

Town of Portola Valley General Plan

Noise Element

Last amended March 25, 2009

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Noise Element

Introduction

4300 The noise element establishes policies for the preservation of tranquility within the town consistent with its rural character.

General Objectives

- 4301
1. To maintain an acoustical environment in harmony with the pastoral nature of the community.
 2. To provide peace and quiet for the enjoyment and self-renewal of the town's residents and visitors.
 3. To preserve for the residents of the town a sense of privacy attainable only in the absence of intrusions by unwarranted noise.

The Noise Environment

4302 In general, Portola Valley enjoys a low ambient noise level. This low level of noise contributes to the “rural” quality of the community. Exceptions to this, however, include traffic noise along some major roads and certain non-transportation generated noise.

4303 Although no federal or state highways pass through the town, motor vehicles constitute the primary source of consistent noise pollution. Alpine Road and Portola Road are the major sources of traffic noise. Outside town boundaries but within its planning area lie two major traffic arterials: a portion of the Junipero Serra Freeway (I 280) and a portion of Skyline Boulevard (State Highway 35). In 1969, a major jet noise burden was placed on the town as the result of an FAA air corridor revision; since that time the town has worked to lessen the impact of aircraft noise over Portola Valley. Private airplanes and helicopters, however, remain as sources of aircraft noise. Non-transportation sources constitute another noise source category, with construction noise, barking dogs, yard maintenance, and mechanical equipment as the primary irritants.

Transportation Generated Noise

- 4304 The State Office of Planning and Research Guidelines related to the preparation of the Noise Element of the General Plan mandate that noise exposure levels be prepared in terms of the day/night average sound level (L_{dn}) or the community noise equivalent level (CNEL). L_{dn} is currently the preferred metric and is used to characterize the 24-hour average noise exposure level with a 10 dBA penalty added to noise at night (10pm to 7am). All sound levels in this element are A-weighted sound levels abbreviated dBA. For definitions of technical terms see Table 1, "Definitions of Acoustical Terms Used in this Report."
- 4305 Noise exposure from traffic is depicted in the form of noise exposure contours along the major roadways. Noise exposure contours are lines of equal loudness, similar to elevation contours that are lines of equal elevation. Noise exposure contours for the Town were calculated using a traffic noise model developed by the Federal Highway Administration and the California Department of Transportation. The traffic noise model was calibrated using the actual measured noise levels in Portola Valley. Noise exposure is presented in terms of the L_{dn} noise metric. The results of the traffic noise modeling are shown on Figure 1, "Noise Contour Map." The noise contour map is incorporated into the Town's graphic information system (GIS) software.
- 4306 The noise measurement survey along roads was completed in 2007. Long-term measurements made hour by hour over a period of several days provide information on how noise levels vary throughout the community day and night and from day to day. A series of attended short-term measurements were also conducted to identify specific noise sources. (For a complete list of measurements and a map showing noise measurement locations see Noise Element Appendix 1, Table 3 and Figure 1.)

Non-Transportation Generated Noise

- 4307 Non-traffic generated noise levels are measured in terms of L_{eq} , which is the average noise level during a specific noise period. It is important to know how noise levels vary within each hour of the day and night. The L_{eq} is the energy average, or equivalent, sound level during a specified time period, often one hour is used. The L_{max} is the maximum instantaneous sound level during a specified time interval. The standard acoustical statistical descriptors are the L_{01} , the L_{10} , the L_{50} , and the L_{90} which represent sound levels exceeded 1 percent (near maximum levels), 10 percent, 50 percent (the median level), and 90 percent of a time interval (representing the background). An index to different noise levels in dBA is shown on Table 2, "Typical Noise Levels in the Environment."
- 4308 Average noise levels in the town during most of the daytime hours on the days unaffected by local neighborhood activities were about 45 dBA L_{eq} . This is about equivalent to the noise level in a "Quiet office environment." During the daytime, noise levels typically ranged from 40 to 50 dBA L_{eq} . Noise levels at night were typically 25 to 30 dBA L_{90} throughout Portola Valley, except overlooking Interstate 280 where noise levels were slightly higher ranging from 30 to 35 dBA L_{90} during the nighttime and in the very center of the quietest portion of the community where noise levels were 20 to 25 dBA L_{90} during the nighttime.

