4.4 NOISE

This section of the environmental impact report (EIR) presents the results of an analysis of both existing background conditions and future noise conditions following completion of the Project. This section incorporates the findings of the Traffic Memorandum, prepared by JB & Associates and dated September 22, 2014 (see **Appendix 4.8**), in addition to the results of noise monitoring datasheets (available in **Appendix 4.4**).

ENVIRONMENTAL SETTING

Fundamentals of Sound

Sound is technically described in terms of loudness and frequency. The loudness of sound or noise, two terms that are used interchangeably throughout this section, is measured using a logarithmic scale with 10 as the base. The standard unit of sound measurement is the decibel (dB), or dB scale, which describes the physical intensity of the pressure vibrations that make up any sound. The decibel scale sets the hearing threshold as 0 dB. The frequency of the sound is related to the pressure vibration, which is measured in hertz (Hz), which is measured in cycles per second.

The human ear can detect a wide range of frequencies and sound pressure levels. The subjective audible sound pressure range is from 0 dB to 140 dB. The just-noticeable difference is typically around 1 dB for sound level. Hearing thresholds show considerable variability from individual to individual, with a standard variation among individuals of about 5 dB. Human ears can detect not only changes in overall sound-pressure level, but also detect sound with a sound pressure well below the background noise level. Studies have shown that sound is perceived to be twice as loud if the sound level increases by 10 dB. Similarly, a 20 dB increase in the sound level is perceived as four times as loud by the normal human ear.

In response to this sensitivity of the human ear to different frequencies, the A-weighted noise level, referenced in units of dB(A), was developed to better correspond with subjective judgment of sound levels by individuals.

A doubling of sound energy results in a 3 dB(A) increase in sound, which means that a doubling of sound wave energy (e.g., doubling the volume of traffic on a roadway) would result in a barely perceptible change in sound level. In general, changes in a noise level of less than 3 dB(A) are not typically noticed by the human ear.[1] Changes from 3 to 5 dB(A) may be noticed by some individuals who are extremely

1 US Department of Transportation, Federal Highway Administration, *Fundamentals and Abatement of Highway Traffic Noise* (Springfield, VA: US Department of Transportation, Federal Highway Administration, September 1980), 81.

sensitive to changes in noise. An increase of greater than 5 dB(A) is readily noticeable, while the human ear perceives a 10 dB(A) increase in sound level to be a doubling of sound volume.

Noise sources can generally be categorized as one of two types: point sources, such as stationary mechanical equipment; and line sources, such as a roadway. Noise levels generated by a variety of activities are shown in **Figure 4.4-1, Common Noise Levels**. Sound generated by a point source typically diminishes or attenuates at a rate of 6 dB(A) for each doubling of distance from the source to the receptor at acoustically hard sites, and at a rate of 7.5 dB(A) at acoustically soft sites. A hard, or reflective, site consists of such materials as asphalt, concrete, and very hard-packed soil, which do not provide any excess ground-effect attenuation, while an acoustically soft site consists of normal earth and most vegetation-containing ground.[2]

As an example, a 60 dB(A) noise level measured at 50 feet from a point source at an acoustically hard site would be 54 dB(A) at 100 feet from the source and 48 dB(A) at 200 feet from the source. Noise from the same point source at an acoustically soft site would be 52.5 dB(A) at 100 feet and 45 dB(A) at 200 feet from the source. Sound generated by a line source typically attenuates at a rate of 3 dB(A) and 4.5 dB(A) per doubling of distance from the source to the receptor for hard and soft sites, respectively.[3]

Man-made or natural barriers can also attenuate sound levels. Solid walls and berms may reduce noise levels by 5 to 10 dB(A).[4] Sound levels from a source may also be attenuated 3 to 5 dB(A) by the first row of houses and 1.5 dB(A) for each additional row of houses in a residential neighborhood.

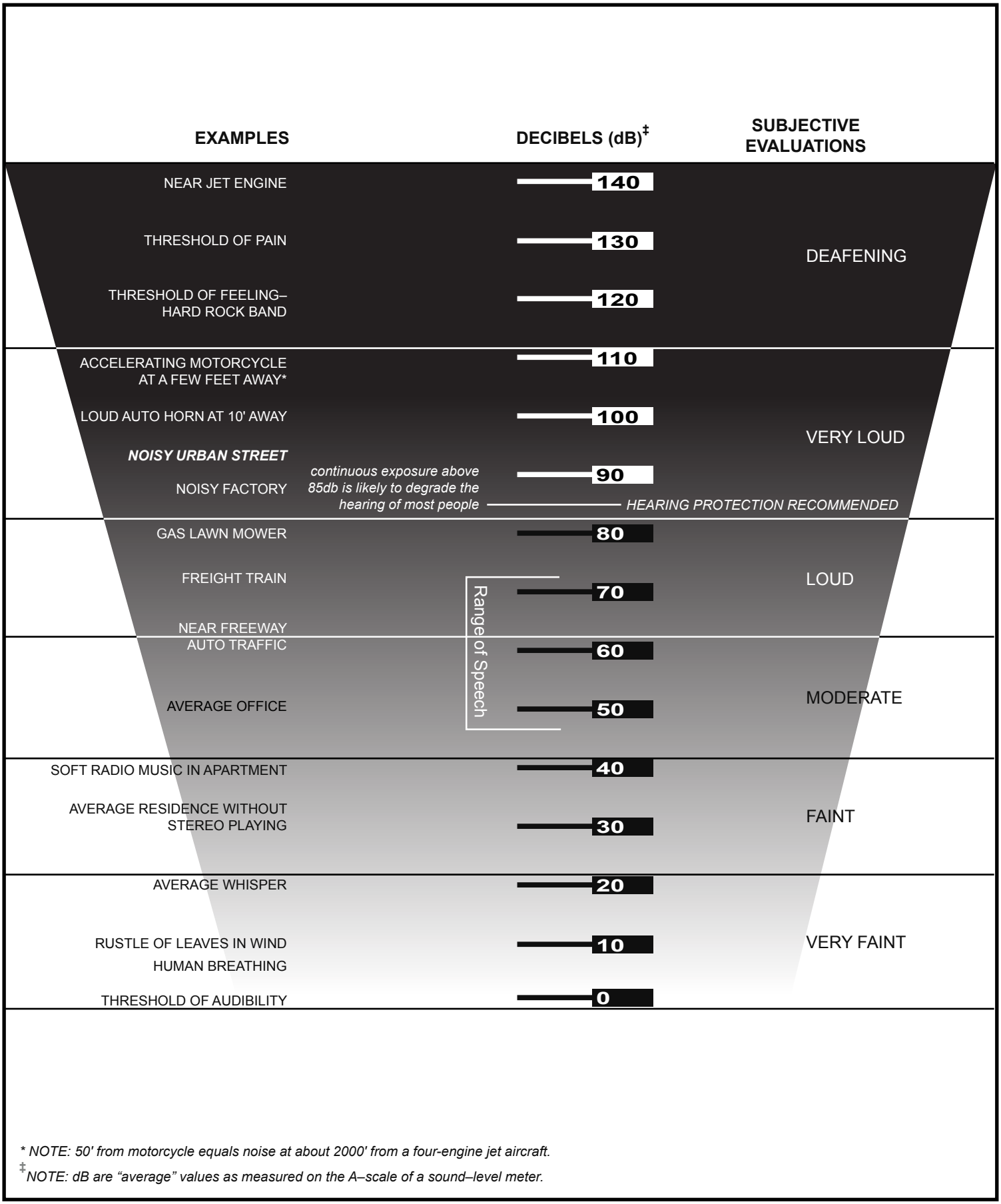
The minimum attenuation of exterior to interior noise provided by typical residential and commercial buildings in California is 17 dB(A) with open windows and 25 dB(A) with closed windows.

