10 NOISE ELEMENT

The purpose of the Noise Element is to identify and appraise noise generation in the community in order to minimize problems from intrusive sound and to ensure that new development does not expose people to unacceptable noise levels.

A. Background Information

The Noise Element analyzes and quantifies, to the extent practicable, current and projected noise levels from all significant noise sources. As required by law, information contained in the Noise Element has been considered in the development of the Land Use Designation Map, Figure LU-4, with the goal of minimizing the exposure of community residents to excessive noise.

Government Code Section 65302(f) identifies potential noise sources the General Plan must assess, which include roadways, railroad operations, aviation-related operations, industrial facilities and other stationary sources.

The following noise sources are potentially of community-wide significance in Calistoga:

- Noise from vehicular traffic on regional highways and city arterials.
- Local industrial sources, including the bottling plants.
- Other ground stationary sources such as seasonal noise from wind machines and the sprint car races at the County Fairgrounds.

The gliderport was not considered in this analysis since its use as a landing field was abandoned in 1999 and the site is currently vacant. Also not subjected to technical analysis are extremely localized noise sources and the City siren, which is sounded daily at noon. Intermittent noise sources are regulated by the Noise Ordinance; issues concerning the City siren are discussed in greater detail below. As part of the General Plan, the Noise Element establishes overall policy guidance for new development that could create or be subject to noise impacts and does address each potential noise source. The Noise Element includes an action to revise the Noise Ordinance address individual noise sources.

Understanding Noise

Noise may be defined as unwanted sound.

Noise can be defined in many ways, but is usually associated with unwanted sound. Noise is usually objectionable when it interferes with people's daily life, such as in the evening when people are having a conversation over dinner, or trying to sleep. In Calistoga, noise interference is particularly important given the interest in retaining the small-town character of the community, and because of the community's tradition of being a destination for rest and relaxation.

The objectionable nature of sound is caused by its pitch or its loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher-pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is caused by

the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave: it is a measure of the amplitude of the sound wave.

Beyond the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. These are listed in Table N-1. The most basic noise measurement is the decibel (dB), which is a unit of measurement indicating the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. Generally, the human ear cannot perceive a difference between two noises that are less than 3 decibels different from one another.

Except in carefully-controlled laboratory experiments, a change of one dB cannot be detected.

A change in level of at least 5 dB is required before any noticeable change in community response would be expected.

A 10 dB change is heard as approximately a doubling in loudness, and would almost certainly cause an adverse change in community response.

There are several methods of refining decibel scales to make them reflect human perception. Most commonly used in California is the *A-weighted sound level* or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table N-2. For example, light traffic heard from a distance of 100 feet would have a level of 50 dBA. A jet taking off 200 feet away would create 120 dBA.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be used. Most commonly, environmental sounds are described in terms of their level of acoustical energy averaged over a period of time. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common L_{eq} averaging period is hourly, but L_{eq} can describe noise events of any specified time period.

Since sensitivity to noise increases during the evening and at night – because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that increase the weighting for noise that occurs during quiet times of day. The increase is referred to as a penalty. For example, the Community Noise Equivalent Level (CNEL) measures the cumulative noise exposure in a place, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB penalty added to nocturnal (10:00 pm - 7:00 am) noise levels. The Day/Night Average Sound Level, Ldn, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Existing Noise Sources

Calistoga's noise levels are quite low. Roadway traffic is the most significant community-wide noise factor in Calistoga. Overall, most of Calistoga is a quiet rural town.

The primary source of community noise in Calistoga is vehicular traffic on the roadway network. Traffic noise exists in varying degrees throughout the community. Other localized sources of noise which affect nearby vicinities include light industry, agricultural operations, agricultural wind turbines and sprint car

TABLE N-1 DEFINITIONS OF ACOUSTICAL TERMS

Term	Definitions
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level (dBA)	Sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network, which de-emphasizes very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% (respectively) of the time during the measurement period.
Equivalent Noise Level (L_{eq})	The average A-weighted noise level during the measurement period.
Community Noise Equivalent Level (CNEL)	The Average A-weighted noise level during a 24-hour day, obtained after adding 5 decibels to measurements taken in the evening (7 to 10 pm) and 10 decibels to measurements taken between 10 pm and 7 am.
Day/Night Noise Level (L_{dn})	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