Conclusions

4309 By and large, noise levels in the Town are quite low except along several portions of the three major roads . Individual non-residential uses have the potential to increase noise levels in residential areas above acceptable levels unless properly located and designed. Elsewhere, levels are generally within normal standards described on Figure 2.

TABLE 1
Definitions of Acoustical Terms Used in this Report

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. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the 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.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period. The hourly L_{eq} used for this report is denoted as dBA $L_{eq[h]}$.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels in the night between 10:00 pm and 7:00 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.
L_{01} , L_{10} , L_{50} , L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time 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.

Town of Portola Valley Traffic Noise Contour Map



Figure 1

LEGEND

- 65 dBA Ldn
- 60 dBA Ldn
- 55 dBA Ldn

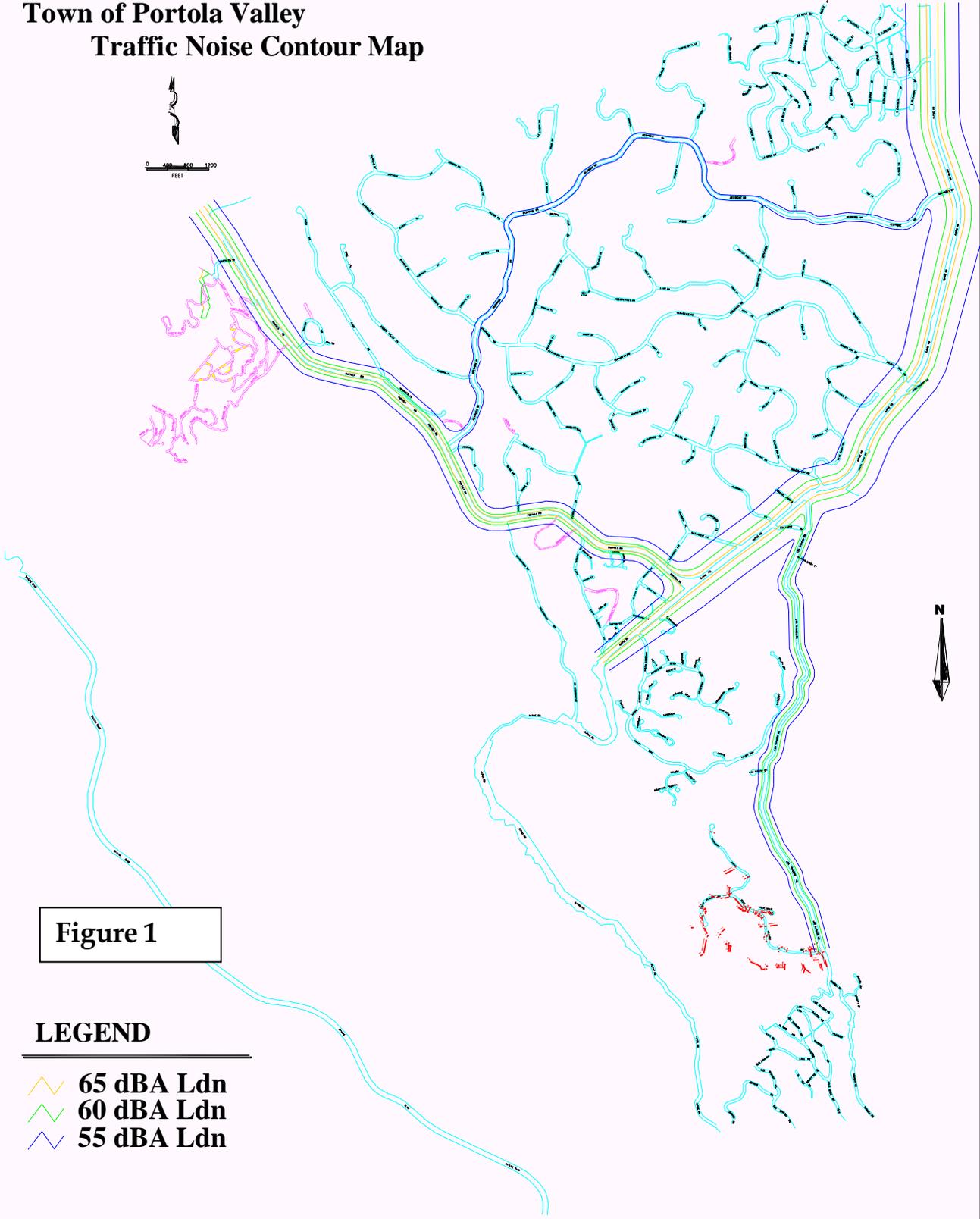


Figure 2 – Land Use Compatibility for Transportation Noise

Land Use Category	Exterior Noise Exposure (L_{dn})			
	55	60	65	70
Single-Family Residential	White	Grey	Black	Black
Multi-Family Residential	White	Grey	Black	Black
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	White	White	Grey	Black
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Religious Facilities	White	White	Grey	Black
Office Buildings, Business Commercial, and Professional	White	White	White	Grey
Auditoriums, Concert Halls, Amphitheaters	Grey	Grey	Black	Black



Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special insulation requirements



Conditionally Acceptable: Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design



Unacceptable: New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
	120 dBA	
Jet fly-over at 1,000 feet		Rock concert
	110 dBA	
Pile driver at 65 feet		Night club with live music
	100 dBA	
Large truck pass by at 50 feet		Noisy restaurant
	90 dBA	
Gas lawn mower at 100 feet Commercial/Urban area daytime		Garbage disposal at 1 meter
	80 dBA	
Suburban expressway at 100 feet Suburban daytime		Vacuum cleaner at 3 meters Normal speech at 1 meter
	70 dBA	
Urban area nighttime		Active office environment
	60 dBA	
Suburban nighttime		Quiet office environment
Quiet rural areas		
	50 dBA	
Wilderness area		Library
	40 dBA	Quiet bedroom at night
	30 dBA	
	20 dBA	
	10 dBA	Quiet recording studio
Threshold of human hearing	0 dBA	Threshold of human hearing

Noise Compatible Land Use Planning

