This section discusses the existing noise setting, identifies potential impacts and proposes mitigation measures related to noise for the Laguna Ridge Town Center project (project). This section is based on the Traffic Noise Impact Assessment prepared for the project which is included as **Appendix C** of this SEIR (AMBIENT, 2008), the Laguna Ridge Specific Plan EIR (June 2004), and the Elk Grove General Plan EIR (2003). Specifically, this report analyzes potential traffic noise impacts due to, and upon, development of the proposed project site as well as stationary-source noise impacts associated with the development allowed by the proposed project. Project impacts are evaluated relative to applicable noise level criteria and to the existing ambient noise environment.

4.3.1 EXISTING SETTING

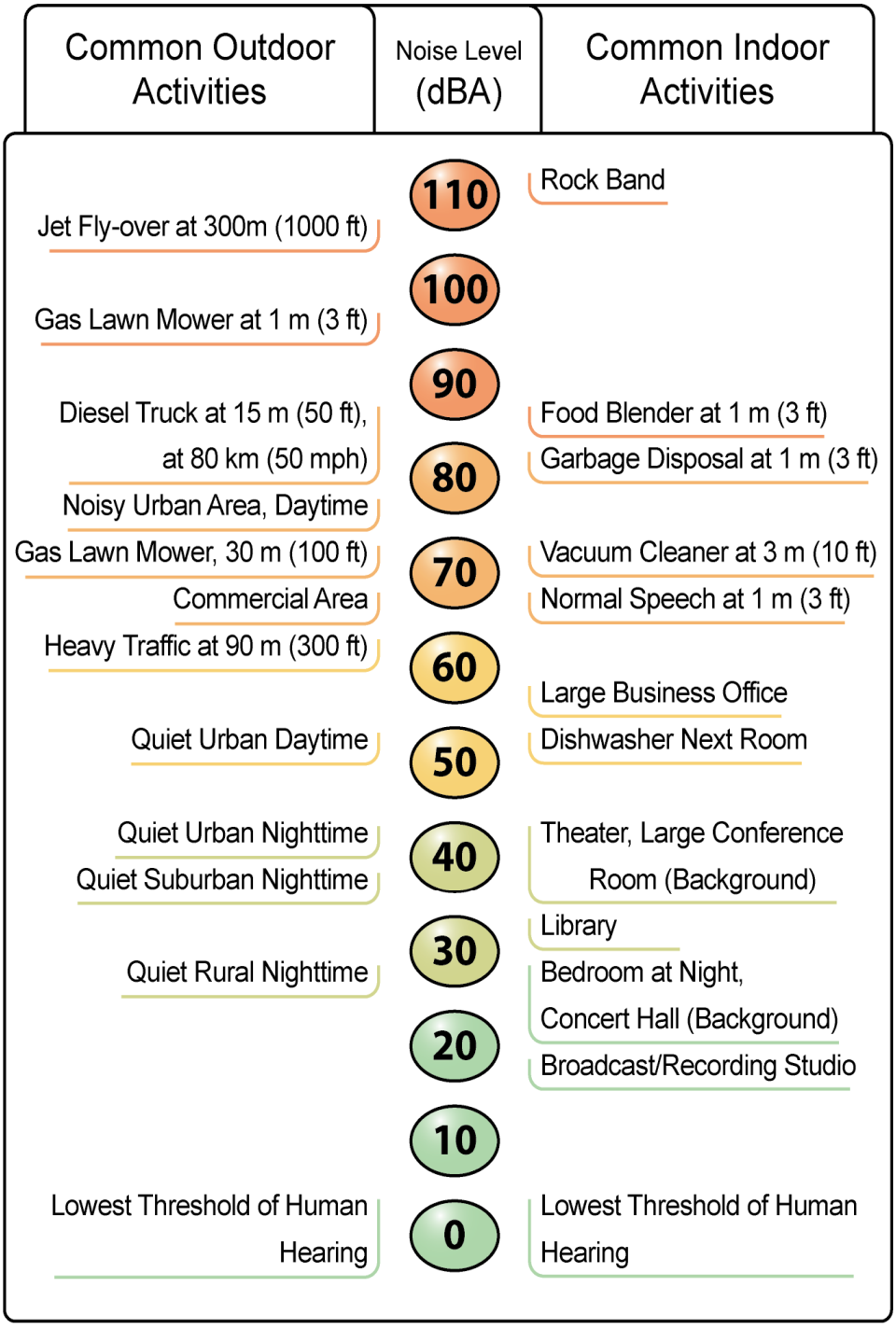
NOISE BACKGROUND

Noise is often described as unwanted sound that is loud, disagreeable, or unexpected. Sound is mechanical energy transmitted in the form of a wave because of a disturbance or vibration and can be defined as any pressure variation in air that the human ear can detect. Sound levels are described in terms of both amplitude and frequency. Amplitude is defined as the difference between ambient air pressure and the peak pressure of the sound wave. Measuring sound directly in terms of pressure would require a very large and awkward range of numbers and the decibel scale was devised to avoid this. Amplitude is measured in decibels (dB) on a logarithmic scale. The decibel scale uses the hearing threshold as a point of reference, defined as 0 decibels. Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3 dB change in amplitude as the minimum audible difference perceptible to the average person. Doubling the source strength increases the sound pressure by 3 dB. For example, 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.

