3.10 Noise

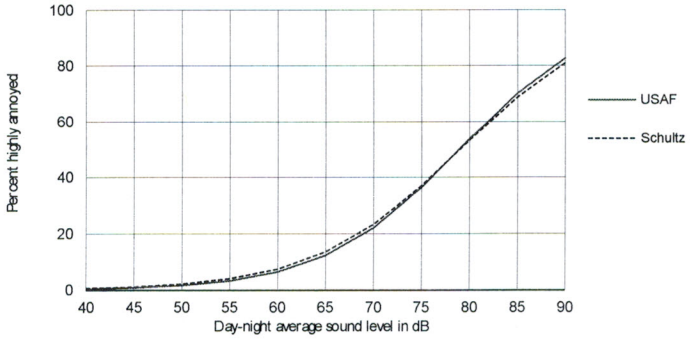
Background

Preserving quality of life requires mitigating the potential for noisy intrusions, but merely shutting out unwanted sound may not always be adequate. For example, buildings along busy roadways need to provide both comfortable acoustic environments and fresh air for their occupants. In addition, noise tends to be more tolerable over shorter time periods.

Vehicle traffic is the primary source of noise in Marin County, with the highest noise levels occurring along major roadways. Other significant local noise sources include aircraft, trains, mining activity, and construction. Estimates of future noise along major roadways can be projected based on estimates of future traffic, while changes in noise due to other sources may depend on a range of site-specific factors.

Minimizing the impact of noise on health and quality of life requires measuring current noise levels to identify existing problems. Noise is commonly described in *Ldn*, which expresses average sound level over a 24-hour period in decibels (dB), the standard measure of pressure exerted by sound. Ldn includes a 10 dB penalty for sounds between 10 P.M. and 7 A.M., when background noise is lower and people are most sensitive to noise.

Figure 3-39 Relationship Between Noise Levels and Annoyance (Schultz Curve)



Note: The most comprehensive and widely accepted evaluation of the relationship between transportation noise exposure (not exclusively aviation noise) and the extent of noise annoyance was one originally developed by Schultz (1978) and later updated by the U.S. Air Force (1992).

Source: 1992 Federal Interagency Committee on Noise.

Because decibels are logarithmic units of measure, a change of 3 decibels is hardly noticeable, while a change of 5 decibels is quite noticeable and an increase of 10 decibels is perceived as a doubling of the noise level (see Figure 3-39). A change from 50 dB to 60 dB increases the percentage of the population that is highly annoyed at the noise source by about 7%, while an increase from 50 dB to 70 dB increases the annoyed population by about 25 percent. Sounds as faint as 10 decibels are barely audible, while noise over 120 decibels can be painful or damaging to hearing (see Figure 3-40). County residents are frequently exposed to noise ranging from 35 to 80 decibels.

Figure 3-40 Typical Noise Levels

Type of Noise or Environment	Decibels
Recording studio	20
Soft whisper; quiet bedroom	30
Busy open-plan office	55
Normal conversation	60–65
Automobile *at 20 mph 25 ft. away*	65
Vacuum cleaner *10 ft. away*	70
Dump truck *at 50 mph 50 ft. away*	90
Gas leaf blower *at 25 ft. away*	100
Helicopter *200 ft. away*	100
Train horn *100 ft. away*	105
Claw hammer; jet takeoff *200 ft. away*	120
Shotgun *at shooter's ear*	140

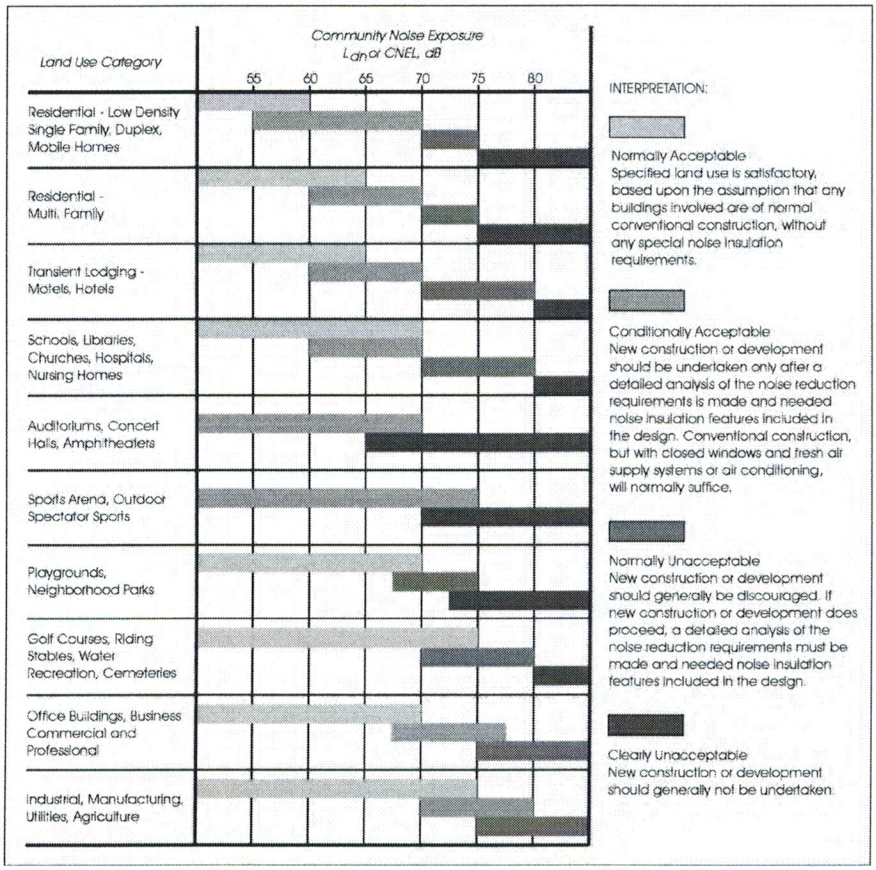
Noise will continue to be an important factor in the planning process as pressure increases to develop properties exposed to high noise levels and noisy activities occur near noise-sensitive receptors. The State sets acceptable noise levels for a variety of activities and types of land uses (in Figure 3-41, the "dB" measure indicates a reduction in the effects of low and high frequencies to simulate human hearing). The policies and programs in this Section of the Countywide Plan are intended to maintain appropriate noise levels and protect noise-sensitive land uses.

