4.4 NOISE

4.4.1 EXISTING SETTING

This section includes a description of ambient noise conditions, a summary of the applicable noise regulations, and an analysis of potential noise impacts of the proposed project. Mitigation measures are recommended, as necessary, to reduce significant noise impacts. (See Appendix E for noise related information, including a copy of the technical noise study [Bollard Acoustical Consultants, Inc. 2007]).

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, unexpected, or unwanted. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration, and as any pressure variation in air that the human ear can detect.

Sound Properties

A sound wave is introduced into a medium (air) by a vibrating object. The vibrating object (e.g., vocal chords, the string and sound board of a guitar, or the diaphragm of a radio speaker) is the source of the disturbance that moves through the medium. Regardless of the type of source creating the sound wave, the particles of the medium through which the sound moves are vibrating in a back and forth motion at a given frequency. The frequency of a wave refers to how often the particles vibrate when a wave passes through the medium. The frequency of a wave is measured as the number of complete back-and-forth vibrations of a particle per unit of time. If a particle of air undergoes 1,000 longitudinal vibrations in 2 seconds, then the frequency of the wave would be 500 vibrations per second. A commonly used unit for frequency is cycles per second, called hertz (Hz).

Each particle vibrates as a result of the motion of its nearest neighbor. The first particle of the medium begins vibrating at, say, 500 Hz, and sets the second particle of the medium into motion at the same frequency (500 Hz). The second particle begins vibrating at 500 Hz and thus sets the third particle into motion at 500 Hz. The process continues throughout the medium; hence each particle vibrates at the same frequency, which is the frequency of the original source. Subsequently, a guitar string vibrating at 500 Hz will set the air particles in the room vibrating at the same frequency (500 Hz), which carries a sound signal to the ear of a listener that is detected as a 500 Hz sound wave.

The back-and-forth vibration motion of the particles of the medium would not be the only observable phenomenon occurring at a given frequency. Because a sound wave is a pressure wave, a detector could be used to detect oscillations in pressure from high to low and back to high pressure. As the compression (high-pressure) and rarefaction (low-pressure) disturbances move through the medium, they would reach the detector at a given frequency. For example, a compression would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Similarly, a rarefaction would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Thus, the frequency of a sound wave refers not only to the number of back-and-forth vibrations of the particles per unit of time but also to the number of compression or rarefaction disturbances that pass a given point per unit of time. A detector could be used to detect the frequency of these pressure oscillations over a given period of time. The period of the sound wave can be found by measuring the time between successive high-pressure points (corresponding to the compressions) or the time between successive low-pressure points (corresponding to the rarefactions). The frequency is simply the reciprocal of the period; thus an inverse relationship exists so that as frequency increases, the period decreases, and vice versa.

A wave is an energy transport phenomenon that transports energy along a medium. The amount of energy carried by a wave is related to the amplitude (loudness) of the wave. A high-energy wave is characterized by high amplitude; a low-energy wave is characterized by low amplitude. The amplitude of a wave refers to the maximum amount of displacement of a particle from its rest position. The energy transported by a wave is directly proportional to the square of the amplitude of the wave. This means that a doubling of the amplitude of a wave is indicative of a quadrupling of the energy transported by the wave.

Sound and the Human Ear

Because of the ability of the human ear to detect a wide range of sound-pressure fluctuations, sound-pressure levels are expressed in logarithmic units called decibels (dB) to avoid a very large and awkward range in numbers. The sound-pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure and the reference sound pressure squared. The reference sound pressure is considered the absolute hearing threshold (Caltrans 1998). Use of this logarithmic scale reveals that the total sound from two individual 65-dBA sources is 68 dBA, not 130 dBA (i.e., doubling the source strength increases the sound pressure by 3 dBA).

Because the human ear is not equally sensitive to all sound frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. An A-weighted dB (dBA) scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been chosen by most authorities for the purpose of regulating environmental noise. Typical indoor and outdoor noise levels are presented in Exhibit 4.4-1.

With respect to how humans perceive and react to changes in noise levels, a 1 dBA increase is imperceptible, a 3 dBA increase is barely perceptible, a 6 dBA increase is clearly noticeable, and a 10 dBA increase is subjectively perceived as approximately twice as loud (Egan 1988), as presented in Table 4.4-1. Table 4.4-1 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 dBA, as this is the usual range of voice and interior noise levels. For these reasons, a permanent noise level increase of 3 dBA or more is typically considered significant and/or substantial in terms of the degradation of the existing noise environment.

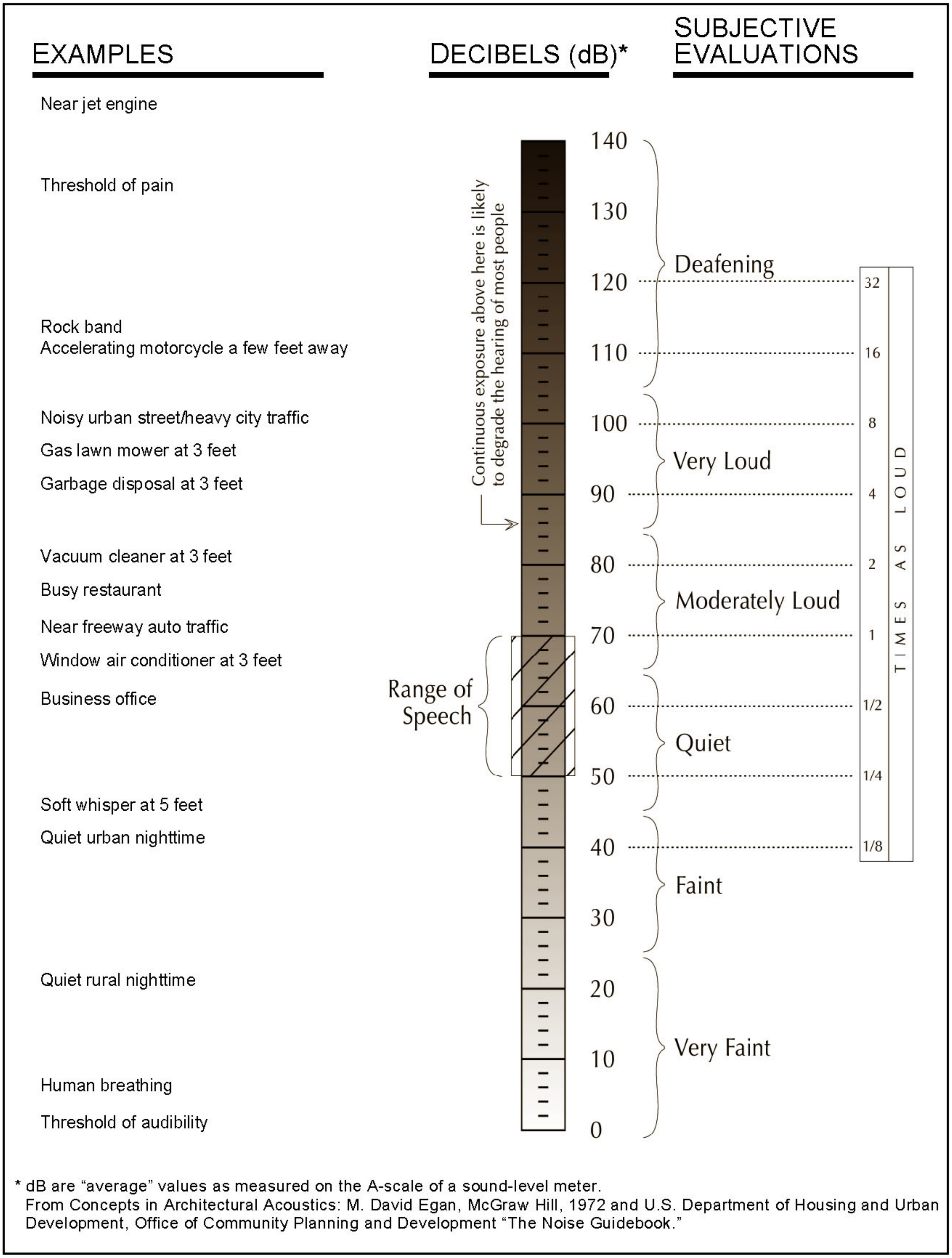
Table 4.4-1
Subjective Reaction to Changes in Noise Levels of Similar Sources