The frequency of a sound is defined as the number of fluctuations of the pressure wave per second. The unit of frequency is the Hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to sound of different frequencies. For instance, the human ear is more sensitive to sound in the higher portion of this range than in the lower and sound waves below 16 Hz or above 20,000 Hz cannot be heard at all. To approximate the sensitivity of the human ear to changes in frequency, environmental sound is usually measured in what is referred to as "A-weighted decibels" (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA (U.S. EPA 1971, Lipscomb and Taylor 1978). Common community noise sources and associated noise levels, in dBA, are depicted in **Figure 4.3-1**.

Noise can be generated by a number of sources, including mobile sources, such as automobiles, trucks, and airplanes, and stationary sources, such as construction sites, machinery, and industrial operations. Noise generated by mobile sources typically attenuates at a rate between 3.0 to 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. For mobile transportation sources, such as highways, hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3.0 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance from the source. Noise generated by stationary sources typically attenuates at a rate of approximately 6.0 to 7.5 dBA per doubling of distance from the source (U.S. EPA 1971).

FIGURE 4.3-1
TYPICAL NOISE LEVELS



Source: Traffic Noise Impact Analysis, page 3 (Ambient Air Quality and Noise Consulting

Sound levels can be reduced by placing barriers between the noise source and the receiver. In general, barriers contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver. Buildings, concrete walls, and berms can all act as effective noise barriers. Wooden fences or broad areas of dense foliage can also reduce noise, but are less effective than solid barriers.

The intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are used. The three most commonly used descriptors are L_{eq}, L_{dn}, and CNEL. The energy-equivalent noise level, L_{eq}, is a measure of the average energy content (intensity) of noise over any given period. Many communities use 24-hour descriptors of noise levels to regulate noise. The day-night average noise level, L_{dn}, is the 24-hour average of the noise intensity, with a 10-dBA "penalty" added for nighttime noise (10 p.m. to 7 a.m.) to account for the greater sensitivity to noise during this period. CNEL, the community equivalent noise level, is similar to L_{dn} but adds an additional 5-dBA penalty for evening noise (7 p.m. to 10 p.m.). Another descriptor that is commonly discussed is the single-event noise exposure level (SENEL), also referred to as the sound exposure level (SEL). The SENEL/SEL describes a receiver's cumulative noise exposure from a single 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). Noise analyses may also depend on measurements of L_{max}, the maximum instantaneous noise level during a specific period of time, and L_{min}, the minimum instantaneous noise level during a specific period. Common noise level descriptors are summarized in **Table 4.3-1**.

TABLE 4.3-1
ACOUSTICAL TERMINOLOGY

Term	Definition
Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, defined as one-tenth of the logarithm of the ratio of the sound pressure squared over the reference pressure squared.
Community Noise Equivalent Level (CNEL)	The CNEL is similar to the Ldn described below, but with an additional 5 dBA "penalty" added to noise events that occur between the hours of 7:00 p.m. to 10:00 p.m. The calculated CNEL is typically approximately 0.5 dBA higher than the calculated Ldn.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Day-Night Average Noise Level (Ldn)	The 24-hour Leq 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 to account for increased sensitivity to noise during these hours.
Energy Equivalent Noise Level (Leq)	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 (in dBA) is calculated.

Term	Definition
Maximum Noise Level (Lmax)	The maximum instantaneous noise level during a specific period of time.
Minimum Noise Level (Lmin)	The minimum instantaneous noise level during a specific period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the AMaximum@ level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
Single Event Level (SEL)	The level of sound accumulated over a given time interval or event. Technically, the sound exposure level is the level of the time-integrated mean square A-weighted sound for a stated time interval or event, with a reference time of one second.

Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases. The acceptability of noise and the threat to public well-being are the basis for land use planning policies preventing exposure to excessive community noise levels.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted: the so-called "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged. Regarding increases in A-weighted noise levels, knowledge of the following relationships will be helpful in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans.
- Outside of the laboratory, a 3-dB change is considered a just-perceivable difference.

- A change in level of at least 5 dB is required before any noticeable change in community response would be expected. An increase of 5 dB is typically considered substantial.

- A 10-dB change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Existing Noise Environment

Noise-Sensitive Land Uses

Noise-sensitive land uses generally include those uses where exposure to noise would result in adverse effects, as well as uses 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. Other noise-sensitive land uses include hospitals, convalescent facilities, parks, hotels, churches, libraries, and other uses where low interior noise levels are essential. Noise-sensitive land uses located near the project site consist of residential land uses, the nearest of which are located to the north of the project site, across Elk Grove Boulevard, and to the south of the project site, across Civic Center Drive.

Ambient Noise Levels

The Laguna Ridge Town Center project vicinity is subjectively evaluated as currently being fairly quiet, as it is located a substantial distance from State Route (SR) 99 (approximately one mile east of the eastern border of the site) and other major local roadways. Railroad and aircraft noise sources do not significantly affect the project site.

