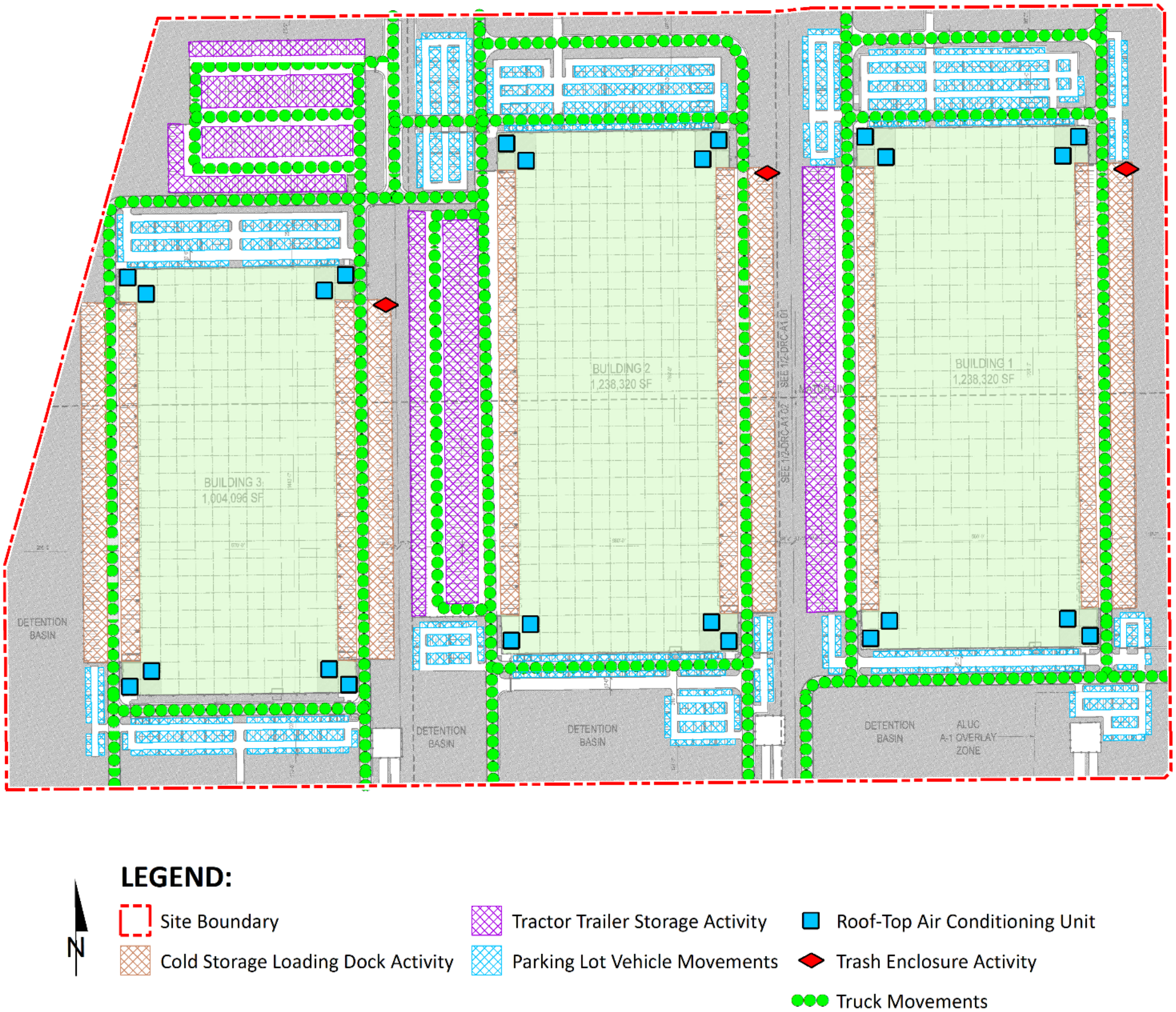


TABLE 9-1: REFERENCE NOISE LEVEL MEASUREMENTS

Reference Noise Source	Noise Source Height (Feet)	Min./ Hour[1]		Reference Noise Level (dBA L_{eq}) @ 50 Feet	Sound Power Level (dBA)[2]
		Day	Night		
Cold Storage Loading Dock Activity	8'	60	60	65.7	111.5
Tractor Trailer Storage Activity	8'	60	60	62.8	103.4
Roof-Top Air Conditioning Units	5'	39	28	57.2	88.9
Parking Lot Vehicle Movements	5'	60	60	52.6	81.1
Trash Enclosure Activity	5'	60	30	57.3	89.0
Truck Movements	8'	60	60	59.8	93.2

