12 NOISE

Noise is usually defined as unwanted sound, and its perception can be characterized as a subjective reaction to a physical phenomenon. The descriptors of community noise in current use that translate objective noise measurements into directly correlated measures of the public's reaction to noise. These tools provide a simplified and practical means to gauge community response to noise. Table 12-1 provides examples of maximum or continuous noise levels associated with common noise sources.

Table 12-1: Typical A-Weighted Maximum Sound Levels of Common Noise Sources

Decibels	Description
130	Threshold of pain
120	Jet aircraft takeoff at 100 feet
110	Riveting machine at operators position
100	Shotgun at 200 feet
90	Bulldozer at 50 feet
80	Diesel locomotive at 300 feet
70	Commercial jet aircraft interior during flight
60	Normal conversation speech at 5-10 feet
50	Open office background level
40	Background level within a residence
30	Soft whisper at 2 feet
20	Interior of recording studio

Source: Parsons, 2002.

A common statistical tool used to measure the ambient noise level is the average sound level (L_{eq}), which is the sound level corresponding to a steady-state A-weighted sound level in decibels (dB) containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq}, or average sound level, is the foundation for determining composite noise descriptors such as L_{dn} and CNEL (see below), and shows very good correlation with community response to noise.

Two composite noise descriptors commonly used are: L_{dn} and CNEL. The L_{dn} (Day-Night Average Level) is based upon the average hourly L_{eq} over a 24-hour day, with a +10 decibel weighting applied to nighttime (10:00 p.m. to 7:00 a.m.) L_{eq} values. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were subjectively twice as loud as daytime exposures. The CNEL (Community Noise Equivalent Level), like L_{dn}, is based upon the weighted average hourly L_{eq} over a 24-hour day, except that an additional +4.77 decibel penalty is applied to evening (7:00 p.m. to 10:00 p.m.) hourly L_{eq} values.

The CNEL was developed for the California Airport Noise Regulations, and is normally applied to airport/aircraft noise assessment. The L_{dn} descriptor is a simplification of the CNEL concept, but the two will usually agree, for a given situation, within 1 dB. Like the L_{eq}, these descriptors are also averages and tend to disguise short-term variations in the noise environment. Because they presume increased evening or nighttime sensitivity, these descriptors are best applied as criteria for land uses where nighttime noise exposures are critical to the acceptability of the noise environment, such as residential developments.

The State Office of Planning and Research Noise Element Guidelines require that major noise sources be identified and quantified by preparing generalized noise contours for current and projected conditions. Noise measurements and modeling are used to develop these contours. Significant noise sources include traffic on major roadways and highways, railroad operations, airports, and representative industrial activities and fixed noise sources.

Noise modeling techniques and noise measurements were used to develop generalized L_{dn}/CNEL or L_{eq} noise contours for the major roadways in the County of Mariposa General Plan study area for existing conditions. Discussions on noise levels for fixed noise sources in the County General Plan study area are also provided. Noise levels associated with the airport are based upon the existing Comprehensive Land Use Plan (CLUP) developed for the Mariposa County Airport.

Noise modeling techniques use source-specific data, including average levels of activity, hours of operation, seasonal fluctuations, and average levels of noise from source operations. Modeling methods have been developed for a number of environmental noise sources such as roadways, railroad line operations and industrial plants. Such methods produce reliable results so long as data inputs and assumptions are valid. The modeling methods used in this report closely follow recommendations made by the State Office of Noise Control, and were supplemented, where appropriate, by field-measured noise levels to account for local conditions. The noise exposure contours are based upon annual average conditions. Because local topography, vegetation or intervening structures may significantly affect noise exposure at a particular location, the noise contours should not be considered site-specific.

A community noise survey was also conducted to describe existing noise levels in noise-sensitive areas within the General Plan study area so that noise level performance standards may be developed to maintain an acceptable noise environment.