To document the existing noise environment, ambient noise surveys were conducted by AMBIENT Air Quality & Noise Consulting at various locations in the project area. Short-term (10-minute) noise level measurements were conducted using a Larson Davis model 820 sound-level meter placed at a height of approximately 4.5 feet above the ground surface. Based on the measurements conducted, average daytime noise levels (in dBA L_{eq}) in the project area generally range from the mid 50s to the upper 60s, dependent primarily on distance from nearby roadways. The dominant noise source noted during the survey was vehicular traffic on area roadways, including Elk Grove Boulevard and Bruceville Road. Measurement locations and corresponding measured daytime noise levels are summarized in **Table 4.3-2.**

The project area is not affected by major railroad operations, as the Union Pacific Railroad (UPRR) mainline is located along Franklin Boulevard, a considerable distance to the west of the project area. At its closest, the UPRR mainline is approximately two miles west of the western border of the site.

TABLE 4.3-2
AMBIENT DAYTIME NOISE LEVELS

Monitoring Location	Measured Noise Level (dBA)		
	L_{EQ}	L_{MIN}	L_{MAX}
Project Site, Northwestern Boundary	68.3	53.2	75.8
Project Site, Southwestern Boundary	66.2	51.8	72.8
Project Site, Northeastern Boundary	67.5	52.4	74.9
Project Site, Sothern Boundary	55.4	43.1	69.6

Source: Ambient Air Quality and Noise Consulting
Note: Noise measurements were conducted using a Larson Davis Laboratories Model 820 Type I integrating sound meter positioned at a height of approximately 4.5 feet above ground level and at a distance of 50 feet from the centerline of the near travel lane of adjacent roadways.

4.3.2 REGULATORY FRAMEWORK

CITY OF ELK GROVE GENERAL PLAN

The Noise Element of the City of Elk Grove General Plan contains policies designed to protect the community from the harmful and annoying effects of exposure to excessive noise. General Plan policies applicable to the proposed project are summarized in **Table 4.3-3**. The City's General Plan also includes maximum allowable noise standards for projects affected by transportation and non-transportation noise sources. Noise compatibility of proposed development is determined in comparison to these standards. The City's noise standards for projects affected by stationary (i.e., non-transportation) and transportation noise sources are summarized in **Tables 4.3-4** and **4.3-5**, respectively.

As depicted in **Table 4.3-4**, the City's maximum acceptable exterior noise standard for non-transportation noise sources is 55 dBA L_{eq} during the daytime hours (i.e., 7 a.m. to 10 p.m.) and 45 dBA during the nighttime hours (i.e., 10 p.m. to 7 a.m.) To account for increased annoyance potential, non-transportation sources with tonal, impulsive, or repetitive noise characteristics are reduce by 5 dBA. The City's maximum acceptable exterior noise standard for transportation noise sources is 60 dBA L_{dn}/CNEL (**Table 4.3-5**). Exterior noise levels of up to 65 dBA L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been incorporated into the project and interior noise levels do not exceed the City's interior noise standard of 45 dBA L_{dn}/CNEL. This interior noise standard is consistent with State of California Title 24 building insulation requirements, which establishes an interior noise standard of 45 dBA L_{dn}/CNEL for multi-family residential dwellings.

TABLE 4.3-3
PROJECT CONSISTENCY WITH GENERAL PLAN NOISE POLICIES

General Plan Policies	Project Consistency with the General Plan	Analysis
Policy NO-3: Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise		No development is proposed as part of the proposed project. Any future development on the site will require discretionary approvals subject to environmental review. The project is required to comply with

General Plan Policies	Project Consistency with the General Plan	Analysis
level standards of Table NO-A as measured immediately within the property line of lands designated for noise-sensitive uses. *NO-3-Action 1:* Limit construction activity to the hours of 7 a.m. to 7 p.m. whenever such activity is adjacent to residential uses. *NO-3-Action 2:* Consider limiting the hours of operation for loading docks, trash compactors, and other noise-producing uses in commercial areas which are adjacent to residential uses. *NO-3-Action 3:* The City shall require that stationary construction equipment and construction staging areas be set back from existing noise-sensitive land uses.	Yes	Laguna Ridge Specific Plan (LRSP) EIR mitigation measures MM 4.4.3a, 4.4.3b, and 4.4.5 (as well as all other LRSP EIR mitigation measures) which requires analysis of noise levels associated with future development of medical uses and to identify noise-reduction measures necessary to ensure compliance with City of Elk Grove noise standards for non-transportation noise sources.
Policy NO-4: Where proposed non-residential land uses are likely to produce noise levels exceeding the performance standards of Table NO-A at existing or planned noise-sensitive land uses, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design. The requirements for the content of an acoustical analysis are shown in Table NO-B.	Yes	A noise study has been prepared for the proposed Laguna Ridge Town Center project, as well as for the approved LRSP area. Mitigation measures are identified for potential noise impacts in the LRSP EIR and are also required for implementation of the proposed project. See analysis above.
Policy NO-8: Where noise mitigation measures are required to achieve the standards of Tables NO-A and NO-C, the emphasis of such measures shall be placed upon site planning and project design. The use of noise barriers shall be considered a means of achieving the noise standards only after all other practical design-related noise mitigation measures, including the use of distance from noise sources, have been integrated into the project.	Yes	See analysis above.