Environmental Noise

Noise level increases are used to determine the effect of noise in environmental settings. Many methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time
- The influence of periodic individual loud events
- The community response to changes in the community noise environment

2 US Department of Transportation (1980), 97.
3 US Department of Transportation (1980), 97.
4 US Department of Transportation (1980), 18.



** NOTE: 50' from motorcycle equals noise at about 2000' from a four-engine jet aircraft.*

‡*NOTE: dB are "average" values as measured on the A–scale of a sound–level meter.*

FIGURE **4.4-1**

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Common Noise Levels

Table 4.4-1, Noise Descriptors, identifies various noise descriptors developed to measure sound levels over different periods of time.

Table 4.4-1
Noise Descriptors

Term	Definition
Decibel (dB)	The unit for measuring the volume of sound equal to 10 times the logarithm (base 10) of the ratio of the pressure of a measure sound to a reference pressure.
A-weighted decibel (dB[A])	A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).
Equivalent sound level (Leq)	The sound level containing the same total energy as a time- varying signal over a given time period. The Leq is the value that expresses the time-averaged total energy of a fluctuating sound level. Leq can be measured over any time period, but is typically measured for 1-minute, 15-minutes, 1-hour, or 24-hour periods.
Community noise equivalent level (CNEL)	A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments add 5 dB(A) for the evening, 7:00 PM to 10:00 PM; and add 10 dB(A) for the night, 10:00 PM to 7:00 AM. The 5 and 10 dB(A) penalties are applied to account for increased noise sensitivity during the evening and nighttime hours. The logarithmic effect of adding these penalties to the 1-hour Leq measurements typically results in a CNEL measurement that is within approximately 3 dB(A) of the peak-hour Leq.[1]
Sound pressure level	The sound pressure is the force of sound on a surface area perpendicular to the direction of the sound. The sound pressure level is expressed in decibels (dB).
Ambient noise	The level of noise that is all encompassing within a given environment, being usually a composite of sounds from many and varied sources near to and far from the observer. No specific source is identified in the ambient environment.

1 *California Department of Transportation, Technical Noise Supplement: A Technical Supplement to the Traffic Noise Analysis Protocol (Sacramento, CA: November 2009), pp. N51–N54.*

Health Effects of Noise

Human response to sound is highly individualized. Annoyance is the most common issue associated with community noise levels. Many factors influence the response to noise, including the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, nonacoustic factors, such as an individual's opinion of the noise source, the ability to adapt to the noise, the attitude toward the source and those associated with it, and the predictability of the noise, all influence the response to noise. These factors result in a reaction to noise that is highly subjective, with the perceived effect of a particular noise varying widely among individuals in a community.

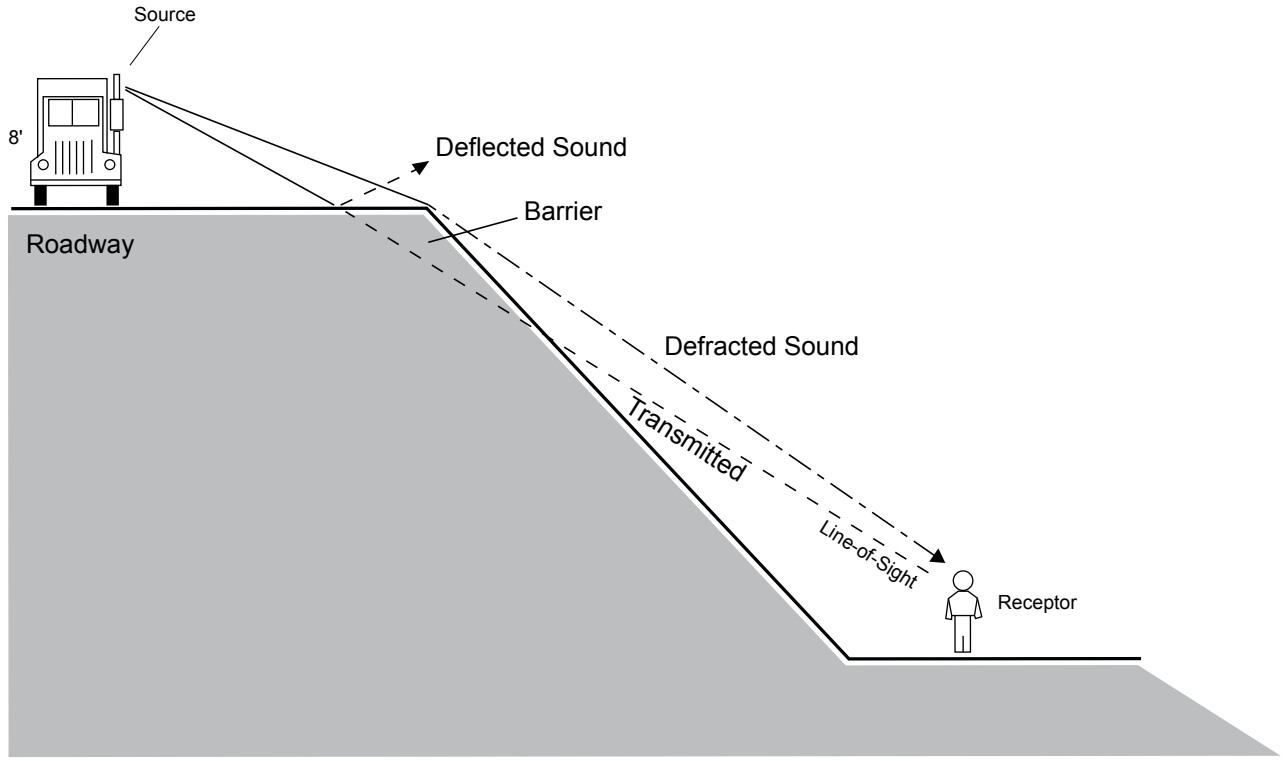
The effects of noise can be grouped into three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects, such as the start of hearing loss

