Chapter 13
Noise


Photo by Jared G

This chapter identifies and examines the existing road, rail, aircraft, and major stationary noise sources in San Benito County. This includes a discussion of the characteristics of noise and how it impacts neighboring land uses. This chapter contains the following sections:

- Acoustical Background Information and Terminology (Section 13.1)
- Ground Transportation Noise Sources (Section 13.2)
- Aircraft Noise Sources (Section 13.3)
- Stationary Noise Sources (Section 13.4)

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SECTION 13.1 ACOUSTICAL BACKGROUND INFORMATION AND TERMINOLOGY

Introduction

This section provides relevant acoustical background information and terminology used as a reference for the remainder of this chapter.

Key Terms

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.

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.

Community Noise Equivalent Level (CNEL). The average A-weighted noise level during a 24-hour day, obtained after addition of five decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.

Day/Night Noise Level, Ldn or DNL. 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.

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.

Equivalent Noise Level (Leq). The average A-weighted noise level during the measurement period.

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. Infrasonics sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.

Intrusive. 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.

L01, L10, L50, and L90. The A-weighted noise levels that are exceeded 1, 10, 50, and 90 percent of the time during the measurement period.

Lmax and Lmin. The maximum and minimum A-weighted noise level during the measurement period.

Sound Pressure Level. The sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where one Pascal is the pressure resulting from a force of one Newton exerted over an area of one square meter. 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.

Regulatory Setting

There is no regulatory setting for this section.

Major Findings

- There are no major findings for this section.

Existing Conditions

Noise is generally defined as unwanted sound that is usually disturbing or annoying. The objectionable nature of sound can be caused by either its pitch or 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 the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, several noise measurement scales are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. A 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 10-fold increase in acoustic energy, while 20 decibels is 100 times more intense, and 30 decibels is 1,000 times more intense. There is a relationship between the subjective noisiness or loudness of a sound and its intensity, such that each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a range of intensities.

Methods to Measure Noise

There are several methods of characterizing sound. The most common 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. 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 is used. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

TABLE 13-1
TYPICAL ENVIRONMENTAL NOISE LEVELS
San Benito County
2010

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 100 feet		
	100 dBA	
Gas lawn mower at three feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area (daytime)		
Gas lawn mower at 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater or large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night or concert hall (background)
	20 dBA	Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Caltrans, Technical Noise Supplement (TeNS), November 2009.

Effects of Noise

Sleep and Speech Interference

A person's sensitivity to noise increases during the evening and at night because excessive noise interferes with the ability to sleep. Because of this, 24-hour descriptors are used that incorporate artificial noise penalties added to quiet-time noise events. The Community Noise Equivalent Level (CNEL) is a measure of the cumulative noise exposure in a community with a five dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The Day/Night Average Sound Level, CNEL or 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.

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, or 60 dBA and 70 dBA, respectively. Steady noise of sufficient intensity (above 35 dBA) and fluctuating noise levels above 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion to all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is, therefore, possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. Typically, bedrooms facing secondary roadways will need to have their windows closed and bedrooms facing major roadways and freeways will need special glass windows in order to achieve an acceptable interior noise environment.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. These surveys typically show the causes for annoyance include vibrations or interference with speech, radio, television, sleep, and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA L_{dn}. At an L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about two percent per dBA between an L_{dn} of 60-70 dBA. Between an L_{dn} of 70-80 dBA, each decibel increase also increases the percentage of the population highly annoyed by 3 percent. People also appear to respond more adversely to aircraft noise. When the L_{dn} is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about three percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several methods are typically used to quantify the amplitude of vibration including Peak Particle Velocity (PPV) and Root Mean Square (RMS) velocity. PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. RMS velocity is defined as the average of the squared amplitude of the signal. PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

Table 13-2 shows the impact of continuous vibration on human annoyance and buildings. As mentioned earlier, annoyance is a subjective measure and vibrations may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying.

TABLE 13-2
REACTION OF PEOPLE AND DAMAGE TO BUILDINGS
FOR CONTINUOUS NOISE LEVELS
Statewide
2002

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.4 to 0.6	Vibrations considered unpleasant by people subjected to continuous vibrations.	Vibration at this level would cause architectural damage and possibly minor structural damage.
0.20	Vibrations annoying to people in buildings.	Threshold at which there is a risk of architectural damage to normal dwellings such as plastered walls or ceilings.
0.10	Vibrations begin to annoy people.	Virtually no risk of architectural damage to normal buildings.
0.08	Vibrations are readily perceptible.	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected.
0.006 to 0.019	Threshold of perception. Possibility of intrusion.	Vibration unlikely to cause damage of any type.

Source: Caltrans, Transportation Related Earthborne Vibrations (TAV-02-01-R9601), February 20, 2002.

Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. This rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Construction activities can cause vibration that varies in intensity depending on several factors. Pile driving and compaction equipment typically generate the highest construction-related ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the peak particle velocity descriptor (PPV) has been routinely used to measure and assess ground-borne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration – the potential to damage a structure and the potential to interfere with the enjoyment of life – are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.2 to 0.3 mm/sec (0.008 to 0.012 inches/sec) PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits used to assess the potential for damaging a structure vary by researcher; there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is in a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

Railroad operations are potential sources of significant ground vibration, depending on distance, the type and speed of trains, and the type of railroad track. A person's response to ground vibration has been correlated best with the velocity of the ground. The velocity of the ground is expressed on the decibel scale, with a reference velocity of 1 x 10-6 inch/second. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

One of the problems with developing suitable criteria for groundborne vibration is the limited available research into human response to vibration and, more importantly, human annoyance inside buildings. The U.S. Department of Transportation, Federal Transit Administration, has developed rational vibration limits that can be used to evaluate human annoyance to groundborne vibration. These criteria are primarily based on experience with passenger train operations, such as rapid transit and commuter rail systems. The main difference between passenger and freight operations is the time duration of individual events. A passenger train lasts a few seconds, whereas a long freight train may last several minutes, depending on speed and length.

