



The purpose of the Noise Element is to identify the noise sources that exist in the Planning Area, and to establish policies and programs which the City can enact to mitigate potential impacts through both preventative and responsive measures. Noise from motor vehicles and aircraft operations are regulated by state and federal agencies. Noise considerations also inform the location of industrial land uses and transportation facilities, since they are common sources of excessive noise levels, and the location of noise-sensitive uses such as residences, schools, churches, and hospitals, so that they may be less affected by noise.

9.1 NOISE CHARACTERISTICS AND MEASUREMENT

Noise is commonly defined as undesirable or unwanted sound. Noises vary widely in their scope, source, and volume, ranging from individual occurrences such as leaf blowers, to the intermittent disturbances of overhead aircraft, to the fairly constant noise generated by traffic on freeways.

Three aspects of community noise are used in assessing the noise environment:

- **Level** (e.g., magnitude or loudness). Sound levels are measured and expressed in decibels (dB) with 10 dB roughly equal to the threshold of hearing. Figure 9-1 shows the decibel levels associated with different common sounds. Transient noise events may be described by their maximum A-weighted noise level (dBA).
- **Frequency** composition or spectrum. Frequency is a measure of the pressure fluctuations per second, measured in units of hertz (Hz). The characterization of sound level magnitude with respect to frequency is the sound spectrum, often described in octave bands, which divide the audible human frequency range (e.g., from 20 to 20,000 Hz) into ten segments.
- **Variation** in sound level with time, measured as noise exposure. Most community noise is produced by many distant noise sources that change gradually throughout the day and produce a relatively steady background noise having no identifiable source. Identifiable events of brief duration, such as aircraft flyovers, cause the community noise level to vary from instant to instant. A single number called the equivalent sound level or L_{eq} describes the average noise exposure level over a period of time. Hourly L_{eq} values are called Hourly Noise Levels.

Reporting Noise Levels

Measuring and reporting noise levels involves accounting for variations in sensitivity to noise during the daytime versus nighttime hours. Noise descriptors used for analysis need to factor in human sensitivity to nighttime noise when background

noise levels are generally lower than in the daytime and outside noise intrusions are more noticeable. Common descriptors include the Community Noise Equivalent Level (CNEL) and the Day-Night Average Level (DNL). Both reflect noise exposure over an average day with weighting to reflect the increased sensitivity to noise during the evening and night. The two descriptors are roughly equivalent. The CNEL descriptor is used in relation to major continuous noise sources, such as aircraft or traffic, and is the reference level for the Noise Element under State planning law.

Knowledge of the following relationships is helpful in understanding how changes in noise and noise exposure are perceived:

- Except under special conditions, a change in sound level of 1 dB cannot be perceived;
- A 3 dB change is considered a just-noticeable difference;
- A 5 dB change is required before any noticeable change in community response would be expected. A 5 dB increase is often considered a significant impact; and
- A 10 dB increase is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response.

In establishing noise contours for land use planning, it is customary to ignore noise attenuation afforded by buildings, roadway elevations, and depressions, and to minimize the barrier effect of natural terrain features. The result is a worst-case estimate of the existing and future (projected) noise environment. The purpose of noise contours is to identify the potential need for more detailed acoustical studies, not to predict with certainty the noise level throughout the City. The assumption is that it is desirable to overestimate the potential noise at a future noise-sensitive development site than to underestimate the noise environment and allow for potentially incompatible land-use development.

9.2 NOISE GENERATION IN PACIFICA

The major noise sources in Pacifica are related to roadways and vehicle traffic, particularly along State Routes 1 and 35. Noise produced by industrial or commercial activity has a negligible effect on the City’s residential noise environment. Figure 9-2 maps existing noise contours.

According to common practice, maximum noise levels of 60 dB (CNEL) are considered “normally acceptable” for unshielded single-family residential development. Noise levels from 60 dB to 70 dB fall within the “conditionally unacceptable” range, and those in the 70 to 75 dB range are considered “normally unacceptable.” Noise levels of up to 65 dB are considered normally acceptable for multi-family housing and lodging, while noise levels of up to 70 dB are normally acceptable for most other uses.

