

APPENDIX D

NOISE SCALES/MEASUREMENT DEFINITIONS

ACOUSTIC FUNDAMENTALS

Noise Scales and Measurement Definitions

Community noise levels are measured in terms of the A-weighted decibel (dBA). A-weighting is a frequency correction that correlates sound pressure levels with the frequency response of the human ear. Additional units of measurement have been developed to evaluate the long-term characteristics of sound. The equivalent noise level (L_{eq}) is a single-number representation of the fluctuating sound level in decibels over a specified period of time. It is a sound-energy average of the fluctuating level. The “eq” of L_{eq} stands for “equivalent.” The L_{eq} of a time-varying sound is equivalent or equal to the level of a constant unchanging sound.

The community noise equivalent level (CNEL) has been adopted (by reference) by Sacramento County to evaluate noise impacts. CNEL represents a time-weighted 24-hour average noise level based on the A-weighted decibel. “Time weighted” refers to the fact that noise occurring during certain sensitive time periods is penalized for occurring at those times. CNEL includes an additional 5-dBA penalty for events occurring in the evening (7 p.m. to 10 p.m.) and a 10-dBA penalty for events occurring in late evening and early morning hours (between 10 p.m. and 7 a.m.). Typical noise levels for different types of noise sources in communities are presented in Exhibit 1.

Noise Criteria

State and local governments have established noise standards and guidelines to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise. The applicable standards and guidelines for this study area are discussed below.

State of California

The State Office of Noise Control, in Guidelines for the Preparation and Content of Noise Elements of the General Plan (February 1976), provided guidance for the acceptability of designated land uses within specific CNEL contours. Residential uses are normally unacceptable in areas exceeding 70 dBA CNEL and conditionally acceptable within 60–70 dBA CNEL. Commercial/professional office buildings and businesses are normally acceptable in areas up to 70 dBA CNEL and normally unacceptable in areas exceeding 75 dBA CNEL. Between 67 and 77 dBA CNEL, commercial uses are conditionally acceptable, depending on the noise insulation features and the noise-reduction requirements. However, the state stresses that these guidelines can be modified to reflect communities’ sensitivities to noise.