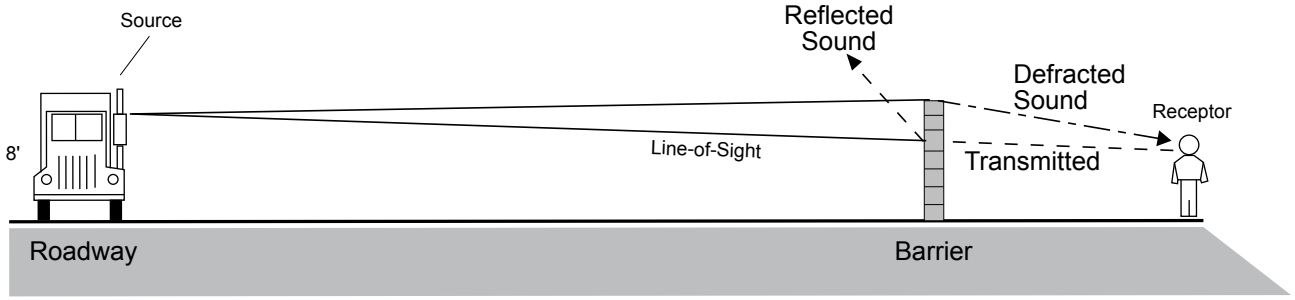
Noise-induced hearing loss usually takes years to develop. Hearing loss is one of the most obvious and easily quantifiable effects of excessive exposure to noise. While the loss may be temporary at first, it can become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly due to the environment is difficult to quantify. Although the major cause of noise-induced hearing loss is occupational, nonoccupational sources may also be a factor.

Noise can mask important sounds and can disrupt communication between individuals in a variety of settings. This process can cause anything from a slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt both face-to-face and telephone communication, as well as the enjoyment of music and television in the home. Interference with communication has proven to be one of the most important components of noise-related annoyance. Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in an individual's natural sleep pattern or level of sleep. This in turn can produce short-term effects on health, with the possibility of more serious health effects if sleep disruption continues over long periods.

Annoyance can be defined as the expression of negative feelings resulting from interference with activities, as well as the disruption of one's peace of mind and the enjoyment of one's environment. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed previously.



"Barrier Effect" Resulting from Differences in Elevation.



"Barrier Effect" Resulting from Typical Soundwall.

FIGURE **4.4-2**

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Noise Attenuation by Barriers

HUMAN/ STRUCTURAL RESPONSE	PPV AMPLITUDE IN INCHES PER SECOND [1]	VELOCITY LEVEL IN VdB	RMS VELOCITY AMPLITUDE IN INCHES PER SECOND [2]	TYPICAL SOURCES: EFFECT 50 FEET FROM SOURCE
THRESHOLD, MINOR COSMETIC DAMAGE TO FRAGILE BUILDINGS	0.4	100	0.1	BLASTING FROM CONSTRUCTION PROJECTS
DIFFICULTY WITH TASKS SUCH AS READING A VDT MONITOR/TV	0.1264	90	0.0316	BULLDOZER AND OTHER HEAVY-TRACKED CONSTRUCTION EQUIPMENT
RESIDENTIAL ANNOYANCE, INFREQUENT EVENTS (E.G., COMMERCIAL RAIL)	0.04	80	0.01	COMMUTER RAIL, UPPER RANGE RAPID TRANSIT, UPPER RANGE
RESIDENTIAL ANNOYANCE, FREQUENT EVENTS (E.G., RAPID TRANSIT)	0.01264	70	0.00316	COMMUTER RAIL, TYPICAL BUS OR TRUCK OVER BUMP RAPID TRANSIT, TYPICAL
LIMIT FOR VIBRATION-SENSITIVE EQUIPMENT				BUS OR TRUCK, TYPICAL
APPROXIMATE THRESHOLD FOR HUMAN PERCEPTION OF VIBRATION	0.004	60	0.001	NEAR FREEWAY AUTO TRAFFIC
AVERAGE RESIDENCE WITHOUT STEREO PLAYING	0.00126	50	0.000316	TYPICAL GROUND VIBRATION
AVERAGE WHISPER				

[1] PPV is typically a factor 1.7 to 6 times greater than RMS vibration velocity. A factor of 4 was used to calculate noise levels.

[2] Vibration levels in terms of velocity levels are defined as: $V=20 \times \log_{10} (a/r)$
V=velocity levels in decibels
a=RMS velocity amplitude
r=reference amplitude (accepted reference quantities for vibration velocity are 1×10^{-6} inches/second in the United States)

FIGURE **4.4-3**

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Typical Levels of Groundborne Vibration

Fundamentals of Vibration

Vibration is commonly defined as an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The peak particle velocity (PPV) or the root-mean-square (RMS) velocity is usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the vibration signal, while RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is typically used for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response to groundborne vibration. The RMS vibration velocity level can be presented in inches per second or in VdB (a decibel unit referenced to 1 microinch per second). Commonly, groundborne vibration generated by manmade activities (i.e., road traffic, construction activity) attenuates rapidly with distance from the source of the vibration.

The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is barely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

Local Setting

Some land uses are recognized as being more sensitive than others to noise levels and vibration. Residences, motels and hotels, schools, libraries, houses of worship, hospitals, nursing homes, auditoriums, parks, and outdoor recreation areas are generally more sensitive to noise and vibration than are commercial and industrial land uses. Existing land uses surrounding the Project site include single-family residences to the north.

The primary noise sources affecting sensitive receptors (homes) in the area are mobile traffic sources generated by traffic on Broadway and Pacific Avenue. Source of mobile source noise include tire squealing, car engine acceleration during pass-bys, and truck engines or backup warnings during deliveries.

The existing ambient noise environment in the Project area was determined by conducting noise measurements. Noise monitoring was conducted over 15-minute intervals with a Larson Davis 831

Sound Level Meter. The ambient noise environment results are provided in **Table 4.4-2, Noise Measurements in Project Vicinity**. As shown, average ambient noise levels ranged from 58.5 dB(A) along N. Kenilworth Avenue to 70.6 dB(A) along N. Pacific Avenue.

Table 4.4-2
Noise Measurements in Project Vicinity

Roadway Segment	Lmin	Lmax	Leq
N. Kenilworth Avenue north of W. Broadway, south of W. Wilson Ave	54.9	73.3	58.5
Corner of Broadway and N. Kenilworth Avenue	55.6	78.4	66.0
North portion of the boundary line	46.5	66.6	55.4
Ivy Street west of S. Pacific Avenue	39.0	75.6	57.5
N. Pacific Avenue north of W. Broadway, south of W. Wilson Ave	51.1	85.8	70.6

*Source: Refer to **Appendix 4.4** for modeling results.*
Notes: Noise measurements were calculated between 7:00 AM to 11:00 AM on July 23, 2014.
dB(A) = A-weighted decibels.

