4.4 NOISE

This section describes ambient noise conditions, summarizes applicable regulations related to noise and vibration, and evaluates the potential noise and vibration impacts resulting from adoption and implementation of the Draft General Plan and GGRP.

4.4.1 ACOUSTIC FUNDAMENTALS

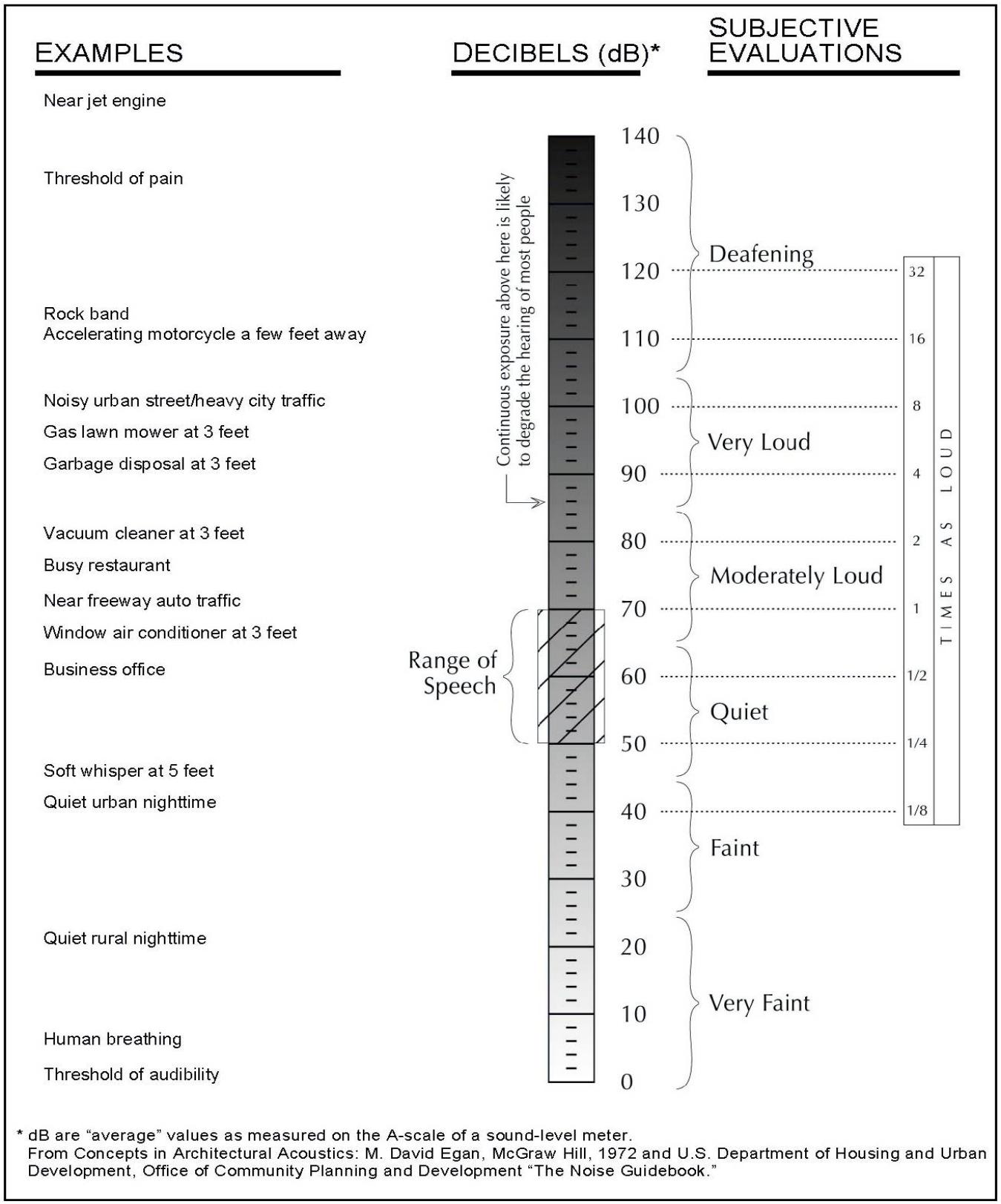
Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature, and can vary substantially from person to person. Common sources of environmental noise and noise levels are presented in Exhibit 4.4-1.

A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz (Hz), which is equivalent to one complete cycle per second.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system, the decibel (dB) scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100 fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation noise sources) such as automobiles, trucks, and airplanes and stationary sources (non-transportation noise sources) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (walls, building façades, berms). Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dB per doubling of distance.



Source: Data compiled by AECOM in 2010

Common Noise Sources and Levels **Exhibit 4.4-1**

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or "shielding" provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods, and human-made features such as buildings and walls may be used as noise barriers.

NOISE DESCRIPTORS

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below.

- **L_{max} (Maximum Noise Level):** The maximum instantaneous noise level during a specific period of time. The L_{max} may also be referred to as the "peak (noise) level."

- **L_x (Statistical Descriptor):** The noise level exceeded X% of a specific period of time. For example, L_{50} is the median noise level, or level exceeded 50% of the time.

- **L_{eq} (Equivalent Noise Level):** The average noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq}. In noise environments determined by major noise events, such as aircraft overflights, the L_{eq} value is heavily influenced by the magnitude and number of single events that produce the high noise levels.

- **L_{dn} (Day-Night Average Noise Level):** The 24-hour L_{eq} with a 10-dBA "penalty" for noise events that occur during the noise-sensitive hours between 10 p.m. and 7 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours, and this generates a higher reported noise level when determining compliance with noise standards. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

- **CNEL (Community Noise Equivalent Level):** The CNEL is similar to the L_{dn} described above, but with an additional 5-dBA "penalty" added to noise events that occur during the noise-sensitive hours between 7 p.m. and 10 p.m., which are typically reserved for relaxation, conversation, reading, and television. When the same 24-hour noise data are used, the reported CNEL is typically approximately 0.5 dBA higher than the L_{dn}.

EFFECTS OF NOISE ON HUMANS

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustomed to, the less tolerable the new noise source will be to the new noise source.

With respect to how humans perceive and react to changes in noise levels, a 1dB increase is imperceptible, a 3 dB increase is barely perceptible, a 6 dB increase is clearly noticeable, and a 10-dB increase is subjectively perceived as approximately twice as loud (Egan 1988: 21). These subjective reactions to changes in noise levels was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 3 dB or more is typically considered substantial in terms of the degradation of the existing noise environment.

VIBRATION

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature, explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (Federal Transit Administration [FTA] 2006: 7-1 – 7-8, California Department of Transportation [Caltrans] 2004: 5-7). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration that is relevant to this analysis occurs 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 (FTA 2006:8-1 – 8-8).

4.4.2 REGULATORY SETTING

Various private and public agencies have established noise guidelines and standards to protect people from potential hearing damage and other adverse physiological and social effects associated with noise. The following federal, state, and local regulations discussed below are applicable to the Draft General Plan.

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

The U.S. Environmental Protection Agency's (EPA's) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, noise control guidelines and regulations contained in EPA rulings in prior years remain in place by designated federal agencies, allowing more individualized control for specific issues by designated federal, state, and local government agencies.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation.

Title 24 of the California Code of Regulations, also known as the California Building Standards Code, establishes building standards applicable to all occupancies throughout the state. The code provides acoustical regulations for both exterior-to-interior sound insulation as well as sound and impact isolation between adjacent spaces of various occupied units. Title 24 regulations state that interior noise levels generated by exterior noise sources shall not exceed 45 dBA L_{dn}, with windows closed, in any habitable room for general residential uses.

Though not adopted by law, the *State of California General Plan Guidelines*, published by the California Governor's Office of Planning and Research (OPR), provides guidance for the compatibility of projects within areas of specific noise exposure. Table 4.4-1 presents acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Airport Land Use Commission

Airports that are either public or serve a scheduled airline are required to have a comprehensive land use plan (CLUP) prepared by the airport land use commission (ALUC). The purpose of ALUC is to:

- Protect public health, safety, and welfare through the adoption of land use standards that minimize the public's exposure to safety hazards and excessive levels of noise.
- Prevent the encroachment of incompatible land uses around public-use airports, thereby preserving the utility of these airports into the future.