Traffic Noise

The level of traffic noise depends on three factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Vehicle noise is a combination of the noises produced by the engine, exhaust, tires, and wind generated by taller vehicles. Other factors that affect the perception of traffic noise include: distance from the roadway, terrain, vegetation, and natural and structural obstacles. While tire noise from autos is generally located at ground level, truck noise sources can be located as high as ten to fifteen feet above the roadbed due to tall exhaust stacks and higher engines.

Noise exposure contours for Pacifica’s major roadways were modeled by applying the Federal Highway Administration’s noise modeling procedure. Traffic data representing annual average traffic volumes and truck mix, for existing conditions, were obtained from the engineers working on the General Plan Update and Caltrans. Existing noise measurements were made in March 2009 at four locations, three along SR 1 and one along Sharp Park Road. Using these data and the FHWA methodology, traffic noise levels were calculated for existing traffic volumes.

Figure 9-1: Typical Sound Levels

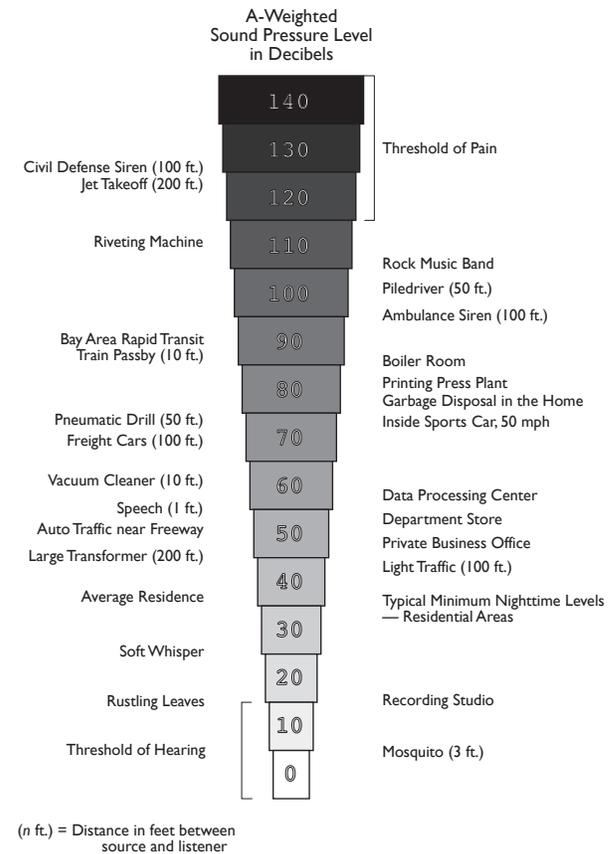
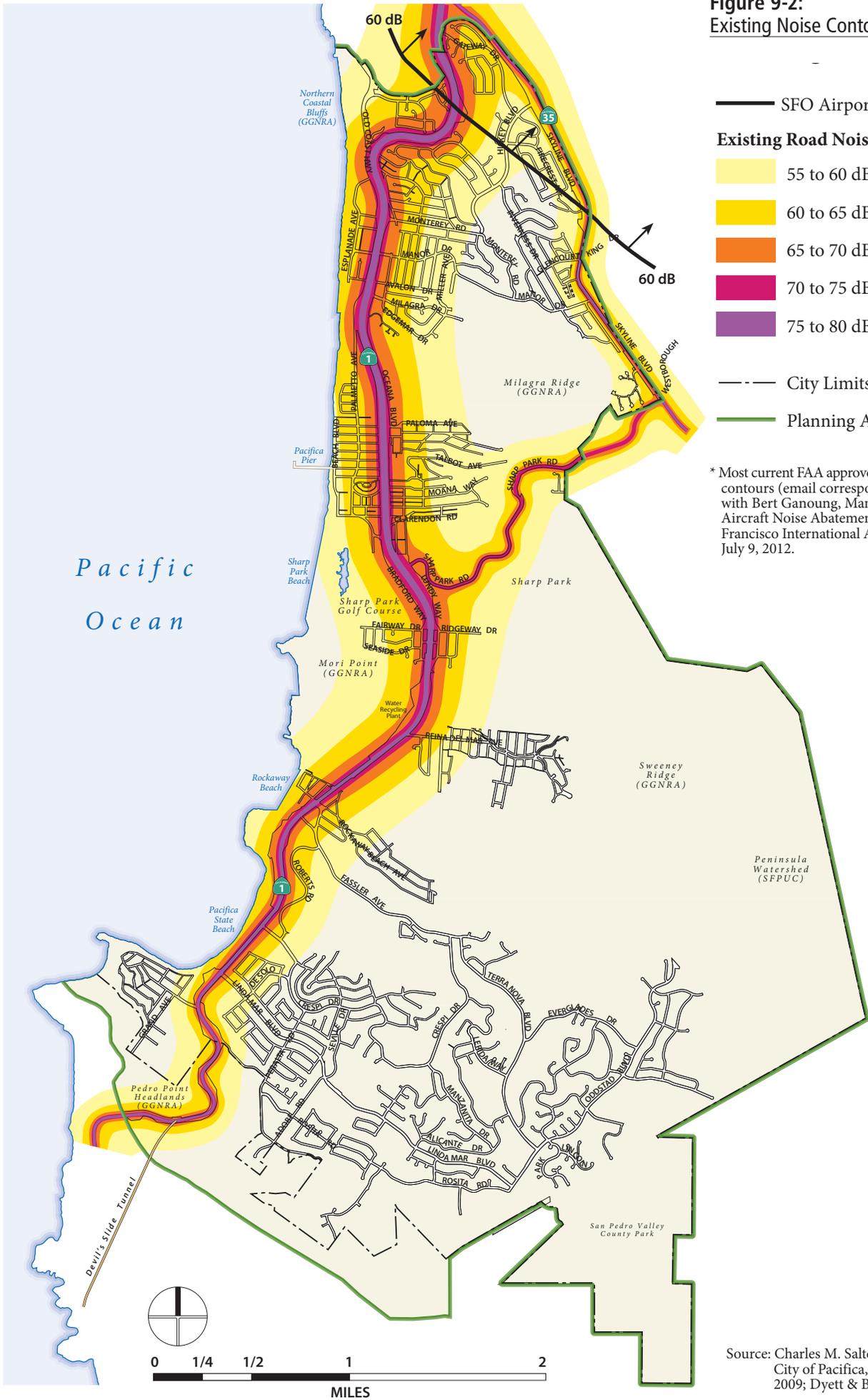