Noise Sensitive Land Uses

Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the primary intended use of the land. Places where people live, sleep, recreate, worship, and study are generally considered to be sensitive to noise because intrusive noise can be disruptive to these activities.

SECTION 13.2 GROUND TRANSPORTATION NOISE SOURCES

Introduction

This section summarizes the results of efforts to measure and calculate existing ambient noise exposure from ground transportation-related noise throughout San Benito County. This section includes results of ambient noise level surveys and specific noise level measurements completed to document existing train and roadway noise exposure. Additionally, this section summarizes the results of modeling completed to establish existing traffic noise exposure for the most significant County roadways.

Key Terms

See Key Terms under Section 13.1.

Regulatory Setting

California Code of Regulations (Title 24). Known as the California Building Code, it contains standards for allowable interior noise levels associated with exterior noise sources. The standards state that "Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room." The standards apply to new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family residential. The code goes on to indicate that: "Residential structures to be located where the annual Ldn or CNEL exceeds 60 dB shall require an acoustical analysis showing that the proposed design will achieve the prescribed allowable interior level. For public use airports or heliports the Ldn or CNEL shall be determined from the airport land use plan prepared by the County in which the airport is located. For all other airports or heliports, or public use airports or heliports for which a land use plan has not been developed, the Ldn or CNEL shall be determined from the noise element of the general plan of the local jurisdiction."

California Code of Regulations (Title 21). The State Division of Aeronautics has adopted standards for airport-related noise. The standards establish an acceptable noise level of 65 dB for uses in the vicinity of airports. This standard applies to persons residing in urban residential areas where houses are of typical California construction and may have windows partially open.

California Department of Transportation Construction Vibration. There are no State plans, policies, regulations or laws related to groundborne vibration that are applicable to the general plan. However, California Department of Transportation (Caltrans) has adopted guidance for construction vibrations. Caltrans uses a vibration limit of 12.7 mm/sec (0.5 inches/sec) Peak Particle Velocity (PPV) for buildings that are structurally sound and designed to modern engineering standards. A conservative vibration limit of five mm/sec (0.2 inches/sec) PPV has been used for buildings that are found to be structurally sound but where structural damage is a major concern. For historic buildings or buildings that are documented to be structurally weakened, a conservative limit of two mm/sec (0.08 inches/sec) PPV is often used to provide the highest level of protection. All of these limits have been used successfully and compliance with these limits has not been known to result in appreciable structural damage. All vibration limits referred to in this chapter apply on the ground level and take into account the response of structural elements (i.e., walls and floors) to ground-borne excitation.

California Government Code Section 65302(f). California Government Code Section 65302(f) requires all General Plans to include a Noise Element that addresses noise-related impacts in the community. The

State Office of Planning and Research (OPR) has prepared guidelines for the content of the noise element, which includes the development of current and future noise level contour maps. These maps must include contours for the following sources:

- Highways and freeways.
- Primary arterials and major local streets.
- Passenger and freight on-line railroad operations and ground rapid transit systems.
- Commercial, general aviation, heliport, and military airport operations, aircraft flyovers, jet engine tests stands, and all other ground facilities and maintenance functions related to airport operation.
- Local industrial plants, including, but not limited to, railroad classification yards.
- Other stationary ground noise sources identified by local agencies as contributing to the community noise environment.

Federal Transportation Administration Vibration Impact Criteria. The Vibration Impact Criteria thresholds adopted by the Federal Transit Administration are designed to identify acceptable noise levels for noise-sensitive buildings, residences, and institutional land uses near railroads. The thresholds that apply to residences and buildings where people normally sleep (e.g., nearby residences) are 72 VdB for frequent events (more than 70 events of the same source per day), 75 VdB for occasional events (30 to 70 vibration events of the same source per day), and 80 VdB for infrequent events (less than 30 vibration events of the same source per day).

HUD Environmental Criteria and Standards, 24 CFR Part 51. The Federal Department of Housing and Urban Development (HUD) requires new residential construction qualifying for HUD financing proposed in high noise areas (exceeding 65 dBA Ldn) to incorporate noise attenuation features to maintain acceptable interior noise levels. HUD requires that all structures provide sufficient attenuation to achieve an interior level of 45 dBA Ldn or less if the exterior level is 65 dBA Ldn or less. HUD approvals in a "normally unacceptable noise zone" (exceeding 65 decibels but not exceeding 75 decibels) requires a minimum of five decibels additional noise attenuation for buildings if the day-night average is greater than 65 decibels but does not exceed 70 decibels, or minimum of 10 decibels of additional noise attenuation if the day-night average is greater than 70 decibels but does not exceed 75 decibels.

Title 23 of the Code of Federal Regulations, Part 772. The Federal Highway Administration (FHWA) requires new Federal or Federal-aid highway construction projects, or alterations to existing highways that significantly change either the horizontal or vertical alignment and/or increases the number of through-traffic lanes, to abatement noise per Title 23 of the Code of Federal Regulations. FHWA considers noise abatement for sensitive receivers such as picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals when “worst-hour” noise levels approach or exceed 67 dBA Leq. Caltrans has further defined the definition of approaching the NAC to be 1 dBA below the NAC (e.g., 66 dBA Leq is considered approaching the NAC for Category B activity areas).