TABLE N-2 **TYPICAL SOUND LEVELS**

Noise Generators (at a given distance from noise source)	**A-Weighted Sound Level in Decibels**	**Noise Environments**	**Subjective Impression**
	140		
Civil defense siren (100 feet)	130		
Jet take-off (200 feet)	120		Pain threshold
	110	Rock music concert	
Diesel pile drive (100 feet)	100		Very loud
Freight cars (50 feet)	90	Boiler room Printing press plant	
Pneumatic drill (50 feet) Freeway (100 feet) Vacuum cleaner (10 feet)	80 70	In kitchen with garbage disposal running	Moderately loud
	60	Data processing center	
Light traffic (100 feet) Large transformer (200 feet)	50	Department store	
	40	Private business office	Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
	10		Threshold of hearing
	0		

races at the Napa County Fairgrounds. Noise from intermittent localized sources such as lawnmowers and leafblowers has also been expressed as a concern by some residents. In the past, the gliderport also contributed to community noise levels in Calistoga, but this facility closed in 1999. If the gliderport were to re-open, nearby residences could be affected by this noise source.

Noise Survey. A noise survey, consisting of both long-term and short-term noise measurements, was conducted in May 2000 to quantify representative noise levels throughout Calistoga. Measurement locations are mapped in Figure N-1. Long-term monitoring of noise levels was conducted at four locations over a period of approximately four days. A graphical representation of the results is contained in Figures N-2 and N-3. In addition, short-term samples were gathered at six other locations in Calistoga. During these short (10-minute) measurement periods, concurrent traffic counts were done to assist in calibrating the traffic noise model used in the development of noise contours. These measures have not been graphed because the time periods were brief. Instead, data is tabulated in Table N-3.

Table N-4 shows calculated noise contours along major roads in the City based on the noise survey results. Where no long-term measurements were conducted, noise levels were estimated based on standard engineering practices calibrated with the six short-term noise measurements. The noise contours represent roadside levels without the additional attenuation provided by roadside noise barriers, structures or topographical features.

The following paragraphs provide information about findings at each noise survey site. Unless the text states otherwise, measured noise levels are acceptable for all uses. The results show that the noise environment in Calistoga is generally one of a country town. As shown in Table N-4, most of the City is outside the 55 dB noise contour, where noise levels are acceptable for all uses. Figure N-5 provides, in graphic format, noise compatibility guidelines for different land uses. One important consequence of Calistoga's relatively quiet environment is the fact that even small increases in noise levels may seem substantial here, compared to other noisier places.

Measurement Location L1: Highway 29 North of the Silverado Trail Turnoff. This measurement was conducted 40 feet from the roadway centerline. At this distance, the measured L_{dn} was 68 dBA. Vehicular traffic on Highway 29 was the only significant source of noise affecting measurements at this location. This site is noisier than most in Calistoga, and the properties near Highway 29 are quite noisy for residential uses. However, because the noise source is a State highway, very few measures to reduce traffic noise are feasible in terms of engineering and costs. Moreover, moving even a short distance away from the road results in a significant reduction in noise.

Surveys show that about two percent of the population is highly annoyed by traffic noise of about 60 dBA L_{dn}. When the L_{dn} increases to 70 dBA, the proportion of the population highly annoyed increases to about 12 percent.

Measurement Location L2: Maggie Street. In this residential area noise sources included distant construction noise, animals, and the occasional sounds of children playing, dogs barking, birds, and horses. The measured L_{dn} was 46 dBA, which is very quiet for ambient noise measurements.

Interference with sleep and speech interference is possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if windows are closed.