The adoption and implementation of a CLUP embodies the land use compatibility guidelines for height, noise, and safety. The Sacramento Area Council of Governments (SACOG) is the ALUC for Sacramento, Sutter, Yolo, and Yuba Counties.

City of Citrus Heights General Plan

The General Plan identifies the City's intent to protect city residents from the harmful and annoying effects of exposure to excessive noise. The following goals and policies are included in the existing General Plan.

Table 4.4-1
Land Use Noise Compatibility Guidelines

Land Use Category	Community Noise Exposure (CNEL/L_{dn}, dB)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential-Low Density Single Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential-Multiple Family	<65	60–70	70–75	75+
Transient Lodging, Motel, Hotel	<65	60–70	70–80	80+
School, Library, Church, Hospital, Nursing Home	<70	60–70	70–80	80+
Auditorium, Concert Hall, Amphitheater		<70	65+	
Sports Arenas, Outdoor Spectator Sports		<75	70+	
Playground, Neighborhood Park	<70		67.5–75	72.5+
Golf Courses, Stable, Water Recreation, Cemetery	<75		70–80	80+
Office Building, Business Commercial and Professional	<70	67.5–77.5	75+	
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	

Notes: CNEL = Community Noise Equivalent Level; dB = A-weighted decibels; L_{dn} = day-night average noise level.

[1] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

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

[3] 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 insulation features included in the design. Outdoor areas must be shielded.

[4] New construction or development should generally not be undertaken.

Source: OPR 2003:244-254

- **Goal 51:** Protect City residents from the harmful and annoying effects of exposure to excessive noise through noise reduction and suppression techniques and appropriate land use policies.

  - **Policy 51.1** Review proposed development projects for compliance with the standards in Table 10: Acceptable Noise Levels (Table 4.4-2 of this EIR). If it appears that a project may exceed the limits of Table 10 (Table 4.4-2 of this EIR), require an acoustical analysis to identify potential noise levels and attenuation methods.

  - **Policy 51.2** New residential development projects shall be designed and constructed to meet acceptable exterior noise level standards shown in Table 10 (Table 4.4-2 of this EIR), as follows:

    - The maximum exterior noise level of 60 dBA L_{dn} shall be applied in residential areas where outdoor use is a major consideration (such as backyards in single family housing developments and recreation areas in multi-family housing projects). Where the City determines that providing a L_{dn} of 60 dBA or lower is not feasible, the noise level in outdoor areas shall be reduced to as close to the standard as feasible through project design.

    - Indoor noise levels shall not exceed a Ldn of 45 dBA in new residential housing units.

Table 4.4-2
Acceptable Noise Levels (Table 10 of the City of Citrus Heights General Plan Noise Element)

Land Use Category	Community Noise Exposure L_{dn} or CNEL, dBA			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential: Low-Density Single Family, Duplex, Mobile Homes	60	65	75	85
Residential: Multiple Family	65	70	75	85
Transient Lodging: Motels, Hotels	65	70	80	85
Schools, Libraries, Churches, Hospitals, Nursing Homes	70	70	80	85
Auditoriums, Concert Halls, Amphitheaters	--	70	--	85
Sports Arena, Outdoor Spectator Sports	--	75	--	85
Playgrounds, Neighborhood Parks	70	--	75	85
Golf Courses, Riding Stable, Water Recreation, Cemeteries	75	--	80	85
Office Buildings, Business Commercial and Professional	70	75	85	--
Industrial, Manufacturing, Utilities, Agriculture	75	80	85	--

Notes:

[1] Specific land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements

[2] 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. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

[3] 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 insulation features included in the design.

[4] New construction or development should generally not be undertaken.

Source: City of Citrus Heights General Plan Noise Element, February 2002, Adapted from the Office of Planning and Research, State of California General Plan Guidelines. Appendix A: Guidelines for the Preparation and Content of the Noise Element of the General Plan, 1990.

  - Noise levels in new residential development exposed to an exterior Ldn of 60 dBA or greater shall be limited to a maximum instantaneous noise level (e.g., trucks on busy streets, train warning whistles) in bedrooms of 50 dBA. Maximum instantaneous noise levels in all other habitable rooms shall not exceed 55 dBA.

- **Policy 51.3** Protect the community, especially noise sensitive receptors, including schools, residences and care facilities, from excessive noise.

- **Policy 51.4** Require major development proposals to reduce noise impacts on adjacent properties through appropriate techniques including, but not limited to, the following strategies:

  - Permit well-designed sounds wall when compatible with the surrounding area

- Screen and control noise sources such as parking, outdoor activities and mechanical equipment
- Increase setbacks for noise sources from adjacent dwellings
- Whenever possible, retain fences, walls or landscaping that serve as noise buffers (although design, safety and other impacts must also be addressed)
- Use soundproofing material and double-glazed windows
- Control hours of operation, including deliveries and trash pickup

- **Policy 51.5** When located adjacent to existing or planned sensitive residential and public/quasi-public uses, require new nonresidential development to mitigate noise to a maximum of 60 dbA Ldn at the property line.
- **Policy 51.6** Use techniques such as roadway design, traffic signalization and other traffic management techniques (such as limiting heavy truck traffic in residential areas and requiting alternative paving material) to reduce noise caused by speed or acceleration of vehicles.
- **Policy 51.7** Protect receivers of roadway noise through appropriate attenuation techniques. The preference is for noise attenuation techniques that minimize the use of sound walls.
- **Policy 51.8** Design sound barriers to be aesthetically pleasing and vandalism resistant.
- **Policy 51.9** Ensure that the City's noise regulations are clear, appropriate, and strictly enforced to protect residents from excessive noise.

City of Citrus Heights Noise Ordinance

The City of Citrus Heights Noise Ordinance (Citrus Heights Municipal Code, Chapter 34, Article III) contains performance standards for the purpose of prohibiting unnecessary, excessive, and annoying sounds that, at certain levels and frequencies, are detrimental to the health and welfare of the City's residents. The following provisions of the City's Noise Ordinance are applicable to the Draft General Plan.

Sec. 34-86. Exterior Noise Standards

The following noise standards, unless otherwise specifically indicated in the Noise Ordinance, shall apply to all properties within a designated noise area:

Noise Area	City Zoning Districts	Time Period	Exterior Noise Standard
1	RD-1, RD-2, RD-3, RD-4, RD-5, R-7, RD-10, R15, RD-20, R-25, RD-30, MH	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	55 dBA 50 dBA

It is unlawful for any person at any location within the City to create any noise which causes the noise levels on an affected property, when measured in the designated noise area, to exceed, for the duration of time set forth following, the specified exterior noise standards in any one hour by:

Cumulative Duration of the Intrusive Sound	Allowance Decibels
1) Cumulative period of 30 minutes per hour	0
2) Cumulative period of 15 minutes per hour	+ 5
3) Cumulative period of five minutes per hour	+10
4) Cumulative period of one minute per hour	+15
5) Level not to be exceeded for any time per hour	+20

Notes:

(c) Each of the noise limits specified in subsection (b) of this section shall be reduced by five dBA for impulsive or simple tone noises or for noises consisting of speech or music.

(d) If the ambient noise level exceeds that permitted by any of the first four noise limit categories specified in subsection (b) of this section, the allowable noise limit shall be increased in five-dBA increments in each category to encompass the ambient noise level. If the ambient noise level exceeds the fifth noise level category, the maximum ambient noise level shall be the noise limit for that category.

(Ord. No. 97-01, § 2(6.68.070), 1-2-1997; Ord. No. 97-13, § 2, 3-26-1997; Ord. No. 97-17, § 2, 9-24-1997)

Sec. 34-87. Interior Noise Standards

In any apartment, condominium, townhouse, duplex or multiple-dwelling unit, it is unlawful for any person to create any noise from inside his or her unit that causes the noise level, when measured in a neighboring unit during the periods 10:00 p.m. to 7:00 a.m., to exceed the following:

- Forty-five dBA for a cumulative period of more than five minutes in any hour.
- Fifty dBA for a cumulative period of more than one minute in any hour.
- Fifty-five dBA for any period of time.

If the ambient noise level exceeds these permitted limits, the allowable noise limit shall be increased in five-dBA increments in each category to encompass the ambient noise level.