Major Findings

- Roadway traffic is the most significant source of noise affecting sensitive land uses in the county. U.S. Highway 101 and State Routes 25, 156, 152 (located just north and outside of San Benito

County), and 129 are the most significant sources of traffic noise. Major arterial roadways are also significant sources of traffic noise at land uses adjoining these roadways.

- Other ground-based transportation noise sources that contribute to community noise levels include intermittent operations associated with the Union Pacific Railroad along the Gilroy-Watsonville and the Gilroy-Hollister tracks.

- Existing noise levels in rural areas of the county that are not located near ground transportation sources are relatively low.

Existing Conditions

The ambient noise environment in San Benito County is predominantly the result of transportation-related noise sources. Traffic continues to be the most significant source of noise affecting sensitive land uses in the county. U.S. Highway 101 and State Routes 25, 156, 152, and 129 are the most significant sources of traffic noise. Major arterial roadways are also significant sources of traffic noise at land uses adjoining these roadways. Other transportation-related noise sources that contribute to community noise levels include intermittent operations associated with the Union Pacific Railroad and aircraft. Stationary noise sources include industrial land uses such as recreational vehicle areas and rock quarries.

The daily trends in noise levels were measured at seven locations throughout the county between September 2009 and March 2010 (Figure 13-1). Six locations were selected along major roadways traversing the county and one location was selected along the Gilroy-Hollister Union Pacific Railroad Spur. Previously-prepared noise data was also reviewed and incorporated into the data set as appropriate. Standard measuring practices were followed for all measurements, which included calibrating precision sound level meters before and after each survey, fitting microphones with windscreens, and gathering data during good weather. The following is a summary of noise data collected at each of these sites (Table 13-6 includes additional detail on the location and characteristics of each collection area):

- **LT-1 (SR 156, South of Fairview Rd).** The primary noise source at this location was traffic along State Route 156. Hourly average noise levels ranged from about 58 dBA L_{eq} to 64 dBA L_{eq} during the daytime and from about 55 dBA L_{eq} to 62 dBA L_{eq} at night. The calculated day-night average noise level at this location was 66 dBA L_{dn}.

- **LT-2 (SR 129).** The primary noise source at this location was automobile traffic along State Route 129. Hourly average noise levels ranged from about 60 dBA L_{eq} to 65 dBA L_{eq} during the day and from about 53 dBA L_{eq} to 62 dBA L_{eq} at night. The calculated day-night average noise level at this location was 66 dBA L_{dn}.

- **LT-3 (UPRR spur along SR 25) northwest of the City of Hollister.** The primary noise sources at this location were traffic along Wright Road and passing trains. Hourly average noise levels ranged from about 58 dBA L_{eq} to 74 dBA L_{eq} during the day and from about 48 dBA L_{eq} to 60 dBA L_{eq} at night. The calculated day-night average noise level at this location was 68 dBA L_{dn}.

- **LT-4 (SR 156).** The primary noise source at this location was automobile traffic along SR 156. Hourly average noise levels ranged from about 63 dBA L_{eq} to 68 dBA L_{eq} during the day and from about 58 dBA L_{eq} to 65 dBA L_{eq} at night. The calculated day-night average noise level at this location was 70 dBA L_{dn}.

- **LT-5 (SR 25, north of Panoche Rd).** The primary noise source at this location was traffic along State Route 25. Hourly average noise levels ranged from about 48 dBA L_{eq} to 59 dBA L_{eq} during the day and from about 33 dBA L_{eq} to 57 dBA L_{eq} at night. The calculated day-night average noise level at this location was 59 dBA L_{dn}.

- **LT-6 (Pinnacles Highway 146).** The primary noise source at this location was automobile traffic along State Routes 146 and 25. Hourly average noise levels ranged from about 37 dBA L_{eq} to 52 dBA L_{eq} during the day and from about 26 dBA L_{eq} to 41 dBA L_{eq} at night. The calculated day-night average noise level at this location was 50 dBA L_{dn}.

- **LT-7 (San Felipe Road).** The primary noise source at this location was traffic along San Felipe Road. Hourly average noise levels ranged from about 60 dBA L_{eq} to 70 dBA L_{eq} during the day and from about 55 dBA L_{eq} to 64 dBA L_{eq} at night. The calculated day-night average noise level at this location was 68 dBA L_{dn}.