REGULATORY SETTING

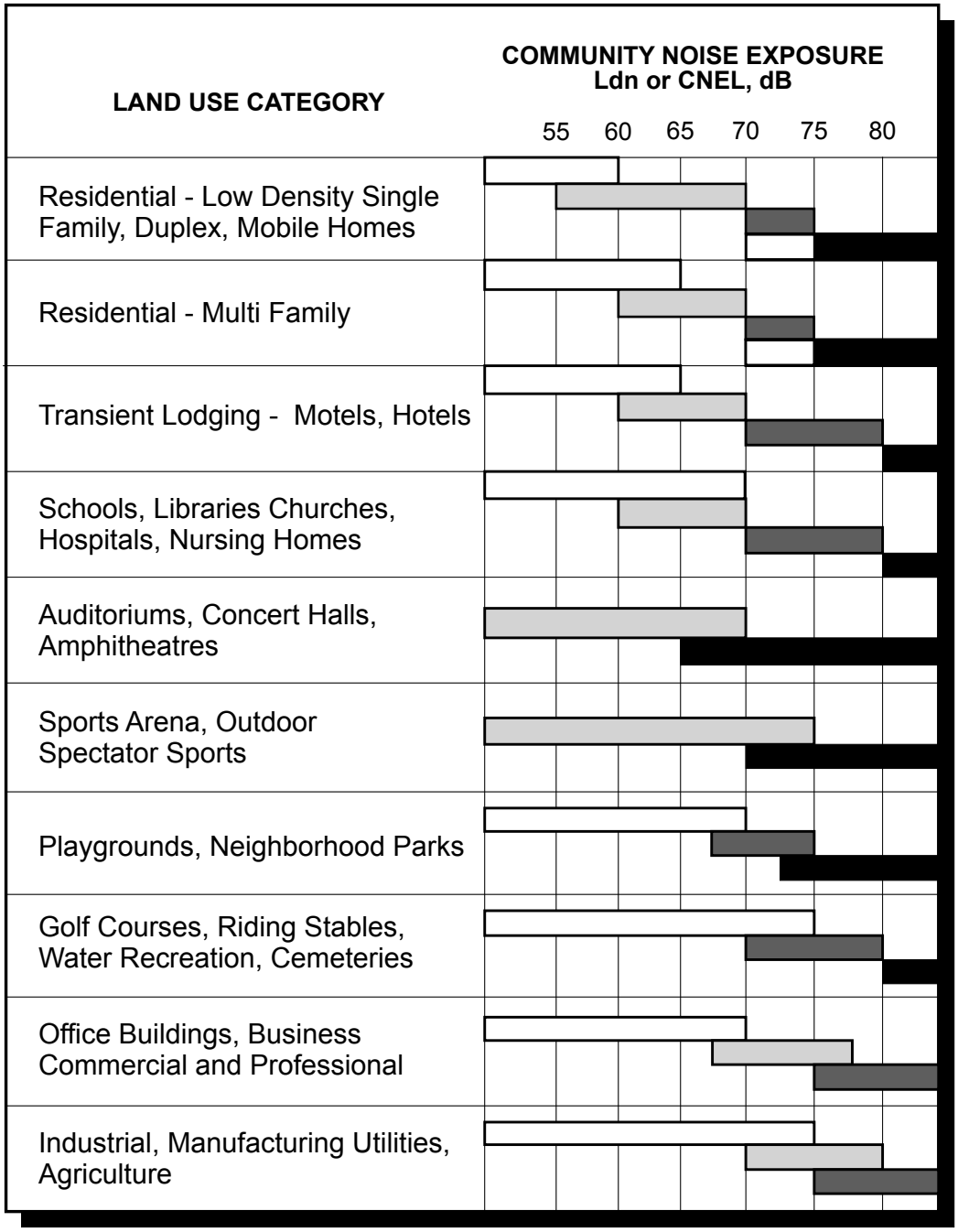
City of Glendale General Plan Noise Element

The City of Glendale General Plan Noise Element establishes noise criteria for the various land uses throughout the City.[5] **Figure 4.4-4, Land Use Compatibility to Noise**, identifies the acceptable limit of noise exposure for various land-use categories within the City. Noise exposure for multifamily uses is "normally acceptable" when the CNEL at exterior residential locations is equal to or below 65 dB(A), "conditionally acceptable" when the CNEL is between 60 to 70 dB(A), and "normally unacceptable" when the CNEL exceeds 70 dB(A). These guidelines apply to noise sources such as vehicular traffic, aircraft, and rail movements. The Noise Element established an interior noise level standard for multifamily uses of 45 dB(A) CNEL or less.

Glendale Noise Ordinance

Noise standards for specific land uses are identified in the City of Glendale's Noise Ordinance, *w*hich is located in Chapter 8.36, Section 8.36.040 of the GMC. Under Section 8.36.040 of the Noise Ordinance, exterior and interior noise is regulated by reference to "presumed noise standards,"[6] which are presented in **Table 4.4-3, Interior and Exterior Presumed Noise Standards**. Under Section 8.36.050 of the Noise Ordinance, where noise levels are below the presumed noise standards, the actual ambient

5 City of Glendale, General Plan, Noise Element (2007).
6 City of Glendale, Municipal Code, sec. 8.36.040, Presumed Noise Standards (1991).



NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise reduction features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

SOURCE: California Governor's Office of Planning and Research, State of California General Plan Guidelines, Appendix C: Guidelines for the Preparation and Content of Noise Elements of the General Plan, October 2003.

FIGURE **4.4-4**

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Land Use Compatibility to Noise

noise level controls, and any noise more than 5 dB(A) above the actual ambient noise level is considered a violation of the Noise Ordinance. Where the actual ambient noise level exceeds the presumed noise standard, the actual ambient noise level is used, and any noise more than 5 dB(A) above the actual ambient noise level is considered a violation of the Noise Ordinance.

However, under the Noise Ordinance, the actual ambient noise levels are not allowed to exceed the presumed noise level by more than 5 dB(A).

Table 4.4-3
Interior and Exterior Presumed Noise Standards

Land Use Categories		Noise Standards	
Categories	**Uses**	**Interior CNEL**	**Exterior CNEL**
Residential	Single family	45[1]	65[2]
	Multifamily	45[1]	65[3]
	Residential within mixed use	45[1]	–
Commercial	Hotel, motel, transient, lodging	45[1]	–
Institutional	Hospital, school classroom, church, Library	45	–
Open Space	Parks[4]	–	65

Source: City of Glendale General Plan, "Noise Element," May 2007.
1. Applies to the indoor environment; excludes bathrooms, toilets, closets, and corridors.
2. Applies to the outdoor environment; limited to the private yard of single-family residences (normally the rear yard).
3. Applies to the patio area where there is an expectation of privacy (i.e., not a patio area that also serves as or is adjacent to the primary entrance to the unit).
4. Only applies to parks where peace and quiet are determined to be of prime importance, such as hillside open space areas accessible to the public. Generally would not apply to urban parks or active-use parks.

