

# CHAPTER 11.0

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## NOISE

This section addresses project impacts related to ambient noise levels, and the exposure of sensitive receptors to construction and operational noise. This section analyzes the type and levels of noise that would be generated by construction and operation of the proposed project.

### 11.1 ENVIRONMENTAL SETTING

#### 11.1.1 CHARACTERISTICS OF ENVIRONMENTAL NOISE

##### *ACOUSTICAL BACKGROUND AND TERMINOLOGY*

Noise is often defined as unwanted sound. Frequently occurring pressure variations (at least 20 times per second) detected by the human ear are identified as sound. The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable. Sound is measured in decibels. The decibel scale uses the hearing threshold as a point of reference, defined as 0 decibels (dB). Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB.

##### *NOISE EXPOSURE AND COMMUNITY NOISE*

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 environment. A common statistical tool to measure the ambient noise level is the average, or equivalent; sound level ( $L_{eq}$ ) over a given time (usually one hour). The  $L_{eq}$  is the foundation of the Day-Night Average Level noise descriptor ( $L_{dn}$ ), and shows high correlation with community response to noise. **Table 11-1** contains definitions of acoustical terminology used in this section. **Table 11-2** shows examples of noise sources that correspond to various sound levels.

The Day-Night Average Level ( $L_{dn}$ ) is based upon the average noise level over a 24-hour day, with a +10 decibel weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. Additional weight is placed on nighttime readings based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because  $L_{dn}$  represents a 24-hour average, it tends to disguise short-term variations in the noise environment.  $L_{dn}$ -based noise standards are commonly used to assess noise effects associated with traffic, railroad, and aircraft noise sources.

**TABLE 11-1  
ACOUSTICAL TERMINOLOGY**

<b>Term</b>	<b>Definition</b>
A-weighted	The A-weighted sound level has been shown to correlate with subjective responses. Two sounds judged to be of similar loudness would produce similar dB(A) values, although their unweighted dB values may vary considerably. The A-weighting compares well with other noise sources. It is, therefore, the most widely used.
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 noise.
Decibel or dB	Fundamental unit of sound. A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 to 10 p.m.) weighted by a factor of 3 and nighttime hours weighted by a factor of 10 prior to averaging.
$L_{dn}$	The 24-hour day and night A-weighted noise exposure level that accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.
$L_{eq}$	The equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The $L_{eq}$ is the constant sound level, which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
$L_{max}$	The highest root-mean-square (RMS) sound level measured over a given period of time.

Source: Ziobroski, 2005; AES, 2007.

### ***EFFECTS OF NOISE ON PEOPLE***

The effects of noise on people fall into three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide

variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

**TABLE 11-2  
TYPICAL A-WEIGHTED SOUND LEVELS OF COMMON NOISE SOURCES**

Loudness Ratio	Decibels (dBA)	Description
128	130	Threshold of pain.
64	120	Jet aircraft take-off at 100 feet.
32	110	Riveting machine at operator's position.
16	100	Shotgun at 200 feet.
8	90	Bulldozer at 50 feet.
4	80	Diesel locomotive at 300 feet.
2	70	Commercial jet aircraft interior during flight.
1	60	Normal conversation speech at 5 to 10 feet.
1/2	50	Open office background level.
1/4	40	Background level within a residence.
1/8	30	Soft whisper at 2 feet.
1/16	20	Interior of recording studio.

Source: Bolt, 1971.

Human reaction to a new noise can be estimated through comparison of the new noise to the existing ambient noise level within a given environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will likely be judged by the recipients. With regard to increases in A-weighted noise levels, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1-dBA cannot be perceived.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5-dBA is required before any noticeable change in human response would be expected.
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause adverse response.

Noise effects on humans can be physical or behavioral in nature. The mechanism for chronic exposure to noise leading to hearing loss is well established. The elevated sound levels cause trauma to the cochlear structure in the inner ear, which gives rise to irreversible hearing loss. Though it pales in comparison to the health effects noted above, noise pollution also constitutes a significant factor of annoyance and distraction in modern artificial environments:

- The meaning listeners attribute to the sound influences annoyance; if listeners dislike the noise content, they are annoyed.
- If the sound causes activity interference (for example, sleep disturbance), it is more likely to annoy.
- If listeners feel they can control the noise source, it less likely to be perceived as annoying.
- If listeners believe that the noise is subject to third party control (including police), but control has failed, they are more annoyed.
- The perceived unpleasantness of the sound causes annoyance. What is music to one is noise to another.