Source: City of Elk Grove General Plan, Noise Element (Amended January 5, 2005).

Note: Transportation noise sources are defined as traffic on public roadways, railroad line operations, and aircraft in flight. Control of noise from these sources is preempted by federal and state regulations. Other noise sources are presumed to be subject to local regulations, such as a noise control ordinance. Non-transportation noise source may include industrial operations, outdoor recreation facilities, HVAC units, loading docks, etc.

TABLE 4.3-4
PERFORMANCE STANDARDS FOR STATIONARY (NON-TRANSPORTATION) NOISE SOURCES

Source	Noise Level (Hourly L_{EQ}, dBA)	
Part 1: Typical Sources[1]	55	45
Part 2: Sources which are Tonal, Impulsive, Repetitive, or Consist Primarily of Speech or Music[2]	50	40

Source: Elk Grove General Plan, Noise Element, Table NO-A (Amended January 5, 2005).

1. The standards above will apply generally to noise sources that are not tonal, impulsive, or repetitive in nature. Typical noise sources in this category would include HVAC systems, cooling towers, fans, blowers, etc.

2. The standards in Part 2 apply to noises which are tonal in nature, impulsive, or repetitive, or which consist primarily of speech or music (e.g., humming sounds, outdoor speaker systems, etc.). Typical noise sources in this category include pile drivers, drive-through speaker boxes, punch presses, steam valves, and transformer stations.

These noise level standards in Parts 1 and 2 above do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

The City may impose noise level standards which are more or less restrictive than those specified above based upon determination of existing low or high ambient levels.

TABLE 4.3-5
NOISE STANDARDS FOR NEW USES AFFECTED BY TRANSPORTATION NOISE

Land Use	Outdoor Activity Areas[1] L_{dn}/CNEL, dB	Interior Spaces	
		L_{dn}/CNEL, dB	L_{eq}, dB[2]
Residential	60[3]	45	--
Residential subject to noise from railroad tracks, aircraft overflights, or similar noise sources which produce clearly identifiable, discrete noise events (the passing of a single train, as opposed to relatively steady noise sources such as roadways)	60[3]	40[5]	--
Transient Lodging	60[4]	45	--
Hospitals, Nursing Homes	60[3]	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	60[3]	--	40
Office Buildings	--	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--

Source: City of Elk Grove General Plan Noise Element, Table NO-C (Amended January 2005).

1. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use. Where it is not practical to mitigate exterior noise levels at patio or balconies of apartment complexes, a common area such as a pool or recreation area may be designated as the outdoor activity area.

2. As determined for a typical worst-case hour during periods of use.

3. Where it is not possible to reduce noise in outdoor activity areas to 60 dBA Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dBA Ldn/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

4. In the case of hotel/motel facilities or other transient lodging, outdoor activity areas such as pool areas may not be included in the project design. In these cases, only the interior noise level criterion will apply.

5. The intent of this noise standard is to provide increased protection against sleep disturbance for residences located near railroad tracks.

LAGUNA RIDGE SPECIFIC PLAN

The Laguna Ridge Specific Plan (LRSP) serves to implement the City's General Plan policies and establish clear direction for the development of the entire Specific Plan Area. The Specific Plan is both a policy and a regulatory document. It provides definition of policy direction, establishes zoning designations for the property, and includes standards to guide the detailed design of individual projects within the Specific Plan Area.

The Specific Plan provides mitigation measures for reduction in noise impacts, which are required to be implemented into project design. The City's General Plan Policy NO-3 requires that noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the City's noise level standards. General Plan Policy NO-4 states that where proposed non-residential land uses are likely to produce noise levels exceeding the City's performance standards at existing or planned noise-sensitive land uses, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design. The LRSP provided measures to respond to these General Plan Policies that were deemed appropriate to the Laguna Ridge Plan Area. These measures included mitigation to reduce construction noise and vibration, operational noise, agricultural operations noise, and traffic noise. These mitigation measures are to be applied to projects within the entire Plan Area.

CITY OF ELK GROVE NOISE ORDINANCE

The City of Elk Grove Noise Ordinance provides an exterior noise level standard of 55 dB for daytime (7 a.m. to 10 p.m.) and an exterior noise level standard of 45 dB for nighttime (10 p.m. to 7 a.m.) for residential areas. The Noise Ordinance also provides a guideline for the allowable interior and exterior noise levels over a cumulative duration. These levels are shown in **Table 4.3-6**. If the ambient noise level exceeds the permitted in any of the noise level categories specified in the subdivision, the allowable noise limit shall be increased by 5 dB increments in each category to encompass the ambient noise level.