For the purposes of planning, the Noise Element contains information on the major noise sources identified in State planning law. It provides practicable noise contours for these major noise sources down to a level of annual average 60 Ldn. Annual average 60 Ldn is an appropriate benchmark for identifying and assessing noise problems, as this is the level above which outdoor noise levels are considered inappropriate in residential areas and at which interior noise levels in residential development will be unacceptable unless the windows are closed. Noise sources that do not generate noise levels in excess of an annual average Ldn of 60 dBA beyond the right-of-way line, in the case of highways, major local streets, and railroad rights-of-way, or the property line for stationary noise sources, are generally not included unless otherwise indicated.

The major noise sources for which noise contours have been developed in Marin County include major highways (Highway 37, Highway 101, and Highway 1), and major county roads (including Sir Francis Drake Boulevard, Petaluma Point Reyes Road, Lucas Valley Road, Novato Boulevard, etc.), the San

Rafael Airport, Gnoss Field, Richardson Bay Helipad, and potential future activity on the Sonoma-Marin Area Rapid Transit Line.

Figure 3-41 Acceptable Noise Levels



Source: California Office of Planning and Research, 1998 General Plan Guidelines.

Existing and Future Noise Exposure

- **Traffic noise.** Traffic noise levels along the major highways, primary arterials, and major county roads have not changed significantly since 1987. Noise monitoring conducted in 2001 and repeated in 2005 (see Map 3-11, Locations of Long-Term Noise Measurements) shows little change from measurements taken at the same locations in 1987. Figure 3-42 shows the resulting Ldn measured at each location over the years. The change at the site located off Highway 101 at St. Vincent's Road was due to the fact that the location was moved closer to the freeway in 2001 and 2005 than it was in 1987. When adjusted for this change in distance, noise levels at this location are also within a decibel of those measured in 1987.