Change in Level, dBA	Subjective Reaction	Factor Change in Acoustical Energy
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or Half) as Loud	10.0

Source: Egan 1988

Sound Propagation

As sound (noise) propagates from the source to the receptor, the attenuation, or manner of noise reduction in relation to distance, is dependent on surface characteristics, atmospheric conditions, and the presence of physical barriers. The inverse-square law describes the attenuation caused by the pattern in which sound travels from the source to receptor. Sound travels uniformly outward from a point source in a spherical pattern



Source: EDAW 2007

Typical Noise Levels **Exhibit 4.4-1**

with an attenuation rate of 6 dBA per doubling of distance (dBA/DD). However, from a line source (e.g., a road), sound travels uniformly outward in a cylindrical pattern with an attenuation rate of 3 dBA/DD. The surface characteristics between the source and the receptor may result in additional sound absorption and/or reflection. Atmospheric conditions such as wind speed, temperature, and humidity may affect noise levels. Furthermore, the presence of a barrier between the source and the receptor may also attenuate noise levels. The actual amount of attenuation is dependent upon the size of the barrier and the frequency of the noise. A noise barrier may be any natural or human-made feature such as a hill, tree, building, wall, or berm (Caltrans 1998).

All buildings provide some exterior-to-interior noise reduction. A building constructed with a wood frame and a stucco or wood sheathing exterior typically provides a minimum exterior-to-interior noise reduction of 25 dBA with its windows closed, whereas a building constructed of a steel or concrete frame, a curtain wall or masonry exterior wall, and fixed plate glass windows of one-quarter-inch thickness typically provides an exterior-to-interior noise reduction of 30–40 dBA with its windows closed (Paul S. Veneklasen & Associates 1973, cited in Caltrans 2002).

Noise Descriptors

The selection of a proper noise descriptor for a specific source is dependent upon the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise are defined below (Caltrans 1998, Lipscomb and Taylor 1978).

- **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_{min}** (Minimum Noise Level): The minimum instantaneous noise level during a specific period of time.

- **LX** (Statistical Descriptor): The noise level exceeded X% of a specific period of time.

- **L_{eq}** (Equivalent Noise Level): The energy mean (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 work levels.

- **L_{dn}** (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dBA "penalty" for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 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 7:00 p.m. to 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the reported CNEL is typically approximately 0.5 dBA higher than the L_{dn}.

- **SEL** (Sound Exposure Level): The SEL describes a receiver's cumulative noise exposure from a single impulsive noise event, which is defined as an acoustical event of short duration (0.5 second), such as a backup beeper, the sound of an airplane traveling overhead, or a train whistle, and involves a change in sound pressure above a defined reference value (usually approximately 40 dBA).

- L_{50} (50 percentile-exceeded sound level): The L_{50} describes the A-weighted sound level happening at 50 percent or more of the time of the measurement.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level, L_{eq}, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

Negative Effects of Noise on Humans

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss both may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (Caltrans 1998).

Vibration

Vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structureborne noise. Sources of groundborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, groundborne vibrations may be described by amplitude and frequency.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS), as in RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (FTA 2006, Caltrans 2002).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006). This is based on a reference value of 1 μ inch/second.

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006).

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 is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Construction activities can generate groundborne vibrations, which can pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2006).

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 4.4-2 describes the general human response to different levels of groundborne vibration-velocity levels.

Table 4.4-2
Human Response to Different Levels of Groundborne Noise and Vibration

Vibration-Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Note: VdB = vibration decibels referenced to 1 μ inch/second and based on the root mean square (RMS) velocity amplitude.
Source: FTA 2006

EXISTING NOISE ENVIRONMENT

The project site is currently vacant. A small commercial center containing gas stations, a convenience store, and a fast food restaurant is located north of the project site across Interstate 80 on the east side of Sierra College Boulevard. The project site has approximately 1,200 feet of frontage along I-80 on its northwest edge. Sierra College Boulevard runs along the west side of the project. Several existing rural residential homes are located east of the project site, as well as to the southwest along the western side of Sierra College Boulevard. A community church is also located southwest of the project site off Sierra College Boulevard. The Sierra College campus is located approximately one mile southwest of the site. The rural residences, community church and college campus would be considered noise-sensitive land uses. It should be noted that the Rocklin 60 residential project is currently proposed on the adjacent property immediately to the east of the project site (an EIR was in process as of Fall 2007). Therefore, if approved, new residential homes would be located along the eastern property line of the project site. The lot boundaries of the nearest proposed residence would be approximately 35 feet from the eastern project site boundary.

To generally quantify the existing ambient noise environment in the project vicinity, continuous hourly noise level measurements were conducted on the project site for a period of 24 hours on January 19, 2006. A Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter was used for the noise level measurement survey. The meter was calibrated before and after use with an LDL Model CA200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI 51.4).

The noise level measurement survey results are summarized in Table 4.4-3. The ambient noise monitoring survey revealed that ambient noise levels in the immediate project vicinity are elevated above the City of Rocklin noise level standards, as would be expected along the I-80 corridor.