Transportation Generated Noise

- 4310 Much research has resulted in the development of a correlation of exterior community noise levels and their acceptability for different land uses. In the mid-1970s the Environmental Protection Agency made a finding that an L_{dn} of 55 dBA (including a 5 dBA margin of safety) would have “no impact” on a residence. Following this, the State of California established guidelines and suggested 60 dBA L_{dn} as an upper limit for environmental noise in a residential setting. Furthermore, typical California construction with windows open provides about 15 dBA L_{dn} of noise reduction when going from outside to inside, so if the exterior L_{dn} is 60 dBA or less, the interior L_{dn} will typically be 45 dBA or less. An L_{dn} of 45 dBA is considered the upper limit of acceptable interior sound for residential development in California (as defined in the State Building Code).
- 4311 Figure 2 shows the transportation noise and land use compatibility guidelines for Portola Valley. Three acceptability categories are identified: “normally acceptable,” “conditionally acceptable,” and “unacceptable.” In the “normally acceptable” category a use would be acceptable without additional mitigation measures. In the “conditionally acceptable” category the use would be acceptable with the application of mitigation measures. In the “unacceptable” category the use would unacceptable even after the application of available mitigation measures. Based on the existing conditions in Portola Valley an exterior noise goal of 55 dBA L_{dn} has been adopted for single-family residences. This is in contrast to the exterior noise goal of 60 dBA generally applied to more urban areas.
- 4312 One of the requirements of the Noise Element is to facilitate the noise insulation standards contained in the State Building Code that are applicable to new multi-family housing development. Where the exterior noise exposure level is 60 dBA L_{dn} or greater, the residential building must attenuate the interior noise level to 45 dBA L_{dn} or less. Existing multi-family housing in Portola Valley is limited to The Sequoias and student and faculty housing at the Priory.
- 4313 Mitigation measures for traffic noise consist mostly of modifications to the path and receiver of the noise. For instance, earthen barriers and sound walls can be used to reduce the noise impact. Also, if new receivers can be located further from the road, the noise will be decreased. In addition, controls on the noise generators such as improved pavements, and enforcement of state laws regarding noise from mufflers and car radios can help reduce the impacts from traffic generated noise.