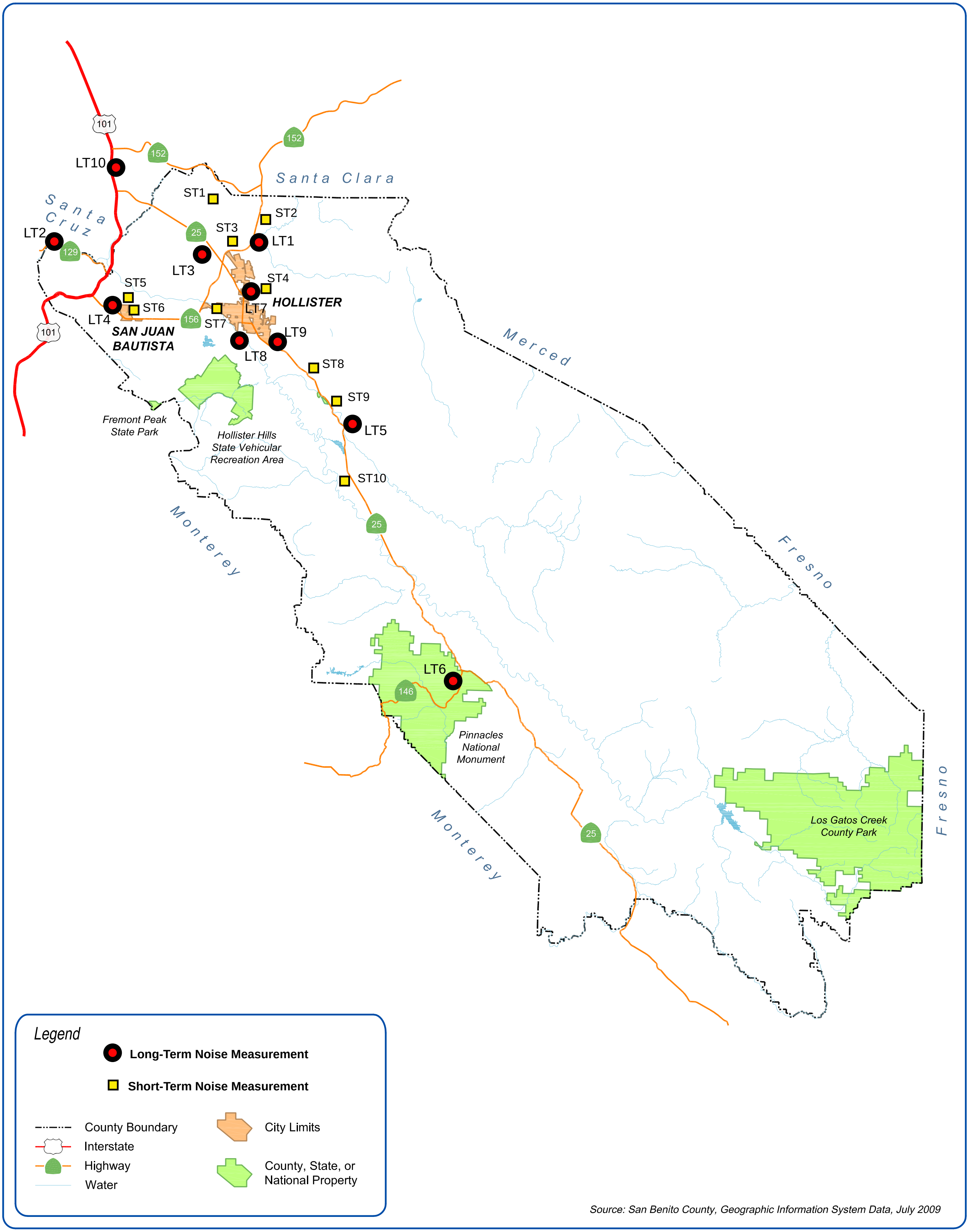
- **LT-8 (Union Road).** The primary noise source at this location was traffic along Union Road. Hourly average noise levels ranged from about 67 dBA L_{eq} to 73 dBA L_{eq} during the day and from about 59 dBA L_{eq} to 65 dBA L_{eq} at night. The calculated day-night average noise level at this location was 74 dBA L_{dn}.

- **LT-9 (Fairview Road).** The primary noise source at this location was traffic along Fairview Road, with minor contributions from Airline Highway. Hourly average noise levels ranged from about 66 dBA L_{eq} to 73 dBA L_{eq} during the day and from about 54 dBA L_{eq} to 66 dBA L_{eq} at night. The calculated day-night average noise level at this location was 71 dBA L_{dn}.

- **LT-10 (Highway 101).** The primary noise source at this location was traffic along Highway 101. Hourly average noise levels ranged from about 66 dBA L_{eq} to 70 dBA L_{eq} during the day and from about 60 dBA L_{eq} to 66 dBA L_{eq} at night. The calculated day-night average noise level at this location was 73 dBA L_{dn}.

TABLE 13-6 DAY-NIGHT AVERAGE NOISE LEVELS AT SELECTED LOCATIONS IN SAN BENITO COUNTY San Benito County 2009-2010			
Location	**L_{dn}**	**Peak Hour L_{eq}**	**Measurement Locations**
LT-1 (State Route 156)	66	64	118 feet from road centerline
LT-2 (State Route 129)	66	64	75 feet from road centerline
LT-3 (Wright Road/UPRR)	68	69	50 feet from railroad centerline and included intermittent transportation
LT-4 (State Route 156)	70	68	200 feet from road centerline
LT-5 (State Route 25)	59	57	190 feet from State Route 25 centerline at Willow Grove School
LT-6 (Pinnacles Hwy 146)	50	49	35 feet from road centerline in a quite countryside area
LT-7 (San Felipe Road)	68	66	170 feet from road centerline
LT-8 (Union Road)	74	73	30 feet from road centerline
LT-9 (Fairview Road)	71	70	33 feet from road centerline in a residential area
LT-10 (Highway 101)	73	71	190 feet from Highway 101 centerline.

Source: Illingworth & Rodkin, based on field research conducted between November 2009 and February 2010.



Source: San Benito County, Geographic Information System Data, July 2009

Figure 13-1
Freeway and Highway Noise Sources

Short-term noise measurements were made along local roadways at ten locations as indicated in Table 13-7. These measurements were made in concurrent time intervals with data being collected at nearby long-term noise measurement sites to provide for a direct comparison of the noise data and to estimate daily average noise levels at the short-term sites. Measurements were made for a period of 10-minutes at a height of 5 feet above the ground and at least 10 feet from structures or barriers. Of the ten short-term measurements, five locations represented noise levels along State highways, three represented noise levels along heavily traveled arterial roadways, and two represented noise levels along lightly traveled collector roadways.

In some instances the data collected during the short-term noise measurements contained loud events such as passing trucks. In quieter residential areas, such loud events are atypical, and the measured average noise level could not be used to estimate the L_{dn}. Where a direct comparison could not be made, the FHWA traffic noise model was used to calculate peak-hour traffic noise levels. Estimates of daily average noise levels were then made based on the traffic noise modeling results.