Table 4.4-3 Summary of Measured 24-Hour Noise Levels									
		Average Measured Hourly Noise Levels, dBA							
Location	Date – Time	24-hour L_{dn}	Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm - 7 am)			
			L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}	
1 On project site at I-80 right-of-way	January 19, 2006	83	79	78	85-92	76	71	83-89	
Source: Monitoring performed by Bollard Acoustical Consultants, Inc.									

EXISTING NOISE SOURCES

Non-Transportation (Stationary)

The project site is located near a few rural residential dwellings. There are no major stationary sources of noise in the vicinity of the proposed project. Transportation noise sources associated with Interstate 80 would dominate the existing noise environment, as discussed below.

Transportation

The ambient noise environment in the immediate project vicinity is dominated by traffic on Interstate 80. Traffic on Sierra College Boulevard also contributes to the ambient noise environment in the project vicinity, but to a far lesser extent than I-80.

Existing Noise Levels

To determine the existing traffic noise levels adjacent to the local roadways within the project vicinity, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used with the California Vehicle Noise Emission Levels. The FHWA Model is based upon the California Department of Transportation Sound 32 Traffic Noise Prediction Model (Calveno) reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. Traffic volumes and roadway segment information were obtained from LSA Transportation Engineers (LSA 2007).

4.4.2 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging noise levels, the State of California, various county governments, and most municipalities in the State have established standards and ordinances to control noise. The Rocklin General Plan Noise Element provides standards regarding noise levels for uses relevant to the proposed project. In addition, noise thresholds can be derived from the CEQA guidelines. The following provides a general overview of the existing regulations which would be pertinent to this project.

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 and freeway noise affecting classrooms, set standards for sound transmission control and occupational noise control, and identify noise insulation standards. The State has also developed land use compatibility guidelines for community noise environments as discussed below.

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation measures that will limit maximum L_{dn} levels to 45 dBA in any habitable room. Although there are no generally applicable interior noise standards pertinent to all uses, many communities in California have adopted an L_{dn} of 45 as an upper limit on interior noise in all residential units.

The State of California General Plan Guidelines (State of California 2003), published by the State Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. Table 4.4-4 presents acceptable and unacceptable community noise exposure limits for various land use categories. Generally, residential uses are considered to be acceptable in areas where exterior noise levels do not exceed 60 dBA CNEL/L_{dn}. Residential uses are normally unacceptable in areas exceeding 70 dBA L_{dn} and conditionally acceptable within 55 to 70 dBA L_{dn}. Schools are normally acceptable in areas up to 70 dBA CNEL and normally unacceptable in areas exceeding 70 dBA CNEL. Commercial uses are normally acceptable in areas up to 70 dBA CNEL. Between 67.5 and 77.5 dBA CNEL, commercial uses are conditionally acceptable, depending on the noise insulation features and the noise reduction requirements. 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.

Table 4.4-4
City of Rocklin General Plan Noise Compatibility Guidelines

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

1 Specified 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 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.
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: State of California Governor's Office of Planning and Research 2003

LOCAL PLANS, POLICIES, REGULATIONS, AND LAWS

The City of Rocklin General Plan Noise Element does not contain quantitative noise level limits for commercial uses affecting residential uses. The following include the existing policies, laws, and regulations established in the City of Rocklin General Plan, as applicable to the proposed project.

Goal: To protect residents from health hazards and annoyance associated with excessive noise levels.

- **Policy 1.** To use adopted noise compatibility guidelines to evaluate compatibility of proposed new development.
- **Policy 2.** To require noise analysis of proposed development projects as part of the environmental review process and to require mitigation measures that reduce noise impacts to acceptable levels.
- **Policy 3.** To require noise buffering or insulation in new development along major streets and highways, and along railroad tracks.
- **Policy 4.** To control noise sources in residential areas by restricting truck traffic to designated truck routes.
- **Policy 5.** To monitor noise generating land uses to assure compliance with acceptable noise levels.
- **Policy 6.** To encourage sound mitigation, including but not limited to sound walls, along existing highways where noise is determined to exceed adopted standards.

4.4.3 IMPACTS AND MITIGATION MEASURES

METHOD OF ANALYSIS

To assess potential construction-, area-, and stationary-source noise impacts, sensitive receptors and potential sensitive receptors and their relative exposure were identified. Noise (and vibration) levels of specific equipment expected to be used in project construction or operation were determined and resultant noise levels at sensitive receptors were calculated assuming documented noise (and vibration) attenuation rates.

The FHWA traffic noise prediction model was used to model traffic noise levels along affected roadways, based on the trip distribution estimates obtained from the traffic analysis prepared for this project (LSA 2007), Caltrans, and site reconnaissance data (LSA 2007; Bollard Acoustical Consultants, Inc. 2007). The project's contribution to the baseline traffic noise levels along area roadways was determined by comparing the predicted noise levels from the centerline of the near travel lane with and without project-generated traffic.

The significance of short-term and long-term noise impacts was determined based on comparisons with applicable standards. Mitigation measures along with their relative effectiveness were provided for significant or potentially significant noise impacts.

THRESHOLDS OF SIGNIFICANCE

In accordance with CEQA Guidelines Appendix G and the City of Rocklin Noise Element, noise impacts are considered significant if implementation of the proposed project under consideration would result in any of the following:

- Exposure of persons to or generation of noise levels in excess of applicable standards. Specifically, exterior and interior noise levels of 60 dBA L_{dn} and 45 dBA L_{dn}, respectively, for residential uses exposed to noise sources.
- 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, typically defined as 3 dBA or greater.
- 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 a plan has not been adopted, within two miles of a public airport or public use airport, where the project would expose people residing or working in the area to excessive noise levels.
- For a project within the vicinity of an active private airstrip, where the project would expose people residing or working in the project area to excessive noise levels.

IMPACTS AND MITIGATION MEASURES

IMPACT 4.4-1 **Construction-Generated Temporary Increases in Ambient Noise Levels.** *Construction activities would result in temporary increases in ambient noise levels for existing and, potentially, for proposed residents (if approved and occupied prior to project construction) directly adjacent to the eastern site boundary. However, these construction noise levels would be intermittent and would be attenuated with the installation of the eastern perimeter wall. As a result, this impact is considered* ***less than significant****.*

Construction at the project site would include site grading, clearing, and excavation associated with the site preparation phase; paving; building construction; and the application of architectural coatings, in addition to other miscellaneous activities. The specific on-site equipment required for construction is not known at this time, but is anticipated to include scrapers, excavators, loaders, backhoes, haul trucks, and other miscellaneous construction equipment. Noise would also be generated during the construction phase by increased truck traffic onsite. A project-generated noise source would include onsite truck traffic associated with the transport of heavy materials and equipment to and from internal construction sites and the movement of heavy construction equipment on the project site.