Non-Transportation Generated Noise

- 4314 Non-transportation uses such as commercial establishments and public uses generate a different kind of noise referred to as non-transportation noise. This noise results from sources such as heating, ventilating, and refrigeration equipment, loading dock activities, parking lot traffic and maintenance, special events with music, etc. If a residence exists or is planned near such a source of noise, special noise guidelines shown in Table 3 that address noise during any hour of the day and night are used to evaluate the suitability of

the environment. Whereas traffic generated noise is measured in L_{dn} , noise from other sources is measured in L_{eq} (noise in dBA during any hour) or L_{max} (maximum noise in dBA during any hour). Thus, rather specific standards are shown for different time periods for the various land uses. Also, whereas traffic generated noise tends to follow rather consistent patterns and can be well described by L_{dn} , noises from other sources tend to vary by the type of noise source. Accordingly, the measurements for these other sources are articulated to specific day and nighttime periods.

4315 The correlations between non-transportation noises and land uses on Table 3 can be applied in two ways. First, noise sensitive uses are discouraged where the noise from non-transportation sources will exceed the standards on the table. Second, generators of non-transportation noise should not be allowed unless they comply with the standards on the table.

TABLE 3 Non-Transportation Noise Standards

Land Use Receiving the Noise	Hourly Noise-Level Descriptor	Exterior Noise-Level Standard In Any Hour (dBA)		Interior Noise-Level Standard In Any Hour (dBA)	
		Daytime (7am-10pm)	Nighttime (10pm-7am)	Daytime (7am-10pm)	Nighttime (10pm-7am)
Residential	L_{eq}	50	40	40	30
	L_{max}	65	55	55	45
Medical, convalescent	L_{eq}	55	45	45	35
	L_{max}	70	60	55	45
Theater, auditorium	L_{eq}	--	--	35	35
	L_{max}	--	--	50	50
Religious Facility, meeting hall	L_{eq}	55	--	40	40
	L_{max}		--	55	55
Office building	L_{eq}	--	--	45	--
School, library, museum	L_{eq}	55	--	40	--
	L_{max}		--	55	--
Playground, park	L_{eq}	55	--	--	--

Notes:

- a) The Residential standards apply to all residentially zoned properties.
- b) Each of the noise levels specified above shall be lowered by 5 dBA for tonal noises characterized by a whine, screech, or hum, noises consisting primarily of speech or music, or recurring impulsive noises.
- c) The exterior noise standards are measured at the property line of the receiving property.
- d) The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors, the thresholds are about 15 dBA higher. Steady noise of sufficient intensity, above 35 dBA, and fluctuating noise levels above about 45 dBA have been shown to affect sleep.

Goals

4316 Goal 1: Develop Land Uses Compatible with the Noise Environment

Transportation Generated Noise (Policies 1–3)

1. The town will utilize the noise contours in Figure 1 and noise/land use compatibility standards on Figure 2.
2. New development of residential or other noise-sensitive land uses are discouraged in noise impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels in outdoor activity areas to 55 dBA Ldn or less.
3. Interior noise levels shall not exceed 45 Ldn in all new residential units (single- and multi-family). Residential development sites exposed to exterior noise levels exceeding 55 Ldn shall be analyzed following protocols in the 2007 California Building Code (Chapter 12, Appendix Section 1207.11.2) or the most recent revision.