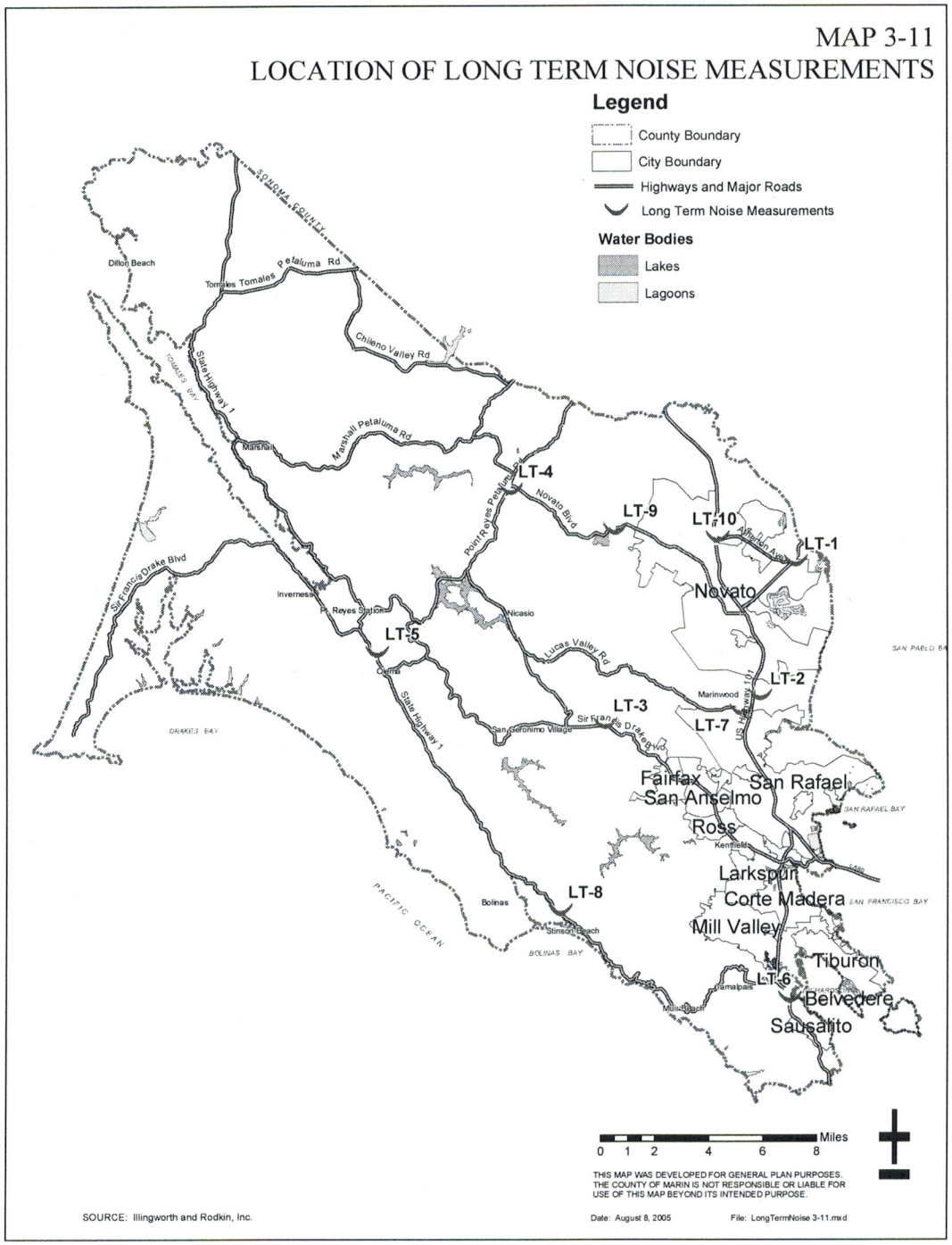
  Future traffic projections for the highways, freeways, major arterials, and primary local county roads show that noise levels are expected to increase by, at most, 1 decibel over existing noise levels (due to the logarithmic nature of noise addition, a 20% increase in the traffic volume will result in only a 1 decibel increase in the average noise level). The resulting increase would be essentially undetectable to the human ear, and the future noise environment along the major roadways in Marin County is expected to be essentially the same as it is today. Map 3-12, Existing and Proposed Noise Contours, shows the projected future noise contours for the major roadways in Marin County. This map is available at the Marin County Community Development Agency Planning Division at a larger scale to evaluate the noise exposure at specific parcels.

- **Aircraft and airport operations noise.** Marin County has two general aviation airports: the Gnoss Field County Airport, north of Novato, and the San Rafael Airport, in northern San Rafael. Existing noise contours for Gnoss Field are shown on Map 3-13. Activity levels and associated noise generation have not changed substantially since 1986. Projected noise contours are shown on Map 3-14. Activity levels, regulated by a conditional use permit, and associated noise generation have not increased since 2003 at the San Rafael Airport and are not projected to increase in the future. Existing and projected noise contours are shown on Map 3-16.

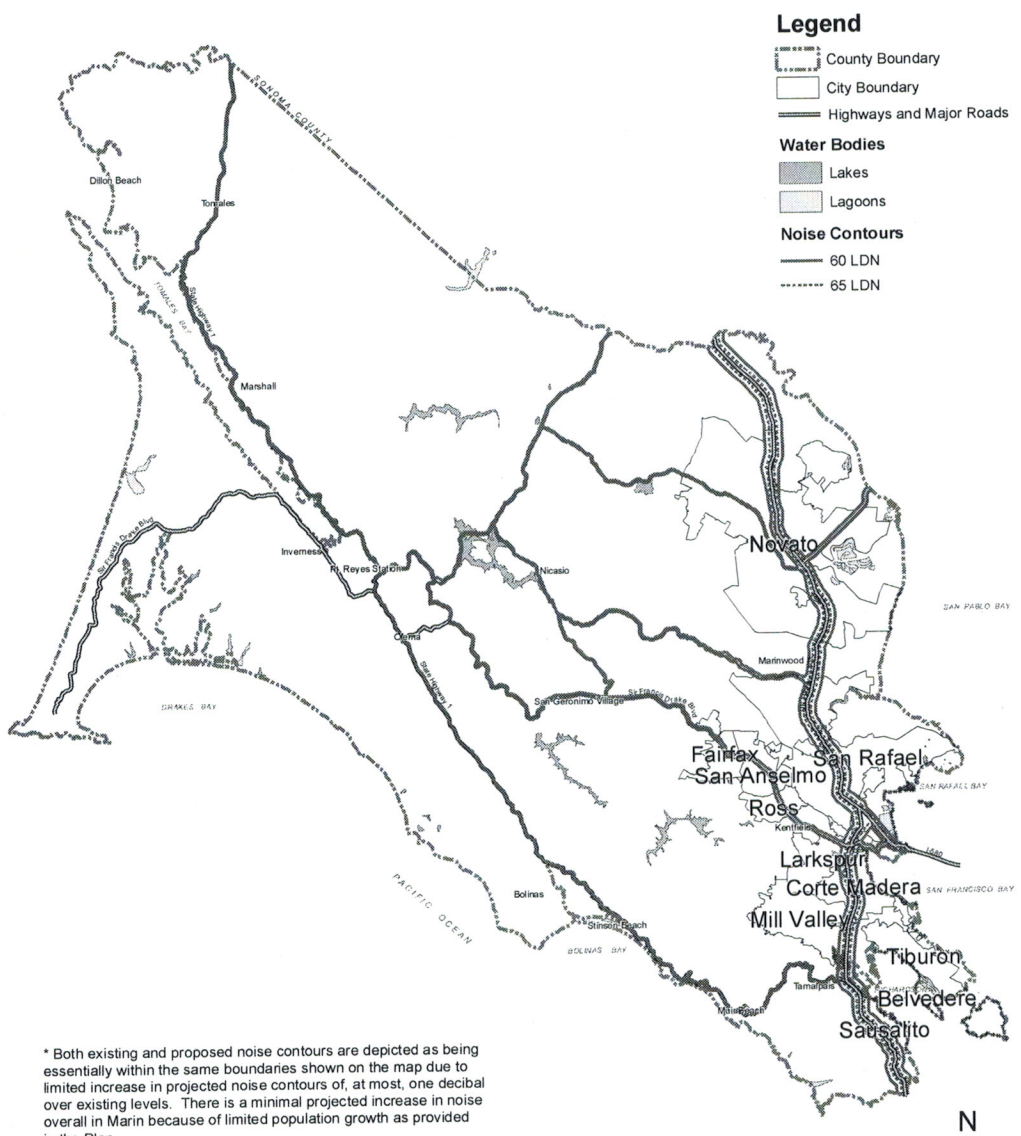
  The Richardson Bay Heliport provides a helicopter landing pad and seaplane rides. Activity at the Richardson Bay Heliport has not changed significantly since 1987, and activity levels continue at about 25 commercial takeoffs and landings per week. The noise exposure contours for the Richardson Bay Heliport are shown in Map 3-15. The annual average 60 Ldn contour clearly does not impact any existing noise-sensitive residential development, although noise generated by helicopters and seaplanes traveling to and from the heliport has been a source of annoyance to residents of the adjacent floating home marina.