During the construction phases of the project, noise from construction activities would contribute to the noise environment in the immediate project vicinity. Activities involved in construction would generate maximum noise levels, as indicated in Table 4.4-5, ranging from 75 to 80 dBA at a distance of 50 feet, with feasible noise control (e.g., mufflers). Construction activities would be of short duration and temporary in nature. As described in Chapter 3, Project Description, market conditions may affect the schedule of site construction. Currently, the first phase of construction would include the mass grading of the entire site and completion of major site work (including, but not limited to, the eastern perimeter wall, the offsite detention basin and other necessary offsite infrastructure improvements) and would likely include construction of the major anchor tenant facilities, additional buildings and the majority of the parking field and access aisles. This entire phase is likely to conclude within two years of initiation. The remaining construction schedule would consist of building the remaining retail square footage available within the Retail Promenade District, as well as remaining unconstructed pad buildings adjacent to the freeway.

Table 4.4-5 Typical Construction Equipment Noise Levels		
Type of Equipment	Noise Level in dBA at 50 feet	
	Without Feasible Noise Control	With Feasible Noise Control[1]
Dozer or Tractor	80	75
Excavator	88	80
Scraper	88	80
Front End Loader	79	75
Backhoe	85	75
Grader	85	75
Truck	91	75

[1] Feasible noise control includes the use of intake mufflers, exhaust mufflers and engine shrouds operating in accordance with manufacturers specifications.
Source: US Environmental Protection Agency 1971

According to the City of Rocklin General Plan Noise Element, sensitive noise receptors include single family residences and churches, both of which are located (or proposed to be located) in close proximity to the project site. The nearest residential dwelling to the project site is located approximately 325 feet east of the site's northeastern boundary. The nearest residence to the west is approximately 550 feet from the project site and the Lifehouse Church is located approximately 300 feet to the southwest. In addition, the Rocklin 60 residential development is proposed to be located immediately east of the project site, with the nearest proposed residential structure to be located approximately 50 feet from the project boundary.

Assuming a standard noise attenuation rate of 6 dBA per doubling of distance from the source to the receptor, exterior noise levels at the nearest existing residence to the east and at the Lifehouse Church to the southwest would be approximately 65 dBA with feasible noise control in place. Using this same noise attenuation rate, the short-term, exterior noise levels at the nearest existing residence to the west is estimated to be approximately 60.5 dBA with feasible noise control in place. For the residence to the east and the church to the southwest, the L_{dn} is estimated to be 62.7 dBA. For the residence to the west, the L_{dn} is estimated to be 58.6 dBA.

The City's General Plan Noise Element does not identify a short-term, construction-noise-level threshold. However, the Noise Compatibility Guidelines included in the Noise Element identify the normally acceptable single-family residential noise level for existing uses as up to 60 dBA $L_{dn,}$ and the conditionally acceptable single-family residential noise level as up to 70 dBA $L_{dn.}$ For churches, the normally acceptable noise level is up to 65 dBA $L_{dn,}$ and the conditionally acceptable noise level is up to 70 dBA L_{dn}. The project's short-term construction noise impacts at the nearest existing residence to the east would be considered conditionally acceptable according to the City's Noise Element thresholds. For the church and the nearest existing residence to the west, the project's short-term construction noise impacts would be considered normally acceptable. This distinction between short-term and long-term noise sources is a typical one in both CEQA documents and local noise ordinances, which generally recognize the reality that short-term noise from construction is inevitable and cannot be mitigated beyond a certain level. Thus, local agencies frequently tolerate short-term noise at levels that they would not accept for permanent noise sources. A more severe approach would be impractical, and might preclude the kind of construction activities that are inevitable from time to time in urban environments. Most residents of urban areas recognize this reality, and expect to hear construction activities on occasion.

For the nearest existing residence to the east, the estimated noise level of 62.7 dBA L_{dn} has been calculated without the proposed perimeter wall along the site's eastern boundary. Following the installation of this perimeter wall, which would occur as part of the first phase of project construction, the noise levels experienced at this existing residence would be reduced by between 10 and 15 dBA, or substantially below the City's noise threshold of 60 dBA L_{dn}. Due to the short-term nature of the construction noise exposure and the intermittent frequency of construction noise, the existing noise sensitive receptors (i.e., residential and church land uses) would not experience excessive noise levels during project construction. Therefore, the noise generated from typical construction activities would result in a **less-than-significant** impact for the existing residential and church uses in the area surrounding the project site.

If the Rocklin 60 project is constructed before the proposed project, residences within the western portion of the development would be exposed to construction noise. The closest residential structures would be located within approximately 50 feet of the project's eastern boundary. However, the Rocklin 60 project would be required to construct a sound wall along the entire length of its western boundary prior to project occupation. As part of this installation, the Rocklin 60 developer would be required to grade the slope between the proposed project and the Rocklin 60 project in order to transition between the different grades of the two projects. Notably, it seems very unlikely, for at least two reasons, that the Rocklin 60 project would be constructed before the Rocklin Crossings project (assuming both are approved). First, the Rocklin Crossings project is ahead of the Rocklin 60 process in terms of processing within the City of Rocklin. Thus, the Rocklin 60 project's draft EIR is expected to trail this EIR by at least a few months, as would be the case with project approval. Second, the housing market is down at present, and is not expected to recover until 2009 or perhaps later. Thus, the market for new homes at the Rocklin 60 site is not expected to be robust enough in the period immediately following project approval (if it occurs) to justify the immediate construction of large numbers of houses. In contrast, the developer of Rocklin Crossings is facing a strong retail market, has executed lease agreements with major tenants, and has stated its intention to develop the property as soon as all necessary approvals and permits are in hand. The project applicant and the Rocklin 60 developer have an agreement to share the cost of constructing this wall. With the sound wall in place along the project's eastern boundary, the construction noise levels experienced by residents within the Rocklin 60 project would be below the City's established thresholds. Therefore, this impact would be considered **less than significant**.

Mitigation Measure 4.4-1 Construction-Generated Temporary Increases in Ambient Noise Levels

No mitigation measures are necessary

Level of Significance after Mitigation

The exposure of residents to high noise levels would be limited in duration due to the installation of the eastern perimeter wall during the first phase of construction. Therefore, the project's short-term construction noise impacts would not be considered excessive in nature and would be considered less than significant.