Figure 9-2:
Existing Noise Contours



— SFO Airport Noise Contours*

Existing Road Noise Levels

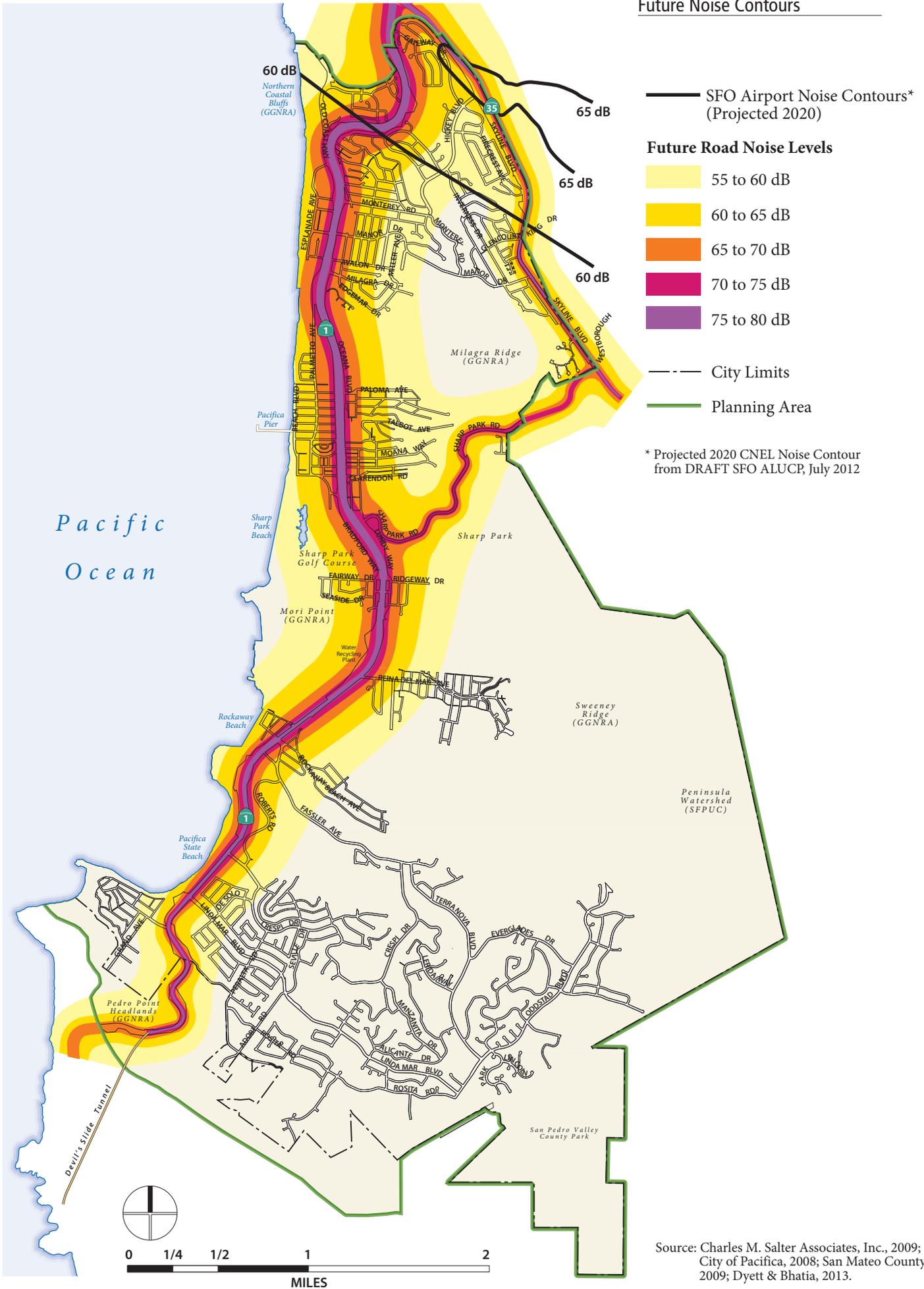
- 55 to 60 dB
- 60 to 65 dB
- 65 to 70 dB
- 70 to 75 dB
- 75 to 80 dB