12.1 EXISTING REGULATORY FRAMEWORK

The existing Mariposa County General Plan Noise Element is based upon recommendations by the California State Office of Noise Control as contained in the Guidelines for the Preparation and Content of Noise Elements of the General Plan. The criteria in the Noise Element are established for determining potential noise conflicts between various land uses and noise sources. The standards for all noise sources are based upon the CNEL/L_{dn} descriptor. Figure 12-1 shows the land use compatibility chart contained in the existing Mariposa County Noise Element.

Figure 12-1: Mariposa County Noise-Land Use Compatibility Chart

Do to the size of this image; Figure 12-1 has been created as a separate file

The existing Mariposa County Noise Element goals are:

- To preserve the quality of life in Mariposa County by preventing and suppressing the intrusion of objectionable levels, frequencies, and time durations of noise by controlling noise at its source.
- To provide sufficient information to the decision making body concerning the community noise environment so that noise may be considered in land use development.
- To ensure that new development does not produce noise levels that create an unacceptable noise environment in those existing areas of the county where the noise environment is deemed acceptable, and also in those locations deemed noise sensitive.
- When it is determined necessary, the County will prepare a Community Noise Exposure Inventory for the communities of Mariposa.
- When it is determined to be necessary, the County will monitor the existing and proposed land uses deemed to be "noise sensitive".

As described earlier, the CNEL and L_{dn} are 24-hour average noise level descriptors, which assume that individuals are more sensitive to noise occurring during the evening and nighttime hours. The CNEL and L_{dn} descriptors have been found to provide good correlation to the potential for annoyance from transportation-related noise sources (i.e.: roadways, airports and, to a lesser extent, railroad operations). However, these descriptors do not provide a good correlation to the potential for annoyance from non-transportation or stationary noise sources, such as industrial and commercial operations, because many times stationary noise sources operate sporadically or for short durations. Examples of these types of noise sources include loading docks, special event concerts, pressure relief valves or alarms, which tend to be short duration noise events. When applying L_{dn} or CNEL descriptors, the noise levels associated with these types of short term operations will be averaged over a 24-hour period, underscoring the potential for annoyance.

12.2 ROADWAY NOISE LEVELS

The Federal Highway Administration's (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD 77-108) was used to develop L_{dn} (24-hour average) noise contours for all highways and major roadways in the General Plan study area. The FHWA Model is the analytical method presently favored for traffic noise prediction by most state and local agencies, including the California Department of Transportation. The current version of 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 predicts hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within 1.5 dB. To predict Ldn values, it is necessary to determine the hourly distribution of traffic for a typical 24-hour period.

Traffic data representing annual average traffic volumes for existing conditions were obtained from the Transportation and Circulation Element for the General Plan Update. Day/night traffic distribution for the major State Routes through the County was based upon 24-hour noise measurement data. Truck mix data were also based upon Caltrans and Bollard & Brennan file data. Using these data and the FHWA methodology, traffic noise levels, as

defined by L_{dn}, were calculated for existing traffic volumes. Distances from the centerlines of selected roadways to the 55 dB, 60 dB and 65 dB L_{dn} contours are summarized in Table 12-2.