  San Rafael Airport is regulated under the jurisdiction of the City of San Rafael and is restricted by conditional use permit to a maximum of 100 based aircraft. Noise exposure contours associated with this population of aircraft have not varied since 1987. In fact, recent noise measurements have confirmed the location of the annual average 60 Ldn contour around the airport. Map 3-16 shows the location of the existing and future noise contours at San Rafael Airport.

MAP 3-11
LOCATION OF LONG TERM NOISE MEASUREMENTS



MAP 3-12
EXISTING AND PROPOSED NOISE CONTOURS*



* Both existing and proposed noise contours are depicted as being essentially within the same boundaries shown on the map due to limited increase in projected noise contours of, at most, one decibal over existing levels. There is a minimal projected increase in noise overall in Marin because of limited population growth as provided in the Plan.

THIS MAP WAS DEVELOPED FOR GENERAL PLAN PURPOSES. THE COUNTY OF MARIN IS NOT RESPONSIBLE OR LIABLE FOR USE OF THIS MAP BEYOND ITS INTENDED PURPOSE.

SOURCE: Illingworth and Rodkin, Inc., Confirmed 2005.

Date: October 31, 2007 File: Noise 3-12.mxd

- **Flights to and from the Oakland and San Francisco International airports produce maximum passby levels of noise** within a range of 45 to 70 dBA when planes fly over Tiburon, Bolinas, and Point Reyes. On an annual average basis, however, the noise levels at all these locations are far below the annual average 60 Ldn standard used to define land use compatibility. Overflight noise from commercial aircraft may be a source of annoyance in the quieter areas of the county.

- **Railroad operations and ground rapid transit facilities noise.** The Northwestern Pacific Railroad runs through the northeastern portion of the county. However, current railroad use does not generate noise in excess of annual average 60 Ldn beyond the rail line's right-of-way. The Sonoma-Marin Area Rail Transit District (SMART) is proposing to begin operation of a commuter rail project along the Northwestern Pacific Railroad right-of-way between Cloverdale and the Larkspur Ferry terminal, a distance of about 71 miles. It is anticipated that there will be five stations in Marin County and that trains will run every 30 minutes during the peak period. There would be approximately 12 to 16 trains per day. It is anticipated that rolling stock will be a state-of-the-art diesel multiple unit built in the United States. These trains are much quieter than standard diesel locomotives. The train under consideration by SMART has been measured to generate a maximum passby sound level of 76–80 dBA at a distance of 50 feet from the passby. This level is similar to the noise level generated by a medium truck passing by at a similar speed.

  Based on the activity level projected in the operations plan, however, the annual average 60 Ldn contour would be located within the right-of-way, and thus projected noise levels from SMART trains would comply with the standard for land use compatibility.

- **Industrial noise.** No industrial plants within the unincorporated county are known or projected to generate noise above annual average 60 Ldn beyond the property line. Noise generated by the San Rafael Rock Quarry has been a source of complaints from neighboring residents. Recent noise studies have been conducted and additional analysis is also scheduled to occur.