IMPACT 4.4-2 Construction Blasting Noise. *If construction activities include blasting, the intermittent noise levels could be considered excessive for adjacent land uses, if the blasting activities are unexpected. As a result, this impact is considered **significant**.*

Construction at the site could require blasting activities if hard rock areas can not be easily excavated with typical construction equipment. Blasting activities could generate intermittent noise in excess of the normally acceptable levels identified in the City's Noise Compatibility Guidelines. These blasting noise levels could be considered excessive if they occur unexpectedly or during noise sensitive hours. Therefore, this impact would be considered **significant**.

Mitigation Measure 4.4-2 Construction Blasting Noise

a. If blasting activities are to occur in conjunction with the improvements, the contractor shall conduct the blasting activities in compliance with state and local regulations. The contractor shall obtain a blasting permit from the City of Rocklin prior to commencing any on-site blasting activities. The permit application shall include a description of the work to be accomplished and a statement of the necessity for blasting as opposed to other methods considered including avoidance of hard rock areas and safety measures to be implemented such as blast blankets. The contractor shall coordinate any blasting activities with Police and Fire Departments to insure proper site access and traffic control, and public notification including media, nearby residents and businesses, as determined appropriate by the Rocklin Police and Fire Departments. Blasting specifications and plans shall include a schedule that outlines the time frame in which blasting will occur in order to limit noise and traffic inconvenience.

b. Construction blasting activities shall be subject to the City of Rocklin Construction Noise Guidelines, including limiting construction-related noise generating activities within or near residential areas to the less noise sensitive daytime hours (between 7:00 a.m. and 7:00 p.m. on weekdays, and between 8:00 a.m. and 7:00 p.m. on weekends).

Level of Significance after Mitigation

With implementation of the identified mitigation measures, the exposure of residents to high noise levels associated with blasting activities would be minimized. As with other sources of short-term noise events (the use of saws and other equipment at construction sites), CEQA documents and local noise ordinances typically allow greater noise levels from temporary blasting activities than would be acceptable from permanent noise sources. Because certain properties, to support planned urban land uses, cannot be developed without blasting, some level of intermittent noise from blasting is considered an unavoidable aspect of the urban environment in areas where development is coming on-line. A more severe approach would be impractical, and might preclude the kind of construction activities that are inevitable from time to time in urban environments. Here, the time of day restrictions should ensure that noise impacts from blasting would occur when the vast majority of people are awake, and many residents are away at their jobs. For all of these reasons, the project's short-term construction blasting noise impacts would be reduced to a less-than-significant level.

IMPACT 4.4-3 **Traffic-Generated Permanent Increases in Ambient Noise Levels.** *The proposed project would not result in a noticeable increase in traffic noise levels at off-site sensitive receptors. Therefore, this impact is considered **less than significant**.*

The increase in daily traffic volumes resulting from implementation of the proposed project would generate increased noise levels along nearby roadway segments. To assess noise impacts due to project-related traffic increases on the existing local roadway network, traffic noise levels were predicted at a representative distance for both baseline (all approved future projects) with and without project conditions.

The FHWA traffic noise prediction model was used to predict existing plus project traffic noise levels at a representative distance of 50 feet from the project area roadway centerlines. Table 4.4-6 shows the predicted traffic noise level increases on the local roadway network for baseline conditions with and without the project. Appendix E provides the complete inputs and results to the FHWA model for each of the no project and plus project conditions.

Table 4.4-6 Summary of Modeled Baseline Traffic Noise Levels With & Without Project				
Roadway	Segment	L_{dn} @ 50 Feet (dBA) [1]		
		Baseline	Baseline + Project	Change
Taylor Road	King Rd & Horseshoe Bar Rd	69.99	70.23	0.24
Taylor Road	Horseshoe Bar Rd & Sierra College Blvd	68.05	68.28	0.23
Pacific Street	Sierra College Blvd & Dominguez Rd	67.32	67.50	0.18
Pacific Street	Dominguez Rd & Rocklin Rd	69.47	69.53	0.06
Rocklin Road	Pacific St & Granite Dr	70.62	70.68	0.06
Rocklin Road	I-80 & Sierra College Blvd	68.22	68.69	0.47
Rocklin Road	Sierra College Blvd & Barton Rd	65.29	66.04	0.75
Barton Road	Rocklin Rd & Brace Rd	63.11	63.78	0.67
Horseshoe Bar Rd	I-80 & Brace Rd	65.53	65.57	0.04
Brace Road	I-80 & Barton Rd	63.72	63.84	0.12
Brace Road	I-80 & Sierra College Blvd	62.98	62.98	0.00
Sierra College Blvd	English Colony Way & King Rd	67.83	68.50	0.67
Sierra College Blvd	King Rd & Taylor Rd	68.16	68.97	0.81
Sierra College Blvd	Taylor Rd & I-80	70.27	71.02	0.75
Sierra College Blvd	I-80 & Dominguez Rd	68.07	70.23	2.16
Sierra College Blvd	Dominguez Rd & Rocklin Rd	69.34	70.31	0.97
Granite Drive	Dominguez Rd & Sierra College Blvd	64.59	64.60	0.01
Granite Drive	Dominguez Rd & Rocklin Rd	65.85	65.88	0.03
Dominguez Road	Taylor Rd & Granite Dr	61.49	61.67	0.18
King Road	Sierra College Blvd & Taylor Rd	65.14	65.14	0.00

1 Distances to traffic noise contours are measured in feet from the centerlines of the roadways. Traffic noise levels are predicted at a standard distance from the roadway centerlines and do not account for shielding from existing noise barriers or intervening structures. Traffic noise levels may vary depending on actual setback distances and localized shielding.

2 Baseline + Approved + Project traffic volumes for Interstate 80 were not included in the traffic study.

Source: Data modeled by EDAW 2007 using FHWA-RD-77-108 with inputs from LSA 2007.

As indicated in Table 4.4-6, the proposed project would not result in traffic noise level increases exceeding 3 dBA on project-area roadways, when compared to no-project conditions. With respect to how humans perceive and react to changes in noise levels, a 3 dBA increase is considered barely perceptible. Therefore, the proposed project would not result in a substantial increase in traffic noise levels at off-site sensitive receptors and this impact would be considered **less than significant**.

Mitigation Measure 4.4-3 Traffic-Generated Permanent Increases in Ambient Noise Levels

No mitigation measures are required.

Level of Significance after Mitigation

Significant traffic-generated noise impacts would not be anticipated with project implementation.

IMPACT 4.4-4 Exposure of Sensitive Receptors to Excessive Stationary- or Area-Source Noise Levels. *The truck deliveries associated with the proposed commercial uses would generate substantial noise levels, which could affect the proposed residential uses immediately to the east of the project site. Therefore, this impact would be considered **significant**.*

The noise sources and levels typically associated with the various components of commercial land uses are discussed individually below.