Table 12-2: Predicted Existing Traffic Noise Levels in Mariposa County

Roadway	Segment	L_{dn} at 100 feet	Distances to L_{dn} Contours		
			55 dB	60 dB	65 dB
Route 41	Fish Camp, Entrance to Yosemite	53.9	85	39	18
Route 49	Triangle Road	61.3	263	122	57
	Woodland/Hirsch Roads	61.2	257	119	55
	Bootjack Road	62.0	294	136	63
	Mormon Bar, Ben Hur road	61.5	271	126	58
	Mariposa, South Jct. Route 140	58.9	181	84	39
	Joe Howard Road	61.8	286	133	62
	Whitlock Road	60.1	218	101	47
	Mount Bullion, Cathey Way	54.4	91	42	20
	Bear Valley, Bear Valley Road	50.6	51	23	11
	Coulterville, Jct. Route 132 West	49.0	40	18	9
	Tuolumne County Line	52.9	72	34	16
Route 120	Buck Meadows	53.3	77	36	17
	Tuolumne County Line	55.2	102	48	22
	Cherry Valley Road	53.1	74	34	16
	Yosemite Park (West Boundary)	53.3	77	36	17
Route 132	Bonds Flat Road	55.9	116	54	25
	Las Palmas Way	57.8	153	71	33
	Merced Falls Road	57.8	153	71	33
	Lozano Street – San Pedro Bar	57.6	150	69	32
	Tuolumne County Line	56.6	128	59	28
	Coulterville, Jct. Route 49	51.5	58	27	13
Route 140	Hornitos Road	63.0	340	158	73
	Mariposa, South Jct. Rte. 49	58.0	160	74	34
	Mariposa, Sixth Street	58.7	177	82	38
	Mariposa, North Jct. Rte. 49	60.5	234	108	50
	Triangle Road	58.2	164	76	35
	Oak Road	56.6	128	59	28
	Colorado Road	55.7	112	52	24
	Briceburg Station	54.8	97	45	21
	Foresta Road	54.2	89	41	19
	El Portal Road	54.2	89	41	19
	Yosemite Park Boundary, El Portal	54.2	88	41	19

Source: Parsons, 2001.

In many cases, the actual distances to noise level contours may vary from the distances predicted by the FHWA model. Factors such as roadway curvature, roadway grade, shielding from local topography or structures, elevated roadways, or elevated receivers may affect actual sound propagation. The distances reported in Table 12-2, therefore, are generally considered to be conservative estimates of noise exposure along roadways in Mariposa County.

The effects of factors, such as roadway curvature and grade, can be determined from site-specific traffic noise measurements. The noise measurement results can be compared to the

FHWA model results by entering the observed traffic volumes, speed and distance as inputs to the FHWA model. The differences between the measured and predicted noise levels can be used to adjust the FHWA model and more precisely determine the locations of the traffic noise contours.

Due to the low traffic volumes on most of the rural roadways, noise level contours have not been calculated for the rural roadways. However, Figure 12-2 can be used to determine the approximate distances to the 60 dB L_{dn} contours for rural roadways in Mariposa County.

Table 12-3 has been prepared to serve as a guide when applying the traffic noise exposure contour information presented in this section to areas with varying topography. The table is used by adding the correction factor to the noise level predicted at a given distance. It should be noted that the adjustment factors presented in this table are intended to provide conservative (worst-case) results.

Table 12-3: Traffic Noise Adjustments for Various Topographic Conditions

	Distance from Center of Roadway (Feet)		
Topographic Situation	**<200**	**200 - 400**	**>400**
Hillside overlooks roadway	-0-	+1 dB	+3 dB
Roadway Elevated (>15')	-5 dB	-2 dB	-0-
Roadway in cut/below embankment	-5 dB	-5 dB	-5 dB
Dense vegetation (100 feet or more)	-5 dB	-5 dB	-5 dB

Source: Parsons, 2001.

12.3 FIXED NOISE SOURCES

The generation of noise is a result of many industrial processes, even when the best available noise control technology is applied. Noise exposures within industrial facilities are controlled by Federal and State employee health and safety regulations (OSHA and Cal-OSHA), but exterior noise levels may exceed locally acceptable standards. Commercial, recreational, and public service facility activities can also produce noise that affects adjacent sensitive land uses. These noise sources can be continuous and may contain tonal components that are annoying to individuals who live nearby. In addition, noise generation from fixed noise sources may vary based upon climatic conditions, time of day, and existing ambient noise levels.