- **Other noise sources.** There are a number of other noise sources in the county, none of which is known to generate an annual average Ldn of greater than 60 dBA off-site. These include such noise sources as localized agricultural activities, dog kennels, and home maintenance activities.

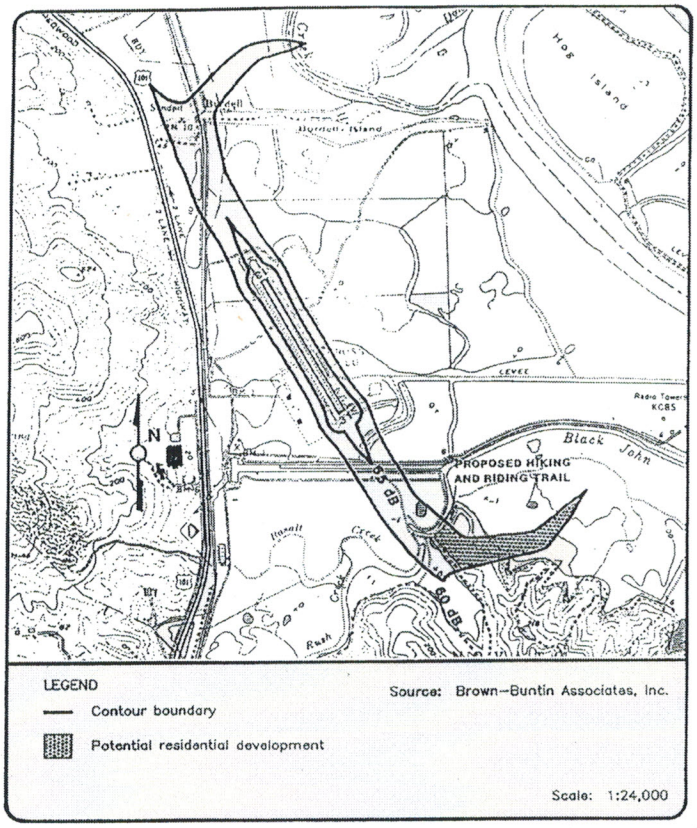
Figure 3-42 Roadway Noise Comparison, 1987 and 2001

Site Locations[1]	Present Land Use	Topography	Noise Source	Ldn Measured in 1987	Ldn Measured in 2001	Ldn Measured in 2005
LTR-1: Hwy 37 at Atherton Rd.	Industrial, Commercial	Flat/Surrounded by Hills	Hwy 37 Railroad	71	71	73
LT2: St. Vincent's Rd.	Agricultural, Residential, Institutional	Flat/Hills to the North	Hwy 101	56	62[1]	63
LT3: Sir Francis Drake Blvd. near Woodacre	Residential, Commercial	Valley	Sir Francis Drake Blvd.	71	71 (August) 72 (December)	73
LT4: Petaluma Point Reyes Road South of Novato Blvd.	Agricultural, Commercial	Valley	Pt. Reyes/ Petaluma Rd.	67	67	68
LT5: Hwy 1 South of Point Reyes Station	Residential, Commercial	Flat/Hills	Hwy 1	62	65	62
LT6: Flea Market(87) / Shopping Center(01) Parking Lot off Hwy 101 in South Marin Co.	Commercial	Flat	Hwy 101	75	76	76
LT7: Lucas Valley Rd.	Residential, Commercial	Valley	Lucas Valley Rd.	Site not measured in 1987	70	72
LT8: Hwy 1 North of Stinson Beach	Residential, Commercial	Inlet	Hwy 1	Site not measured in 1987	60	61
LT9: Novato Blvd. Near Stafford Lake	Recreational, Residential	Hills	Novato Blvd.	Site not measured in 1987	64	65
LT10: Hwy 101 at Atherton Ave. Exit	Residential, Commercial, Recreational	Flat	Hwy 101 Frontage Rd.	Site not measured in 1987	70	69

[1]LTR-1, LT3, LT4, LT5, and LT6 are sites measured in 1987; the exact location of LT2 could not be repeated in 2001.

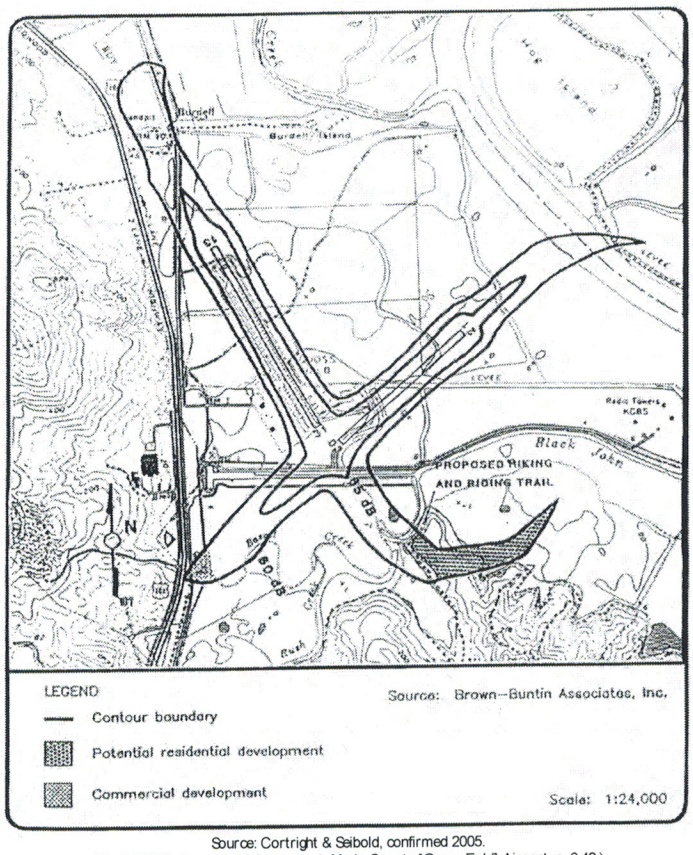
Source: 2002 Marin County Community Development Agency.