Truck Delivery Noise

The identity of the remaining tenants, as well as the location and size of the remaining tenant buildings, has not yet been determined. The total size of the remaining tenants, combined with the Wal-Mart Supercenter and Home Depot, would not, in any event, exceed 543,500 square feet. It is currently anticipated that the remaining tenants would be primarily located directly north of the proposed Wal-Mart Supercenter, although a single building may be located between the Supercenter and the proposed Home Depot building. Some of the remaining tenant buildings may have separate loading docks located in the rear of the buildings.

The proposed home improvement store, large retail/grocery store, and the remaining smaller commercial buildings along the eastern site boundary would all have truck loading dock facilities in the rear of the buildings. In order to utilize the loading dock facilities, trucks would arrive, stop, couple and decouple trailers, back into loading docks, be unloaded, and depart the site. The trailers would consist of enclosed trailers with food (some refrigerated) and merchandise for each of the commercial buildings, and flatbeds carrying lumber to the home improvement store. According to project representatives, worst case daily truck activity at these stores would conservatively consist of approximately 15 semi-trailer trucks per day and approximately 3 semi dual-trailer flatbed trucks per day for delivery of materials at the home improvement store. In addition, 6 semi-trailer trucks delivering dry grocery goods and general merchandise per day and 3 refrigerated semi-trailer truck deliveries per day would occur at the Wal-Mart Supercenter. Approximately 15 smaller 2-axle vender trucks would also make deliveries to these stores each day. Therefore, for this analysis, it was assumed that up to 27 truck deliveries and 15 small truck deliveries could occur in a given day (Bollard Acoustical Consultants, Inc. 2007).

Based on an evaluation of the project site plan, delivery trucks would likely enter the site from the roadway along the southern edge of the project site and traverse north behind the stores along the project's eastern border and then return to the site’s southern exit. The trucks would be closest to the noise-sensitive receivers during passages directly behind the stores. Specifically, truck pass-bys would be approximately 70 feet from the approximate center of the nearest residential backyards proposed to the east. Truck pass-bys en route to the loading dock areas are expected to be relatively brief, and are estimated to produce an average Sound Exposure Level (SEL) of approximately 87 dBA at a distance of 50 feet. Smaller truck pass-by’s would produce an average SEL of approximately 80 db at 50 feet. Relative to the louder and greater number of heavy truck deliveries, the noise generation of the smaller (2-axle) trucks is not anticipated to appreciably affect overall truck pass-by noise levels. The typical L_{max} level due to a truck pass-by has been measured to be approximately 75 dBA at a distance of 50 feet. Because the SEL represents a single impulsive noise event over a short duration (0.5 second), it is typically higher than the L_{max} level, which represents the maximum instantaneous noise level during a specific period of time.

Primary noise sources associated with loading dock operations at the proposed large retail/grocery store would most likely be heavy trucks stopping (air brakes), backing into the loading docks (back-up alarms), and pulling out of the loading docks (revving engines). Two below-grade truck loading docks are proposed for the Wal-Mart Supercenter, each with three individual side-by-side loading bays. The bay doors would be equipped with sealed gaskets to minimize noise generation from off-loading trailers.

If the heavy truck engines idle and/or trailer refrigeration units cycle on and off while the trucks are being unloaded, then these would be additional sources of noise at the loading dock location. Once the trucks have backed into the loading dock, they are unloaded from the inside of the store using a fork lift or hand cart, and most of that unloading noise is contained within the building and truck trailer.

Not all trucks are unloaded at loading docks, as beverage, bread, potato chip, and other venders often utilize hand carts to unload their products through rear doors (as opposed to depressed dock areas). Flatbed lumber trailers would be unloaded using forklifts in the area behind the home improvement store. Noise from these operations also contributes to the overall truck delivery noise environment.

Due to the fairly intensive truck unloading operations which would occur adjacent to the eastern site boundary, it is not feasible to assess the noise of different operations (i.e., lumber unloading, loading docks, truck pass-bys, refrigeration trucks, etc.), independently. As a result, the noise generation of each of these sources was combined to arrive at a cumulative assessment of truck delivery noise. The results of this assessment indicate that a typical busy hour of overall truck activity along the eastern site boundary would generate median (L_{50}) and maximum (L_{max}) noise levels of 60 dBA and 80 dBA, respectively, at a reference distance of 50 feet from the effective noise center of the truck unloading activities. An exception to these levels is made for refrigeration trucks, in which median noise levels would be approximately 5 dBA higher, or 65 dBA L_{50}. Maximum noise levels associated with refrigeration trucks were not found to be higher than maximum noise levels for non-refrigeration trucks.

The reference noise levels cited above are propagated to the nearest proposed residences to the east assuming standard spherical spreading treating the noise source as a stationary point. This standard assumption leads to a 6 dBA decrease in noise levels for each doubling of distance. For example, the reference level of 60 dBA L_{50} at 50 feet from the source would decrease to 54 dBA L_{50} at a distance of 100 feet, and to 48 dBA L_{50} at a distance of 200 feet.

The distances from the approximate noise center of the truck delivery areas to the nearest proposed residences in the Rocklin 60 residential development to the east vary. For example, proposed Lot 38 is located closer to the project than proposed lots 46-47, 66-67, and 92-93. Proposed lots 145 and 146 are located even closer to the eastern site boundary. Table 4.4-7 shows the approximate distances from the effective noise centers of the truck delivery areas to the nearest proposed residences to the east, and the corresponding noise levels associated with the combined truck delivery operations.

Based on the predicted average and maximum noise levels associated with truck deliveries identified in Table 4.4-7, a noise barrier analysis was performed for this project. The barrier analysis took into account the relative elevations of the commercial truck activity areas as well as the elevations of the proposed residences to the east. It should be noted that a noise barrier is proposed by the project applicant and that the barrier is to

Table 4.4-7
Predicted Truck Delivery Noise Levels at Nearest Proposed Residences

Lots(s)	Distance (feet)	Predicted L_{50} Without/With Refrigeration Trucks (dBA)	Predicted L_{max} (dBA)
38	70	57/62	77
46–47, 66–67, 92–93, 117–118	120	52/57	72
145–146	70	57/62	77

Notes:
[1] Lot locations are shown in Figure 1a of the Environmental Noise Assessment prepared for this project (Bollard Acoustical Consultants, Inc.2007) (Appendix E).
[2] Distances shown are from approximately the noise center of truck activity areas to the backyards of the nearest residences.
[3] Predicted L_{50} values based on a reference level of 60 dBA at 50 feet.
[4] Predicted L_{max} values based on a reference level of 80 dBA at 50 feet.
Source: Bollard Acoustical Consultants, Inc. 2007

be located relative to the elevation of the commercial site. This is important in that the proposed residential area would be at a lower elevation than the commercial site, thereby improving the efficiency of the noise barrier constructed at the commercial site. The results of the barrier analysis are summarized in Table 4.4-8, with the detailed results shown in Appendix E (Bollard Acoustical Consultants, Inc. 2007).