EXAMPLES

DECIBELS (dB)*

SUBJECTIVE EVALUATIONS

- Near jet engine

- Threshold of pain

- Rock Band
Accelerating motorcycle a few feet away

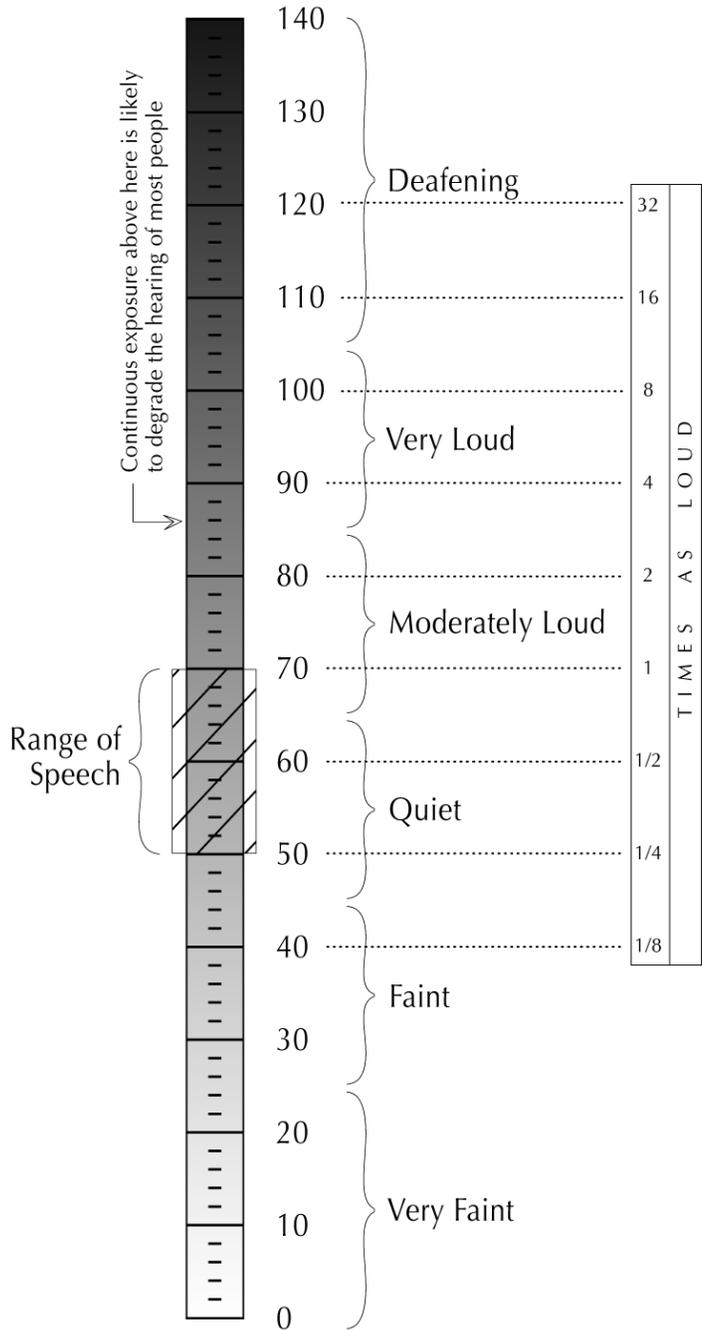
- Noisy urban street/heavy city traffic
Gas Lawn Mower at 3 feet
Garbage disposal at 3 feet

- Vacuum cleaner at 3 feet
Busy restaurant
Near freeway auto traffic
Window air conditioner at three feet
Business office

- Soft whisper at 5 feet
Quiet urban nighttime

- Quiet rural nighttime

- Human breathing
Threshold of audibility



* dB are average values as measured on the A-scale of a sound-level meter.
 From Concepts in Architectural Acoustics: M. David Egan, McGraw Hill, 1972 and U.S. Department of Housing and Urban Development, Office of Community Planning and Development (The Noise Guidebook).

Source: EDAW 2003

Sacramento County Noise Element

The Noise Element of the Sacramento County General Plan, as adopted December 15, 1993, identifies policies designed to accomplish the following goals: (1) protect the citizens of the county from the harmful and annoying effects of excessive noise exposure and (2) protect the economic base of the county by preventing incompatible land uses from encroaching on existing or planned noise-producing uses. The Noise Element provides the following relevant policies:

- NO-1 Noise created by new transportation noise sources should be mitigated so as to not exceed 60 dB Ldn/CNEL at the outdoor activity areas of any affected residential lands or land use situated in the unincorporated areas. When a practical application of the best available noise-reduction technology cannot achieve the 60 dB Ldn/CNEL standard, then an exterior level of 65 Ldn/CNEL may be allowed in outdoor activity areas. [The noise element defines “transportation noise sources” as traffic on public roadways and railroad line operations.]
- NO-2 Noise created by new non-transportation noise sources shall be mitigated so as not to exceed any of the noise level standards of Table II-1 [of the Noise Element], as measured immediately within the property line of any affected residential land use situated in the unincorporated areas [Table II-1 of the Noise Element provides daytime (7:00 a.m. to 10:00 p.m.) exterior noise standards of 50 dBA L₅₀ and 70 dBA L_{max} and nighttime (10:00 p.m. to 7:00 a.m.) standards of 45 dBA L₅₀ and 65 dBA L_{max}.]
- NO-3 Where proposed transportation noise sources are likely to produce noise levels exceeding the performance standards of Table II-1 at existing or planned residential 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.