--- City Limits

— Planning Area

* Most current FAA approved NEM contours (email correspondence with Bert Ganoung, Manager, Aircraft Noise Abatement, San Francisco International Airport, July 9, 2012).

Figure 9-3:
Future Noise Contours



Source: Charles M. Salter Associates, Inc., 2009; City of Pacifica, 2008; San Mateo County, 2009; Dyett & Bhatia, 2013.



Vehicle noise is a combination of the noises produced by the engine, exhaust, tires, and wind generated by taller vehicles (top). Locating noise-sensitive uses away from high-noise areas and buffering noise levels through design and landscaping features will help minimize future noise-related land use conflicts (middle). Nearby SFO's noise abatement programs aim to minimize the effects of aircraft noise on communities (bottom).

Based on this analysis, about 1,180 acres or 15 percent of the Planning Area were in areas with traffic noise levels greater than 60 dB (CNEL). These areas include approximately 433 acres designated for medium or low density residential development with community noise levels between 60 and 70 dB, considered “conditionally acceptable” for single-family or townhouse development, and 26 acres of medium or low density land with community noise levels over 70 dB, considered “normally unacceptable.” Another 32 acres of high density residential and mixed use land is affected by noise levels of between 65 and 70 dB, considered “conditionally acceptable” for multi-family development, and four acres of land in these categories is currently exposed to unacceptable noise levels over 70 dB. In general, the further development is from Sharp Park Road, SR 35, and especially SR 1, the less noise is likely to be experienced.

Projected Noise Sources and Levels

Future development within the Planning Area will result in increased traffic volumes, thus increasing noise levels in some areas. Future noise contours are illustrated in Figure 9-3. In 2035, an estimated 1,433 acres or 19 percent of the Planning Area will be within areas with noise levels greater than 60 dB (CNEL). About 5410 acres of low and medium density residential land would be exposed to the “conditionally acceptable” 60 to 70 dB range, up from 433 acres today, while 44 acres would have “unacceptable” noise, up from 26 acres today. Acreage of conditionally acceptable high density and mixed use land would rise from 32 to 42 acres, and land in these categories exposed to unacceptable noise levels would increase from 4 to 9 acres.

Locating noise-sensitive uses away from high-noise areas (e.g. major transportation routes) and buffering noise levels through design features will help minimize future noise-related land use conflicts. Policies in this chapter establish review criteria for certain land uses to ensure that future noise levels will not exceed acceptable levels near noise-sensitive land uses.