Map 3-13. Existing Noise Contours for the Airport at Gnoss Field



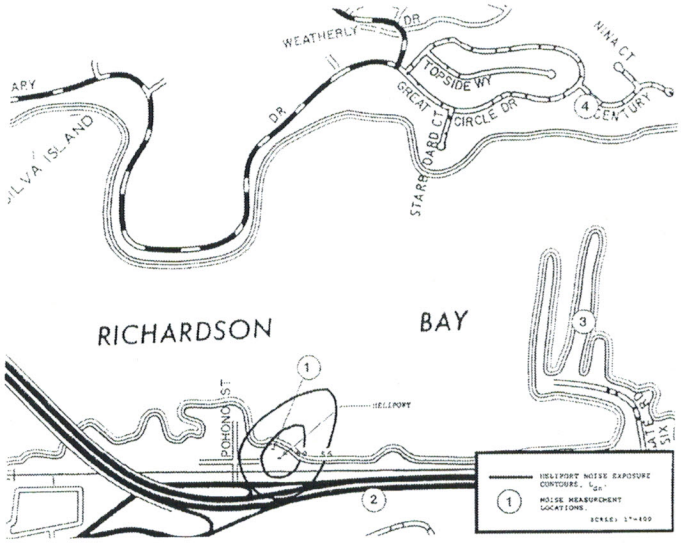
Source: Cortright & Seibold, confirmed 2005.
(Draft EIR/Environmental Assessment: Marin County [Gnoss Field] Airport, p. 6.41)

Map 3-14. Projected Future Noise Contours for the Airport at Gnoss Field



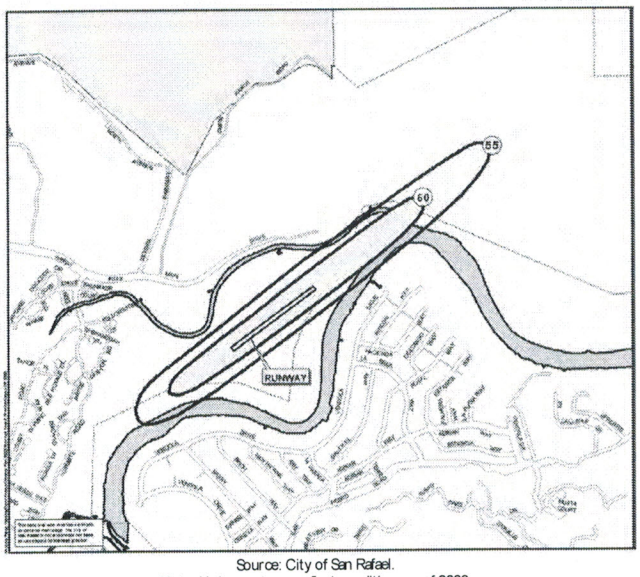
Source: Cortright & Seibold, confirmed 2005.
(Draft EIR//Environmental Assessment: Marin County [Gnoss Field] Airport, p. 6.42.)

Map 3-15. Existing Noise Contours for the Richardson Bay Heliport



Source: Illingworth & Rodkin, confirmed 2005.
(Preparation of General Plan Noise Exposure Contours for the Commercial Heliport Located in Richardson Bay in Marin County, p. 8.)

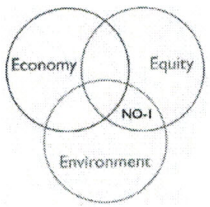
Map 3-16 San Rafael Airport Noise Contours



Source: City of San Rafael.
Note: Noise contours reflect conditions as of 2003.

What Are the Desired Outcomes?

GOAL NO-1



Protection from Excessive Noise. Ensure that new land uses, transportation activities, and construction do not create noise levels that impair human health or quality of life.

Policies

NO-1.1 Limit Noise from New Development. Direct the siting, design, and insulation of new development to ensure that acceptable noise levels are not exceeded.

NO-1.2 **Minimize Transportation Noise.** Ensure that transportation activities do not generate noise beyond acceptable levels, including in open space, wilderness, wildlife habitat, and wetland areas.

NO-1.3 **Regulate Noise Generating Activities.** Require measures to minimize noise exposure to neighboring properties, open space, and wildlife habitat from construction-related activities, yard maintenance equipment, and other noise sources, such as amplified music.

NO-1.4 **Limit Sound Walls Along Highway 101.** Promote best available noise reduction technologies and alternatives to sound walls to mitigate noise along Highway 101.

