

## 3.8 Noise

The following section summarizes information from the Noise Technical Report for the Winchester to Temecula (WT) Corridor (LSA, 2002). Please refer to the technical report for more detailed information regarding noise in the study area.

### 3.8.1 Fundamentals of Noise

As transportation systems develop in an area such as the WT Corridor, the general level of noise in our day-to-day living environment rises. Sound refers to anything that is or may be perceived by the ear. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency dependent rating scale is usually used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating among frequencies in a manner approximating the sensitivity of the human ear. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. If noise is produced by a line source such as highway traffic or railroad operations, the sound decreases three decibels for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases four and one-half decibels for each doubling of distance.

The predominant rating scales for human communities in the State of California are the equivalent continuous noise level ( $L_{eq}$ ) and Community noise equivalent level (CNEL) based on A-weighted decibels (dBA).  $L_{eq}$  is the total sound energy of time-varying noise over a sample period and is a measurement of the sound energy averaged over a specified time period (usually one hour).  $L_{eq}$  is a one number representation of the amount of fluctuating sound level received by a receptor averaged over a specified time interval. For example, a one hour  $L_{eq}$  noise level represents the average amount of acoustic energy that occurred in that hour. Both the Federal Highway Administration (FHWA) and California Department of Transportation (Caltrans) use the hourly  $L_{eq}$  for noise impact evaluation.

CNEL is the time-varying noise over a 24 hour period, with a weighting factor applied to the hourly  $L_{eq}$  for noises occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours) with a weighting factor of 10 dBA, and a 5 dBA weighting factor on events occurring in the evening hours between 7 p.m. and 10 p.m. (defined as relaxation hours). Day-night average noise level (Ldn) is another 24 hour averaged noise scale. Similar to the CNEL scale, the Ldn scale has a weighting factor of 10 dBA on events occurring during the nighttime hours between 10 p.m. and 7 a.m. However, the Ldn scale does not have the adjustment for the evening hours. The CNEL and Ldn noise scales are within one dBA of each other and are usually interchangeable. The County of Riverside and cities within the County use the CNEL or Ldn noise scales for land use and noise compatibility criteria from transportation sources.