Generally, most noise is generated by transportation systems, principally motor vehicle noise, but also including aircraft noise and rail noise. Stationary point sources of noise, including stationary mobile sources, such as idling vehicles, attenuate (lessen) at a rate of six to nine dBA per doubling of distance from the source, depending on environmental conditions (i.e., atmospheric conditions and noise barriers, either vegetative or manufactured, etc.). Widely distributed noises, such as a large industrial facility spread over many acres or a street with moving vehicles, would typically attenuate at a lower rate, approximately four to six dBA per doubling of distance. It generally takes an increase of 200 cars on a roadway to raise the ambient noise level by three dBA (Road Traffic Noise, 1998).

### ***LOCAL SETTING***

As shown in **Figure 4-1**, the proposed project site is located within the Sunset Industrial Area (SIA). The SIA is primarily open space and undeveloped. However, several significant noise sources dominate the existing noise environment, and create substantial background noise. Industrial facilities in the vicinity of the project site generate noise from normal operations. In particular, signal horns can be heard regularly from the Rio Bravo Rocklin Biomass Power Plant south of the project site. The Union Pacific Railroad, immediately east of the site, generates substantial noise from train whistles, railroad crossing alarms, and track noise during regular passages of rail traffic. Noise from vehicular traffic is significant, and consists of several sources: refuse hauling trucks going to and from the Western Regional Sanitary Landfill creates regular noise along Athens Avenue and Industrial Boulevard; vehicular traffic on State Route 65 contributes noise; and vehicular noise is generated from patrons and employees of the Thunder Valley Casino along primary roadways.

### ***SENSITIVE LAND USES***

Some land uses are considered more sensitive to ambient noise levels than others; sensitivity being a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. Residential land uses, hospitals, and schools are generally more sensitive to noise than commercial and industrial land uses.

Land uses surrounding the proposed project site are shown in **Figure 4-4**. No sensitive land uses currently exist or are planned in the immediate vicinity of the proposed project. The nearest residential communities include Lincoln Crossing, approximately 0.85 miles north of the proposed project site, and Twelve Bridges, approximately one mile east of the project site. Two and one-half miles west of Fiddyment Road are several single-family ranch homes, which are presently surrounded by agricultural land. The nearest schools are Twelve Bridges Middle School and Whitney High School, located approximately one mile east-northeast and east-southeast of the project site, respectively. Twelve Bridges Elementary and Diamond Creek Elementary schools are both located approximately 2.5 miles from the project site. The nearest medical facilities include Sutter Medical Plaza Lincoln and Kaiser Permanente's Lincoln Medical Offices, which are located approximately 1.25 and 1.3 miles from the project site, respectively. The newly completed Lincoln Twelve Bridges Public Library is located approximately 1.25 miles from the project site.

## 11.2 REGULATORY SETTING

The following text provides an overview of the Placer County policies and guidelines relevant to noise associated with the proposed project.

### 11.2.1 PLACER COUNTY GENERAL PLAN NOISE ELEMENT

Placer County's policies and guidelines towards noise are contained in the Placer County General Plan (General Plan) Noise Element. The General Plan (2005) establishes noise exposure standards for different land uses. For impacts to residential land uses, the normally acceptable exterior noise level is 50 dBA,  $L_{dn}$  or less as measured at the property line of the receiving land use. If the proposed residential land use is to be located adjacent to an industrial land use, the normally acceptable exterior noise level would be 60 dBA,  $L_{dn}$ . For office buildings/business and commercial land uses, the normally acceptable exterior noise level is 70 dBA,  $L_{dn}$  or less. In instances where attainment of the noise performance standards is not possible with best available noise reduction measures, the General Plan allows an exterior noise level exceeding the acceptable  $L_{dn}$ , provided that noise level reduction measures have been implemented and that certain interior noise levels are achieved. The County's noise exposure standards for various land uses are shown in **Table 11-3** (Placer County, 2005a).

The General Plan also contains specific policies governing noise sources and receptors. Policies intended to regulate noise sources that are relevant to the proposed project include mitigation requirements for new transportation and non-transportation noise sources so that the standards presented in **Table 11-3** and **Table 11-4** are not exceeded; continued enforcement of the State Noise Insulation Standards; and mitigation for existing noise levels which significantly impact existing noise-sensitive land uses. Site planning and project design are promoted as the primary means of achieving the County noise standards. **Table 4-2** contains the complete text of the relevant goals and policies regarding noise sources and receptors.