Why is this important?

Planning to avoid noise is important for the well-being of people and animals. Reducing transportation noise to acceptable levels will be critical to siting housing near public transit.

Environment: Noise can impact local habitat in a natural setting by driving away key species that are part of the broader local ecosystem.

Equity: Noise can cause stress, disrupt sleep and other important activities, and cause health problems and auditory system damage. Enforcing uniform standards that comply with State-adopted guidelines for acceptable noise levels ensures that people in the county are protected from unwanted and excessive noise and have the opportunity to live, work, and rest in a healthy environment.

How will results be achieved?

Implementing Programs

NO-1.a *Enforce Allowable Noise Levels.* Through CEQA and County discretionary review, require new development to comply with allowable noise levels.

The Acceptable Noise Levels in Figure 3-41 shall be used as a guide for determining the appropriate type of new development in relation to its ambient noise environment. Figure 3-41 applies primarily to proposed development exposed to transportation generated noise and to existing development exposed to increases in transportation generated noise due to proposed development. The standards in Figure 3-41 shall also be used to determine allowable noise levels for commercial, industrial, agricultural, or other less-noise-sensitive land uses exposed to stationery source noise generated by new development.

The Benchmarks for Allowable Noise Exposure from Stationary Noise Sources in Figure 3-43 shall be used as a guide for establishing allowable noise levels produced by stationary noise sources. These standards shall apply to new residential projects and other noise-sensitive land uses proposed near stationary noise sources. The standards shall also apply to new stationary noise-generating development proposed near existing residential or other noise-sensitive land uses.

It should be noted that the standards in Figures 3-41 and 3-43 are for purposes of planning and siting land uses. The standards are not a noise ordinance and are not to be used to achieve the same objectives as a noise ordinance. The standards are not to

be used for regulating existing noise sources or enforcement concerning noise problems.

Figure 3-43 Benchmarks for Allowable Noise Exposure from Stationary Noise Sources

	Daytime (7 A.M. to 10 P.M.)	Nighttime (10 P.M. to 7 A.M.)
Hourly L_{eq}, dB	50	45
Maximum Level, dB	70	65
Maximum Level, dB (Impulsive Noise)	65	60

L_{eq} ("Equivalent Sound Pressure Level") is the constant sound energy that would produce the same noise level as actual sources that are fluctuating during the specified time period (one hour).

Guidelines for use of Figure 3-43:

1. The measurements are made at the property line of the receiving land use. The effectiveness of noise mitigation measures should be determined by applying the standards on the receptor side of noise barriers or other property line noise mitigation measures.
2. The nighttime standards apply only when the receiving land use operates or is occupied during nighttime hours.
3. Sound-level measurements to determine maximum level noise shall be made with "slow" meter response.
4. Sound-level measurements for impulsive noise sources shall be made with "fast" meter response. Impulsive noises are defined as those that have sharp, loud peaks in decibel levels but that quickly disappear. Examples include a dog's bark, a hammer's bang, and noise with speech or music content.
5. The allowable noise level standard shall be raised to the ambient noise level in areas where the ambient level already exceeds the standards shown in this table. For example, if the neighborhood already experiences daytime hourly noise levels of 60 dBA as an ambient condition, the noise level standard shall be raised to 60 dBA.
6. The allowable noise level shall be reduced 5 dB if the ambient hourly Leq is at least 10 dB lower than the noise-level standard shown in this table. For example, if the neighborhood experiences daytime hourly noise levels of 40 dBA as an ambient condition, the noise level standard shall be lowered to 45 dBA.

NO-1.b *Comply with Acceptable Noise Levels.* Require discretionary permits for residential and other noise-sensitive land uses proposed near noise sources that may exceed acceptable noise levels and/or benchmarks to provide acoustical analyses; and, if necessary, commit to measures to comply with the applicable standards set out in Program NO-1.a. Amend the Development Code to include these requirements.

NO-1.c *Require Project-Specific Noise Mitigation.* Require all development to mitigate its noise impacts where the project would

- raise the Ldn by more than 5 dBA;

- raise the Ldn by more than 3 dBA and exceed the Normally Acceptable standard; or
- raise the Ldn by more than 3 dBA and the Normally Acceptable standard is already exceeded.

NO-1.d *Set Additional Limits for Housing.* Amend the Development Code to require the following maximum noise levels for all new residential units:

- Exterior —60 dBA Ldn
- Interior —45 dBA Ldn

NO-1.e *Coordinate with Public Agencies.* Work with local, regional, State, and federal agencies to address existing and potential noise impacts, such as vehicle tire sound production and aircraft overflight, and to determine appropriate mitigation measures necessary to meet Acceptable Noise Levels.

NO-1.f *Review Projects Near Gnoss Field.* Review development proposals within the two-mile referral area of Gnoss Field for consistency with the noise criteria set forth in the Countywide Plan and the adopted Airport Land Use Plan.

NO-1.g *Plan for New Helipad.* Require any proposed helipad to provide site-specific environmental review, including detailed noise and safety impact analyses and mitigation, prior to consideration.