TABLE 13-7
SHORT-TERM NOISE MEASUREMENTS AT SELECTED LOCATIONS IN SAN BENITO COUNTY
San Benito County
2009-2010

#	Location	Date Time	Measured Leq (dBA)	Ldn (dBA)*
ST-1	70 feet from the centerline of Shore Road near of Lake Road	3/11/2010 14:40 to 14:50	67	71
ST-2	160 feet from the centerline of SR 156, south of Fairview Road	3/11/2010 15:00 to 15:10	63	64
ST-3	140 feet from the centerline of SR 25, along Briggs Road	9/10/2009 13:20 to 13:30	63	68
ST-4	42 feet from the centerline of McCloskey Road, near intersection with San Felipe Road	9/10/2009 12:50 to 13:00	67	71
ST-5	48 feet from the centerline of Monterey Street at Church Street, westernmost limit of San Juan Batista	3/11/2010 13:40 to 13:50	53	57
ST-6	28 feet from the centerline of Third Street at Polk Street in downtown San Juan Bautista	3/11/2010 13:10 to 13:20	60	64
ST-7	60 feet from the centerline of 4th Street/San Juan Road, westernmost limit of Hollister	3/11/2010 15:40 to 15:50	69	70
ST-8	75 feet from the centerline of SR 25, along 4th Street in Tres Pinos	3/11/2010 12:00 to 12:10	62	65
ST-9	100 feet from the centerline of SR 25 along Murphy Road	3/11/2010 10:20 to 10:30	58	61
ST-10	285 feet from the centerline of SR 25 and 27 feet from the centerline of Cienega Road	3/11/2010 10:50 to 11:00	57	58

* Determined from correlation with long-term monitoring site and/or traffic noise modeling.
Source: Illingworth & Rodkin, based on field research conducted between November 2009 and February 2010.

Existing day-night average traffic noise contours, or distances at which noise reaches a particular level from a noise source, are summarized in Table 13-8. The traffic noise contours were developed based on measured noise data as well as modeled results. This table presents distances measured in feet from the roadway centerline. The noise contour distances assume standard attenuation rates per doubling of distance from the noise source and do not account for shielding provided by noise barriers or buildings. Noise contours presented in this table do not assume shielding from barriers or structures and, therefore, may overestimate noise levels at receivers located away from the major transportation noise sources affecting the portions of San Benito County. The contours, however, do present credible worst-case noise levels, which should be used as a screening tool in future land use decisions.

TABLE 13-8
EXISTING DAY-NIGHT AVERAGE (L_{DN}) TRAFFIC NOISE CONTOURS
San Benito County
2010

Roadway Segment	Average Daily Traffic Volume (ADT)	70 dBA L_{dn}	65 dBA L_{dn}	60 dBA L_{dn}
Route 25				
Panoche Rd to Southside Rd (Tres Pinos)	2,259	--*	50	120
Southside Rd (Tres Pinos) to Fairview Rd	9,505	--	70	140
Fairview Rd to Tres Pinos Rd/Sunnyslope Rd	19,328	70	180	340
Nash Rd to Santa Ana Rd	26,475	100	240	420
Santa Ana Rd to San Felipe Rd/Bolsa Rd	16,716	60	160	300
San Felipe Rd/Bolsa Rd to SR 156	21,486	80	200	360
SR 156 to Shore Rd	23,418	90	220	390
Shore Rd to County Line	22,850	90	210	380
Route 101				
County Line to SR 156 (east)	61,576	280	600	1,300
SR 129 to County Line	56,064	260	560	1,210
Route 129				
County Line to US 101	11,846	--	80	170
Route 156				
US 101 to The Alameda	22,999	200	430	920
The Alameda to Union Rd/Mitchell Rd	18,913	70	170	310
Union Rd/Mitchell Rd to SR 25	16,198	60	150	280
SR 25 to San Felipe Rd	9,553	--	90	190
San Felipe Rd to County line	12,431	--	120	230
Buena Vista Road				
SR 156 to Locust Av	2,080	--	--	100
Cienega Road				
Union Rd to Hospital Rd	2,290	--	--	80
Fairview Road				

TABLE 13-8 EXISTING DAY-NIGHT AVERAGE (L_{DN}) TRAFFIC NOISE CONTOURS San Benito County 2010				
Roadway Segment	Average Daily Traffic Volume (ADT)	70 dBA L_{dn}	65 dBA L_{dn}	60 dBA L_{dn}
Union Rd ext. to Airline Hwy	3,890	--	110	210
Hillcrest Rd to Sunnyslope Rd	7,300	60	150	280
Meridian St to Hillcrest Rd	8,820	70	180	320
McCloskey Rd to Santa Ana Rd	7,820	60	160	300
Fallon Rd to McCloskey Rd	6,660	50	140	260
SR 156 to Orchard Rd	4,560	--	120	240
San Felipe Rd to SR 156	4,650	50	120	240
Fallon Road				
San Felipe Rd to Fairview Rd	5,791	60	150	280
Frazer Lake Road				
Bloomfield Av to Pacheco Pass Hwy (SR 152)	3,700	--	80	170
Shore Rd to Bloomfield Av	4,002	--	90	180
Hillcrest Road				
San Benito St to Clearview Dr	8,666	70	170	320
Clearview Dr to Fairview Rd	3,100	--	70	150
John Smith Road				
Fairview Rd to Best Rd	760	--	--	60
Ladd Lane				
Southside Rd to Nash Rd	7,260	--	100	200
McCloskey Road				
San Felipe Rd to Fairview Rd	4,160	--	110	210
Mitchell Road				
Freitas Rd to SR 156	2,390	--	60	120
Nash Road				
San Benito St to Airline Hwy	15,980	50	140	270
Ridgemark Drive				
Airline Hwy to Joes Ln	4,310	--	--	130
San Benito Street				
Nash Rd to Union Rd	6,590	--	70	160
San Felipe Road				
Wright Rd/McCloskey Rd to SR 25	13,400	130	290	490
Fallon Rd to Wright Rd/McCloskey Rd	10,680	50	140	270
SR 156 to Fallon Rd	6,433	--	110	220
Shore Rd/Fairview Rd to SR 156	2,610	--	50	110
SR 152 to Shore Rd/Fairview Rd	910	--	--	60
Santa Ana Road				