City Limit Line

L = 4 days measurement

S = 10 minute spot survey

FIGURE N-1

NOISE MEASUREMENT LOCATIONS

CITY OF CALISTOGA
2003 GENERAL PLAN

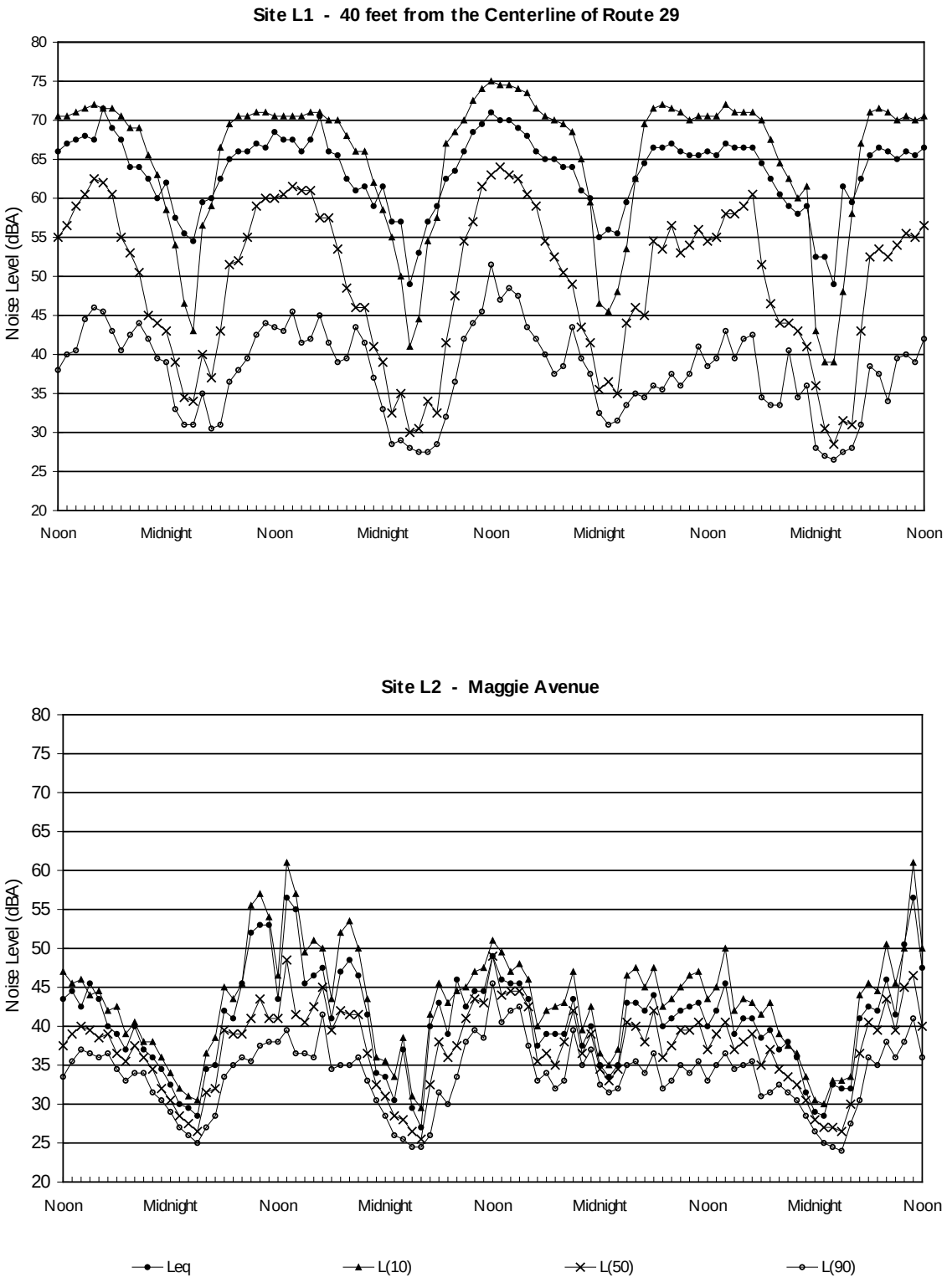

FIGURE N-2 **HOURLY NOISE LEVEL MEASUREMENTS: HIGHWAY 29 AND MAGGIE - MAY 12-16, 2001**