TABLE 4.3-6
DURATION OF INDOOR INTRUSIVE NOISE LEVELS

Cumulative Duration of the Intrusive Noise	Exterior Noise Level, dB		Interior Noise Level, dB
	Daytime	Nighttime	Nighttime
30 minute per hour	55	50	N/A
15 minutes per hour	60	55	N/A
5 minutes per hour	65	60	45
1 minute per hour	70	65	50
Level not to exceed for any time per hour	75	70	55

Source: City of Elk Grove Noise Ordinance.

4.3.3 PROJECT IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

Criteria for determining the significance of noise impacts were developed based on information contained in the California Environmental Quality Act Guidelines (CEQA Guidelines, Appendix G). According to those guidelines, a project may have a significant effect on the environment if it will satisfy the following conditions:

1) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

2) Exposure of persons to or generation of excessive groundborne vibration of groundborne noise levels.

3) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

4) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

5) 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 of public use airport, the project exposes people residing or working in the project area to excessive noise levels.

6) For a project within the vicinity of a private airstrip, the project exposes people residing or working in the project area to excessive noise levels.

The Laguna Ridge Town Center Notice of Preparation/Initial Study determined that the nearest airport/airstrip is the Sunset Skyranch Airport, which is located approximately five miles southeast of the project site. Implementation of the proposed project would not affect airport operations, nor would implementation of the proposed project result in the development or relocation of any noise-sensitive land uses in proximity to any airport or airstrip. As a result, implementation of the proposed project would not result in increased exposure of individuals to excessive aircraft noise levels. There are no private airstrips within the vicinity of the project area. Noise impacts from airports and airstrips were identified as being less than significant or having no impact and will not be further discussed in this document.

In comparison to impacts already addressed in the Elk Grove Laguna Ridge Specific Plan (LRSP) EIR, the proposed General Plan Amendment, Specific Plan Amendment, and Rezone project would not result in new noise or groundborne vibration impacts associated with construction-related activities. The LRSP identified groundborne vibration impacts and concluded that with mitigation measure **MM 4.4.2,** impacts would be reduced to less than significant. This mitigation measure requires that an assessment of vibrations induced by pile driving at the site shall be completed, and during construction, vibrations should be measured at regular intervals to determine the levels of vibration at various distances. Additionally, methods to reduce vibrations, if needed, could include cut-off trenches and the use of smaller hammers. This requirement shall be included as a note in all project construction plans. In addition, groundborne vibration levels associated with the proposed increase in commercial uses and reconfiguration of commercial and residential uses would not substantially change from those evaluated in the LRSP EIR; it is not anticipated that the reconfiguration of commercial and residential uses would affect the

significance of groundborne vibration levels as discussed in the LRSP EIR. The reconfiguration of onsite land uses would, however, result in a potential change in vehicle traffic generation rates. In addition, the increase in commercial designation and reconfiguration of onsite land uses could result in new non-transportation source noise impacts from the increase in commercial development potential to nearby noise-sensitive land uses not previously addressed in the LRSP EIR. This document includes analysis of potential increases in traffic noise levels as well as non-transportation source noise levels associated with the potential development allowed under the proposed land use reconfiguration.

Noise impacts associated with the proposed project would be considered significant if implementation of the proposed land uses would:

- Result in a substantial permanent long-term increase in ambient noise levels. For purposes of this analysis, increases in ambient noise levels were evaluated based on the following criteria:
  - Where existing traffic noise levels are less than 60 dBA CNEL at the outdoor activity areas of noise-sensitive uses, a 5 dBA increase in noise levels due to roadway improvement projects will be considered significant; and
  - Where existing traffic noise levels range between 60 and 65 dBA CNEL at the outdoor activity areas of noise-sensitive uses, a 3 dBA increase in noise levels due to roadway improvement projects will be considered significant; and
  - Where existing traffic noise levels are greater than 65 dBA CNEL at the outdoor activity areas of noise-sensitive uses, a 1.5 dBA increase in noise levels due to roadway improvement projects will be considered significant.
- Result in the generation or exposure to noise levels that would exceed the City's applicable noise standards (**Table 4.3-4** of this document).

Significance of Changes in Ambient Noise Levels

Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local project criteria or ordinances, or if it would substantially increase noise levels at noise-sensitive land uses.

The potential increase in traffic noise from the project is a factor in determining significance. Research into the human perception of changes in sound level indicates the following:

- A 3-dB change is barely perceptible,
- A 5-dB change is clearly perceptible, and
- A 10-dB change is perceived as being twice or half as loud.

A limitation of using a single noise level increase value to evaluate noise impacts is that it fails to account for pre-project-noise conditions. **Table 4.3-7** is based upon recommendations made by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed

by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been asserted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the L_{dn}.

According to **Table 4.3-7**, an increase in the traffic noise level of 1.5 dB or more would be significant where the ambient noise level exceeds 65 dB L_{dn}. Extending this concept to higher noise levels, an increase in the traffic noise level of 1 dB or more may be significant where the ambient noise level exceeds 75 dB L_{dn}. The rationale for the **Table 4.3-7** criteria is that as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause significant annoyance.