[1] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.
[2] Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels calculated using the CadnaA noise model at the reference distance to the noise source. Numbers may vary due to size differences between point and area noise sources.

9.2.2 COLD STORAGE LOADING DOCK ACTIVITY

The reference cold storage loading dock activities are intended to describe the typical outdoor operational noise activities associated with the Project. This includes truck idling, reefer activity (refrigerator truck/cold storage), deliveries, backup alarms, trailer docking including a combination of tractor trailer semi-trucks, two-axle delivery trucks, and background operation activities. Since the noise levels generated by cold storage loading dock activity can be slightly higher due to the use of refrigerated trucks or reefers, this reference noise level conservatively assumes that all loading dock activity is associated with cold storage facilities, even though only 10 percent cold storage is anticipated. (24) The reference noise level measurement was taken in the center of the loading dock activity area and represents multiple concurrent noise sources resulting in a combined noise level of 65.7 dBA L_{eq} at a uniform distance of 50 feet. Specifically, the reference noise level measurement represents one truck located approximately 30 feet from the noise level meter with another truck passing by to park roughly 20 feet away, both with their engines idling. Throughout the reference noise level measurement, a separate docked and running reefer truck was located approximately 50 feet east of the measurement location. Additional background noise sources included truck pass-by noise, truck drivers talking to each other next to docked trucks, and air brake release noise when trucks parked.

9.2.3 TRACTOR TRAILER STORAGE ACTIVITY

To evaluate the noise levels associated with truck idling, backup alarms, trailer movements and storage activities, Urban Crossroads collected a reference noise level measurement at an existing parcel hub facility to describe the potential operational noise levels associated with Project tractor trailer storage activities. The measured reference noise level at 50 feet from activity was measured at 62.8 dBA L_{eq}. The reference noise level measurement includes a semi-truck with trailer pass-by event, background switcher cab trailer towing, drop-off, idling, and backup alarm events. Tractor trailer activity is estimated during all the daytime, evening, and nighttime hours.

9.2.4 ROOF-TOP AIR CONDITIONING UNITS

The noise level measurements describe a single mechanical roof-top air conditioning unit. The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit. At the uniform reference distance of 50 feet, the reference noise level is 59.2 dBA L_{eq}. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for and average 39 minutes per hour during the daytime hours, and 28 minutes per hour during the nighttime hours. These operating conditions reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F. For this noise analysis, the air conditioning units are expected to be located on the roof of the Project buildings.

9.2.5 PARKING LOT VEHICLE MOVEMENTS

To describe the on-site parking lot activity, a long-term reference noise level measurement was collected in the center of activity within the staff parking lot of a warehouse distribution center. At 50 feet from the center of activity, the parking lot produced a reference noise level of 56.1 dBA L_{eq}. Parking activities are expected to take place during the full hour (60 minutes) throughout the daytime and evening hours. The parking lot noise levels are mainly due to cars pulling in and out of parking spaces in combination with car doors opening and closing.

9.2.6 TRASH ENCLOSURE ACTIVITY

To describe the noise levels associated with a trash enclosure activity, Urban Crossroads collected a reference noise level measurement at an existing trash enclosure containing two dumpster bins. The trash enclosure noise levels describe metal gates opening and closing, metal scraping against concrete floor sounds, dumpster movement on metal wheels, and trash dropping into the metal dumpster. The reference noise levels describe trash enclosure noise activities when trash is dropped into an empty metal dumpster, as would occur at the Project Site. The measured reference noise level at the uniform 50-foot reference distance is 59.3 dBA L_{eq} for the trash enclosure activity. The reference noise level describes the expected noise source activities associated with the trash enclosures for the Project's proposed building. Typical trash enclosure activities are estimated to occur for 10 minutes per hour.