TABLE 13-8 EXISTING DAY-NIGHT AVERAGE (L_{DN}) TRAFFIC NOISE CONTOURS San Benito County 2010				
Roadway Segment	**Average Daily Traffic Volume (ADT)**	**70 dBA L_{dn}**	**65 dBA L_{dn}**	**60 dBA L_{dn}**
San Felipe Rd to Fairview Rd	6,239	--	110	210
Santa Ana Valley Road				
Fairview Rd to Quien Sabe Rd	860	--	--	70
Shore Road				
Frazer Lake Rd to San Felipe Rd	5,560	80	200	360
Southside Road				
Enterprise Rd to Blossom Ln	2,390	--	50	140
Union Rd to Enterprise Rd	3,100	--	70	170
Ladd Ln to Union Rd	2,550	--	60	150
Sunnyslope Road				
Airline Hwy to Fairview Rd	14,395	120	270	460
The Alameda				
SR 156 to San Juan Hollister Rd	1,003	--	--	50
Franklin St to SR 156	3,920	--	70	150
Union Road				
Airline Hwy to Valley View Rd	6,450	--	50	110
Southside Rd to Airline Hwy	7,870	50	130	250
San Benito St to Southside Rd	9,610	60	150	280
Cienega Rd to San Benito St	10,560	60	160	300
SR 156 to Nothing Rd	8,110	50	130	250
Wright Road				
SR 25 to San Felipe Rd	2,900	--	--	130
Buena Vista Rd to SR 25	1,004	--	--	90

* Data not reported within 50 feet of roadway centerline.

Source: Illingworth & Rodkin, based on field research conducted between November 2009 and February 2010.

Railroad Noise

Railroad operations are potential sources of noise and substantial ground vibration. The following two Union Pacific railroad tracks run through San Benito County, both of which are sources of intermittent, high-level noise:

- **Gilroy-Hollister Track.** This track roughly parallels State Route 25 in an agricultural/rural area in the northwest part of the county. The UPRR spur serves local businesses on an as-needed basis, with three to five freight trains operating irregularly over the course of a week, as indicated by the 1984 San Benito County General Plan. The year 2005 L_{dn} 50 dB railroad noise contour (the point at which average rail noise is L_{dn} 50 dB) is 110 feet from the track.

- **Gilroy-Watsonville Track.** This track is located west of Highway 101, runs within the northwestern part of the county near Aromas. The 1984 General Plan indicates that two passenger trains and eight freight trains operate on this track per day. The 2005 L_{dn} 60 and 65 dB railroad noise contours are 350 and 190 feet from the track, respectively.

The most significant source of noise associated with intermittent railroad trains are train warning whistles. Unless a “quiet zone” has been established, trains that travel at a speed less than 45 mph are required to sound their warning whistle at all public grade crossings at least 15 seconds, but not more than 20 seconds, prior to entering a crossing to warn pedestrians and motorists of the oncoming train. These warning whistles can produce maximum noise levels up to 110 dBA L_{max} at 50 feet.

Trains also result in groundborne vibration. Assuming a travel speed of 30 to 35 mph, groundborne vibration levels would be expected to reach 80 VdB within approximately 50 to 75 feet from the centerline of the railroad track.

SECTION 13.3 AIRCRAFT NOISE SOURCES

Introduction

This section focuses on noise generated by aircraft operating out of the airports in the San Benito County. There are currently (2010) two public-use airports within San Benito County: Hollister Municipal Airport and the Frazier Lake Airpark. Aircraft/Airport noise exposure for each of these airports is presented in the Airport Land Use Compatibility Plan (ALUCP). This noise exposure is presented in the form of Community Noise Equivalent Level (CNEL) contours, as mandated by Title 21 of the California Code of Regulations. The CNEL contours represent 24-hour average noise exposure due to annual-average Airport operations.

Key Terms

See Key Terms under Section 13.1.

Regulatory Setting

See Regulatory Setting under Section 13.2.

Federal Aviation Regulations (FAR) Part 150, Airport Noise Compatibility Planning. Advisory in nature, it prescribes a system for measuring airport noise impacts and presents guidelines for identifying incompatible land uses. Completion of an FAR Part 150 plan by the airport proprietor is a prerequisite for obtaining Federal Aviation Administration funding for noise abatement projects.

California Government Code, Sections 65302 (f) (Title 7, Division 1, Chapter 3, Article 5). Requires that a noise element be included as part of local general plans. Airports and heliports are among the noise sources specifically to be analyzed. To the extent possible, both current and future noise contours (expressed in terms of either CNEL or DNL) are to be included. The noise contours are to be “used as a guide for establishing a pattern of land uses…that minimizes the exposure of community residents to excessive noise.”

Major Findings

- Hollister Municipal Airport and Frazier Lake Airpark operations are significant contributors to ambient noise levels in their immediate vicinities.

- Aircraft noise levels in the remaining parts of the county are generally compatible with noise-sensitive land uses.