Sec. 34-88. Exemptions

The Noise Ordinance provides exemptions from the above standards for outdoor school events; outdoor gatherings conducted pursuant to a City permit; activities in parks, playgrounds and school grounds; machinery used in connection with emergency activities; daytime construction noise; daytime agricultural noise; agricultural noise to salvage crops or perform pest control; daytime residential property maintenance; and airport operations and maintenance.

Specifically, the following exemption is provided for daytime construction noise.

> Noise sources associated with construction, repair, remodeling, demolition, paving or grading of any real property, provided the activities do not take place between the hours of 8:00 p.m. and 6:00 a.m. on weekdays and Friday commencing at 8:00 p.m. through and including 7:00 a.m. on Saturday, Saturdays commencing at 8:00 p.m. through and including 7:00 a.m. on the next following Sunday, and on each Sunday after the hour of 8:00 p.m. However, when an unforeseen or unavoidable condition occurs during a construction project and the nature of the project necessitates that work in process be continued until a specific phase is completed, the contractor or owner shall be allowed to continue work after 8:00 p.m. and to operate machinery and equipment necessary until completion of the specific work in progress can be brought to conclusion under conditions which will not jeopardize inspection acceptance or create undue financial hardships for the contractor or owner.

Sec. 34-90. Schools, Hospitals and Churches

It is unlawful for any person to create any noise which causes the noise level at any school, hospital or church, while the school, hospital or church is in use, to exceed City noise standards specified above or to create any noise which unreasonably interferes with the use of such institution or unreasonably disturbs or annoys patients in the hospital. In any disputed case, interfering noise which is ten dBA or more, greater than the ambient noise level at the building, shall be deemed excessive and unlawful.

4.4.3 ENVIRONMENTAL SETTING

EXISTING NOISE CONDITIONS

There are no significant stationary sources of noise in the planning area. Most noise is caused by vehicular traffic, railroad activity (i.e., Roseville Railyard), and industrial sources adjacent to the planning area. Ambient noise levels in this area are influenced by traffic on I-80 and major roads such as Greenback Lane, Sunrise Boulevard, Antelope Road, Auburn/Old Auburn, San Juan Avenue, and Sylvan Road.

Roadways

Traffic noise is the dominant noise source in the City and is influenced by I-80 and major roads such as Greenback Lane, Sunrise Boulevard, Antelope Road, Auburn/Old Auburn, San Juan Avenue, and Sylvan Road. Existing vehicle traffic noise levels in the City were modeled using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and traffic data derived from the SACMET regional travel demand model provided by the project traffic consultant (Fehr & Peers 2009). The FHWA model is based on CALVENO reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receptor, and ground attenuation factors.

Table 4.4-3 summarizes the modeled traffic noise levels, provides noise levels at 100 feet from the centerline of each major roadway within the City, and lists distances from the roadway centerlines to the 60 dB, 65 dB, and 70 dB L_{dn} traffic noise contours. Exhibit 4.4-2 shows the traffic noise contours for roadways within the City. These traffic noise modeling results are based on existing average daily traffic (ADT) volumes. As shown in Table 4.4-3, the location of the 60 dB L_{dn} contour ranges from 30 to 1,603 feet from the centerline of the modeled roadways. The extent to which existing land uses in the planning area are affected by existing traffic noise depends on their respective proximity to the roadways and their individual sensitivity to noise.

Railways

There are no rail lines that operate in the City of Citrus Heights; however, railroad operations associated with the Roseville Railyard occur in the planning area, northwest of the City limits. Railroad operations occurring in the Roseville Railyard include freight and passenger train operations on Union Pacific Railroad (UPRR) tracks and activities at the Railyard. Noise levels associated with the Railyard include master and group retarder noise, recurring impulsive noises, and train pass-bys. Retarders are mechanized rail braking systems used to slow rail cars; retarder noise is a distinct squeal which occurs primarily at the southern end of the Roseville Railyard as a result of rail cars passing through retarders at the head of the classification area. The recurring impulsive noise generally occurs at the north and central portions of the Railyard as a result of rail cars coupling and decoupling. Additional stationary source noise is generated from the maintenance and repair of locomotives and rail cars; maintenance activities typically occur on the northern portion of the Railyard. Noise generated by maintenance activities includes impact tools, power tools, coupling and decoupling of cars, idling locomotives, and engine load testing.

Table 4.4-3
Summary of Modeled Levels of Existing Traffic Noise

Roadway	Segment		L_{dn} (dB) 100 Feet	Distance (feet) from Roadway Centerline to L_{dn} Contour		
	From	To		70 dB	65 dB	60 dB
Twin Oaks Ave	Sylvan Road	Sunrise Boulevard	54.8	3	9	30
Antelope Road	Roseville Road	Interstate 80	69.9	98	309	977
Antelope Road	Interstate 80	Van Maren Lane	70.1	102	324	1,024
Antelope Road	Van Maren Lane	Auburn Boulevard	68.4	69	219	692
Antelope Road	Auburn Boulevard	Mariposa Avenue	67.5	56	178	562
Antelope Road	Mariposa Avenue	Sunrise Boulevard	67.3	53	168	531
Auburn Boulevard	Manzanita Way	Greenback Lane	67.7	59	185	586
Auburn Boulevard	Greenback Lane	Van Maren Lane	67.5	57	179	567
Auburn Boulevard	Van Maren Lane	Sylvan Road	67.9	61	193	612
Auburn Boulevard	Sylvan Road	Mariposa Avenue	66.3	43	136	431
Old Auburn Road	Mariposa Avenue	Sunrise Boulevard	64.4	27	86	273
Old Auburn Road	Sunrise Boulevard	Fair Oaks Boulevard	65.8	38	121	383
Old Auburn Road	Fair Oaks Boulevard	Wachtel Way	63.9	25	78	247
Greenback Lane	Garfield Avenue	Auburn Boulevard	72.0	160	507	1,603
Greenback Lane	Auburn Boulevard	Dewey Drive	70.9	124	393	1,242
Greenback Lane	Dewey Drive	Sylvan Road	71.3	133	422	1,334
Greenback Lane	Sylvan Road	Mariposa Avenue	71.4	139	441	1,395
Greenback Lane	Mariposa Avenue	Sunrise Boulevard	71.2	133	421	1,331
Greenback Lane	Sunrise Boulevard	Fair Oaks Boulevard	70.3	107	338	1,068
Madison Avenue	San Juan Avenue	Mariposa Avenue	71.8	150	475	1,503
Madison Avenue	Sunrise Boulevard	Fair Oaks Boulevard	72.0	159	503	1,591
Oak Avenue	Sunrise Boulevard	Kenneth Avenue	62.6	18	58	183
Van Maren Lane	Auburn Boulevard	Antelope Road	63.7	23	74	235
Dewey Drive	Greenback Lane	Connemara Circle	65.0	32	101	318
San Juan Avenue	Greenback Lane	Madison Avenue	67.5	56	176	557
Sylvan Road	Greenback Lane	Auburn Boulevard	68.3	67	213	673
Sylvan Road	Auburn Boulevard	Antelope Road	68.0	63	200	633
Sylvan Road	Antelope Road	Twin Oaks Avenue	67.6	58	182	576
Sylvan Road	Twin Oaks Avenue	Whyte Avenue	68.1	64	202	640
Sunrise Boulevard	Madison Avenue	Greenback Lane	71.5	141	447	1,414
Sunrise Boulevard	Greenback Lane	Woodmore Oaks Drive	70.8	121	383	1,212
Sunrise Boulevard	Woodmore Oaks Drive	Oak Avenue	70.5	112	355	1,124
Sunrise Boulevard	Oak Avenue	Old Auburn Road	69.9	98	310	979
Sunrise Boulevard	Old Auburn Road	Antelope Road	70.7	118	372	1,178

Table 4.4-3
Summary of Modeled Levels of Existing Traffic Noise

Roadway	Segment		L_{dn} (dB) 100 Feet	Distance (feet) from Roadway Centerline to L_{dn} Contour		
	From	To		70 dB	65 dB	60 dB
Sunrise Boulevard	Antelope Road	Twin Oaks Avenue	70.4	110	346	1,096
Fair Oaks Boulevard	Madison Avenue	Greenback Lane	67.5	56	177	560
Fair Oaks Boulevard	Greenback Lane	Woodmore Oaks Drive	67.3	53	168	531
Interstate 80	Greenback Lane	Antelope Road	83.5	2,214	7,000	22,137
Interstate 80	Antelope Road	Riverside Avenue	83.1	2,039	6,448	20,390

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level.
Source: Data modeled by AECOM in 2009

Noise associated with train pass-bys along the UPRR line occurs primarily throughout the northwestern portion of the City. Operations along the UPRR main line result in stationary- and transportation-source related noise from warning horns/wayside horns, at-grade crossing bells, as well as locomotive engine and rail car noise.