9.2.7 TRUCK MOVEMENTS

The truck movements reference noise level measurement was collected over a period of 1 hour and 28 minutes and represent multiple heavy trucks entering and exiting the outdoor loading dock area producing a reference noise level of 59.8 dBA L_{eq} at 50 feet. The noise sources included at this measurement location account for trucks entering and existing the Project driveways and maneuvering in and out of the outdoor loading dock activity area.

9.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. Using the ISO 9613-2 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source.

Consistent with the ISO 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (L_w) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment. The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the noise analysis to account for mixed ground representing a combination of hard and soft surfaces. Appendix 9.1 includes the detailed noise dBA L_{eq} model inputs used to estimate the Project operational noise levels presented in this section.

9.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the Project operations that include cold storage loading dock activity, tractor trailer storage activity, roof-top air conditioning units, parking lot vehicle movements, trash enclosure activity, and truck movements, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 9-2 shows the Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 42.1 to 47.6 dBA L_{eq}.

TABLE 9-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)				
	R1	R2	R3	R4	R5
Cold Storage Loading Dock Activity	40.6	46.4	47.1	41.6	43.9
Tractor Trailer Storage Activity	34.1	31.4	30.9	29.5	31.8
Roof-Top Air Conditioning Units	25.4	30.3	30.0	26.8	28.1
Parking Lot Vehicle Movements	26.1	30.2	29.7	26.6	29.5
Trash Enclosure Activity	22.1	30.1	25.8	18.9	18.1
Truck Movements	31.3	35.0	34.0	30.1	32.5
Total (All Noise Sources)	**42.1**	**47.1**	**47.6**	**42.4**	**44.7**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

Table 9-3 shows the Project operational noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. The nighttime hourly noise levels at the existing off-site receiver locations are expected to range from 42.1 to 47.5 dBA L_{eq}. The differences between the daytime and nighttime noise levels are largely related to the estimated duration of noise activity as outlined in Table 9-1. Appendix 9.1 includes the detailed noise model inputs.

TABLE 9-3: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)				
	R1	R2	R3	R4	R5
Cold Storage Loading Dock Activity	40.6	46.4	47.1	41.6	43.9
Tractor Trailer Storage Activity	34.1	31.4	30.9	29.5	31.8
Roof-Top Air Conditioning Units	23.0	27.9	27.6	24.3	25.7
Parking Lot Vehicle Movements	26.1	30.2	29.7	26.6	29.5
Trash Enclosure Activity	18.1	26.1	21.8	14.9	14.2
Truck Movements	31.3	35.0	34.0	30.1	32.5
Total (All Noise Sources)	**42.1**	**47.0**	**47.5**	**42.3**	**44.6**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

9.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the unmitigated Project-only operational noise levels are evaluated against exterior noise level thresholds based on the Town of Apple Valley exterior noise level standards at nearby noise-sensitive receiver locations. Table 9-4 shows the unmitigated operational noise levels associated with Lake Creek Logistics Center will not exceed the exterior noise level standards, adjusted in five dBA increments to reflect the ambient noise levels (see Table 5-1) per the Town of Apple Valley Municipal Code Section 9.73.050[A][1][c]. Therefore, the stationary operational noise impacts are considered *less than significant* at the nearest noise-sensitive receiver locations.

TABLE 9-4: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA Leq)[2]		Noise Level Standards (dBA Leq)[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	42.1	42.1	55	45	No	No
R2	47.1	47.0	60	60	No	No
R3	47.6	47.5	60	60	No	No
R4	42.4	42.3	55	45	No	No
R5	44.7	44.6	60	60	No	No

[1] See Exhibit 8-A for the receiver locations.
[2] Proposed Project unmitigated operational noise levels as shown on Tables 9-2 and 9-3.
[3] Exterior noise level standards, adjusted in five (5) dBA increments to reflect the ambient noise levels (see Table 5-1) per Town of Apple Valley Municipal Code Section 9.73.050[A][1][c].
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
"Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.