Sacramento City and County Noise Ordinance

The Sacramento City and County Noise Control Ordinance sets limits for exterior noise levels (Table 1). The ordinance generally limits exterior noise levels (measured at residential land and agricultural land uses) to a maximum of 55 dBA during any cumulative 30-minute period during the daytime hours (7:00 a.m. to 10:00 p.m.), and 50 dBA during any cumulative 30-minute period during the nighttime hours (10:00 p.m. to 7:00 a.m.). The ordinances set somewhat higher noise limits for noise of shorter duration; however, noise shall never exceed 75 dBA in the day and 70 dBA at night. Activities conditionally exempt from the noise standards include construction activities that occur during the daytime hours of 7:00 a.m. to 6:00 p.m., Monday through Saturday, and from 9:00 a.m. to 6:00 p.m. on Sunday.

**Table 1
Summary of Sacramento City and County
Noise Ordinance Standards**

	Period of Measurement	Maximum Acceptable Noise Standards	
		Exterior Noise Standards	Interior Noise Standards
Residential, school, church, hospital, agricultural land uses	7:00 a.m. to 10:00 p.m.	55 dBA ¹	-
	10:00 p.m. to 7:00 a.m.	50 dBA ¹	-
Apartment, condominium, townhouse, duplex, or multi-dwelling unit	10:00 p.m. to 7:00 a.m. ² 5 minutes/hour: 15 minutes/hour: Any period of time:	-	45 dBA 50 dBA 55 dBA

Note: This table presents a summary of the noise ordinance standards that are considered to be most applicable to the proposed project. Refer to the City of Sacramento Municipal Code, Title 8, Chapter 8.68, Noise Control, for additional noise control standards and limitations pertaining to noise-generating activities.

¹ Cumulative duration of intrusive sound, when measured on agricultural or residential property, shall not exceed the above specified exterior noise standards in any one hour by the following limits during the specified cumulative period (noise limits shall be reduced by 5 dBA for impulsive or simple tone noise, or noise consisting of speech or music):

- A. 30 minute: +0 dBA
- B. 15 minutes: +5 dBA
- C. 5 minutes: +10 dBA
- D. 1 minute: +15 dBA
- C. Level not to be exceed for any time: +20

In addition to the above standards, interfering noise at schools, churches, hospitals, while the same is in use, which is 10 dBA or more greater than the ambient noise level at the building, shall be deemed excessive and unlawful. Residential use HVAC system equipment, such as pumps, fans, air conditioners, and cooling towers, shall not exceed 60 dBA at any point at least 1 foot inside the property line of the affected residential or agricultural property line, or 55 dBA when measured in the center of a neighboring patio or at the exterior window of the affected residential unit.

² Based on cumulative periods of time during any one hour. Interior noise levels, when measured in the neighboring unit, shall not exceed the specified standards for the corresponding cumulative period of time during any hour.

Sources: Sacramento County, June 7, 2001, Sacramento City and County Noise Control Code.

Community Ambient Noise Degradation

In community noise assessments, it is “generally not significant” if no noise-sensitive sites are located in the project area or if increases in community noise levels with the implementation of the project are expected to be 3 dBA or less at noise-sensitive locations and the proposed project would not result in violations of local ordinances or standards. Noise-sensitive sites include residences, motels, hotels, public meeting rooms, auditoriums, schools, churches, libraries, hospitals, amphitheaters, parks, and other areas where quiet is essential.

If the increase in noise exposure level is greater than 3 dBA, the significance of the impact will depend on the ambient noise level and the presence of noise-sensitive sites. Noise impacts are “possibly significant” if increases in noise exposure levels are expected to be greater than 5 dBA with implementation of the project. Noise impacts are “generally significant” if the proposed project would cause noise standards or ordinances to be exceeded, or increases in the community noise levels by 6–10 dBA in built-up areas, or increases by 10 dBA or more in rural areas. CNEL is used in this report for arterial/highway traffic-generated noise assessment.