Existing Conditions

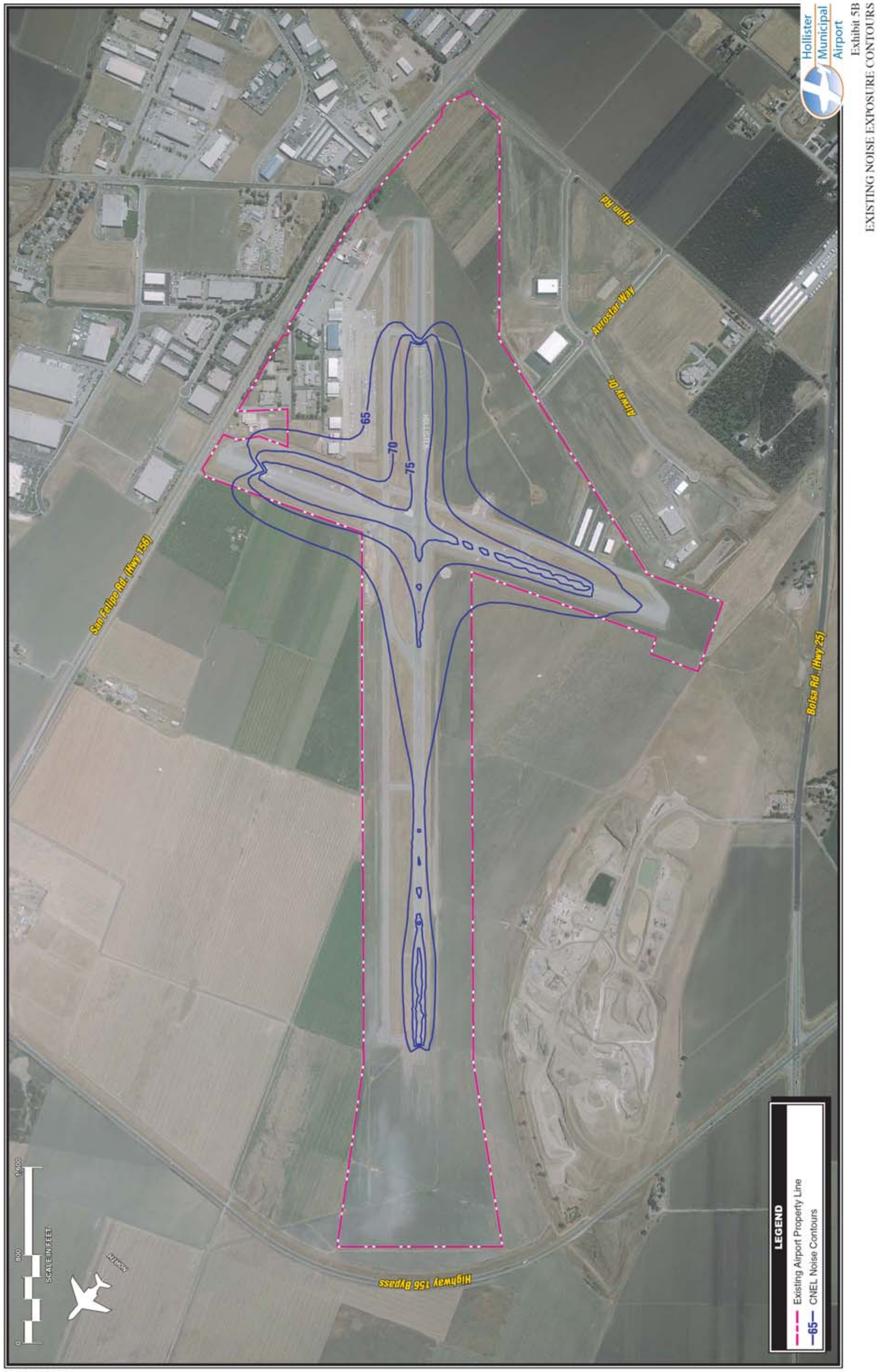
Aircraft noise in California is described in terms of the CNEL, which is approximately equivalent to the day/night average noise level (L_{dn}), but includes a 5 dB weighting factor for the evening hours (7:00 p.m. to 10:00 p.m.).

Hollister Municipal Airport

Hollister Municipal Airport, located on the west side of San Felipe Road at Airport Drive in Hollister, averages about 180 aircraft operations per day. This includes general aviation (57 percent), transient general aviation (41 percent), and military operations (2 percent). Existing noise contours presented in the Hollister Municipal Airport Master Plan (2003) are shown on Figure 13-2. The 65 dBA CNEL noise contour generated by Hollister Municipal Airport is generally limited to airport property. The 65 dBA CNEL is considered the maximum allowable noise level that would be compatible with underlying noise-sensitive land uses.