Table 4.4-8
Barrier Heights Required to Satisfy Exterior Noise Standards at Nearest Residences

Lots(s)	Noise Barrier Height (feet) to Achieve:	
	45 dBA L_{50} Without / With Refrigeration Trucks	65 / 75 dBA L_{max}
38	7 / 16	7 / 6
46–47	6 / 11	6 / 0
66–67	6 / 11	6 / 0
92–93	6 / 11	6 / 0
117–118	6 / 13	6 / 0
145–146	9 / 16	9 / 6

Notes:
[1] Cumulative commercial noise levels do not include refrigerated trailer unit noise.
Source: Bollard Acoustical Consultants, Inc. 2007

The results of the noise barrier analysis indicate that, without refrigeration trucks present, noise barriers ranging in height from 6 to 9 feet along the eastern site boundary could be utilized to reduce truck unloading activity noise to below the City's Noise Element standards (Bollard Acoustical Consultants, Inc. 2007). With the use of refrigeration trucks, additional noise controls would be necessary to ensure the City's noise thresholds are not exceeded. The barrier heights identified in Table 4.4-8 with the use of refrigeration trucks assume that no additional noise controls are implemented. However, with the implementation of the additional noise control measures included in Mitigation Measure 4.4-4 below, a perimeter noise barrier height of greater than nine feet would not be necessary. Because the noise generated by the proposed truck delivery operations could generate noise levels in excess of applicable standards, the noise impacts from on-site trucking activity is considered **significant**.

Mechanical Equipment Noise

The heating and air conditioning (HVAC) systems for the site buildings would consist of packaged rooftop systems. The units would be relatively evenly distributed across the roof of the buildings, starting about 30 feet in from the edges of the roof. These HVAC units, which typically stand about 4 to 5 feet tall, would be shielded from view by the project building parapets. Such rooftop HVAC units typically generate noise levels of approximately 50 dBA L_{50} at a reference distance of 100 feet from the building, including shielding by the building. During nighttime hours, the air conditioning requirements of the facilities decrease significantly, with reference levels being reduced to less than 45 dBA L_{50}. Given the distance between the rooftop HVAC units and the nearest existing residences to the east and the proposed residences in the Rocklin 60 residential development, and the shielding provided by the rooftop parapet, impacts from stationary source noise from mechanical equipment would be **less than significant**.

To quantify the noise emissions from food cold storage refrigeration equipment, noise level measurements conducted at a similar large grocery store were utilized. At a distance of 50 feet from the food cold storage equipment, a noise level of 66 dBA L_{50} was recorded. This equipment is proposed to be located on the roof of the large retail/grocery store, approximately 300 feet west of the nearest proposed residences and substantially farther away from the existing residences to the east. At this distance, the food cold storage equipment is predicted to generate noise levels of 50 dBA L_{50}, not including shielding by the rooftop and parapet. After consideration of this shielding, cold storage equipment noise levels are predicted to be below the recommended 45 dBA L_{50} nighttime noise criteria. As a result, noise impacts associated with this stationary source would be **less than significant**.

Parking Lot Noise

The majority of the on-site parking for the proposed project would be located on the west side of the largest proposed buildings, well removed from the existing and proposed residences to the east. Nonetheless, there is a smaller parking area and rows of parking along the eastern project boundary, as indicated in Exhibit 3-2.

Assuming all of the approximately 200 spaces in the parking area located at the northeastern portion of the project site are filled and emptied in one hour, a total of 400 parking lot events would occur in that area during a very busy hour. The approximate center of activity of the parking area would be approximately 65 feet from the residential property line to the east and approximately 70 feet from the nearest backyard locations of the proposed residential development. A typical SEL due to automobile arrivals/departures, including car doors slamming and people conversing is approximately 70 dB and maximum parking lot noise levels are typically 63 dB, at a distance of 50 feet. At the nearest outdoor activity areas, the predicted median hourly and maximum noise levels were computed to be 49 dB L_{50} and 51 dB Lmax. Interior levels within the nearest proposed residences would be at least 15 dB lower, or approximately 33 dB L_{50} and 36 dB Lmax. The predicted levels, which include a -9 dB offset to account for the recommended property line noise barrier for truck delivery noise, would not exceed the City's noise level standards identified in Table 4.4-4 for this parking area. Because the parking lot activities would not expose offsite residents to noise levels in excess of applicable standards, this impact would be considered **less than significant**.

Parking Lot Sweeper Noise

As mentioned above, the majority of the on-site parking lot areas for the proposed project would be located on the west side of the largest proposed buildings, well removed from the residences to the east. In addition, parking lot sweeper noise varies and is dependent upon the actual sweeper truck equipment, as well as the truck operator. However, the proposed intervening buildings along with the recommended eastern property line noise barrier are predicted to provide significant shielding of sweeper truck noise. Also, the noise generated by the sweeper truck equipment would be substantially lower than the noise generated from heavy truck deliveries. Therefore, the sweeper truck equipment noise would be considered a relatively negligible noise source on the site and it would not expose offsite residents to excessive noise levels. This impact would be considered **less than significant**.

Garden Center Noise

The project includes garden centers at both the proposed Wal-Mart and Home Depot stores. The garden center for the Wal-Mart is located at the northwestern portion of the building and the garden center for the Home Depot is located at the southern portion of that building. The public address (PA) systems at the garden centers are anticipated to generate lower noise levels than the truck delivery and unloading activities. The PA system speakers typically face down towards the customers in the garden centers and would not be directed toward the residences to the east. As a result, the PA systems would not expose offsite residents to excessive noise levels and this impact would be considered **less than significant**.

Other Noise Sources

Other noise sources located behind the commercial center could include cardboard baling and trash compaction machinery, and garbage collection. These noise sources are predicted to be less intensive than the truck delivery activities and the noise barrier recommended for those operations would provide similar noise reduction from these ancillary noise sources.