The City of Glendale does not have regulations that establish maximum construction noise levels. However, Section 8.36.290(K) provides an exemption from the Noise Ordinance for any activity, operation, or noise, that cannot be brought into compliance (with the Noise Ordinance) because it is technically infeasible to do so.[7] "Technical infeasibility" for the purpose of this section means that noise limitations cannot be complied with despite the use of mufflers, shields, sound barriers, and/or any other noise reduction devices or techniques during the operation of the equipment.

7 Glendale Municipal Code, sec. 8.36.290, Exemptions (1991).

Section 8.36.210 of the Noise Ordinance provides that vibration created by the operation of any device would be a violation of City standards if such vibration were above the vibration perception threshold of an individual at or beyond the property boundary of a source on private property.[8] For sources on a public space or public right-of-way, a violation would occur if the vibration perception threshold of an individual were exceeded at a distance of 150 feet from the source. The Noise Ordinance does not define the level of vibration deemed perceptible by an individual and does not establish maximum allowable vibration levels.

ENVIRONMENTAL IMPACTS

Thresholds of Significance

To assist in determining whether a project would have a significant effect on the environment, the City determines that a project may be deemed to have a significant noise and vibration impact if, per the State CEQA Guidelines Appendix G (Environmental Checklist), it would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- For a project located within an airport land use plan or, where such plan has not been adopted, within 2 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 (issue is addressed in **Section 6.0, Effects Not Found to Be Significant)**
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels (issue is addressed in **Section 6.0, Effects Not Found to Be Significant)**

The State CEQA Guidelines do not provide a definition for "substantial increase" in noise and they do not provide a threshold of significance for potential noise or vibration impacts. Therefore, the following thresholds of significance were developed for this noise analysis based on the General Plan Noise Element and Noise Ordinance discussed previously in this EIR section. These thresholds apply to both Project impacts and cumulative impacts.

8 Glendale Municipal Code, sec. 8.36.200, Vibration (1991).

Noise

On-Site Noise Thresholds

As shown in **Figure 4.4-4**, exterior noise levels of up to 65 dB(A) CNEL are considered "normally acceptable" for multifamily uses, noise levels between 60 and 70 dB(A) CNEL are considered "conditionally acceptable," and noise levels exceeding 70 dB(A) CNEL are considered normally unacceptable." The Noise Element does establish an interior noise standard for multifamily residential uses of 45 dB(A) CNEL.

Off-Site Noise Thresholds

Off-site noise thresholds consider the following: the City's Noise Compatibility Criteria, community response to changes in noise levels, and CEQA standards. As stated earlier, changes in a noise level of less than 3 dB(A) are not typically noticed by the human ear. Some individuals who are extremely sensitive to changes in noise may notice changes from 3 to 5 dB(A). Based on this information, the following thresholds have been established for this analysis:

- An increase of 3 dB(A) or greater in traffic noise level that occurs due to Project-related activities would be significant if the resulting noise levels would cause the City's noise compatibility thresholds for "normally acceptable" exterior or interior noise levels to be exceeded, or result in a 3 dB(A) increase in noise to a land use experiencing levels above the City's noise compatibility threshold for "normally acceptable." A noise level increase of less than 3 dB(A) under either of the previously described scenarios is not considered to be significant.
- An increase of 5 dB(A) or less in traffic noise level that occurs from Project-related activities would be considered not significant if the resulting noise levels remain below the "acceptable" thresholds established by the City. Increases in traffic noise greater than 5 dB(A) would be considered to be significant even if the resulting noise levels are below City standards.
- Stationary noise sources proposed as part of the Project that could result in increases in noise levels at adjacent land uses that exceed City standards would be considered significant.

Vibration

The City's Municipal Code states that a violation of City standards would occur if the operation of a device creates a vibration above the vibration perception threshold.[9] A numerical threshold to identify the point at which a vibration impact is deemed perceptible is not identified in the City's Municipal Code. In the absence of significance thresholds for vibration from construction and operations, the FTA identifies a maximum acceptable level threshold of 65 VdB for buildings where low ambient vibration is essential for interior operations (such as hospitals and recording studios), 72 VdB for residences and

9 City of Glendale, Municipal Code, sec. 8.36.200, Vibration (1991).

buildings where people normally sleep, and 75 VdB for institutional land uses with primary daytime use (such as churches and schools).

Methodology

An analysis of the existing and future noise environments presented in this section is based on technical reports, noise monitoring, and noise prediction modeling. Predicted vibration impacts resulting from the implementation of the Project were determined using data from the FTA. Noise modeling procedures involved the calculation of existing and future vehicular noise levels along individual roadway segments. This was accomplished using the Federal Highway Administration Highway TNM. This model calculates the average noise levels at specific locations based on traffic volumes, average speeds, roadway geometry, and site conditions. Traffic volumes utilized as data inputs to the noise prediction model were calculated based on information provided by KOA Corporation and are consistent with the analysis provided in **Section 4.8, Traffic and Transportation,** of this EIR.

Impact Analysis

Thresholds: **Would result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies**

Would result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project

Vehicle Noise

Vehicular noise can potentially affect the Project site, as well as land uses located along the studied roadway system. As discussed previously, an increase in CNEL of 3 dB(A) represents the point at which only the most sensitive individuals notice a change in noise levels. The existing uses on the Project site generate traffic and traffic noise under existing conditions. Existing average daily trips for the existing office supply superstore along Broadway and Pacific Avenue total approximately 1,080 trips. A doubling of roadway volumes would result in an increase in vehicle-generated noise by 3 dB(A). Because the Project is forecast to result in an increase of 902 daily trips, which is less than half the existing trips, the Project would not increase roadway noise levels by 3 dB(A) or greater; thus, land uses located along study area roadways would not be affected by any additional traffic noise. Therefore, impacts would be less than significant.

Level of Significance before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance after Mitigation: Less than significant.