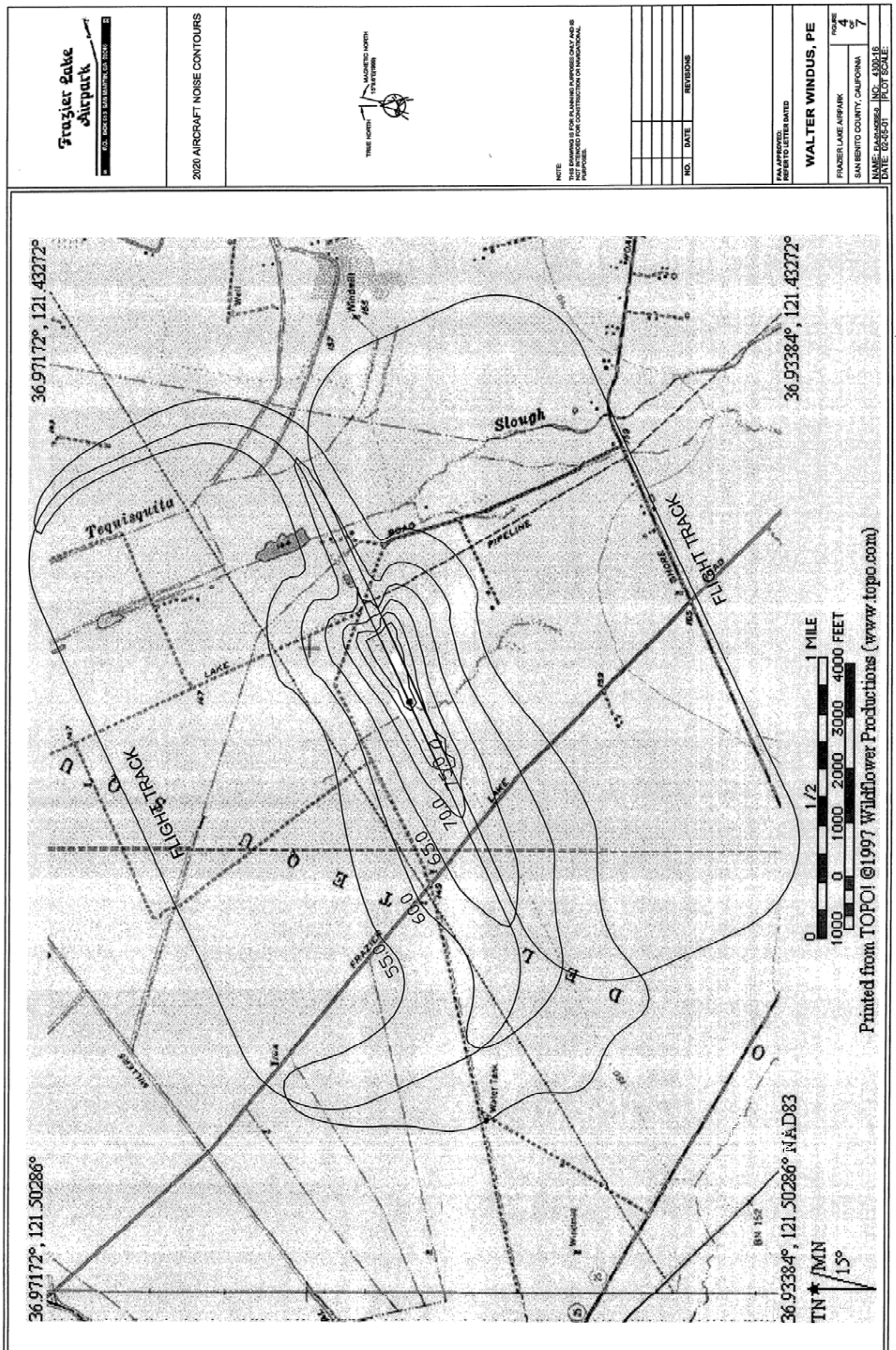
Frazier Lake Airpark

Frazier Lake Airpark is located approximately eight miles northwest of Hollister at 7901 Frazer Lake Road. The Airpark averages about 21 aircraft operations per day, of which approximately 67 percent are transient general aviation and 33 percent are local general aviation. Existing and future (2020) noise contours for the Frazier Lake Airpark are shown on Figure 13-3. The 65 dBA CNEL noise contour generated by the Airpark is generally limited to airport property. The 65 dBA CNEL is considered the maximum allowable noise level that would be compatible with underlying noise-sensitive land uses.



Source: San Benito County, Comprehensive Land Use Plan for Hollister Airport, 2001

Figure 13-2
Hollister Airport Existing Noise Exposure Contours



Source: San Benito County, Comprehensive Land Use Plan for Frazier Lake Airpark, 1997

Figure 13-3

2020 Noise Contours for Fraiser Lake Airpark

SECTION 13.3 STATIONARY NOISE SOURCES

Introduction

This section discusses several fixed-noise sources within San Benito County. Site-specific noise analyses should be performed where similar sources are proposed near noise-sensitive uses, or where noise-sensitive uses are proposed near established stationary noise sources.

Key Terms

See Key Terms under Section 13.1.

Regulatory Setting

See Regulatory Setting under Section 13.2.

Major Findings

- Existing stationary noise sources can generate noise levels that are not compatible with adjacent sensitive land uses.
- The development of new stationary noise sources can be constrained by existing noise-sensitive land uses that are not compatible with proposed noise-generating uses.

Existing Conditions

There are a number of significant stationary noise sources in San Benito County. The most significant is Hollister Hills State Vehicular Recreation Area, located southwest of the city of Hollister, approximately 1.25 miles south of Union Road. This facility is located in the Gabilan Mountains and is operated by the Off-Highway Motor Vehicle Recreation division of California State Parks. It consists of 3,200-acres for motorcyclists, 4x4s, picnickers, and campers. Public use of the facility is only permitted between sunrise and sunset. Noise from this facility is audible and disturbing to some residential and commercial land uses (e.g., wineries) in the immediate vicinity.

Another significant stationary noise source is A.R. Wilson Quarry, located at the end of Quarry Road in Aromas. Noise generated at this quarry includes the sound of heavy equipment used in mineral resource extraction, processing operations, and the loading and operation of trucks and rail cars. Truck traffic to and from the quarry is also a substantial contributor to traffic noise levels along roadways serving the site.

In addition to the two significant stationary noise sources, other uses, such as agricultural operations, industrial uses, and service commercial uses such as automotive repair facilities, wrecking yards, tire installation centers, car washes, transfer yards, and loading docks, are found at various locations throughout San Benito County. The noise emissions from these uses are dependent on many factors and are, therefore, difficult to precisely quantify. Noise generated by these uses contributes to the ambient noise environment in their immediate vicinity and should be considered where either new noise-sensitive uses are proposed nearby or where similar uses are proposed near existing residential areas.