TABLE 4.3-7
SIGNIFICANCE OF CHANGES IN NOISE EXPOSURE

Ambient Noise Level Without Project, L_{dn}	Increase Required for Significant Impact
< 60 dB	+ 5.0 dB or more
60-65 dB	+ 3.0 dB or more
> 65 dB	+ 1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON)

METHODOLOGY

The analysis of noise impacts for this project focuses on the increase in traffic noise levels along existing roadways due to the additional traffic generated by the proposed land use reconfiguration.

Traffic Noise Impact Assessment Methodology

To assess traffic noise impacts, traffic noise levels are predicted at a representative distance for both existing and future, project and no-project conditions. Noise impacts are identified if the noise level increases as a result of the project and exceed the significance thresholds described previously. Noise impacts at future noise-sensitive land uses located within the project are identified if the predicted future plus project traffic noise levels exceed the project standards of significance.

Existing Roadway Traffic Noise

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used for the prediction of existing traffic noise levels in the project vicinity. The FHWA Model is the analytical method currently favored for traffic noise prediction by most state and local agencies. The model is based upon the CALVENO noise emission 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.

The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. To predict L_{dn} values, it is necessary to determine the day/night distribution of traffic and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Existing traffic data for area roadways were obtained from the Noise Impact Analysis prepared for the project. The FHWA model input data for all major project area roadways for existing conditions and future cumulative conditions are provided in **Table 4.3-8** and **Table 4.3-9** respectively.

PROJECT IMPACTS AND MITIGATION MEASURES

Long-Term Traffic Noise Levels

Impact 4.3.1 Implementation of the proposed project would not result in a significant increase in ambient transportation noise levels. As a result, this impact would be considered **less than significant.**

Development in the Laguna Ridge Specific Plan (LRSP) area is guided by the LRSP, which includes land use designations, development standards, design guidelines, infrastructure plans, and financing plans. The EIR prepared for the LRSP (SCH #2000082139) determined that the LRSP, in combination with approved and planned urban development in the region, would increase traffic volumes within and adjacent to the plan area, which would increase transportation-related noise levels in excess of the City of Elk Grove noise standards unless mitigation was implemented. As identified in the LRSP EIR, the LRSP project would expose on-site residential and other noise-sensitive land uses to noise levels in excess of City noise standards along the future extension of Big Horn Road between Elk Grove Boulevard and Poppy Ridge Road, the plan area's frontage with Elk Grove Boulevard, and along Poppy Ridge Road. The LRPS EIR requires that all development within the LRSP identify specific noise mitigation measures, specifically **MM 4.4.5,** for areas that would be located within the 60 dB Ldn traffic noise contours as determined by the LRSP EIR. Potential mitigation measures are provided within the LRSP EIR and include implementing setbacks, constructing sound barriers, or creating 100 feet of dense foliage. Due to this requirement, the LRSP resulted in a less than significant impact regarding excessive traffic noise impacts. These mitigation measures would be applicable to the project area at the entire northern boundary, which is along Elk Grove Boulevard, as well as the entire western boundary, which is along Bruceville Road.

All future development plans on the project site will need to be prepared to incorporate the mitigation requirements of MM 4.4.5 of the LRSP EIR. Potential design features for noise attenuation include:

1) Setbacks (i.e., open space, frontage roads, recreational areas, and storage yards) typically reduce noise attenuation by 4 to 6 dB per doubling of distance from the source.

2) Barriers (i.e., walls, berms, or structures) to achieve a noise reduction ranging from 5 to 15 dB. Earth berms provide approximately 3 dB more attenuation than a wall.

3) Site design (i.e., building location) to reduce noise levels.

4) Building design (i.e., location of noise-sensitive uses within a building) to reduce the impact of noises on inhabitants.

5) Building façades (i.e., utilizing all features of the building façade including the closed windows) to reduce noise.

6) Vegetation (i.e., trees and other vegetation) 100 feet of dense foliage can achieve a 5 dB attenuation of traffic noise.

7) Noise-reducing paving materials (i.e., rubberized asphalt) reduce traffic noise by approximately 4 dB.

These design features must be in place prior to approval of tentative subdivision maps and development projects along Elk Grove Boulevard and Big Horn Road by the City of Elk Grove Development Services.

The increase in traffic associated with implementation of the proposed Laguna Ridge Town Center project has the potential to increase transportation noise levels beyond those disclosed and addressed in the LRSP EIR. The FHWA roadway noise prediction model was used to predict traffic noise levels along affected roadways for existing traffic conditions, with and without implementation of the proposed project. Modeling was conducted for roadways anticipated to be primarily affected by the proposed project, based on predicted traffic volumes obtained from the traffic analysis prepared for this project (Fehr & Peers, 2008). Modeling was conducted for existing and future cumulative conditions. Predicted traffic noise levels for existing conditions, with and without implementation of the proposed project, are summarized in **Table 4.3-8**. The project's contribution to traffic noise levels along area roadways was determined by comparing the predicted noise levels with and without project-generated traffic. The predicted noise levels do not take into account shielding or reflection of noise from existing terrain or existing/future structures.