9.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations that may be potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (4) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented on Tables 9-5 and 9-6, respectively. As indicated on Table 9-5, the Project will generate a daytime operational noise level increase ranging from 0.3 to 0.5 dBA L_{eq} at the nearest receiver locations. Table 9-6 shows that the Project will generate a nighttime operational noise level increase ranging from 0.2 to 3.6 dBA L_{eq} at the nearest receiver locations. Project-related operational noise level increases will not exceed the operational noise level increase significance criteria presented in Table 4-1. Therefore, Project related operational noise level increases at the sensitive receiver locations will be *less than significant.*

TABLE 9-5: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	42.1	L1	52.8	53.2	0.4	5.0	No
R2	47.1	L2	57.9	58.2	0.3	5.0	No
R3	47.6	L3	57.2	57.7	0.5	5.0	No
R4	42.4	L4	53.8	54.1	0.3	5.0	No
R5	44.7	L5	56.9	57.2	0.3	5.0	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 9-2.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

TABLE 9-6: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	42.1	L1	40.9	44.5	3.6	5.0	No
R2	47.0	L2	57.2	57.6	0.4	5.0	No
R3	47.5	L3	57.8	58.2	0.4	5.0	No
R4	42.3	L4	43.6	46.0	2.4	5.0	No
R5	44.6	L5	59.0	59.2	0.2	5.0	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 9-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

10 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 10-A shows the on-site construction noise source activity in relation to the nearest sensitive receiver locations previously described in Section 7. Section 9.73.060[F][1] of the Town of Apple Valley Municipal Code, provided in Appendix 3.2, indicates that *operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7 p.m. and 7 a.m., or at any time on weekends or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by variance issued by the Town.*

In addition, Municipal Code Section 9.73.060[F][2] requires construction activities to be conducted in such a manner that the noise levels at affected residential properties will not exceed the daytime (7:00 a.m. to 7:00 p.m.) mobile exterior noise level limit of 75 dBA L_{eq} and 60 dBA L_{eq} during the nighttime hours of 7:00 p.m. to 7:00 a.m.