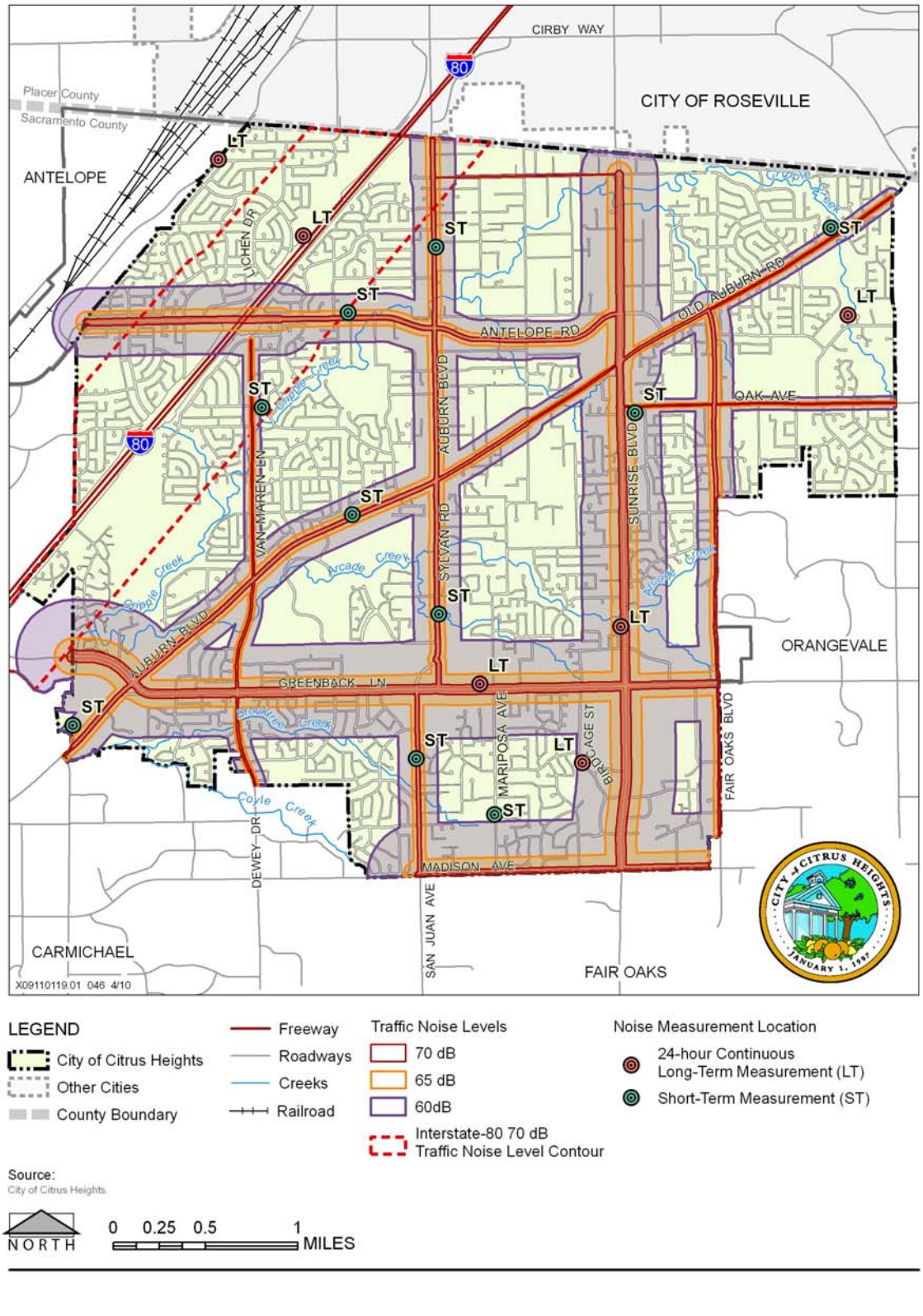
The 60 dBA L_{dn} noise contour for the UPRR line extends approximately 500 feet from the rail line centerline (City of Roseville 2010: 7). According to the UPRR, railroad operations within the Roseville area are not anticipated to change substantially in the future. Therefore, significant modifications to the existing noise contours documented in the City of Roseville General Plan are not anticipated (City of Roseville 2010: 4).

Aircraft Flyovers

There are two airports in the vicinity of the planning area. McClellan Park is located approximately four miles west of the City's western boundary, and Mather Airport is located approximately seven miles south of the City's southern boundary. Both airports are converted Air Force bases that have been decommissioned and converted to non-military use. McClellan Park that now contains industrial, manufacturing, office, hotel, residential, recreation, and other land uses. McClellan Park maintains an active airfield on the premises and the 60 dB CNEL noise contour is approximately 3.5 miles from the nearest City boundary line (Sacramento County Airport System, 2005). Mather Airport now contains industrial (e.g., warehouse, air cargo sorting facilities, hangar space) and office uses. Mather Airport maintains an active airfield on the premises and the 60 dB CNEL noise contour is approximately five miles from the nearest City boundary line (Sacramento County Department of Airports, 2003).

Community Noise Survey

A community noise survey was conducted on November 11 through November 19, 2009, to document the existing noise environment at noise-sensitive receptors within the planning area and existing noise sources. The dominant noise source identified during the ambient noise survey was traffic from the local area roadway network. Measurements of noise levels were taken in accordance with ANSI standards at 10 locations using a Larson Davis Laboratories (LDL) Model 820 precision integrating sound-level meter. Continuous 24-hour, long-term monitoring of noise levels was conducted at six locations within the City using an LDL Model 820 sound-level meter. The sound-level meters were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure that the meter was operating accurately. The equipment used meets all pertinent specifications of the ANSI for Type 1 sound-level meters (ANSI S1.4-1983[R2006]).



Source: Data compiled by AECOM 2009

Noise Measurement Sites and Traffic Noise Contours **Exhibit 4.4-2**

Community noise survey locations are shown in Exhibit 4.4-2. The L_{eq}, L_{max}, L_{10}, L_{50}, and L_{90} values were taken at each short-term ambient noise measurement location presented in Table 4.4-4. During the survey, average daytime ambient noise levels ranged from 51.6 dB to 72.0 dB L_{eq}, with maximum noise levels that ranged from 62.5 dB to 82.4 dB L_{max}.

Table 4.4-4
Summary of Monitored Short Term Daytime Ambient Noise Levels

Site	Location	Date/Time	Noise Sources	Traffic Counts			A-Weighted Sound Level (dBA)				
				Autos	MT	HT	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}
ST-1	Van Maren Lane north of Calvin Drive in New Hope Baptist Church parking lot	November 11, 2009 11:05–11:20 a.m.	Traffic, dog barking, aircraft overflights	175	3	0	51.6	62.5	55	49	46
ST-2	San Juan Avenue north of Westgate Drive in Advent Lutheran Church parking lot	November 19, 2009 1:55–2:10 p.m.	Traffic, landscape maintenance activities	457	8	4	72.0	78.3	76	71	61
ST-3	Sylvan Road south of Woodside Drive, at Creative Frontiers School	November 19, 2009 3:10–3:25 p.m.	Traffic	566	1	1	70.8	80.0	74	69	63
ST-4	Auburn Blvd at Coachman Way	November 19, 2009 3:45–4:00 p.m.	Traffic, landscape maintenance activities	0	0	0	69.9	82.4	73	68	63
ST-5	Antelope Road, east of Rosswood Drive in Rusch Park	November 11, 2009 9:35–9:50 a.m.	Traffic, landscape maintenance activities, aircraft overflights	348	4	2	62.0	72.5	65	61	54
ST-6	Sunrise Blvd at Oak Avenue, at Sunrise Tech Center	November 18, 2009 5:25–5:40 p.m.	Traffic, parking lot activity, people talking	146	2	0	55.7	74.1	58	54	52
ST-7	Old Auburn Road northeast of Wintergreen Drive, at Allene Creek Court	November 18, 2009 4:50–5:05 p.m.	Traffic, landscape maintenance activities, neighborhood activities	0	0	0	55.2	68.1	58	49	45
ST-8	Auburn Blvd northeast of Manzanita Avenue, in Imperial Manor mobile home park	November 19, 2009 1:10–1:25 p.m.	Traffic, neighborhood activities, people talking, heavy equipment operation	0	0	0	52.9	64.2	56	51	49
ST-9	Mariposa Avenue at Northeast Circle, at Skycrest Elementary School	November 19, 2009 2:35–2:50 p.m.	Traffic, playground noise, neighborhood activities	32	1	0	59.5	78.8	61	52	48
ST-10	Auburn Blvd south of Rollingwood Blvd, at Baird Way	November 18, 2009 6:20–6:35 p.m.	Traffic	355	1	0	70.2	80.4	73	69	63