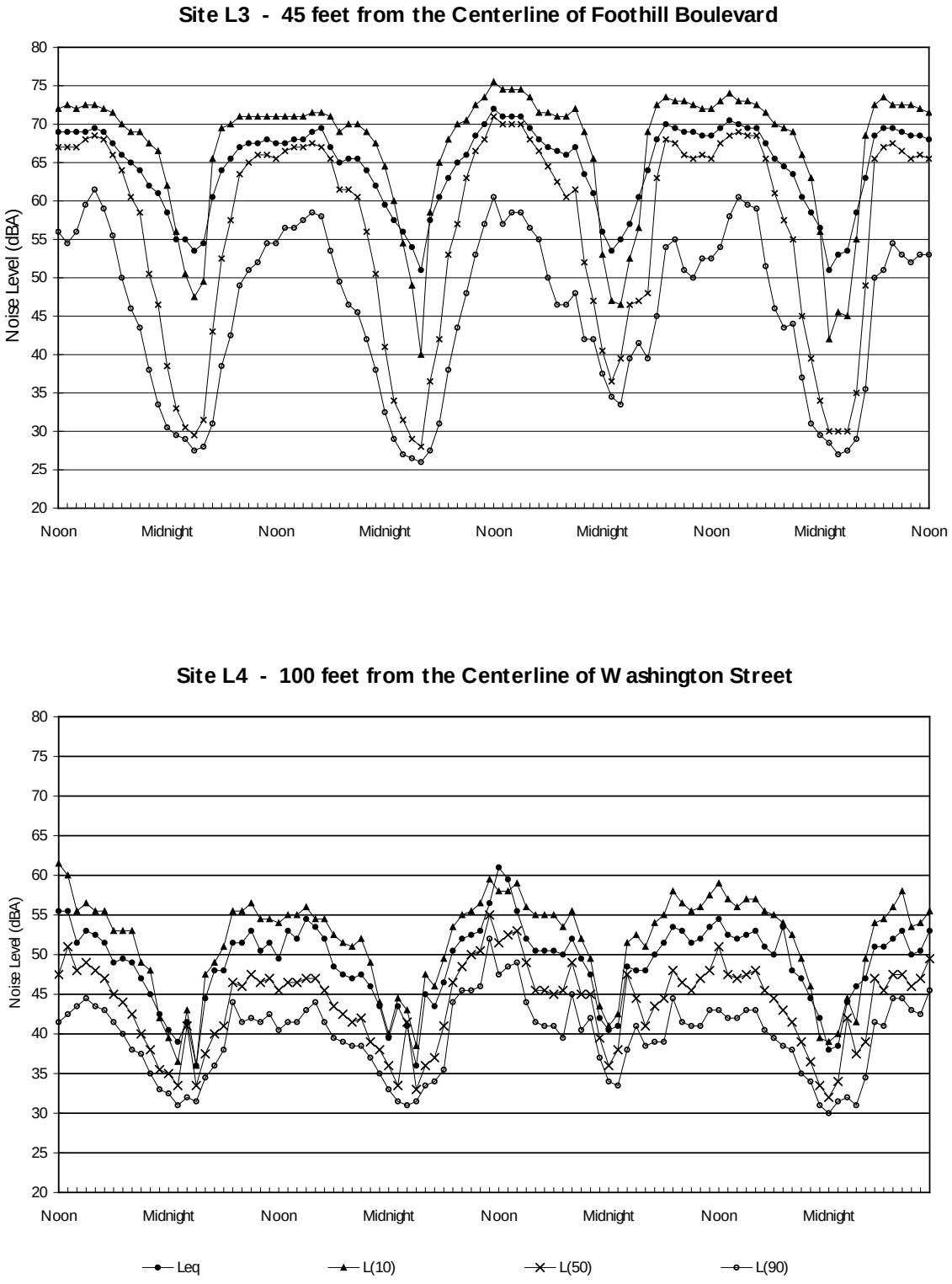

FIGURE N-3 **HOURLY NOISE LEVEL MEASUREMENTS: FOOTHILL & WASHINGTON - MAY 12-16, 2001**

TABLE N-3 **RESULTS OF SHORT-TERM MID-DAY NOISE MEASUREMENTS** (MAY 16, 2000)