10.1 CONSTRUCTION NOISE LEVELS

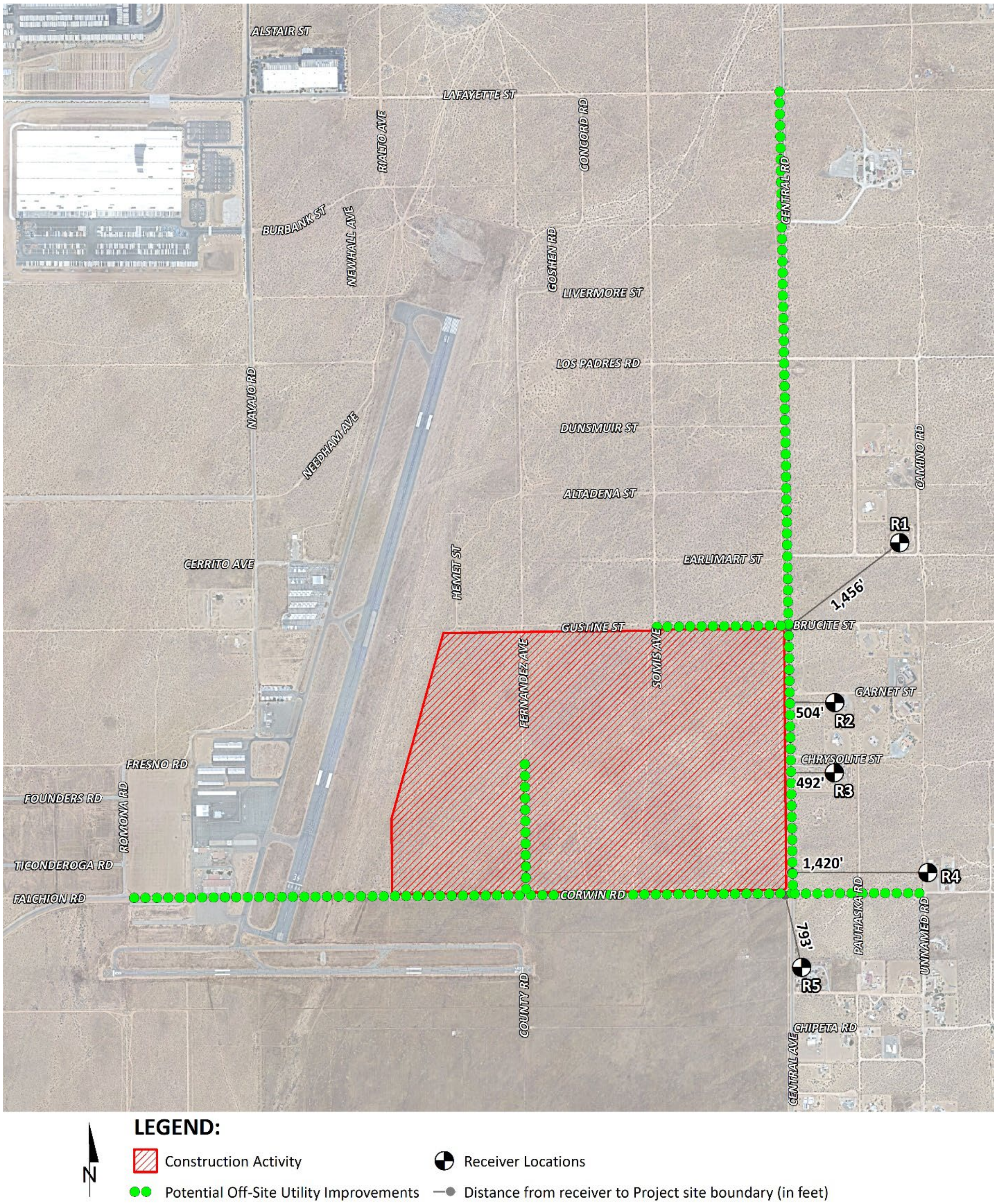
The FTA *Transit Noise and Vibration Impact Assessment Manual* recognizes that construction projects are accomplished in several different stages and outlines the procedures for assessing noise impacts during construction. Each stage has a specific equipment mix, depending on the work to be completed during that stage. As a result of the equipment mix, each stage has its own noise characteristics; some stages have higher continuous noise levels than others, and some have higher impact noise levels than others. The Project construction activities are expected to occur in the following stages:

- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coating

10.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe construction noise activities, this construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (25) The RCNM equipment database, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

EXHIBIT 10-A: CONSTRUCTION NOISE SOURCE LOCATIONS



10.3 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearby sensitive receiver locations were completed. Consistent with FTA guidance for general construction noise assessment, Table 10-1 presents the combined noise levels for the loudest construction equipment, assuming they operate at the same time. As shown on Table 10-2, the construction noise levels are expected to range from 43.5 to 57.8 dBA L_{eq} at the nearby receiver locations. Appendix 10.1 includes the detailed CadnaA construction noise model inputs.

TABLE 10-1: PCONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Equipmnet[1]	Reference Noise Level @ 50 Feet (dBA L_{eq})	Composite Reference Noise Level (dBA L_{eq})[2]	Reference Power Level (dBA L_w)[3]
Site Preparation	Tractor	80	84.0	115.6
	Backhoe	74		
	Grader	81		
Grading	Scraper	80	83.3	114.9
	Excavator	77		
	Dozer	78		
Building Construction	Crane	73	80.6	112.2
	Generator	78		
	Front End Loader	75		
Paving	Paver	74	77.8	109.5
	Dump Truck	72		
	Roller	73		
Architectural Coating	Man Lift	68	76.2	107.8
	Compressor (air)	74		
	Generator (<25kVA)	70		

[1] FHWA Road Construction Noise Model.
[2] Represents the combined noise level for all equipment assuming they operate at the same time consistent with FTA Transit Noise and Vibration Impact Assessment guidance.
[3] Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings.