Notes: dBA = A-weighted decibels; L_{eq} = equivalent noise level; L_{max} = maximum noise level; L_n = noise level exceeded n% of a specific period of time; MT = Medium Truck; HT = Heavy Truck
Source: Data collected by AECOM 2009

The L_{dn}, L_{eq}, L_{max}, L_{50}, and L_{90} values were taken at each long -term ambient noise measurement location presented in Table 4.4-5. During the survey, 24-hour ambient noise levels ranged from 53.7 dB to 77.9 dB L_{dn}, with maximum noise levels that ranged from 66.8 dB to 86.5 dB L_{max}.

Table 4.4-5
Summary of Measured 24-hour Long Term Ambient Noise Levels

Site	Location	Date	Average Measured Hourly Noise Levels, dBA								
			L_{dn}	Daytime (7 a.m.–10 p.m.)				Nighttime (10 p.m.–7 a.m.)			
				L_{eq}	L_{max}	L_{50}	L_{90}	L_{eq}	L_{max}	L_{50}	L_{90}
LT-A	99 yards north of Olivine Avenue, west of Feldspar Court	11/18/09 – 11/19/09	53.7	54.3	66.8	44.2	41.4	42.6	55.2	40.5	38.5
LT-B	Birdcage Street, north of Macy Plaza Drive and south of Farmgate Way	11/16/09 – 11/17/09	66.2	66.4	81.2	61.6	55.4	55.8	73.1	50.3	47.2
LT-C	Roseville Road, south of Whyte Avenue and north of Butternut Drive	11/16/09 – 11/17/09	74.6	72.8	86.5	69.5	56.6	66.6	83.9	56.8	50.8
LT-D	Interstate 80 at Westwood Park (near tennis courts)	11/16/09 – 11/17/09	77.9	74.7	80.6	74.4	72.3	70.6	79.8	69.0	63.9
LT-E	Greenback Lane, east of San Juan Avenue and 130 yards west of Mariposa Avenue	12/3/09 – 12/4/09	70.0	66.6	82.1	65.2	59.3	62.9	77.8	57.8	50.3
		12/4/09 – 12/5/09	69.6	66.9	84.5	64.5	57.1	62.1	77.1	58.3	50.2
		12/5/09 – 12/6/09	69.3	67.2	82.5	65.6	58.0	61.5	76.0	56.8	48.4
		12/6/09 – 12/7/09	70.6	67.4	81.2	65.8	58.5	63.3	77.2	58.0	50.3
		12/7/09 – 12/8/09	70.1	67.3	81.5	65.8	58.6	62.6	78.3	57.5	49.2
LT-F	Sunrise Boulevard, north of Greenback Lane and 200 yards north of Sun Hill Drive	12/3/09 – 12/4/09	62.4	58.9	73.4	57.0	52.6	55.2	66.0	52.5	47.8
		12/4/09 – 12/5/09	61.2	58.0	72.8	56.6	52.1	53.9	68.4	51.0	46.8
		12/5/09 – 12/6/09	60.8	57.8	73.3	56.2	52.3	53.5	68.6	50.2	46.2
		12/6/09 – 12/7/09	63.5	59.7	71.4	57.8	53.2	56.5	67.8	52.5	46.8
		12/7/09 – 12/8/09	62.9	59.3	72.3	57.9	53.0	55.7	68.8	51.4	46.8

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level; L_{eq} = the equivalent hourly average noise level; L_{max} = maximum noise level; L_{50} = the noise level exceeded 50% of a specific period of time; L_{90} = the noise level exceeded 90% of a specific period of time.
Monitoring locations correspond to those depicted in Exhibit 4.4-2.
Source: Data collected by AECOM 2009

Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to exterior noise levels. Schools, places of worship, hotels,

libraries, nursing homes, retirement residences, and other places, where low interior noise levels are essential, are also considered noise-sensitive land uses. The majority of noise sensitive land uses within the City are residential. There are 34 learning centers, including high schools, middle schools, elementary schools, and private schools within the City. There are approximately 12 places of worship and two cemeteries within the City.

4.4.4 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

METHODOLOGY

Because this EIR considers the impacts associated with adoption of the Draft General Plan, including noise policies and current and future noise-sensitive and noise-generating land uses, the following methodology was employed for the impact analysis. Noise impacts were identified for new noise-sensitive developments located within areas affected by substantial existing or future noise sources (e.g., aircraft, automobile or truck traffic, railroad lines, industrial uses). Noise impacts were also identified for noise-producing projects proposed near existing or proposed noise-sensitive areas. Noise impacts were also identified where implementation of Draft General Plan noise policies would result in the exposure of people to excessive noise levels. Finally, noise impacts were evaluated by comparing projected traffic noise associated with implementation of the Draft General Plan relative to existing conditions.

Analysis of Future Traffic Noise Levels

The FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108), with CALVENO noise emission levels, was used to predict traffic noise levels within Citrus Heights under existing conditions and 2035 conditions under the Draft General Plan. Table 4.4-6 lists the predicted distances to the 60 and 65 dBA L_{dn} traffic noise contours under 2035 Draft General Plan conditions. These contour distances are used to identify areas within the City that would be considered potentially subject to noise impacts from traffic. Table 4.4-7 compares projected future traffic noise levels in 2035 under the Draft General Plan to those under existing conditions (2007). This table provides an evaluation of the cumulative changes in traffic noise levels that would result from development under the Draft General Plan.

Vehicle speeds vary in Citrus Heights, and noise modeling attempted to account for such variation. The contour distances do not account for local topographic shielding, including any walls, berms, or other existing barriers.

As shown in Table 4.4-6, the 60 dBA CNEL noise contour ranges from 44 to 2,011 feet from the roadway centerline for arterials, and the 65 dBA CNEL noise contour ranges between 14 and 636 feet for arterial roadways in the City. As shown in Table 4.4-7, implementation of the Draft General Plan update would result in increased noise levels of up to 1.6 dBA L_{dn} along most roadways in the planning area.

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the State CEQA Guidelines, a noise impact is considered significant if implementation of the proposed project under consideration would do any of the following:

- Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

Table 4.4-6
Distances to 2035 60 and 65 dBA L_{dn} Traffic Noise Contours

Roadway	Roadway Segment		Distance to Contours	
	From	To	60 dBA CNEL	65 dBA CNEL
Twin Oaks Ave	Sylvan Road	Sunrise Boulevard	44	14
Antelope Road	Roseville Road	Interstate 80	1,157	366
Antelope Road	Interstate 80	Van Maren Lane	1,159	367
Antelope Road	Van Maren Lane	Auburn Boulevard	768	243
Antelope Road	Auburn Boulevard	Mariposa Avenue	621	196
Antelope Road	Mariposa Avenue	Sunrise Boulevard	531	168
Auburn Boulevard	Manzanita Way	Greenback Lane	704	223
Auburn Boulevard	Greenback Lane	Van Maren Lane	588	186
Auburn Boulevard	Van Maren Lane	Sylvan Road	647	205
Auburn Boulevard	Sylvan Road	Mariposa Avenue	443	140
Old Auburn Road	Mariposa Avenue	Sunrise Boulevard	297	94
Old Auburn Road	Sunrise Boulevard	Fair Oaks Boulevard	542	172
Old Auburn Road	Fair Oaks Boulevard	Wachtel Way	287	91
Greenback Lane	Garfield Avenue	Auburn Boulevard	1,869	591
Greenback Lane	Auburn Boulevard	Dewey Drive	1,569	496
Greenback Lane	Dewey Drive	Sylvan Road	1,404	444
Greenback Lane	Sylvan Road	Mariposa Avenue	1,575	498
Greenback Lane	Mariposa Avenue	Sunrise Boulevard	1,566	495
Greenback Lane	Sunrise Boulevard	Fair Oaks Boulevard	1,386	438
Madison Avenue	San Juan Avenue	Mariposa Avenue	1,775	561
Madison Avenue	Sunrise Boulevard	Fair Oaks Boulevard	2,011	636
Oak Avenue	Sunrise Boulevard	Kenneth Avenue	194	61
Van Maren Lane	Auburn Boulevard	Antelope Road	252	80
Dewey Drive	Greenback Lane	Connemara Circle	434	137
San Juan Avenue	Greenback Lane	Madison Avenue	559	177
Sylvan Road	Greenback Lane	Auburn Boulevard	744	235
Sylvan Road	Auburn Boulevard	Antelope Road	735	232
Sylvan Road	Antelope Road	Twin Oaks Avenue	676	214
Sylvan Road	Twin Oaks Avenue	Whyte Avenue	768	243
Sunrise Boulevard	Madison Avenue	Greenback Lane	1,550	490
Sunrise Boulevard	Greenback Lane	Woodmore Oaks Drive	1,351	427
Sunrise Boulevard	Woodmore Oaks Drive	Oak Avenue	1,247	394
Sunrise Boulevard	Oak Avenue	Old Auburn Road	1,105	349
Sunrise Boulevard	Old Auburn Road	Antelope Road	1,288	407
Sunrise Boulevard	Antelope Road	Twin Oaks Avenue	1,392	440

Table 4.4-6
Distances to 2035 60 and 65 dBA L_{dn} Traffic Noise Contours

Roadway	Roadway Segment		Distance to Contours	
	From	To	60 dBA CNEL	65 dBA CNEL
Fair Oaks Boulevard	Madison Avenue	Greenback Lane	604	191
Fair Oaks Boulevard	Greenback Lane	Woodmore Oaks Drive	623	197
Interstate 80	Greenback Lane	Antelope Road	25,583	8,090
Interstate 80	Antelope Road	Riverside Avenue	23,988	7,586

Notes: FHWA-RD-77-108 = Federal Highway Administration Highway Traffic Noise Prediction Model; dB = decibel; CNEL = community noise equivalent level; dBA = A-weighted decibel; ADT = average daily trips; SR = state route.
Medium (2 axles) and heavy trucks (3+ axles) produce significantly more noise than passenger vehicles so their percentages are taken into account with heavier weighting when computing traffic noise levels.
Source: Modeling conducted by AECOM 2010

- Expose people residing or working in the project area to excessive aircraft source noise levels;
- Expose persons to or generation of excessive groundborne vibration or groundborne noise levels;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public-use airport, expose people residing or working in the project area to excessive noise levels; or
- For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

City of Citrus Heights standards have also been considered in defining the significance of noise impacts. Applicable standards are described below.

- **Transportation Impacts.** Long-term transportation noise impacts would be significant if noise levels exceed applicable City standards (60 dB L_{dn}) or result in a substantial increase (i.e., + 3 dB) in ambient noise levels related to the project at existing nearby noise-sensitive land uses.
- **Stationary and Area Noise Impacts.** Long-term stationary and area noise impacts would be significant if project-generated noise levels exceed applicable City exterior noise standards presented in the "Regulatory Setting," above.
- **Land Use Compatibility Impacts.** Land use compatibility impacts would be significant if noise levels from mobile or stationary sources exceed applicable City standards at proposed noise-sensitive land uses.
- **Vibration Impacts.** Vibration impacts would be significant if levels exceed Caltrans recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or the Federal Transit Administration (FTA) maximum acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance) at nearby vibration-sensitive land uses.

Table 4.4-7
Project-Related Increases in Traffic Noise on Citrus Heights Roadways under the 2035 Draft General Plan Relative to Existing Conditions[1]

Roadway	Roadway Segment		Existing Condition (dBA L_{dn})	2035 General Plan (dBA L_{dn})	Change
	From	To			
Twin Oaks Ave	Sylvan Road	Sunrise Boulevard	54.8	56.4	1.6
Antelope Road	Roseville Road	Interstate 80	69.9	70.6	0.7
Antelope Road	Interstate 80	Van Maren Lane	70.1	70.6	0.5
Antelope Road	Van Maren Lane	Auburn Boulevard	68.4	68.9	0.5
Antelope Road	Auburn Boulevard	Mariposa Avenue	67.5	67.9	0.4
Antelope Road	Mariposa Avenue	Sunrise Boulevard	67.3	67.3	0.0
Auburn Boulevard	Manzanita Way	Greenback Lane	67.7	68.5	0.8
Auburn Boulevard	Greenback Lane	Van Maren Lane	67.5	67.7	0.2
Auburn Boulevard	Van Maren Lane	Sylvan Road	67.9	68.1	0.2
Auburn Boulevard	Sylvan Road	Mariposa Avenue	66.3	66.5	0.2
Old Auburn Road	Mariposa Avenue	Sunrise Boulevard	64.4	64.7	0.3
Old Auburn Road	Sunrise Boulevard	Fair Oaks Boulevard	65.8	67.3	1.5
Old Auburn Road	Fair Oaks Boulevard	Wachtel Way	63.9	64.6	0.7
Greenback Lane	Garfield Avenue	Auburn Boulevard	72.0	72.7	0.7
Greenback Lane	Auburn Boulevard	Dewey Drive	70.9	72.0	1.1
Greenback Lane	Dewey Drive	Sylvan Road	71.3	71.5	0.2
Greenback Lane	Sylvan Road	Mariposa Avenue	71.4	72.0	0.6
Greenback Lane	Mariposa Avenue	Sunrise Boulevard	71.2	71.9	0.7
Greenback Lane	Sunrise Boulevard	Fair Oaks Boulevard	70.3	71.4	1.1
Madison Avenue	San Juan Avenue	Mariposa Avenue	71.8	72.5	0.7
Madison Avenue	Sunrise Boulevard	Fair Oaks Boulevard	72.0	73.0	1.0
Oak Avenue	Sunrise Boulevard	Kenneth Avenue	62.6	62.9	0.3
Van Maren Lane	Auburn Boulevard	Antelope Road	63.7	64.0	0.3
Dewey Drive	Greenback Lane	Connemara Circle	65.0	66.4	1.4
San Juan Avenue	Greenback Lane	Madison Avenue	67.5	67.5	0.0
Sylvan Road	Greenback Lane	Auburn Boulevard	68.3	68.7	0.4
Sylvan Road	Auburn Boulevard	Antelope Road	68.0	68.7	0.7
Sylvan Road	Antelope Road	Twin Oaks Avenue	67.6	68.3	0.7
Sylvan Road	Twin Oaks Avenue	Whyte Avenue	68.1	68.9	0.7
Sunrise Boulevard	Madison Avenue	Greenback Lane	71.5	71.9	0.4
Sunrise Boulevard	Greenback Lane	Woodmore Oaks Drive	70.8	71.3	0.5
Sunrise Boulevard	Woodmore Oaks Drive	Oak Avenue	70.5	71.0	0.5
Sunrise Boulevard	Oak Avenue	Old Auburn Road	69.9	70.4	0.5
Sunrise Boulevard	Old Auburn Road	Antelope Road	70.7	71.1	0.4
Sunrise Boulevard	Antelope Road	Twin Oaks Avenue	70.4	71.4	1.0
Fair Oaks Boulevard	Madison Avenue	Greenback Lane	67.5	67.8	0.3
Fair Oaks Boulevard	Greenback Lane	Woodmore Oaks Drive	67.3	67.9	0.6
Interstate 80	Greenback Lane	Antelope Road	83.5	84.1	0.6
Interstate 80	Antelope Road	Riverside Avenue	83.1	83.8	0.7

Notes:

[1] Traffic noise level at 100 feet from roadway centerline in terms of day/night average levels, dBA = A-weighted decibels; L_{dn} = day-night average noise level

Sources: Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108); data provided by Fehr and Peers in 2010

IMPACT ANALYSIS

IMPACT 4.4-1 Potential for Temporary, Short-Term Exposure of Sensitive Receptors to Construction Noise. *Short-term construction source noise levels could exceed the applicable City standards at nearby noise-sensitive receptors. In addition, if construction activities were to occur during more noise-sensitive hours, construction source noise levels could also result in annoyance and/or sleep disruption to occupants of existing and proposed noise-sensitive land uses and create a substantial temporary increase in ambient noise levels. However, the City's Municipal Code exempts noise associated with construction activities that occur during daytime hours. Compliance with this Municipal Code provision, adopted for the purpose of mitigating an environmental impact, would result in a* ***less-than-significant*** *impact.*

Residences and businesses located adjacent to areas of construction activity would be affected by construction noise associated with future land uses consistent with the Draft General Plan. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (i.e., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction duration lasts over extended periods of time.