From a land use planning perspective, fixed-source noise control issues focus upon two goals: to prevent the introduction of new noise-producing uses in noise-sensitive areas; and to prevent encroachment of noise sensitive uses upon existing noise-producing facilities. The first goal can be achieved by applying noise level performance standards to proposed new noise-producing uses. The second goal can be met by requiring that new noise-sensitive uses in near proximity to noise-producing facilities include mitigation measures to ensure compliance with noise performance standards.

Figure 12-2: Approximate Distance to 60 dB L_{DN} Contour for Rural Residences

Do to the size of this image; Figure 12-2 has been created as a separate file

Fixed noise sources that are typically of concern include but are not limited to the following:

- HVAC Systems
- Cooling Towers/Evaporative Condensers
- Pump Stations
- Lift Stations
- Steam Valves
- Steam Turbines
- Generators
- Fans
- Air Compressors
- Grinders
- Conveyor Systems
- Heavy Equipment
- Pile Drivers
- Transformers
- Drill Rigs
- Grinders
- Welders
- Gas or Diesel Motors
- Outdoor Speakers
- Cutting Equipment
- Chippers
- Blowers
- Loading Docks
- Amplified Music and Voice

The types of uses which may typically produce the noise sources described above, include, but are not limited to: wood processing facilities, pump stations, industrial facilities, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, public works projects, batch plants, bottling and canning plants, recycling centers, electric generating stations, race tracks, landfills, sand and gravel operations, special events such as concerts, and athletic fields.

Three specific noise sources are especially prominent in Mariposa County. These sources are the Tenaya Lodge music events located in Fish Camp, the Landfill/Recycling Center located south of Mariposa along S.R. 49, and the Outback Materials batch plant located in the Mariposa Industrial Park.

12.3.01 TENAYA LODGE MUSIC EVENTS

Tenaya Lodge is located at 1122 Highway 41 in Fish Camp. Based upon the Tenaya Lodge Conditional Use Permit (CUP) No. 256, 1999, the Planning Commission approved three separate music events during the summer periods between May 1st and October 31st. The CUP also establishes that hours of music are limited to the daytime hours between 3:00 p.m. and 7:00 p.m. The CUP establishes noise level standards generally between 75 dB to 78 dB Leq, and not to exceed 80 dB L_{eq}. These criteria are established at the northwest corner of the concert lawn area.

As a means of determining compliance with the CUP noise level conditions, the CUP also stated that an independent acoustical consultant shall be hired and retained by the County. Prior to the conduct of any concerts, the acoustical consultant shall submit information to the County to verify representative ambient noise levels throughout the community during non-concert times. In addition, the consultant was responsible for conducting noise level measurements during each of the three concerts and report the findings to the Planning Department.

Based upon the CUP conditions, an acoustical consultant was employed to conduct background noise level measurements prior to concerts, and during two of the concerts in August and September 1998. The noise level measurements were conducted at the following locations:

- Site 1: Northerly property boundary. Approximately 1200 feet south of the adjacent pond, directly north of the concert area.
- Site 2: Westerly property boundary. Along the westerly edge of the Tenaya Lodge access road at the Apple Tree Inn property line.
- Site 3: Southerly property boundary. Along Jackson Road at the propane tanks.
- Site 4: Easterly property boundary. In National Forest approximately 600 feet north of Jackson Road.
- Site 5: Highway 41 at Tenaya Lodge entrance on the west side of the highway.
- Site 6: 7731 Forest Drive (Durr Residence).
- Site 7: 7776 White Chief Mountain Road (White Chief Mountain Lodge).

The results of the noise measurements during the three reported periods are summarized in Table 12-4.