TABLE 10-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})					
	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	51.3	50.6	47.9	45.2	43.5	51.3
R2	57.5	56.8	54.1	51.4	49.7	57.5
R3	57.8	57.1	54.4	51.7	50.0	57.8
R4	52.4	51.7	49.0	46.3	44.6	52.4
R5	54.4	53.7	51.0	48.3	46.6	54.4

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix 10.1.

10.4 PROJECT SITE CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 75 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 75 dBA L_{eq} significance threshold during Project construction activities as shown on Table 10-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 10-3: PROJECT SITE CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	51.3	75	No
R2	57.5	75	No
R3	57.8	75	No
R4	52.4	75	No
R5	54.4	75	No

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations as shown on Table 10-2.
[3] Construction noise level thresholds as shown on Table 4-1.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

10.5 OFF-SITE ROADWAY AND UTILITY IMPROVEMENTS CONSTRUCTION NOISE ANALYSIS

To support the Project development, there will be grading, trenching, and paving for off-site improvements associated with roadway construction and utility installation for the Project. Water service to the Project site would be provided by Liberty Utilities. The Project proposes 12-inch Ductile Iron Pile (DIP) connections along Corwin Road and Gustine Street, a 16-inch DIP connection along Central Road north to Lafayette Street, and an 8-inch pressure reducing valve (PRV). Sewer service to the Project site would be provided by the Town of Apple Valley Public Works Wastewater Division. Sewer infrastructure is not currently located immediately adjacent to the site. As such, the Project would install an approximately one-mile-long sewer line within the Corwin Road right-of-way westerly to an existing sewer main located at the intersection of Corwin and Ramona Roads. This alignment would require the sewer line to be installed under the Apple Valley Airport runway. The sewer line would be installed using trenchless construction techniques (jack and bore) so that the runway is not affected.

The Project's drainage system has been designed to capture and convey offsite flows that run onto the Project site, as well as runoff generated onsite. Drainage from all three buildings would be collected in catch basins located throughout the site. Each building will have multiple storm drain systems which will discharge to detention basins. From the detention basins flows will discharge by gravity via separate storm drain system to an onsite channel where it will eventually spillover to the westerly adjacent earthen channel. Electrical power for the Town is provided by Southern California Edison (SCE) and natural gas service is provided by the Southwest Gas Holdings, Inc. (Southwest Gas). The Project would install utility lines within/along Corwin Road to connect to existing lines in the Project vicinity.

It is expected that the off-site construction activities would not take place at any one location for the entire duration of construction due to the nature of the linear construction activity. Construction noise from this off-site work would, therefore, be relatively short-term and the noise levels would be reduced as construction work moves linearly along the selected alignment and farther from sensitive uses. Therefore, the off-site roadway and utility improvement construction activities will be *less than significant.*

10.6 NIGHTTIME CONCRETE POUR NOISE ANALYSIS

It is our understanding that nighttime concrete pouring activities will occur as a part of Project building construction activities. Nighttime concrete pouring activities are often used to support reduced concrete mixer truck transit times and lower air temperatures than during the daytime hours and are generally limited to the actual building pad area. Since the nighttime concrete pours will take place outside the hours permitted by Section 9.73.060 of the Town of Apple Valley Municipal Code, the Project Applicant will be required to obtain authorization for nighttime work from the Town of Apple Valley. Any nighttime construction noise activities are evaluated against the exterior construction noise level threshold of 60 dBA L_{eq} for noise sensitive residential land use.

10.6.1 NIGHTTIME CONCRETE POUR REFERENCE NOISE LEVEL MEASUREMENTS

To estimate the noise levels due to nighttime concrete pour activities, sample reference noise level measurements were taken during a nighttime concrete pour at a construction site. Urban Crossroads, Inc. collected short-term nighttime concrete pour reference noise level measurements during the noise-sensitive nighttime hours between 1:00 a.m. to 2:00 a.m. at 27334 San Bernardino Avenue in the City of Redlands. The reference noise levels describe the expected concrete pour noise sources that may include concrete mixer truck movements and pouring activities, concrete paving equipment, rear mounted concrete mixer truck backup alarms, engine idling, air brakes, generators, and workers communicating/whistling.