**TABLE 11-3  
PLACER COUNTY NON-TRANSPORTATIONAL AND TRANSPORTATIONAL  
NOISE PERFORMANCE STANDARDS**

<b>Zone District/Land Use<sup>1</sup></b>	<b>Non-Transportational Noise Sources Exterior/Interior (Ldn, dBA)</b>	<b>Transportational Noise Sources Exterior/Interior (Ldn/CNEL, dBA)</b>
Residential Adjacent Industrial	60/45	--
Other Residential <sup>2</sup>	50/45	60/45
Office/Professional	70/45	na/45 <sup>3</sup>
Transient Lodging	65/45	60/45
Hospitals, Nursing Homes	--	60/45
Theaters, Auditoriums, Music Halls	--	na/35 <sup>3</sup>
Churches, Meeting Halls	--	60/40 <sup>3</sup>
Schools, Libraries, Museums	--	na/45 <sup>3</sup>
Playgrounds, Neighborhood Parks	--	70/na
Neighborhood Commercial	70/45	--
General Commercial	70/45	--
Heavy Commercial	75/45	--
Limited Industrial	75/45	--
Highway Service	75/45	--
Shopping Center	70/45	--
Industrial	na/45	--
Industrial Park	75/45	--

na none applied

<sup>1</sup> Zone District applies to receptors affected by non-transportational noise sources.

<sup>2</sup> Exterior noise standards for single family residences located in agricultural zone districts may be subject to 70 Ldn, dB.

<sup>3</sup> Interior noise standard is measured as a worst case one hour Leq, dB, rather than an Ldn/CNEL.

Source: Tables 9-1, 9-3 of Placer County General Plan, 2005a. *Noise levels are A-weighted.*

In addition to these noise policies intended to protect noise-sensitive land uses, the General Plan lists noise policies specifically directed to industrial land uses and the retention of those industrial land uses within the County. These special concessions granted to industrial land uses allows for the benefit of the doubt to be afforded to the industrial use whenever noise exposure standards listed in **Table 11-4** fall subject to interpretation.

### ***PROJECT CONSISTENCY WITH THE PLACER COUNTY GENERAL PLAN***

The proposed project is consistent with the General Plan. The proposed project does not propose to violate the noise standards set forth for Industrial Park uses, nor is it anticipated to create noise levels that would violate the noise standards of surrounding or distant land uses.

**TABLE 11-4  
MAXIMUM ALLOWABLE NOISE EXPOSURE  
TRANSPORTATION NOISE SOURCES**

Land Use	Outdoor Activity Areas <sup>1</sup>	Interior Spaces	
	Ldn/CNEL, dBA	Ldn/CNEL, dBA	Leq, dBA <sup>2</sup>
Residential	60 <sup>3</sup>	45	-
Transient Lodging	60 <sup>3</sup>	45	-
Hospitals, Nursing Homes	60 <sup>3</sup>	45	-
Theaters, Auditoriums, Music Halls	-	-	35
Churches, Meeting Halls	60 <sup>3</sup>	-	40
Office Buildings	-	-	45
Schools, Libraries, Museums	-	-	45
Playgrounds, Neighborhood Parks	70	-	-

<sup>1</sup> 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.

<sup>2</sup> As determined for a typical worst-case hour during periods of use.

<sup>3</sup> Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB 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.

Source: Placer County General Plan, 2005a; AES, 2007.

## 11.3 IMPACTS

### SIGNIFICANCE CRITERIA

A significant effect from noise may exist if a project would result in:

- Exposure of offsite persons to noise levels in excess of standards established in the Placer County General Plan Noise Element.
- Exposure of offsite persons to excessive groundborne vibration or groundborne noise levels.
- A substantial permanent increase in ambient noise levels in the offsite vicinity of the project.
- A substantial temporary or periodic increase in ambient noise levels in the offsite vicinity of the project.
- Exposure of existing or future planned residential land uses to noise levels greater than Placer County's noise goals.

### METHODOLOGY

This section identifies any impacts to the existing noise environment that could occur from construction and operation of the proposed project. Impacts to ambient noise conditions were analyzed based on the project site and published information regarding noise of the project area, and comparison of these factors

to the significance criteria listed above. If significant impacts are likely to occur, mitigation measures are included to increase the compatibility of the proposed project and reduce impacts to less than significant levels.