NO-1.h *Anticipate Additional Rail Noise.* Once the Sonoma-Marin Area Rail Transit District (SMART) selects a vehicle and evaluates the environmental impacts of proposed regional rail service, including noise impacts, update the Noise Section of the Countywide Plan to include a map showing noise contours along the railroad tracks, and work with SMART to determine appropriate mitigation measures necessary to meet acceptable noise levels.

NO-1.i *Regulate Noise Sources.* Sections 6.70.030(5) and 6.70.040 of the Marin County Code establish allowable hours of operation for construction-related activities. As a condition of permit approval for projects generating significant construction noise impacts during the construction phase, construction management for any project shall develop a construction noise reduction plan and designate a disturbance coordinator at the construction site to implement the provisions of the plan.

NO-1.j *Consider Regulating Outdoor Amplified Music and Equipment.* Evaluate the feasibility of adopting an ordinance regulating the type and time of use of outdoor amplified music and/or motorized outdoor equipment such as leaf blowers, generators, lawn mowers, trimmers, chain saws, and other gas-powered tools (special consideration shall be given to homeowners who perform their own work).

NO-1.k *Minimize Noise Impacts from Temporary Land Uses.* Amend the Development Code to include standards for temporary land uses, such as fairs or exhibits, that require

mitigation of noise impacts on surrounding areas in conformance with State and County noise level guidelines for nearby land uses.

NO-1.l *Enforce Personal Watercraft Ban.* Continue to enforce the ban on personal watercraft in areas where such vessels have been prohibited.

NO-1.m *Limit Sound Walls.* Encourage Caltrans to consider utilizing alternatives to sound walls along Highway 101, such as landscaped berms, sloped walls, and other best technology. Amend the Development Code to include standards for construction of non-sound- wall noise mitigation structures. Consider the impacts of reflected noise resulting from sound wall installation.

Figure 3-44 Relationships of Goals to Guiding Principles
This figure illustrates the relationships of the goal in this section to the Guiding Principles.

Goal	Guiding Principles											
	1. Link equity, economy, and the environment locally, regionally, and globally.	2. Minimize the use of finite resources and use all resources efficiently and effectively.	3. Reduce the use and minimize the release of hazardous materials.	4. Reduce greenhouse gas emissions that contribute to global warming.	5. Preserve our natural assets.	6. Protect our agricultural assets.	7. Provide efficient and effective transportation.	8. Supply housing affordable to the full range of our workforce and diverse community.	9. Foster businesses that create economic, environmental, and social benefits.	10. Educate and prepare our workforce and residents.	11. Cultivate ethnic, cultural, and socioeconomic diversity.	12. Support public health, safety, and social justice.
NO-1 Protection from Excessive Noise			•		•							•

How Will Success Be Measured?

Indicator Monitoring

Nonbinding indicators, benchmarks, and targets.[1] will help to measure and evaluate progress. This process will also provide a context in which to consider the need for new or revised implementation measures.

Indicator	Benchmark	Target
Roadway noise levels at sites identified in Countywide Plan.	See CWP Roadway Noise Comparison dataset.	Increase no more than 2 decibels at identified sites through 2020.

[1] Many factors beyond Marin County government control, including adequate funding and staff resources, may affect the estimated time frame for achieving targets and program implementation.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame.[1] will be dependent upon the availability of adequate funding and staff resources.

Figure 3-45
Noise Program Implementation

Program	Responsibility	Potential Funding	Priority	Time Frame
NO-1.a – Enforce Allowable Noise Levels.	CDA, Sheriff	Existing budget	Medium	Ongoing
NO-1.b – Comply with Acceptable Noise Levels.	CDA	Existing budget	Medium	Short term
NO-1.c – Require Project-Specific Noise Mitigation.	CDA	Existing budget	High	Ongoing
NO-1.d – Set Additional Limits for Housing.	CDA	Existing budget and may require additional grants or revenue.[2]	Medium	Short term
NO-1.e – Coordinate with Public Agencies.	CDA	Existing budget	Medium	Ongoing
NO-1.f – Review Projects Near Gnoss Field.	CDA	Existing budget	High	Ongoing
NO-1.g – Plan for New Helipad.	CDA	Existing budget	High	Ongoing
NO-1.h – Anticipate Additional Rail Noise.	CDA, SMART	Existing budget	High	Long term
NO-1.i – Regulate Noise Sources.	CDA	Existing budget	Medium	Immediate
NO-1.j – Consider Regulating Outdoor Amplified Music and Equipment.	CDA	Will require additional grants or revenue[2]	Medium	Long term
NO-1.k – Minimize Noise Impacts from Temporary Land Uses.	CDA	Existing budget	Medium	Short term

[1] Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–7 years); Long term (over 7 years); and Ongoing (existing programs already in progress whose implementation is expected to continue into the foreseeable future).
[2] Completion of this task is dependent on acquiring additional funding. Consequently, funding availability could lengthen or shorten the time frame and ultimate implementation of this program.

Program	Responsibility	Potential Funding	Priority	Time Frame
NO-1.l – Enforce Personal Watercraft Ban.	Sheriff	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
NO-1.m – Limit Sound Walls.	CDA, Caltrans, TAM	Existing budget	Medium	Ongoing/ short term