Roadway Segment		Start time	Distance from edge of near lane (feet)	Measured Noise Level					Comments
				L_{eq}	L_{01}	L_1	L_{50}	L_{90}	
S1	Tubbs Lane near Myrtledale Road	10:55	60	63	72	68	54	42	The large range between L_{90} and L_{01} shows that noise is the result of infrequent cars passing by quickly
S2	Highway 29 near Greenwood Avenue	11:15	50	62	75	67	48	37	Infrequent fast car passbys
S3	Silverado Trail near Silver Rose Inn	11:30	50	65	76	70	54	42	Infrequent fast car passbys
S4	Highway 29 south of Pine Street	11:50	40	73	81	77	70	58	Traffic with trucks moving faster than 55 mph speed limit
S5	Lincoln Avenue at Gliderport Plaza	12:05	55	62	71	66	60	52	Slow moving traffic and other downtown noise
S6	Grant Street at North Oak Street	12:20	50	55	65	57	44	38	Infrequent traffic

L_{eq} is the average noise level during the measurement period.
L_{01} is the noise level exceeded one percent of the time, L_{10} is the noise level exceeded 10 percent of the time, L_{50} is the noise level exceeded 50 percent of the time, L_{90} is the noise level exceeded 90 percent of the time.

TABLE N-4 **NOISE CONTOUR DISTANCES FROM ROADWAY CENTERLINE**

	Existing Ldn			Projected Ldn (Year 2020)		
	60 dBA	**65 dBA**	**70 dBA**	**60 dBA**	**65 dBA**	**70 dBA**
Lincoln Avenue						
from Foothill to Fair Way	200 feet	90 feet	40 feet	260 feet	120 feet	60 feet
from Fair Way to Silverado Trail	160 feet	60 feet	--	200 feet	90 feet	40 feet
from Silverado Trail to north	180 feet	80 feet	--	220 feet	100 feet	50 feet
Foothill Boulevard						
from Dunaweal to Lincoln	300 feet	140 feet	60 feet	450 feet	210 feet	100 feet
from Lincoln to Petrified Forest	250 feet	120 feet	50 feet	430 feet	210 feet	100 feet
from Petrified Forest to north	280 feet	130 feet	60 feet	530 feet	240 feet	110 feet
Silverado Trail						
from Dunaweal to Lincoln	150 feet	70 feet	--	200 feet	90 feet	40 feet
Tubbs Lane						
from Foothill to Lincoln	150 feet	70 feet	--	170 feet	80 feet	40 feet
Petrified Forest Road						
from Foothill Boulevard to west	240 feet	110 feet	50 feet	310 feet	140 feet	70 feet

Land Use Category	Exterior Noise Exposure L_{dn} or CNEL, dB					
	55	60	65	70	75	80
Residential, hotels and motels						
Outdoor sports and recreation Neighborhood parks and playgrounds						
Schools, libraries, museums, hospitals Personal care, meeting halls, churches						
Auditoriums, concert halls Amphitheaters						

NORMALLY ACCEPTABLE

Specified land use is satisfactory: any buildings involved could be of normal conventional construction, no special insulation requirements.

CONDITIONALLY ACCEPTABLE

Specified land use to be permitted only after detailed analysis of the noise reduction requirements and inclusion of noise insulation features in the design.

UNACCEPTABLE

New construction or development should generally not be permitted because mitigation is usually not feasible.

FIGURE N-4 **LAND USE COMPATIBILITY GUIDELINES FOR NOISE EXPOSURE**

Measurement Location L3: Foothill Boulevard at the Wayside Inn. This measurement was made 45 feet from the centerline of Foothill Boulevard, across from Silver Street. Automobile and truck traffic on Foothill Boulevard dominated the noise environment. The measured L_{dn} was 69 dBA. This rating is considered extremely noisy for a residential area, although it should be noted that noise drops off quickly with distance from the roadway.

Measurement Location L4: Washington Street at Second Street. The noise monitor was placed 100 feet from the roadway centerline. Vehicular traffic in the area was the only significant source of noise. The measured L_{dn} was 54 dBA, which is considered somewhat quiet.

Short-Term Measurement Locations. Although measured noise levels at the six short-term measurement locations were relatively high, all measurement locations were close to major roadways and all were for short durations of time. Noise levels over longer periods would be lower, since quieter periods would be averaged in.

As noted in Table N-3, the variation between L_{10} and L_{90} is wide at several of the measurement sites. This means there were short periods of loud noise during the measurements, but that there was less noise than at other times. Each of these locations is subject to intermittent loud noises but the median noise levels (L_{50}) for all of but one of the sites is less than 60 dBA, which means no significant noise impact indoors and limited impact for outdoor activity.