Major noise generating construction activities could include demolition activities, site grading and excavation, building erection, paving, and landscaping. The highest construction noise levels are typically generated during grading and excavation and lower noise levels typically occur during building construction. The duration of construction period would differ for individual projects consistent with the Draft General Plan, depending upon the extent of land use change proposed, and the extent to which the change involves new construction rather than re-use of existing structures. However, the amount of construction activity is not anticipated to occur at high levels because the City of Citrus Heights is already approximately 98% built out.

Large pieces of earth-moving equipment, such as graders, excavators, and dozers, generate maximum noise levels of 85 to 90 dBA at a distance of 50 feet (refer to Table 4.4-8 below) (EPA 1971: 11). Typical hourly average construction-generated noise levels are about 80 to 85 dBA measured at a distance of 50 feet from the site during busy construction periods.

Section 34-88 of the City's Municipal Code exempts noise associated with construction activities that occur between 6:00 a.m. and 8:00 p.m. on weekdays and between 7:00 a.m. and 8:00 p.m. on weekends. This portion of the Municipal Code (commonly referred to as the City's Noise Ordinance) was adopted for the purpose of mitigating an environmental impact, and establishes performance standards for acceptable ambient noise, which specifically exempt construction during daytime hours. Compliance with a plan adopted for the purpose of mitigating an impact is evidence that the impact will be less than significant (CEQA Guidelines, sections 15064(h), 15130(d)).

Conclusion

The analysis in this EIR assumes that application of this regulation is required as a routine City practice, and thus construction activities would not occur during more sensitive hours of the day. Compliance with the noise ordinance, inclusive of the exemption, is by definition, adherence to the City's significance threshold for noise, absent substantial evidence to the contrary. Therefore, this impact is considered **less than significant**.

IMPACT 4.4-2 Increases in Ambient Noise Levels. *Future land uses consistent with the Draft General Plan would result in new noise-generating uses within areas containing noise-sensitive uses. However, the Draft General Plan includes policies and actions that reduce the potential for noise levels to exceed established standards. This impact would be* ***less than significant.***

Non-transportation noise sources would accompany new land uses consistent with the Draft General Plan. Noise from residences and commercial land uses that can be heard at surrounding areas consists mainly of noise from

Table 4.4-8
Typical Construction Equipment Noise Levels

Equipment Item	Typical Maximum Noise Level (dB) at 50 Feet
Earthmoving	
Backhoes	80
Bulldozers	85
Front Loaders	80
Graders	85
Paver	85
Roller	85
Scrapers	85
Tractors	84
Slurry Trencher	82
Dump Truck	84
Pickup Truck	55
Materials Handling	
Concrete Mixer Truck	85
Concrete Pump Truck	82
Crane	85
Man Lift	85
Stationary Equipment	
Compressors	80
Generator	82
Pumps	77
Impact Equipment	
Compactor	80
Jack Hammers	85
Impact Pile Drivers (Peak Level)	95
Pneumatic Tools	85
Rock Drills	85
Other Equipment	
Concrete Saws	90
Vibrating Hopper	85
Welding Machine / Torch	73
Truck Back Up Alarm / Beeper[1]	85 - 118

Notes: dB = A-weighted decibels. Noise levels are for equipment fitted with properly maintained and operational noise control devices, per manufacturer specifications.

[1] OSHA standards require back-up beeper alarms to be 10 dB higher than the ambient noise environment, which is variable throughout the planning area.

Source: FTA 2006:12-6; OSHA ISO 7731 (2003)

heating and ventilation equipment and loading and unloading activities. This is a general issue related to all development in the City, but relates particularly to areas of the City regulated by the Corridor policies and the Corridor Transition Overlay Zone. Future development within areas regulated by these policies, located primarily along major arterials within the City, would result in mixed-use development. This mixed-use development could result in the placement of various land uses within close proximity to one another, thereby raising the noise levels at nearby or adjacent sensitive (e.g., residential, day care) land uses.

Noise levels from commercial central air conditioning units can reach 100 dBA at three feet (USEPA 1971). These units usually have noise shielding cabinets, placed on the roof or mechanical equipment rooms and are not usually significant sources of noise impacts. Loading docks would foster truck traffic and thus could be significant sources of noise impacts to nearby or adjacent sensitive receptors. This impact would most likely occur in the Sunrise MarketPlace and proposed mixed commercial/residential areas.

Draft General Plan Policies and Actions

The Draft General Plan Community Health Element identifies acceptable noise levels for various land uses occurring within the planning area. These noise levels are presented in Table 4.4-9. Additionally, the following policies and actions in the Draft General Plan are designed to reduce ambient noise levels:

Policies

- **52.1:** Review proposed development projects for compliance with the standards in Table 4.4-9. If it appears that a project may exceed the limits of Table 4.4-9, require an acoustical analysis to identify potential noise levels and attenuation methods.

- **52.2:** New residential development projects shall be designed and constructed to meet acceptable exterior noise level standards shown in Table 4.4-9, as follows:

    - The maximum exterior noise level of 60 dBA L_{dn} shall be applied in residential areas where outdoor use is a major consideration (such as backyards in single family housing developments and recreation areas in multi-family housing projects). Where the City determines that providing a L_{dn} of 60 dBA or lower is not feasible, the noise level in outdoor areas shall be reduced to as close to the standard as feasible through project design.

    - Indoor noise levels shall not exceed a L_{dn} of 45 dBA in new residential housing units.

    - Noise levels in new residential development exposed to an exterior L_{dn} of 60 dBA or greater shall be limited to a maximum instantaneous noise level (e.g., trucks on busy streets, train warning whistles) in bedrooms of 50 dBA L_{max}. Maximum instantaneous noise levels in all other habitable rooms shall not exceed 55 dBA L_{max}.

- **52.3:** Protect the community, especially noise sensitive receptors, including schools, residences and care facilities, from excessive noise. Residential uses located in a commercial zone are not considered noise sensitive land uses.

- **52.4**: Require major development proposals to reduce noise impacts on adjacent properties through appropriate techniques including, but not limited to, the following strategies:

    - Permit well-designed sound walls when compatible with the surrounding area

    - Screen and control noise sources such as parking, outdoor activities. loading docks and mechanical equipment

Table 4.4-9
Acceptable Noise Levels (Table 9 of the Draft General Plan Community Health Element)

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dBA)			
	Normally Acceptable [1]	Conditionally Acceptable [2]	Normally Unacceptable[3]	Clearly Unacceptable [4]
Residential: Low-Density Single Family, Duplex, Mobile Homes	60	65	75	85
Residential: Multiple Family	65	70	75	85
Residential: Multiple Family Located in Commercial Zone Districts[5]	65	70	--	--
Transient Lodging: Motels, Hotels	65	70	80	85
Schools, Libraries, Churches, Hospitals, Nursing Homes	70	70	80	85
Auditoriums, Concert Halls, Amphitheaters	--	70	--	85
Sports Arena, Outdoor Spectator Sports	--	75	--	85
Playgrounds, Neighborhood Parks	70	--	75	85
Golf Courses, Riding Stable, Water Recreation, Cemeteries	75	--	80	85
Office Buildings, Business Commercial and Professional	70	75	85	--
Industrial, Manufacturing, Utilities, Agriculture	75	80	85	--

Notes:

[1] Specific land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements

[2] 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. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

[3] 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 insulation features included in the design.

[4] New construction or development should generally not be undertaken.

[5] For residential multiple family uses located in Commercial zone districts, exterior space standards apply only to common outdoor recreational areas.

Source: Adapted from the Office of Planning and Research, State of California General Plan Guidelines. Appendix A: Guidelines for the Preparation and Content of the Noise Element of the General Plan, 1990.