Non-Transportation Noise (Policy 4)

4. New development of noise-sensitive land uses are discouraged where the noise level due to non-transportation noise sources will exceed the standards of Table 3. Where noise sensitive land uses exist or are proposed in areas exposed to existing or proposed exterior non-transportation noise levels exceeding the performance levels of Table 3, an acoustical analysis shall be submitted by an applicant so that the noise mitigation may be included in the design of the new development.

4317 Goal 2: Reduce Noise from Traffic

1. Utilizing currently available information, and to the extent feasible, select a “quieter” pavement that also meets other criteria established by the Town for pavements, and use the quieter pavement when resurfacing roadways.
2. Control the sound of vehicle amplification systems, (e.g. loud stereos) by encouraging the enforcement of Section 27007 of the California Motor Vehicle Code. This section prohibits amplified sound that can be heard 50 or more feet from a vehicle.
3. Control excessive exhaust noise by encouraging the enforcement of Section 27150 of the California Motor Vehicle Code.

4318 Goal 3: Mitigate Noise from New Projects

1. Noise created by new transportation noise sources (e.g., increased traffic or a new roadway) shall be mitigated so as to not cause the following criteria to be exceeded or to cause a significant adverse community response:

- Cause the Ldn at noise-sensitive uses to increase by 3 dBA or more and exceed the “normally acceptable” level. See Figure 2 for the definition of “normally acceptable.”
- Cause the Ldn at noise-sensitive uses to increase by 5 dBA or more and remain “normally acceptable.”

Where a proposed transportation noise source is likely to produce noise levels that would exceed the above standards, an acoustical analysis shall be required as a part of project review or as part of the environmental review process so that noise mitigation may be included in the project design.

2. Noise created by new non-transportation noise sources shall be mitigated so as to not cause the land use receiving the noise to exceed interior and exterior noise level standards of Table 3. Where proposed non-transportation noise sources are likely to produce noise levels that would exceed the standards of Table 3, an acoustical analysis shall be required as a part of project review or as part of the environmental review process so that noise mitigation may be included in the project design.
3. All acoustical analyses shall:
 - Be the responsibility of the applicant for the project.
 - Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics.
 - Include representative noise level assessments with sufficient sampling periods and locations to adequately describe local conditions.
 - Estimate existing and projected (20 years) noise levels in terms of Ldn and/or the standards of Table 3, and compare those levels to the policies of this Element.
 - Recommend mitigation to achieve compliance with the adopted policies and standards of this Element. Where the noise source in question consists of intermittent single events, the report must address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance.
 - Describe a post-project assessment program that could be used to evaluate the effectiveness of the proposed mitigation measures.

4319

Goal 4: Control Noise from Construction and Yard Maintenance Activities

1. Implement appropriate standard controls for all construction projects carried out by contractors or homeowners.
2. Implement appropriate standard controls for yard maintenance activities carried out by commercial companies and homeowners.
3. Require ASCC review for all construction projects scheduled for or lasting more than 24 months and submittal of construction staging, timing and noise management plans.

4. Develop a guidance manual to provide information to the public regarding noise control.

4320 Goal 5: Control Noise from Other Sources

1. Communicate with the FAA through the San Francisco International Airport (SFO) Airport Roundtable, and other government persons and agencies, to minimize the noise impact of commercial aircraft operations.
2. Work with local airports to promote a “fly neighborly” program to minimize noise resulting from low altitude aircraft operations and unnecessary general aviation aircraft over Portola Valley.
3. Revise the noise ordinance to address ongoing noise issues by using quantitative noise limits where appropriate and establishing comprehensive noise control measures.
4. Develop a “quiet neighbor” information program and distribute information to the community defining community norms.
5. Develop a program for dealing with chronic noise complaints.

Appendix

The document “Noise Technical Report Supporting the Updates of the Portola Valley Noise Element and Noise Ordinance, June 18, 2008” prepared by Richard B. Rodkin, PE, is included as an appendix to the noise element.

**Noise Element Appendix 1:
2008 Noise Technical Report**