To describe the nighttime concrete pour noise levels associated with the construction of the Lake Creek Logistics Center, this analysis relies on reference sound pressure level of 67.7 dBA L_{eq} at 50 feet representing a sound power level of 100.3 dBA L_w. While the Project noise levels will depend on the actual duration of activities and specific equipment fleet in use at the time of construction, the reference sound power level of 100.3 dBA L_w is used to describe the expected Project nighttime concrete pour noise activities.

10.6.2 NIGHTTIME CONCRETE POUR NOISE LEVEL COMPLIANCE

As shown on Table 10-4, the noise levels associated with the nighttime concrete pour activities are estimated to range from 36.0 to 42.5 dBA $L_{eq.}$ The analysis shows that the unmitigated nighttime concrete pour activities will not exceed the 60 dBA L_{eq} nighttime residential noise level threshold at all the nearest noise sensitive receiver locations. Therefore, the noise impacts due to Project construction nighttime concrete pour noise activity are considered *less than significant* at all receiver locations with prior authorization for nighttime work from the Town of Apple Valley. Appendix 10.2 includes the CadnaA nighttime concrete pour noise model inputs.

TABLE 10-4: NIGHTTIME CONCRETE POUR NOISE LEVEL COMPLIANCE

Receiver Location[1]	Concrete Pour Construction Noise Levels (dBA L_{eq})		
	Exterior Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	36.0	60	No
R2	42.2	60	No
R3	42.5	60	No
R4	37.1	60	No
R5	39.1	60	No

[1] Construction noise source and receiver locations are shown on Exhibit 10-A.
[2] Nighttime Concrete Pour noise model inputs are included in Appendix 10.2.
[3] Construction noise level thresholds as shown on Table 4-1.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

10.7 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. The operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibration levels associated with various types of construction equipment are summarized on Table 10-5. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential for human response (annoyance) and building damage using the following vibration assessment methods defined by the FTA. To describe the vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 10-5: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089
Vibratory Roller	0.210

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Table 10-6 presents the expected Project related vibration levels at the nearby receiver locations. At distances ranging from 492 to 1,456 feet from Project construction activities, construction vibration velocity levels are estimated to range from 0.000 to 0.002 in/sec PPV. Based on maximum acceptable continuous vibration threshold of 0.04 (in/sec), the typical Project construction vibration levels will fall below the vibration thresholds at all the sensitive receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during typical construction activities at the Project site.

TABLE 10-6: PROJECT CONSTRUCTION VIBRATION LEVELS

Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]						Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jack-hammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	1,456'	0.000	0.000	0.000	0.000	0.000	0.000	0.004	No
R2	504'	0.000	0.000	0.001	0.001	0.002	0.002	0.004	No
R3	492'	0.000	0.000	0.001	0.001	0.002	0.002	0.004	No
R4	1,420'	0.000	0.000	0.000	0.000	0.000	0.000	0.004	No
R5	793'	0.000	0.000	0.000	0.000	0.001	0.001	0.004	No

[1] Construction noise source and receiver locations are shown on Exhibit 9-A.
[2] Distance from receiver building facade to Project construction boundary (Project site boundary).
[3] Based on the Vibration Source Levels of Construction Equipment (Table 9-5).
[4] Town of Apple Valley Municipal Code 9.73.020[34], (Appendix 3.1)
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

Moreover, the vibration levels reported at the sensitive receiver locations are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter.

11 REFERENCES

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29. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.

12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Lake Creek Logistics Center Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 584-3148.

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EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of San Diego • March, 2018
Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

TOWN OF APPLE VALLEY MUNICIPAL CODE

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APPENDIX 5.1:

STUDY AREA PHOTOS

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE LEVEL CALCULATIONS

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APPENDIX 9.1:

OPERATIONAL NOISE MODEL INPUTS

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APPENDIX 10.1:

CONSTRUCTION NOISE MODEL INPUTS

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APPENDIX 10.2:

NIGHTTIME CONCRETE POUR NOISE MODEL INPUTS

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