- Increase setbacks for noise sources from adjacent dwellings
- Whenever possible, retain fences, walls or landscaping that serve as noise buffers (although design, safety and other impacts must also be addressed)
- Use soundproofing material and double-glazed windows
- Control hours of operation, including deliveries and trash pickup

► **52.5:** When located adjacent to existing or planned sensitive residential and public/quasi-public uses, require new nonresidential development to mitigate noise to a maximum of 60 dBA L_{dn} at the property line.

Actions

52.2A. Revise the Noise Ordinance to reflect noise limits to protect noise sensitive land uses from intrusion by stationary noise sources.

52.3A. Amend the Noise Ordinance to identify short- and long-term unacceptable noise generating activities (including certain music bass levels), and to establish allowable duration for certain noise generators (including construction activities, car alarms and leaf blowers).

Conclusion

As described above, the policies and actions in the Draft General Plan require use of project-specific measures (e.g., design improvements) to mitigate noise impacts to sensitive land uses. Implementation of policies and actions in the Draft General Plan would reduce the potential for noise levels in areas of new noise-sensitive land uses to exceed the City's noise level standards. Therefore, this impact would be **less than significant**.

IMPACT 4.4-3 Potential for Development of Noise-Sensitive Land Uses in Areas Subject to Noise Impacts. *Future development of new noise-sensitive land uses would occur under the Draft General Plan within areas that either are currently affected by noise from transportation noise sources, or will be in the future. However, the Draft General Plan includes policies and actions to reduce the potential for noise levels to exceed established standards. This impact would be* ***less than significant.***

Implementation of the Draft General Plan would result in increased volumes on many arterials within the planning area, leading to corresponding increases in ambient noise levels at adjacent sensitive receptors. The corresponding increases in noise could be significant depending upon the types of land uses along the alignment, existing noise levels and the expected traffic volumes. All of the major road segments analyzed in the traffic study show small increases in traffic volumes. These additional cars, the majority of which are pass-through trips, would add to the ambient noise environment.

Noise level contours were developed for select roadway segments using average daily traffic data compiled from the SACMET regional travel demand model (Fehr & Peers 2010). The noise contours reflect traffic volumes of all segments reported. Based on the traffic study, no large increases in traffic volumes between existing 2007 and Draft General Plan conditions in 2035 would occur. In general, a doubling of traffic volumes corresponds to an increase of 3 dBA to the existing noise levels. None of the road segments show a doubling in traffic volumes.

Draft General Plan Policies and Actions

The Draft General Plan includes the following policies and actions that reduce the magnitude of noise impacts on noise-sensitive uses:

Policies

- **10.8**: Discourage concentration of auto intensive facilities (such as drive through and gas station uses) and ensure that drive-through businesses are allowed only where compatible with the surrounding areas.
- **10.9:** Require upgraded architectural and landscape features on projects involving auto intensive facilities.
- **52.6:** Use techniques such as roadway design, traffic signalization and other traffic management techniques (such as limiting heavy truck traffic in residential areas and requiring alternative paving material) to reduce noise caused by speed or acceleration of vehicles.
- **52.7:** Protect receivers of roadway noise through appropriate attenuation techniques. The preference is for noise attenuation techniques that minimize the use of sound walls.

Actions

52.7A. Prepare and adopt Community Design Guidelines that favor site planning and design techniques over sound walls. Preferred approaches include: a) installing earth berms, b) increasing the distance between the noise source and the receiver; c) using non-sensitive structures to shield noise-sensitive areas; and d) orienting buildings to shield outdoor spaces from the noise source.

Conclusion

Implementation of Draft General Plan policies and actions would assure that feasible measures are implemented to reduce the level of impact on existing residences and at future sensitive receptors. Additionally, implementation of the Transition Corridor Overlay would result in a transition of land uses which would be required to comply with City noise level standards. Increases in traffic volumes related to future land uses consistent with the Draft General Plan would not result in a noticeable increase (+ 3 dBA) in existing noise levels (refer to Table 4.4-7). This impact is considered **less than significant**.

IMPACT 4.4-4 Increases in Vibration Levels. *Construction of future land uses consistent with the Draft General Plan could cause a temporary, short-term disruptive vibration if it were to occur near sensitive receptors. Future development of new sensitive land uses could occur within vibration-generating areas (e.g., railroads). However, the Draft General Plan includes policies and actions that reduce the potential for vibration levels to exceed established standards. This impact would be* ***significant.***

Construction and demolition activities associated with future land uses consistent with the Draft General Plan have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used, the location of construction activities relative to sensitive receptors, and operations/activities involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. The type and density of soil can also affect the transmission of energy. Table 4.4-10 provides vibration levels for typical construction equipment.

Table 4.4-10
Typical Vibration Levels for Construction Equipment

Equipment		PPV at 25 Feet (in/sec)	Approximate L_v at 25 Feet
Pile Driver (Impact)	Upper Range	1.518	112
	Typical	0.644	104
Pile Driver (Sonic)	Upper Range	0.734	105
	Typical	0.170	93
Large Bulldozer		0.089	87
Drill		0.089	87
Truck		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58
Significance Threshold		0.2/0.08[1]	80

Notes: in/sec = inches per second; Lv = the velocity level in decibels referenced to 1 microinch per second and based on the root mean square velocity amplitude; PPV = peak particle velocity.
[1] For normal residential buildings and for buildings more susceptible to structural damage, respectively.
Sources: Caltrans 2004: 26, FTA 2006: 12-12

The required construction equipment for future projects is not known at this time, but could include maximum generation of vibration from trucks, bulldozers, and pile driving. According to the FTA, vibration levels associated with the use of such equipment would range from 0.003 in/sec PPV, 58 VdB (referenced to 1 µin/sec and based on the root mean square velocity amplitude) to 0.644 in/sec PPV, 104 VdB at 25 feet, as shown in Table 4.4-10. Although the City does not anticipate a large amount of multi-story development in the foreseeable future, it is nonetheless possible that pile-driving could occur at some future development sites. Using FTA's recommended procedure for applying a propagation adjustment to these reference levels, predicted worst-case vibration levels would exceed 0.2 in/sec PPV (Caltrans' recommended standard with respect to the prevention of structural damage for normal buildings) and would exceed 80 VdB (FTA's maximum-acceptable vibration standard with respect to human annoyance for residential uses) within 60 feet of vibration-sensitive receptors.

Depending on the nature of future projects, existing vibration-sensitive receptors could be located within 60 feet of proposed construction sites. Temporary, short-term vibration levels from project construction sources could exceed FTA's maximum-acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance) at vibration-sensitive land uses and could exceed 0.2 in/sec PPV (Caltrans' recommended standard with respect to the prevention of structural damage for normal buildings). If construction activities were to occur during more noise-sensitive hours, vibration from construction sources could annoy and/or disrupt the sleep of occupants of existing and proposed residences and expose persons to excessive groundborne vibration or groundborne noise levels.

Similarly, depending on the nature and location of future projects, new vibration-sensitive receptors could be located near an existing or future vibration-generating land use (e.g., industrial facility). Temporary, short-term vibration levels from existing or future vibration sources could exceed FTA's maximum-acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance) at vibration-sensitive land uses and could exceed Caltrans' recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings. Vibration from existing or future sources could annoy and/or disrupt the sleep of occupants of existing and proposed residences and expose persons to excessive groundborne vibration or groundborne noise levels if vibration-generating activities were to occur during more noise-sensitive hours. Therefore, vibration levels exceeding standards established by the FTA and recommended by Caltrans represent a **significant** impact requiring mitigation.

Mitigation Measure

Mitigation Measure 4.4-4: The City shall require project applicants that would generate substantial long-term vibration to provide analysis and mitigation, as necessary, to achieve velocity levels, as experienced at habitable structures of vibration-sensitive land uses, of less than 80 VdB.

Conclusion

Implementation of Mitigation Measure 4.4-4 would require use of project-specific vibration reduction measures (preparation of vibration analysis and implementation of vibration abatement measures) to mitigate vibration impacts to sensitive land uses and structures. Implementation of recommended mitigation measures, as described above, would also reduce the potential for vibration levels in areas of new vibration-sensitive land uses to exceed the standards of the FTA (80 VdB) and reduce the potential for vibration levels at structures to exceed the recommended standards of Caltrans (0.2 in/sec PPV). Therefore, this impact would be **less than significant** with mitigation incorporated.