Table 12-4: Tenaya Lodge and Fish Camp Area Concert Noise Level Comparison

Date	Time	Measured Noise Levels at Monitoring Sites, dB								
		Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9
Pre-Concert Ambient Noise Measurements										
8-16-98	2-4 p.m.	47	62	50	41	62	57	42	--	--
	5-7 p.m.	47	55	41	39	63	57	40	--	--
Concert/Ambient Noise Measurements										
8-30-98	2-4 p.m.	46	58	44	40	62	58	49	41	61
	5-7 p.m.	51	56	--	--	64	52	43	37	69
Concert/Ambient Noise Measurements										
9-20-98	2-4 p.m.	51	56	42	45	64	60	44	40	68
	5-7 p.m.	50	56	36	50	65	57	45	43	67

Source: Dobbs Acoustics, Fish Camp Noise Levels, August 26, 1998, September 9, 1998, & September 29, 1998

12.3.02 OUTBACK MATERIALS BATCH PLANT

The Outback Materials Batch Plant is located on Highway 49, south of the Town of Mariposa, at 5649 Highway 49. The facility is a concrete batch plant. Typical noise sources associated with the batch plant include truck traffic, front-end loaders, processing equipment and back-up beepers associated with the mobile equipment. The batch plant generally operates between 7:00 a.m. and 5:00 p.m.

Bollard & Brennan, Inc. conducted noise level measurements of batch plant operations during the early morning of May 4, 2001. The noise level measurements were conducted on the batch plant site and at the adjacent Mykleson Estates residential area across Highway 49 from the site

Table 12-5 shows the results of the noise level measurements. Based upon the noise measurement results, noise levels at the nearest residences were audible. Most noise sources associated with the batch plant were similar in nature to traffic along Highway 49. However, back-up alarms were distinctly audible and were dissimilar to other background noise sources.

Table 12-5: Outback Materials Noise Level Measurements, May 5, 2001

				Measured Noise Levels		
Time	**Duration**	**Site**	**Location**	**L_{eq}**	**Maximum**	**Comments**
7:15 a.m.	1 hr.	1	Outback Materials, 125' from truck and materials bins	70.7 dB	75.0	2 trucks arriving, loading, and leaving site.
7:15 a.m.	15 min.	2	Mykleson Estates, at nearest residence on Mykle Oaks Road	48.0	59.1	1 truck arriving, loading and leaving site

Source: Bollard & Brennan, Inc., 2001.

12.3.03 MARIPOSA COUNTY LANDFILL AND RECYCLING CENTER

The Mariposa County Landfill and Recycling Center is located at 5593 Highway 49, and is located south of the Town of Mariposa. The landfill generally operates 7 days per week from 7:00 a.m. to 4:00 p.m. Residences are located to the east and north of the landfill site. The primary on-site noise sources associated with the Mariposa County Landfill are the powered equipment and haul trucks, which include a bellyscraper used for excavating dirt and spreading it over the refuse; a bulldozer that is used for ripping dirt for the scraper and moving refuse at the dump site; a compactor that is used for moving refuse, compacting the garbage and dirt deposited by the belly scraper; and the 10-wheel haul trucks that bring the refuse to the landfill.

Bollard & Brennan, Inc. conducted noise level measurements of the landfill operations on May 4, 2001. The noise level measurements were conducted at the east boundary of the landfill, with a clear view of the operations. Noise level data indicated that typical hourly operations resulted in an average noise level of approximately 51 dB L_{eq}. Maximum noise levels were as high as 66.5 dB, generally due to mobile equipment on the site.

12.4 MARIPOSA-YOSEMITE AIRPORT

The Mariposa-Yosemite Airport is located northwest of the Town of Mariposa, approximately 20 miles southwest of Yosemite National Park, on Highway 49. The airport is classified as a General Aviation - Basic Utility Airport. The airfield consists of a single

runway with an east-west orientation, and has a heading of 8 - 26. The airport is open 24-hours per day, and has a lighted runway.

Aircraft that generally use the airport are single engine fixed-wing general aviation aircraft. Twin-engine aircraft and helicopters also utilize the airport. On an annual average basis, there are approximately 10 operations per day. However, during the summer peak season, between 30 and 400 operations could occur. In 2000, annual operations totaled 4405. Figure 12-3 shows the CNEL contours associated with the airport.