Traffic Noise. Only location S4, at Highway 29 south of Pine Street, is noisy for most of the time period measured. The measured Leq of 73 dBA is above the threshold of 68 dBA at which noise interferes with normal speech for people trying to converse standing outside at the measurement site. This noise level would not impair conversation indoors nor would the noise level be unacceptable if the receptor is separated from the street by a sound barrier such as a wall. Thus, noise levels in this area are marginally acceptable.

The noise survey results show that the major source of noise in Calistoga is traffic. Much of the noise is generated by vehicles driving faster than the speed limit, which means that enforcement of speed limits would not only improve safety but would also have noise reduction benefits. Other methods to reduce traffic noise include vehicle engine modifications, and use of alternative roadway surfacing materials.

The use of open-grade asphalt and rubberized asphalt to pave roads has been shown to provide sustained traffic noise reduction.

Sprint Car Races at the Napa County Fairgrounds. Figure N-5 shows noise level estimates for the sprint car racing at the Napa County Fairgrounds taken from the 1990 General Plan Master Environmental Assessment. During the races, noise levels in the neighborhoods surrounding the fairgrounds are substantially higher than normal. Because of the limited time and duration of the races, the L_{eq} during the event is the most representative noise measurement. The contours show that throughout a large part of Calistoga, noise is significant during the sprint car events. Therefore, this Noise Element includes actions to reduce problems from sprint car races.

Seasonal sources such as wind machines and the sprint car races are secondary sources of communitywide noise.

City Limit Line

FIGURE N-5

SPRINT CAR NOISE CONTOUR ESTIMATES

CITY OF CALISTOGA
2003 GENERAL PLAN

TABLE N-5 **NOISE CONTOURS NEAR A TYPICAL WIND MACHINE**

Contour Leq (dBA)	Distance of Contour from Wind Machine
90	126 feet
85	224 feet
80	400 feet
75	710 feet
70	1,125 feet
65	1,782 feet
60	2,518 feet
55	3,170 feet

One type of wind machine used to reduce frost damage in vineyards.

Wind Machines. Wind machines are also a source of intermittent noise in Calistoga. Wind machines are used to combat the effects of frost in the vineyards and other frost-sensitive crop areas. The intermittent and seasonal nature of their operation makes the L_{eq} (hourly average noise level descriptor) the most appropriate noise measurement. The locations of L_{eq} contours around a typical wind machine are given in Table N-5. The table indicates that the noise level would be perceived as loud, i.e. 70dbA, within an area extending 1,125 feet from the machine. This is similar to hearing a vacuum cleaner in the same room.

Industry. Little manufacturing or other potential sources of industrial noise are located in the Calistoga area. Industry is limited to two water bottling plants. One of these plants has intermittently been a source of community noise in Calistoga. In 1999, noise from new mechanical equipment at the plant resulted in complaints from the neighbors. The company instituted measures to reduce noise produced by its activities and it appears that the problem has been solved.

B. Key Findings

1. Calistoga is relatively quiet. The only on-going source of significant noise is roadway traffic. Other secondary sources include light industry, agricultural operations, agricultural wind turbines and sprint car races at the Napa County Fairgrounds. No heavy industrial activities are located in the Calistoga vicinity. However, because the level of noise is so low, increases that might seem small elsewhere could have a more perceptible effect here.

2. Given the relatively low level of noise, Calistoga's Noise Element need not be as extensive as that of other communities that are denser or more industrialized. Calistoga need not incorporate a broad array of planning policy related to noise. The incidence and extent of noise are such that most problems can be successfully addressed through the Noise Ordinance.

3. The only places in Calistoga where noise is a consistent problem are immediately adjacent to heavily traveled roads, where noise borders on unacceptable levels for residential use. The principal way to address traffic noise is through measures to reduce speeds. In the long term, there may be additional ways to reduce the amount of noise produced by modifying vehicles or even the materials used on the roadway itself.

4. Additional noise in Calistoga is caused by sprint car racing. Like many exterior recreational activities, the car racing creates noise that is likely to be more objectionable for the part of the community not attending. Measures could be instituted to work with the race organizers to attenuate the noise impacts.