Parking Noise

The Project would include a total of 331 parking spaces located within a single-level subterranean parking garage and at-grade. The subterranean parking garage would be accessible from Kenilworth Avenue, and at-grade parking would be accessible from W. Broadway and Pacific Avenue. In general, noise associated with parking structures is not at levels that exceed community standards based on the time-weighted CNEL scale. Parking structures can be a source of annoyance due to automobile engine start-ups and acceleration, the activation of car alarms, tire squealing, and door slamming. When parking structures are above ground and not fully contained within structures, noise from these sources can often reach between 50 and 75 dB(A) at a distance of 50 feet from the structure. Since this parking would be in an enclosed subterranean garage, noise emanating from the parking structure would be contained and buffered by the perimeter concrete walls on the perimeter of the parking structure and would not generally effect nearby sensitive receptors. Furthermore, all floors and walls would conform to the California Building Code, which regulates the materials and design requirements of all buildings in the State of California. CBC Section 1207.2, Air-Borne Sound, states, "Walls, floors, and ceilings separating dwelling units from each other or from the public shall have a sounds transmission class (STC) of not less than 50 (45 if field tested) for air-borne noise tested."[10] The new construction standards would reduce interior noise by a minimum of 20 dB(A). Such provisions would further reduce short-term noise levels generated within the subterranean parking structure. As such, on-site parking structure noise would be less than significant.

Estimates of the maximum noise levels associated with at-grade activities are presented in **Table 4.4-4, Maximum Noise Levels Generated by Parking Lots**. These levels are based on numerous measurements conducted by Meridian Consultants. The noise levels presented are for a distance of 50 feet from the source and are the maximum noise level generated. A range is provided to reflect the variability of noise generated by various automobile types and driving styles.

10 California Building Code, sec. 1207.2, Air-borne sound (2013).

Table 4.4-4
Maximum Noise Levels Generated by Parking Lots

Parking Structure Event	Peak Noise Levels at 50 Feet (dB[A])
Door slamming	60–70
Car alarms	65–75
Engine start-ups	60–70
Tire squeals	50–70
Car pass-bys	55–70

Due to the existing traffic noise along the surrounding roadways (mainly along Broadway and Pacific Ave) and shielding from commercial space, normal daytime parking Leq noise would not likely be audible or exceed the 65 dB(A) Municipal Code threshold at receptor locations.

Level of Significance before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance after Mitigation: Less than significant.

Sweepers

Other noise sources that may be associated with the parking structure areas include the use of sweepers in the early morning or late evening hours. Noise levels generated by sweepers are generally higher than parking lot noise associated with automobile activities. Sweepers can generate average noise levels of 68 dB(A) at 50 feet for normal sweeping activities. The noise from sweepers is intermittent and would not cause an increase in long-term noise of more than 3 dB(A) over the time-weighted CNEL, and therefore would not be significant from that perspective. However, the peak sound levels generated by the sweepers could exceed the single-noise event threshold for on-site residences. Depending on the timing of operations, this noise source would result in significant noise impacts during quieter morning and evening periods, and would exceed the 65 dB(A) threshold for exterior uses at receptor locations.

Level of Significance before Mitigation: Potentially Significant.

Mitigation Measures: The following mitigation measure is provided to reduce noise levels associated with street sweeper operations to acceptable levels during the early morning and late evening periods:

4.4-1 On-site sweeper operations shall be restricted to between the hours of 7:00 AM and 10:00 PM, Monday through Friday.

Level of Significance after Mitigation: Less than significant.

Residential On-Site Development

Future residents located on the Project site, as well as off-site uses, including nearby sensitive receptors, may experience noise due to an increase in human activity within the area from people living on the premises and utilizing the on-site amenities, including common areas. Potential residential-type noise sources include people talking, doors slamming, stereos, and other noises associated with human activity. These noise sources are not unique and generally contribute to the ambient noise levels experienced in all residential areas. Noise levels for residential areas are typically between 48 and 52 dB(A) CNEL. Overall, the noise generated by the Project's residential land uses would not exceed the City of Glendale's compatibility thresholds and is considered to be less than significant.

Level of Significance before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance after Mitigation: Less than significant.

On-Site Roadway Noise

As shown in **Table 4.4-2,** existing plus project exterior noise levels on the Project site due to vehicle traffic along Broadway frontage and near the intersection of Broadway/Pacific Avenue Broadway/Kenilworth Avenue range from 58.5 to 70.6 dB(A) CNEL. These noise levels are not uncommon for a typical urban setting. As previously mentioned, the Project is forecast to result in 902 additional daily trips. On-site roadway noise as a result of the Project would be similar to existing conditions because the slight increase in trips generated would not be enough to noticeably increase ambient noise levels. However, as noted in Exhibit 2 in the City's General Plan Noise Element, the exterior 2030 noise contours for the Project site would be greater than 65 dB(A) CNEL. The Project includes private outside patios or balconies for each unit. Noise levels would be greater than the City's exterior noise standard of 65 dB(A) for patio/balcony areas, and exterior noise impacts would be potentially significant.

The Project would be constructed according to the 2014 Glendale Building and Safety Code, which requires new construction to meet a 45 CNEL noise standard. Average sound transmission loss between the exterior and interior environment is a minimum of 20 dB(A) with windows closed. Since ambient noise levels near the Project range from 58.5 to 70.6 dB(A), interior noise levels would be between 38.5 to 50.6 dB(A). Therefore, interior noise levels in the apartment building would be above the interior threshold of 45 dB(A) CNEL, and interior noise impacts would be potentially significant.

Level of Significance before Mitigation: potentially significant (interior and exterior noise levels).

Mitigation Measures: The following mitigation measure is provided to reduce on-site noise levels associated with vehicle traffic to acceptable levels:

4.4.2 Prior to the issuance of occupancy permits, noise-sensitive residential land uses proposed in areas exceeding the exterior 65 dB(A) CNEL (such as those dwelling units facing Broadway) shall be designed so that interior noise levels attributable to exterior sources do not exceed 55 dB(A) during the daytime and 45 dB(A) during nighttime when doors and windows are closed. An acoustical analysis of the noise insulation effectiveness of proposed construction shall be required and documented during permit review, showing that the building materials and construction specifications are adequate to meet both the interior noise standard and exterior private living space (i.e. balconies). Examples of building materials and construction specifications that may be used to meet the interior and exterior noise standard include but are not limited to the following:

- Windows along Broadway shall be doubled paned, mounted in low air filtration rate frames, and have a minimum sound transmission coefficient rating of 30 or greater.
- Units along Broadway shall include a continuous balcony at all levels except ground level, equipped with full-height sliding glass panels acting as a second barrier of the building façade to block noise.
- Air conditioning units may be provided to allow for windows to remain closed.
- Roof or attic vents facing southward shall be baffled.

Level of Significance after Mitigation: Less than significant.

Threshold: **Would result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels**

Construction Vibration

Ground vibrations from construction activities very rarely reach the levels that can damage structures, but they can achieve the audible range and be felt in buildings close to the construction site. The primary and most intensive vibration source associated with the development of the Project would be the use of heavy construction equipment during site preparation/grading activities. Vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. **Table 4.4-5, Vibration Source Levels for Construction Equipment**, lists vibration source levels for construction equipment.