In general, all land uses located outside of the 65 dB CNEL contours are considered compatible. However, based upon the Comprehensive Land Use Plan (CLUP), which was prepared in 1995, residential and lodging land uses located between the 55 dB and 60 dB CNEL contours could generate complaints. This can be expected, as the background noise levels, without aircraft overflights, are generally low. Maximum noise levels due to typical single engine aircraft overflights can range between 65 dB and 80 dB, which may be considered annoying to individuals.

Figure 12-3: Mariposa-Yosemite Airport 1990 Noise Contours

Do to the size of this image; Figure 12-3 has been created as a separate file

12.5 COMMUNITY NOISE SURVEY

A community noise survey was conducted to document noise exposures in the County at sites where noise sensitive land uses are located and along major roadways. Noise monitoring sites were selected to be representative of typical residential, commercial or recreational areas within the County.

Short-term noise monitoring was conducted at eight sites on May 3 and 4, 2001. Seven continuous 24-hour noise monitoring sites were also established in the County to record day-night statistical noise level trends. Community noise monitoring systems were calibrated with acoustical calibrators in the field prior to use. The systems complied with all pertinent requirements of the American National Standards Institute (ANSI) for Type I sound level meters. The data collected included the hourly average (L_{eq}), and the maximum level (L_{max}) during the measurement period. Noise monitoring sites and the measured noise levels at each site are summarized in Table 12-6.

Table 12-6: Community Noise Measurement Results, May 2001

Site	Location	Date	Time	Measured Sound Level, dB		Measured L_{dn}
				L_{eq}	L_{max}	
1	5366 Hwy 49 N. / CDF Station	May 2-3	24 hours	Daytime = 63.5 Nighttime = 55.7	Daytime = 81.7 Nighttime = 78.2	64.4
2	Bootjack Volunteer Fire Dept.	May 2-3	24 hours	Daytime = 55.6 Nighttime = 49.9	Daytime = 73.7 Nighttime = 68.2	57.8
3	Highway 140 & 8th Street	May 2-3	24 hours	Daytime = 66.9 Nighttime = 58.5	Daytime = 83.3 Nighttime = 75.4	67.6
4	Highway 140 & Indian Gulch Rd.	May 3-4	24 hours	Daytime = 58.4 Nighttime = 54.6	Daytime = 79.0 Nighttime = 77.2	61.8
5	7294 Highway 49 in Bear Valley	May 2-3	24 hours	Daytime = 60.4 Nighttime = 55.0	Daytime = 77.3 Nighttime = 59.8	62.7
6	Highway 140 in Midpines	May 2-3	24 hours	Daytime = 58.9 Nighttime = 52.7	Daytime = 76.7 Nighttime = 70.9	60.7
7	Darrah	May 3 May 3 May 3	10:00 a.m. 5:35 p.m. 11:00 p.m.	41.3 42.5 39.5	46.5 46.1 41.2	Approximately 46.4
8	Ponderosa Basin	May 3 May 3 May 3	10:50 a.m. 6:10 p.m. 10:30 p.m.	40.3 41.2 39.7	43.9 47.5 43.5	Approximately 46.2
9	Hornitos	May 3 May 3 May 3	10:00 a.m. 5:45 p.m. 11:30 p.m.	52.0 46.0 38.0	71.0 67.0 43.0	Approximately 49.3
10	Mount Bullion	May 3 May 3 May 3	11:15 p.m. 5:15 p.m. 11:45 p.m.	45.0 48.0 29.0	61.0 63.0 44.0	Approximately 45.1
11	El Portal	May 3	12:45 p.m.	49.6	51.1	---
12	Wawona Campground	May 3	3:30 p.m.	47.9	53.7	----
13	Fish Camp Post Office	May 3	3:45 p.m.	45.0	51.7	----

Source: Parsons, 2001.