Airport Noise

The greatest potential for noise intrusion from airports occurs when aircraft land, take off, or run their engines while on the ground. San Francisco International Airport (SFO) is located approximately four miles east of the Planning Area. Noise contours developed for SFO show noise levels elevated above 60 dB extending over approximately 117 acres in the northeastern corner of the Planning Area, in the Fairmont neighborhood, including 88 acres of residential land. Airport noise is projected to increase so that by 2020 an estimated 251 acres in Pacifica, including 175 acres of residential land, would experience aircraft noise levels above 60 dB.¹ No part of the Planning Area is currently within the 65 dB CNEL noise contour. By 2020, the 65 dB contour is expected to affect eight acres of the Planning Area, including 5 acres of residential land. This contour is the current eligibility threshold for noise-affected sensitive uses to receive funding through SFO's Residential Sound Insulation Program.

SFO's Aircraft Noise Abatement Office maintains a noise abatement program that integrates parts of the approved Noise Compatibility Plan; City and County of San Francisco resolutions; stated goals of the San Francisco International Airport/Community Roundtable; and air traffic control requirements. The program includes a mix of regulatory and voluntary actions that together minimize the impacts of noise on communities while ensuring safety.

Other Noise Sources

General Service Commercial and Light Industrial Uses

Noise sources associated with service commercial uses such as automotive repair facilities, car washes, and recycling yards, are found at various locations in the City. The noise emissions of these types of uses are dependent on many factors and are therefore dif-

icult to quantify precisely. Nonetheless, noise generated by these uses contributes to the ambient noise environment in the immediate vicinity of these uses and should be considered where either new noise-sensitive uses are proposed nearby or where similar uses are proposed in existing residential areas.

Construction and Other Equipment

Construction can be another substantial, though short-term, source of noise. Construction is most disruptive when it takes place near sensitive land uses, or occurs at night or in early morning hours. The dominant construction equipment noise source is usually a diesel engine without sufficient muffling. In a few cases, however, such as impact pile driving or pavement breaking, process noise dominates.

Other portable or small-scale pieces of equipment may also produce noise. Mechanical equipment such as pumps and fans may produce low noise levels, but continuously and for substantial distances. Rooftop or otherwise exposed mechanical equipment can also produce constant and disturbing noises. Portable power equipment, such as leaf blowers and drills, can produce very high noise levels at the location of the work. Other amplified sounds such as automotive audio equipment or loudspeakers also create noise exposure.

Parks and School Playing Fields

There are numerous park and school uses in the Planning Area. Noise generated by these uses depends on the age and number of people utilizing the respective facility at a given time and the types of activities they are engaged in. School playing field activities tend to generate more noise than those of neighborhood parks, as the intensity of school playground usage tends to be higher.

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 use of the land. Places where people live, sleep, recreate, worship and study generally are considered to be sensitive to noise because intrusive noise can be disruptive to these activities.

¹ SFO Interactive Community Noise Map Application, Quarterly Contours 3rd Quarter 2007, accessed at http://www.flyquietsfo.com/mapping_tools.asp, June 11, 2012.

9.3 NOISE EXPOSURE STANDARDS

City standards established in this General Plan are intended to augment Federal and State standards, and protect community members and sensitive receptors from noise hazards.

Federal Regulations

Federal regulations establish noise limits for medium and heavy trucks. The federal truck passby noise standard is 80 dB at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers. In addition to noise standards for individual vehicles, under regulations established by the Federal Highway Administration, noise abatement must be considered for certain federal or federally-funded projects such as new highways and highway expansions.

State Regulations

Title 24 of the California Code of Regulations, the Building Standards Administrative Code, contains the State Noise Insulation Standards, which specify interior noise standards for new hotels, motels, apartment houses, and dwellings other than single-family homes. Such new structures must be designed to reduce outdoor noise to an interior level of no more than 45 dB in any habitable room. They require an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than 60 dB. Title 24 standards are enforced through the building permit application process.

City of Pacifica Regulations

Title 5, Chapter 10 of the Pacifica Municipal Code makes it unlawful to cause any “loud, disturbing, unnecessary, or unnatural noise” that disturbs persons in Pacifica, and identifies specific types of noises including vehicle horns and amplifiers. It prohibits the use of pile drivers or similar equipment at night, and restricts the hours of solid waste collection. Title 5, Chapter 28 defines the terms for regulating loud

parties. Chapter 29 requires general disclosure of the existence of the airport and the potential for noise from overflight, for all property in the City. Special disclosure is required for property within the airport’s CNEL noise footprint as of 1983.