Table 4.4-5
Vibration Source Levels for Construction Equipment

Equipment	VdB at 25 Feet
Excavator	80
Large bulldozer	87
Backhoe	80
Loaded truck	86
Roller	74
Jackhammer	79
Small bulldozer	58

Source: Office of Planning and Environment, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, FTA-VA-90-1003-06 (May 2006), p. 12-9.

As shown in **Table 4.4-5**, large bulldozers are capable of producing approximately 87 VdB at 25 feet, which is the approximate distance to the nearest structure west of the site and to the multifamily uses northeast of the site. This would exceed the threshold of 80 VdB for residences and buildings where people normally sleep. Land uses surrounding the Project site consist mostly of residential and commercial uses. High noise-producing (and vibration-producing) activities during construction would be scheduled to occur between the hours of 7:00 AM and 5:00 PM to minimize disruption to sensitive uses. Nonetheless, potential impacts due to vibration would be significant.

Level of Significance before Mitigation: Potentially significant.

Mitigation Measures: The following mitigation measures are provided to reduce significant vibration impacts due to construction equipment:

4.4-3 Demolition, earthmoving, and ground-impacting operations shall be conducted so as not to occur in the same period.

4.4-4 Select demolition method to minimize vibration where possible (e.g., sawing masonry into sections rather than demolishing it by pavement breakers).

4.4-5 Operate earthmoving equipment on the construction site as far away from vibration sensitive sites as possible.

Level of Significance after Mitigation: Significant and unavoidable.

Threshold: **Would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.**

As described in **Section 3.0, Project Description,** Project construction is anticipated to last approximately 18 months and is expected to commence on or about April 2015. The Project would be constructed in three phases: (1) demolition; (2) site preparation/excavation; and (3) building construction/architectural coating and asphalt paving.

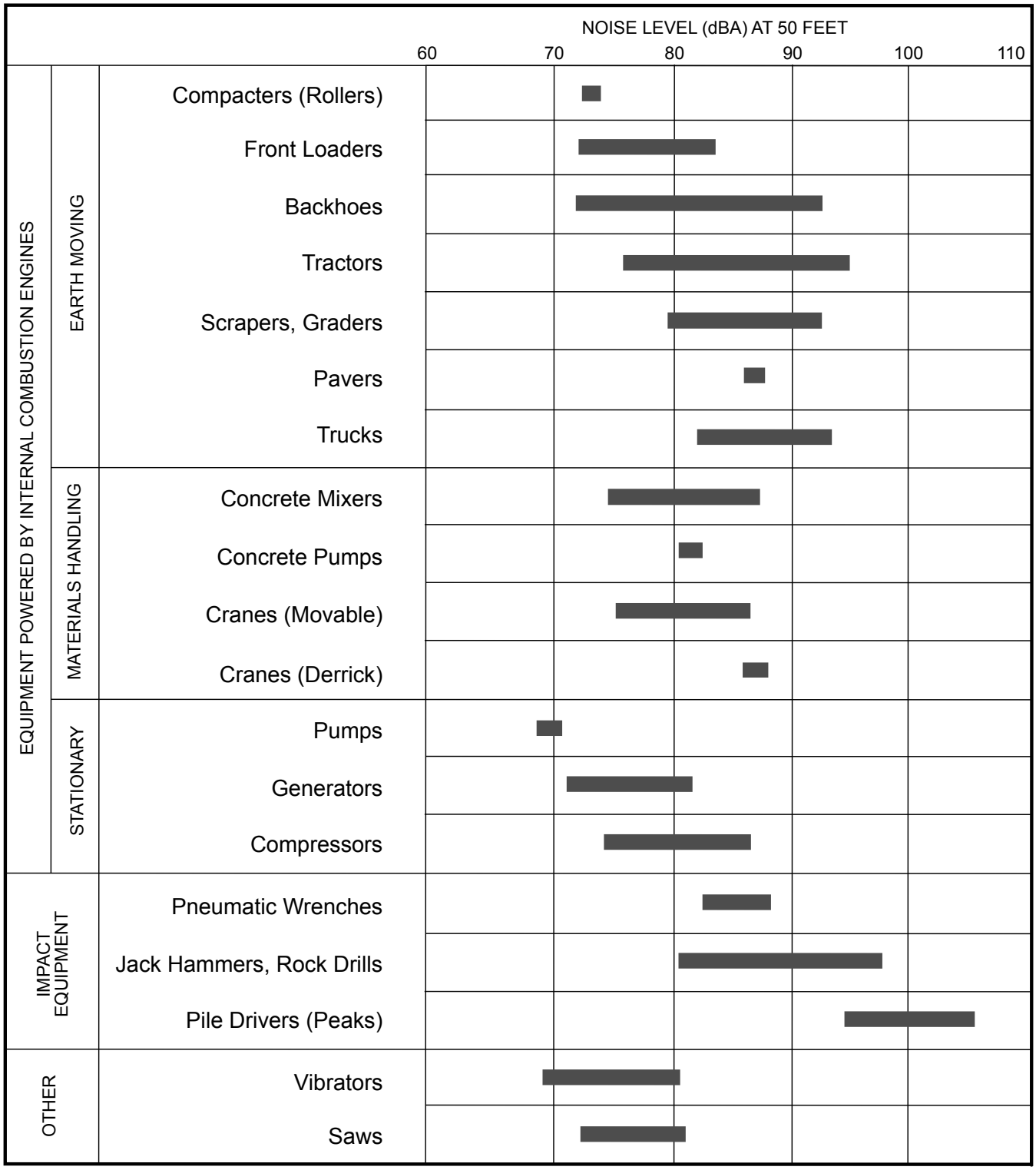
Equipment used during the construction phases would generate both steady state and episodic noise that would be heard both on and off the Project site. Noise levels generated during construction would primarily affect the commercial and residential uses adjacent to the Project site. The US Department of Transportation has compiled data regarding the noise-generating characteristics of specific types of construction equipment. This data is presented in **Figure 4.4-5, Noise Levels of Typical Construction Equipment**. As shown, noise levels generated by heavy equipment can range from approximately 73 dB(A) to noise levels in excess of 80 dB(A) when measured at 50 feet.

Noise levels generated during each of the Project phases are presented in **Table 4.4-6, Typical Maximum Noise Levels for Construction Phases**. Equipment estimates used for the analysis for demolition, grading, and building construction noise levels are representative of worst-case conditions because it is very unlikely that all the equipment contained on site would operate simultaneously. As presented, potential construction-related noise impacts are considered significant due to exceeding the noise threshold of 65 dB(A) for residential and 70 dB(A) for commercial areas, as allowed by the Municipal Code.

Table 4.4-6
Typical Maximum Noise Levels for Construction Phases

	Approximate Leq dB(A) Without Noise Attenuation			
Construction Phase	**25 Feet**	**50 Feet**	**100 Feet**	**200 Feet**
Demolition	92	86	80	74
Site preparation	88	82	76	70
Grading	93	87	81	75
Building construction	94	88	82	76
Architectural coating	88	82	76	70

Source: US Department of Transportation, Construction Noise Handbook, ch. 9.0, (August 2006).