In addition, the long-term operation of the proposed project would result in the use of property maintenance equipment (e.g., leaf blowers, lawn mowers, and trimmers). According to the EPA, noise attributable to such equipment could result in noise levels of approximately 80 to 90 dBA at 3 feet from the source, depending on the exact type and size of the maintenance equipment (U.S. Environmental Protection Agency 1971). Thus, property maintenance activities occurring at the proposed project site could result in noise levels of approximately 65 dBA at 50 feet from the proposed project limits. However, noise from property maintenance would be intermittent and of limited duration (e.g., less than 1 to 2 hours per day during the daytime). Also , landscaping and maintenance would be primarily focused on the west-facing side of the shopping center, where customers enter and exit, and would be minimal as landscaped or vegetated area is not a predominant feature of the project. As in the case of other stationary- and area-sources of noise, the proposed sound wall, intervening structures, and vegetation would substantially diminish the offsite noise levels generated from property maintenance equipment. Because the use of property maintenance equipment on the site would not expose offsite residents to excessive noise levels, this impact would be considered **less than significant**.

Mitigation Measure 4.4-4 Exposure of Sensitive Receptors to Excessive Stationary- or Area-Source Noise Levels

- The noise barrier proposed to be constructed along the site's eastern boundary shall be constructed of masonry block, pre-cast concrete panels, or other massive materials.
- The height of the noise barrier along the entire eastern boundary shall be sufficient to ensure that the proposed project is consistent with City's exterior and interior noise levels of 60 dBA L_{dn} and 45 dBA L_{dn}, respectively, for residential uses exposed to noise sources.
- Solid noise barriers shall extend along the cold food unloading area of the large retail/grocery store loading dock to further shield refrigeration trucks while being unloaded. Refrigeration trucks shall be required to park within those shielded loading dock areas while on the site.
- All rooftop mechanical equipment shall be completely screened from view of existing or proposed residences by the proposed building parapet.
- The noise mitigation measures shall be designed by an acoustical engineer consistent with the Noise Element's acceptable noise levels for residential land uses.

Level of Significance after Mitigation

With implementation of the identified mitigation measures, the noise levels at the existing and potential future residences adjacent to the site would be consistent with City standards for residential land uses. Therefore, operational noise impacts would be reduced to less-than-significant levels.

IMPACT 4.4-5 Exposure of Sensitive Uses to Vibration Levels. *The vibration levels generated by the proposed construction activities would not expose adjacent future residences to excessive vibration levels and the project's operations would not generate any vibration sources. Therefore, this impact is considered **less than significant**.*

Construction activities have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and operations involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Table 4.4-9 displays vibration levels for typical construction equipment.

Table 4.4-9 Typical Construction-Equipment Vibration Levels		
Equipment	PPV at 25 feet (in/sec)[1]	Approximate L_v at 25 feet[2]
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

[1] Where PPV is the peak particle velocity

[2] Where L_v is the velocity level in decibels (VdB) referenced to 1 μ inch/second and based on the root mean square (RMS) velocity amplitude.

Source: Federal Transit Administration 2006

As discussed above, on-site construction equipment could include dozers and trucks. According to Federal Transit Administration (FTA), vibration levels associated with the use of a large bulldozer is 0.089 inches per second (in/sec) peak particle velocity (PPV) and 87 vibration decibels [VdB referenced to 1 microinch per second (μin/sec) and based on the root mean square (RMS) velocity amplitude] at 25 feet, as shown in Table 4.4-9. Using FTA's recommended procedure for applying a propagation adjustment to these reference levels, predicted worst-case vibration levels of approximately 0.03 in/sec PPV and 81 VdB at the closest proposed off-site sensitive receptor (approximately 50 feet from the eastern boundary of the project site) could occur from use of a large bulldozer. These vibration levels would not exceed Caltrans' recommended standard of 0.2 in/sec PPV (California Department of Transportation 2002) with respect to the prevention of structural damage for normal buildings. Vibration levels could exceed the FTA's maximum-acceptable vibration standard of 80 VdB (Federal Transmit Administration 2006) with respect to human annoyance for residential uses. However, this exceedance would occur intermittently and for very short durations, depending upon the type of construction activities being performed. Therefore, project construction would not be expected to expose offsite sensitive receptors to vibration levels that would be considered excessive. The long-term operation of the proposed project would not include any vibration sources. Thus, short-term construction and long-term operations would not expose people to excessive groundborne vibration or groundborne noise levels. As a result, this impact is considered **less than significant**.

Mitigation Measure 4.4-5 Exposure of Sensitive Uses to Vibration Levels

No mitigation measures are necessary.

Level of Significance after Mitigation

The proposed project's vibration impacts would be considered less than significant.

IMPACT 4.4-6 — Land Use Compatibility with On-Site Noise Levels *The project would not result in exposure of sensitive land uses to noise levels in excess of the applicable land-use compatibility noise standards. In addition, the project site is not located near an airport and would not expose people to excessive aircraft-generated noise. Therefore, land use compatibility impacts associated with on-site noise levels would be **less than significant.***

Noise levels within the project site are influenced largely by vehicle traffic on Interstate 80. The compatibility of proposed land uses with respect to vehicle traffic and aircraft noise under the proposed project is discussed below.

Roadway Traffic Noise Levels

Measured noise levels on the project site near the Interstate 80 right of way are 83 dBA L_{dn} (see Table 4.4-3). This noise level is in excess of the normally acceptable land use compatibility standard for industrial or commercial-type land uses of 75 dBA L_{dn} (see Table 4.4-4). However, this noise level was measured immediately adjacent to the roadway (approximately 100 feet from the centerline of the near travel lane). Assuming a typical 3 dBA reduction in noise levels per doubling of distance from a line-source (e.g., roadway), predicted noise levels at the proposed commercial buildings closest to the freeway would be 80 dBA L_{dn}. This noise level is further reduced by the noise attenuation provided by the building itself. Because the entrances to these buildings would typically face away from the freeway, the noise levels at the entrances would be reduced to between 65 and 70 dBA L_{dn}. Because the on-site noise levels at the active area of the proposed commercial buildings would be below the 75 dBA L_{dn} acceptable noise level for the proposed land use, the proposed project would not expose people to noise levels in excess of applicable standards. This impact would be considered **less than significant**.

Airport Noise Levels

The project is not located within 2 miles of an airport land use plan or a public airport, or in the vicinity of an active private airport. The Holsclaw's short take-off and landing airstrip, located parallel to I-80 to the northeast, is the nearest private airstrip, but is inactive. Finally, the proposed project does not involve the siting of any sensitive land use. Thus, the project would not expose people residing in the project area to excessive noise levels. As a result, **no impact** is anticipated to occur.

Mitigation Measure 4.4-6 Land Use Compatibility with On-Site Noise Levels

No mitigation measures are required.

Level of Significance after Mitigation

The on-site noise levels at the active areas of the proposed commercial buildings would be within acceptable noise level standards for the proposed land use and no aircraft-related noise impacts are anticipated with project implementation.