General Plan Noise Standards

The General Plan establishes thresholds for community noise exposure by land use type in Table 9-1. For proposed land uses in areas where noise exposure may be expected to be greater than the “normally acceptable” threshold, maximum allowable noise exposure with noise mitigation measures is defined in Table 9-2. Table 9-3 provides noise emission standards for new stationary noise sources.

Community Noise Exposure

Table 9-1 presents the community noise exposure matrix, establishing criteria the City can use to evaluate land use compatibility based on noise levels. This matrix is adapted from guidelines provided by the Office of Planning and Research.

Noise exposure levels are classified as being “normally acceptable,” “conditionally acceptable,” “normally unacceptable,” or “clearly unacceptable” for different land use types.

Normally Acceptable

- **Indoor Uses:** Either the activities associated with the land use are inherently noisy or standard construction methods will sufficiently attenuate exterior noise to an acceptable level; for land use types that are compatible because of inherent noise levels, sound attenuation must be provided for associated office, retail, and other noise-sensitive indoor spaces sufficient to reduce exterior noise to an interior maximum of 50 dB CNEL.
- **Outdoor Uses:** Outdoor activities associated with the land use may be carried out with minimal interference.

Conditionally Acceptable

- Indoor Uses: Noise reduction measures must be incorporated into the design of the project to attenuate exterior noise to the indoor noise levels listed in Table 9-2.
- Outdoor Uses: Noise reduction measures must be incorporated into the design of the project to attenuate exterior noise to the outdoor noise levels listed in Table 9-2. Acceptability is dependent upon characteristics of the specific use.

Normally Unacceptable

- Indoor Uses: Extensive mitigation techniques are required to make the indoor environment acceptable for indoor activities. Noise level reductions necessary to attenuate exterior noise to the indoor noise levels listed in Table 9-2 are difficult to achieve and may not be feasible.
- Outdoor Uses: Severe noise interference makes the outdoor environment unacceptable for outdoor activities. Noise level reductions necessary to attenuate exterior noise to the outdoor noise levels listed in Table 9-2 are difficult to achieve and may not be feasible.

Clearly Unacceptable

- New construction or development should generally not be undertaken.

ALLOWABLE NOISE EXPOSURE

Table 9-2 indicates acceptable limits of noise for various land uses for both exterior and interior environments. For new development in areas where the community noise environment is not considered “normally acceptable,” noise impacts may be mitigated through use of sound-reducing strategies so that noise levels meet the allowable limits.

Noise Emission Standards for Stationary Noise Sources

The General Plan also provides standards for exposure to stationary (non-transportation) noise sources such as industrial facilities, automotive servicing, or equipment yards, in Table 9-3.

TABLE 9-1: LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS

Land Use Category	Exterior Day/Night Noise Levels DNL or Ldn, dB					
	55	60	65	70	75	80
Residential–Single Family	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Residential–Multiple Family	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Transient Lodging–Motels, Hotels	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Schools, Libraries, Churches, Hospitals*, Nursing Homes	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Auditoriums, Concert Halls, Amphitheaters	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Sports Arena, Outdoor Spectator Sports	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Playgrounds, Parks	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Office Buildings, Business Commercial and Professional	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray
Industrial, Manufacturing,	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray

Source: Office of Planning and Research, State of California General Plan Guidelines, Appendix A: Guidelines for the Preparation and Content of the Noise Element of the General Plan, 1998.

*Because hospitals are often designed and constructed with high noise insulation properties, it is possible for them to be satisfactorily located in noisier areas.

INTERPRETATION

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

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

Normally Unacceptable:
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable:
New construction or development clearly should not be undertaken.

TABLE 9-2: ALLOWABLE NOISE EXPOSURE

Noise-Sensitive Land Use	Outdoor Activity Areas ¹	Interior Spaces	
	DNL/CNEL ² , dB	DNL/CNEL ² , dB	Leq dB ³
Residential	65	45	–
Transient Lodging (Hotels, Motels)	65	45	–
Hospitals, Nursing Homes	65	45	–
Theaters, Auditoriums, Music Halls	–	–	35
Churches, Meeting Halls	65	–	45
Office Buildings	–	–	45
Schools, Libraries, Museums	–	–	45

¹ Outdoor activity areas generally include backyards of single-family residences and outdoor patios, decks or common recreation areas of multi-family developments.