Note: Based on limited available data samples.

SOURCE: United States Environmental Protection Agency, 1971, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances," NTID 300-1.

FIGURE **4.4-5**

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Noise Levels of Typical Construction Equipment

In addition to equipment-generated noise associated with construction activities, construction traffic would generate noise along access routes to the proposed development areas. The major pieces of heavy equipment would be moved onto the development only one time for each construction activity (i.e., demolition, grading). In addition, daily transportation of construction workers and the hauling of materials both on and off the Project site are expected to cause increases in noise levels along study area roadways, although noise levels from such trips would be less than peak-hour noise levels generated by Project trips during Project operation. Average daily trips associated with construction activities would not result in a doubling of trip volumes along study area roadways. Given that it takes a doubling of average daily trips on roadways to increase noise by 3 dB(A), the noise level increases associated with construction vehicle trips along major arterials in the City of Glendale would be less than 3 dB(A), and potential impacts would be less than significant.

Level of Significance before Mitigation: Potentially Significant.

Mitigation Measures: The following mitigation measures are provided to reduce significant noise impacts due to construction equipment:

4.4-6 The following construction best management practices (BMPs) shall be implemented to reduce construction noise levels:

- Ensure that construction equipment is properly muffled according to industry standards and be in good working condition.
- Place noise-generating construction equipment and locate construction staging areas away from sensitive uses, where feasible.
- Schedule high noise-producing activities between the hours of 7:00 AM and 5:00 PM to minimize disruption on sensitive uses.
- Implement noise attenuation measures to the extent feasible, which may include but are not limited to temporary noise barriers or noise blankets around stationary construction noise sources.
- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.
- Turn off construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, when not in use for more than 30 minutes.
- Post construction hours, allowable workdays, and the phone number of the job superintendent clearly at all construction entrances to allow for surrounding owners to contact the job superintendent. If the City or the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective action, and report the action taken to the reporting party.

4.4-7 Construction staging areas along with the operation of earthmoving equipment within the Project area shall be located as far away from vibration-and noise-sensitive sites as possible.

Level of Significance after Mitigation: Although the mitigation measures identified would reduce noise levels to the maximum extent feasible, impacts during construction would remain significant and unavoidable.

Cumulative Impacts

For purposes of this analysis, development of the related projects provided in **Table 4.0-1, List of Related Projects**, in **Section 4.0**, **Environmental Impact Analysis**, will be considered to contribute to cumulative noise impacts. By definition, noise is a localized phenomenon, and drastically reduces as distance from the source increases. Consequently, only projects and growth in the general area of the Project site would contribute to cumulative noise impacts.

Thresholds: **Would result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies**

Would result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project

Cumulative development from related projects would not result in a cumulative impact in terms of a substantial permanent increase in ambient noise levels. A substantial permanent increase is most likely to originate from an increase in noise levels due to roadway traffic. For the purposes of this analysis, an increase of 5 dB(A) at any roadway location is considered a significant impact, and if the resulting noise level would exceed the land use compatibility criteria, then an increase of 3 dB(A) is considered significant. To determine whether the Project would result in a cumulatively significant impact, the increase between existing conditions and future with Project conditions were determined. As shown in **Table 4.4-7, Cumulative with and without Project Noise Levels,** the Project's contribution to these cumulative noise level increases would be less than 3 dB(A). Overall, the Project's contribution would not be considered to be cumulatively considerable and would be less than significant.

Table 4.4-7
Cumulative with and without Project Noise Levels

Roadway Segment	Existing (dB[A])	Cumulative without Project (dB[A])	Cumulative with Project (dB[A])	Change Due to Project	Significant Impact?
Broadway					
West of Pacific Ave.	56.9	56.9	57.1	0.2	No
East of Kenilworth Ave.	57.0	57.0	57.3	0.3	No
Pacific Ave.					
North of Broadway	60.8	61.0	61.0	0.2	No
South of Wilson Ave.	61.2	61.3	61.3	0.0	No
Broadway					
West of Kenilworth Ave.	56.8	57.0	57.1	0.1	No
East of San Fernando Rd.	57.8	57.7	57.8	0.1	No
Pacific Ave					
South of Broadway	60.8	61.0	61.1	0.1	No
North of Colorado Blvd.	61.1	61.3	61.3	0.0	No
Broadway					
East of Pacific Ave.	58.3	58.4	58.5	0.1	No
West of Central Ave.	58.6	58.8	58.9	0.1	No

*Refer to **Appendix 4.4** for noise modeling sheets.*

With regard to stationary sources, a cumulatively significant impact could result from cumulative development. The major stationary sources of noise that would be introduced in the area by related projects would include parking structures and sweeper operations. Since these related projects would be required to adhere to City of Glendale noise standards, all the stationary sources would be required to provide shielding or other noise abatement measures so as not to cause a substantial increase in ambient noise levels. Moreover, due to distance, it is unlikely that noise from multiple related projects would interact to create a significant combined noise impact. Because of this, it is not anticipated that a significant cumulative increase in permanent ambient noise levels would occur; therefore, the impact would be less than significant. Consequently, the Project contribution to cumulative noise impacts is not considered to be cumulatively considerable.

Level of Significance before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance after Mitigation: Less than significant.

Threshold: **Would result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels**

Vibration impacts are localized in nature and decrease with distance. Consequently, to achieve a cumulative increase in vibration, more than one source emitting high levels of vibration (greater than 80 VdB) would need to be in close proximity to the noise receptor. The closest related project, the CCTAN/Colorado Street Mixed-Use Project at 507–525 W. Colorado Street, is located approximately 1,550 feet south from the Project site. This related project would not be located close enough to the Project site such that significant vibration impacts would occur from concurrent construction. It should be noted that the mitigation measures identified for the Project would also apply to the CCTAN/Colorado Mixed-Use Project and any other related projects, and would reduce noise levels to the maximum extent feasible.

Level of Significance before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance after Mitigation: Less than significant.

Threshold: **Would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project**

Noise impacts are localized in nature and decrease with distance. Consequently, to achieve a cumulative increase in noise, more than one source emitting high levels of noise would need to be in close proximity to the noise receptor. As previously mentioned, the closest related project is the CCTAN/Colorado Street Mixed-Use Project, which is located approximately 1,550 feet south from the Project site and would not result in cumulative noise impacts during construction. This related project would not be located close enough to the Project site such that significant construction noise impacts would occur from concurrent construction. The combined construction noise impact of the related projects and the Project's contribution would not be cumulatively significant.

Level of Significance before Mitigation: Less than significant.

Mitigation Measures: No mitigation measures are required.

Level of Significance after Mitigation: Less than significant.