5. Community noise is also generated by frost-preventing wind machines which are a component of Calistoga's agricultural base. Given the necessity of these machines to protect crops and their intermittent use, it is not appropriate to regulate them.

6. Some residents have expressed concerns about intermittent localized noise sources such as leaf blowers, lawn mowers and garbage trucks. Noise from such uses is extremely difficult to quantify or regulate in a policy document like the General Plan. Instead, these types of local noise nuisances should be addressed in the City's Noise Ordinance.

7. The Gliderport is currently closed. If it reopens, there could be noise incompatibility problems with housing located in the residential part of Washington Street downvalley from Lincoln Avenue.

8. Given the existing low noise levels, the addition of new development sensitive to noise in most parts of the City and Planning Area would not expose these sensitive receptors to unacceptable noise levels. Despite this, new development sensitive to noise should seek to minimize potential noise exposure through attenuating site and architectural design methods.

9. There is a need to prevent new development from creating unacceptable noise levels in the quiet parts of the City.

C. Goals, Objectives, Policies and Actions

Goal N-1	**Preserve current low levels of noise in Calistoga to maintain the City's rural atmosphere.**

Objective N-1.1 Use existing regulations to protect residents from the undesirable effects of excessive noise.

Actions

A1.1-1 Revise the Noise Ordinance so that it contains quantitative measures to maintain Calistoga's existing low level of noise, as well as measures to address localized, temporary noise sources such as leaf blowers, lawn mowers and garbage trucks.

A1.1-2 Increase enforcement of speed limits as a means to reduce vehicle noise.

A1.1-3 Encourage the County Sheriff's Department to enforce speed limits on State highways and in the unincorporated parts of the Planning Area.

Objective N-1.2 Explore innovative ways to reduce noise levels.

Actions

A1.2-1 Consider reducing speed limits on major roads within the City.

A1.2-2 Work with Caltrans to reduce speed limits on State highways in order to reduce noise levels.

A1.2-3 Work with State and federal agencies to actively enforce regulations dealing with noise. Examples include the California Vehicle Code governing motor vehicle noise emissions and federal vehicle construction standards.

A1.2-4 Explore the use of alternative paving materials on city streets to reduce vehicle sound levels.

A1.2-5 Work with the Napa County Transportation Planning Agency to explore the feasibility of purchasing quieter buses.

Objective N-1.3 Ensure noise exposure compatibility between neighboring land uses.

Policy

P1.3-1 New development near or around the gliderport shall be permitted and designed with consideration for avoiding exposure of new uses to unacceptable noise levels from aircraft operation.

Actions

A1.3-1 Work with the Napa County Fair Board to minimize noise by limiting or changing the sprint car races held at the County Fairgrounds.

A1.3-2 If the gliderport is reopened for aviation use, study ways to protect adjacent residences and other sensitive receptors from exposure to airport noise.

Objective N-1.4 Minimize the potential for new development projects to create unacceptable noise levels at sensitive receptors such as residential areas, hospitals, convalescent homes and schools.

Policies

P1.4-1 New residential projects shall be required to meet the following noise level standards:

- A maximum of 45 dB for interior noise level.
- A maximum of 60 dB for exterior noise level, especially when outdoor activities are important components of a project (e.g., multi-family housing).

P1.4-2 A noise study, including field noise measurement, shall be required for any proposed project which would:

- Place a potentially intrusive noise source near an existing noise sensitive receptor, or
- Place a noise-sensitive land use near an existing potentially intrusive noise source.

P1.4-3 New development projects shall not be approved unless they are generally consistent with the Noise Compatibility Guidelines contained in Figure N-5.

P1.4-4 The City shall encourage the inclusion of site design techniques for new construction to minimize noise impacts, including building placement, landscaped setbacks, orientation of noise-tolerant components (i.e., parking, utility areas, and maintenance facilities) between noise sources and the sensitive receptor areas.

P1.4-5 The City shall encourage the use of architectural design techniques to meet noise attenuation requirements, such as:

- Using noise-tolerant rooms (garages, kitchens, bathrooms) to shield noise sensitive rooms or areas (living rooms, bedrooms).
- Using architectural design techniques and building facade materials that help shield noise.