² The CNEL is used for quantification of aircraft noise exposure as required by CAC Title 21.

³ As determined for a typical worst-case hour during periods of use.

TABLE 9-3: NOISE LEVEL PERFORMANCE STANDARDS FOR STATIONARY NOISE SOURCES¹

	Daytime (7:00 a.m. – 10:00 p.m.)	Nighttime (10:00 p.m. – 7:00 a.m.)
Hourly Equivalent Sound Level (Leq), dBA	50	45
Maximum Sound Level (Lmax), dBA	70	65

¹ As determined at the property line of the receiving noise-sensitive use.

POLICIES

Guiding Policies

NO-G-1 Coordination with Other Agencies.

Continue to work with other agencies, airports and jurisdictions to reduce noise levels in Pacifica created by their operations.

NO-G-2 Acceptable Noise Environment. Strive to

achieve an acceptable noise environment for the environmental, health and safety needs of present and future residents of Pacifica.

NO-G-3 Sensitive Land Uses. Protect noise sensitive

land uses, such as schools, hospitals, and senior care facilities, from encroachment of and exposure to excessive levels of noise.

Implementing Policies

NO-I-1 Community Noise Level Standards. Use

the Community Noise Level Exposure Standards, shown in Table 9-1, as review criteria for new land uses. Require all new development that would be exposed to noise greater than the “normally acceptable” noise level range to reduce interior noise through design, sound insulation, or other measures.

NO-I-2 Design Features for Noise Reduction.

Require noise-reducing mitigation to meet allowable outdoor and indoor noise exposure standards in Table 9-2. Noise mitigation measures that may be approved to achieve these noise level targets include but are not limited to the following:

- Construct façades with substantial weight and insulation;
- Use sound-rated windows for primary sleeping and activity areas;

- Use sound-rated doors for all exterior entries at primary sleeping and activity areas;
- Use minimum setbacks and exterior barriers;
- Use acoustic baffling of vents for chimneys, attic and gable ends;
- Install a mechanical ventilation system that provides fresh air under closed window conditions.

Alternative acoustical designs that achieve the prescribed noise level standards may be approved, provided that a qualified Acoustical Consultant submits information demonstrating that the alternative designs will achieve and maintain the specific targets for outdoor activity areas and interior spaces.

NO-I-3 Best Available Control Technology.

Require new, fixed noise sources (e.g. mechanical equipment) to use best available control technology (BACT) to minimize noise and vibration.

Noise from mechanical equipment can often be reduced by applying soundproofing materials, mufflers, or other controls provided by the manufacturer.

NO-I-4 Mechanical Equipment for New Residential Development.

Ensure that building regulations require that noise-generating appliances serving new multi-family or mixed-use residential development are located or adequately insulated to protect residents from the noise.

NO-I-5 Noise Criteria for City Equipment.

Develop noise criteria for new equipment purchased by the City.

- NO-I-6 Construction Noise.** Continue to limit hours for certain construction and demolition work to reduce construction-related noises.
- NO-I-7 Noise from Highways and Buses.** Work with Caltrans and Sam Trans to mitigate transportation-related noise impacts on residential areas and sensitive uses. This may include encouraging installation of sound barriers or bus stop relocation in selected locations.
- NO-I-8 Airport Noise Disclosure Requirements.** Update the Municipal Code to ensure that special disclosure requirements concerning airport noise refer to the most current CNEL noise contours developed for San Francisco International Airport.
- NO-I-9 Airport Noise Abatement Program.** Continue to work with the airport in improving and implementing its noise abatement program.
- NO-I-10 Residential Sound Insulation Program.** If the airport's federally-approved 65 dB CNEL annual noise contour is mapped within the City, request that the San Francisco Airport's Residential Sound Insulation Program allocate available federal and airport funding to sensitive, noise-affected properties in Pacifica.
- NO-I-11 Noise Ordinance.** Update the noise ordinance to implement General Plan policies and noise standards.
- NO-I-12 Noise Enforcement.** Establish a Noise Abatement Unit made up of members of the Police and other departments to enforce the City's noise regulations, and assign primary responsibility for coordinating overall noise control effort to one City department.