In comparison to existing conditions, implementation of the proposed project would result in predicted increase in traffic noise levels of approximately 0.6 dBA or less along area roadways. As a result, this impact would be considered **less than significant**.

TABLE 4.3-8
PREDICTED INCREASES IN TRAFFIC NOISE LEVELS – EXISTING CONDITIONS

Roadway Segment	Predicted Noise Level (dBA CNEL/Ldn) at 50 Feet From Near Travel Lane Centerline			
	No Project	Plus Project	Increase	Significant
Elk Grove Blvd., Bruceville Rd. to Wymark Dr.	73.06	73.26	0.20	No
Elk Grove Blvd., Wymark Dr. to Big Horn Blvd.	73.06	73.39	0.33	No
Elk Grove Blvd., Big Horn Blvd. to Laguna Springs Dr.	72.93	73.38	0.45	No
Bruceville Rd., North of Elk Grove Blvd.	69.17	69.68	0.51	No
Bruceville Rd., South of Elk Grove Blvd.	69.74	70.33	0.59	No
Big Horn Blvd., North of Elk Grove Blvd.	65.10	65.54	0.44	No

Source: Ambient Air Quality and Noise Consulting, Noise Impact Analysis, 2008

Note: Traffic noise levels were modeled using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) based on traffic data obtained from the traffic analysis prepared for this project. Modeling assumes no natural or human-made shielding (e.g., vegetation, berms, walls, buildings).

Mitigation Measures

None required.

Long-term Noise Levels – Proposed Medical Center

Impact 4.3.2 Proposed medical office land uses could result in substantial increases in ambient noise levels that could exceed the City's noise standards at nearby noise-sensitive land uses. As a result, this impact would be considered **potentially significant**.

The proposed project does not include any specific development proposals. However, it is anticipated that future development of the project site may include a medical center. Noise associated with a hospital or emergency medical uses may vary from noise associated with more typical shopping commercial uses.

Stationary noise sources commonly associated with medical centers are typically associated with building mechanical equipment, including cooling towers and back-up power generators. Noise levels associated with such equipment can reach levels of up to approximately 90-100 dBA. Mechanical equipment is typically located within buildings or separated from direct public exposure, such as on rooftop areas. In addition, increases in ambient noise levels at nearby noise-sensitive land uses could also occur associated with arrivals and departures of helicopters, in the event that a helipad were to be proposed as part of a future medical center.

Depending on the specific equipment proposed, services provided, and site design, the proposed medical center could result in significant increases in ambient noise levels at nearby noise-sensitive land uses in excess of the City's noise standards. As a result, this impact would be considered **potentially significant**.

Mitigation Measure

MM 4.3.2 The City shall require an acoustical assessment to be performed to evaluate noise impacts associated with the development of proposed onsite medical land uses. Where acoustical analysis determines that noise levels would exceed applicable noise standards, the City shall require the implementation of noise-reduction measures to reduce noise impacts to nearby noise-sensitive receptors. Such measures may include, but are not limited to, the incorporation of setbacks, sound barriers, berms, or equipment enclosures.

Timing/Implementation: *Prior to approval of tentative subdivision maps and development projects along Elk Grove Boulevard, Big Horn Road and Poppy Ridge Road.*

Enforcement/Monitoring: *City of Elk Grove Development Services*

Significance After Mitigation

Implementation of the above mitigation measure would require analysis of noise impacts associated with the proposed medical center and that noise reduction measures be incorporated to reduce associated impacts. The incorporation of noise reduction measures and site design considerations can result in substantial reductions in operational noise levels. However, predicted operational noise levels at some nearby noise-sensitive land uses could still exceed the City's applicable noise standards. In addition, in the event that the proposed medical center were to include a helipad, it is unlikely that resultant noise levels at all nearby

noise-sensitive land uses would be reduced to within acceptable levels. As a result, this impact would be considered **significant and unavoidable**.

4.6.4 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

The cumulative setting for noise assumes development of land uses in the City and surrounding area. It is anticipated that development would be consistent with the General Plan as amended under cumulative conditions and would include the cumulative projects identified in **Table 4.0-1** in Section 4.0, Introduction to the Environmental Analysis and Assumptions Used. The projects listed in **Table 4.0-1**, along with the proposed project, comprise the major cumulative development occurring in the City and its vicinity. Potential cumulative noise impacts would be primarily associated with traffic noise sources; on-site noise sources associated with operation of the project under cumulative conditions are expected to result in the project-level impacts previously discussed and not significantly contribute to cumulative noise impacts.

The CEQA guidelines and the Elk Grove General Plan Noise Element have been used to establish cumulative noise impact standards for this section. Implementation of the project would result in **significant cumulative** noise impacts if the project would result in either of the following:

1) Exposure of persons to or generation of noise levels in excess of standards established in the Elk Grove General Plan, or applicable standards of other agencies.

2) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project, as defined by **Table 4.3-4**, above.