## CONSTRUCTION IMPACTS

**IMPACT 11.1:** Construction noise can create significant intermediate and temporary noise impacts to sensitive receptors such as residential uses. The nearest sensitive receptors are approximately 0.85 miles north of the project site.

**SIGNIFICANCE:** Less than Significant

**MITIGATION:** None Warranted

Typical noise levels during the various phases of construction are shown in **Table 11-5**. **Table 11-6** shows the noise levels from construction equipment that would potentially be used during construction of the proposed project. Although construction activity can generate substantial levels of noise, the nearest sensitive receptor is located approximately 0.85 miles north of the project site. Construction noise attenuates at a rate of 6 dBA per doubling of distance from the source.

**TABLE 11-5  
TYPICAL CONSTRUCTION PHASE NOISE LEVELS**

Construction Phase	Noise Level (dBA, L <sub>eq</sub> at 50 feet)
Ground Clearing	84
Excavation	89
Foundations	78
Erection	87
Finishing	89

Source: Bolt, Beranek, and Newman, 1971; AES, 2007

**TABLE 11-6  
CONSTRUCTION EQUIPMENT NOISE**

Type of Equipment	Maximum Level, dBA at 50 feet
Bulldozers	87
Heavy Trucks	88
Backhoe	85
Pneumatic Tools	85

Source: Cunniff, 1977.

Assuming normal spherical dissipation of an 89 dBA,  $L_{eq}$ , construction phase noise as measured at a reference distance of 50 feet, the attenuated noise to the nearest sensitive receptor would be equivalent to approximately 50 dBA,  $L_{eq}$  when heard at the nearest sensitive receptor; therefore the noise level at the nearest sensitive receptor would be less than the Placer County General Plan daytime non-transportation noise threshold of 60 dBA. Furthermore, construction noise is intermittent and temporary in nature and construction activities are generally performed between the hours of 6:00 AM and 5:00 PM. There would be a less than significant impact due to construction noise from the proposed project.

<b>IMPACT 11.2:</b>	Construction of the proposed project could expose offsite sensitive receptors to groundborne vibration or groundborne noise.
<b>SIGNIFICANCE:</b>	Less than Significant
<b>MITIGATION:</b>	None Warranted

Construction activities such as excavation, and use of jackhammers, impact hammers, and compactors may produce detectable levels of vibration at nearby sensitive land uses. Due to the distances involved, ground vibrations from construction activities would not reach the levels that would damage structures or reach levels perceptible in buildings closest to the site.

## OPERATIONAL IMPACTS

<b>IMPACT 11.3:</b>	Operation of the proposed project would attract vehicle traffic to and from the project site. Noise generated from traffic could create significant impacts to sensitive receptors.
<b>SIGNIFICANCE:</b>	Less than Significant
<b>MITIGATION:</b>	None Warranted

The existing casino operates 24 hours per day, seven days per week, and generates traffic on nearby roads. The proposed project would add to the existing traffic; therefore, it could add to the ambient noise in the project area. The additional traffic noise would be similar in nature to the existing noise along State Route (SR) 65, and would be consistent with what would be expected along a state highway. Although there would be an increase in the ambient noise level due to additional traffic, the impact would be less than significant because of the distance between the proposed project and the nearest sensitive receptor, which is approximately 0.85 miles north of the project site.

<b>IMPACT 11.4:</b>	Onsite noise generated from the operation of the proposed project could impact offsite sensitive receptors.
<b>SIGNIFICANCE:</b>	Less than Significant
<b>MITIGATION:</b>	None Warranted

Noise generated by project operations would include noise from heating, ventilating and air conditioning equipment, loading/unloading activities in delivery areas, noise from vehicle operation on the project site, and noise escaping from the casino. Noise sources from the proposed project could include noise from public assembly and live entertainment shows. In addition, noise associated with the parking lot could include occasional car alarm noise, vehicle horns, vehicle doors and trunks opening and closing, conversations of people, and music from car stereos or outdoor speakers installed by the casino. These types of outdoor noise would be attenuated by the distance to the nearest sensitive receptor, project design, landscaping, orientation of loading and unloading areas, and parking structure design. There would be a less than significant impact due to operational noise.

## **11.4 MITIGATION MEASURES**

No mitigation measures are warranted.