CUMULATIVE IMPACTS

Permanent Cumulative Noise Increase: Traffic

Impact 4.3.3 Implementation of the proposed project, along with approved and planned urban development in the region, would increase traffic volumes within and adjacent to the project area which would increase transportation related noise levels in excess of the City of Elk Grove noise standards. Development of the project site would result in increased cumulative traffic noise levels. However, the proposed project would result in an increase in ambient noise levels of approximately 0.4 dBA or less along area roadways. As a result, the project would have a **less than cumulatively considerable** contribution to cumulative traffic noise impacts.

Table 4.3-9 shows predicted traffic noise levels for future cumulative conditions, with and without implementation of the proposed project.

TABLE 4.3-9
PREDICTED INCREASES IN TRAFFIC NOISE LEVELS – FUTURE CUMULATIVE CONDITIONS

Roadway Segment	Cumulative Predicted Noise Level (dBA CNEL/Ldn) at 50 Feet From Near Travel Lane Centerline			
	No Project	Plus Project	Increase	Significant
Elk Grove Blvd., Bruceville Rd. to Wymark Dr.	74.85	74.97	0.12	No
Elk Grove Blvd., Wymark Dr. to Big Horn Blvd.	74.74	74.94	0.20	No
Elk Grove Blvd., Big Horn Blvd. to Laguna Springs Dr.	73.84	74.04	0.20	No
Bruceville Rd., North of Elk Grove Blvd.	72.39	72.59	0.20	No
Bruceville Rd., South of Elk Grove Blvd.	70.34	70.74	0.40	No
Big Horn Blvd., North of Elk Grove Blvd.	70.58	70.82	0.24	No

Source: Ambient Air Quality and Noise Consulting, Noise Impact Analysis, 2008

Note: Traffic noise levels were modeled using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) based on traffic data obtained from the traffic analysis prepared for this project. Modeling assumes no natural or human-made shielding (e.g., vegetation, berms, walls, buildings).

Development in the Laguna Ridge Specific Plan (LRSP) area is to be guided by the LRSP, which includes land use designations, development standards, design guidelines, infrastructure plans, financing plans for the its systematic implementation. The EIR prepared for the Laguna Ridge Specific Plan (SCH #2000082139) determined that the LRSP, in combination with approved and planned urban development in the region, would increase traffic volumes within and adjacent to the plan area, which would increase cumulative transportation related noise levels in excess of the City of Elk Grove noise standards unless mitigation was implemented. Although all of the major roadways in the vicinity of the Laguna Ridge Specific Plan area were determined be exposed to elevated traffic noise levels, some roadway segments have been anticipated to incur higher rates of elevated traffic noise than others. Impact 4.4.5 of the Laguna Ridge Specific Plan EIR listed the following roadway segments within and near the Specific Plan area that were determined to sustain substantial traffic noise level increases due to the development of the Specific Plan:

- Bilby Road – Franklin Boulevard to Bruceville Road
- Bruceville Road – Laguna Boulevard to Elk Grove Boulevard
- Bruceville Road – Elk Grove Boulevard to Poppy Ridge Road
- Poppy Ridge Road – Bruceville Road to Big Horn Boulevard
- Poppy Ridge Road – Big Horn Boulevard to State Route 99

The LRSP EIR requires that all development within the LRSP identify specific noise mitigation measures (MM 4.4.5 of the Laguna Ridge Specific Plan EIR) for areas that would be located within the 60 dB Ldn traffic noise contours identified in the LRSP EIR. Areas of the proposed project that meet this description include the entire northern boundary, which is along Elk Grove Boulevard, as well as the entire western boundary, which is along Bruceville Road. Potential mitigation measures are provided within the Specific Plan EIR and include implementing setbacks, constructing sound barriers, or creating 100 feet of dense foliage. Due to this requirement, the LRSP was determined to result in a less than significant impact regarding cumulative traffic noise impacts. All future development plans on the project site will need to be prepared to incorporate the mitigation requirements of MM 4.4.5 of the LRSP EIR.

According to the noise impact analysis prepared for the proposed project, development of the project site would result in increased cumulative traffic noise levels by approximately 0.4 dBA or less along area roadways. This fact, coupled with the requirements of MM 4.4.5 of the Laguna Ridge Specific Plan EIR along the northern and western boundaries of the project site, results in a **less than cumulatively significant** impact.

Mitigation Measures

Implementation of mitigation measure MM 4.4.5 of the Laguna Ridge Specific Plan EIR is required in order to maintain transportation-related noise levels.

REFERENCES

Ambient Air Quality and Noise Consulting, 2008. *Noise Impact Analysis, Laguna Ridge Town Center.* Carmichael, California. January 2008.

City of Elk Grove, 2003. City of Elk Grove General Plan Draft Environmental Impact Report. Elk Grove, CA. August, 2003.

City of Elk Grove, 2005. *City of Elk Grove General Plan, Noise Element*. Elk Grove, CA. Adopted November 2003; amended January 2005.

City of Elk Grove, 2004. *Laguna Ridge Specific Plan.* Elk Grove, CA. June, 2004.

City of Elk Grove, 2004. *Laguna Ridge Specific Plan EIR.* Elk Grove, CA. June 2004.