CITY OF SIGNAL HILL

# General Plan

# NOISE ELEMENT

**Updated December 2009**

*Prepared by the City of Signal Hill in collaboration with RGP Planning & Development Services*

# ACRONYMS & ABBREVIATIONS

| | |
|---|---|
| ALUC | Airport Land Use Commission |
| Caltrans | California Department of Transportation |
| CCR | California Code of Regulations |
| CNEL | Community Noise Equivalent Level |
| dB | decibel |
| dBA | A-weighted decibel |
| FAA | Federal Aviation Administration |
| FHWA | Federal Highway Administration |
| FTA | Federal Transit Administration |
| I-405 | Interstate 405 |
| $L_{eq}$ | Equivalent Energy Noise Level |
| $L_{max}$ | Maximum Noise Level |
| Metro | Los Angeles County Metropolitan Transportation Authority |
| PCH | Pacific Coast Highway |
| SENEL | Single Event Noise Exposure Level |
| SHMC | Signal Hill Municipal Code |

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# I. INTRODUCTION

## A. Purpose and Scope

The Noise Element of the Signal Hill General Plan provides goals, policy direction, and implementation measures intended to limit the community's exposure to excessive noise levels. This element includes:

- A discussion of the regulatory framework impacting noise elements, including applicable local, State, and federal regulations;
- A discussion of major local noise sources, how noise is measured, and how it can be mitigated; and
- A list of goals, policies, and implementation measures that will serve to effectively reduce negative noise impacts throughout Signal Hill.

To assist the reader, definitions of terms used throughout this document are provided in Table 1, *Noise Element Definitions*.

TABLE 1 **Noise Element Definitions**

| Abbreviation | Term | Definition |
|---|---|---|
| | **Ambient Noise** | The composite of all noise sources; the normal or existing level of environmental noise in a given location. |
| **CNEL** | **Community Noise Equivalent Level** | A 24-hour average $L_{eq}$ with a 10 dBA weighting added during the hours of 10:00 pm and 7:00 am and a 5 dBA weighting added during the hours of 7:00 pm to 10:00 pm to account for noise sensitivity in the evening, nighttime, and early morning. |
| **dB** | **Decibel** | The standard measurement of sound, measured on a logarithmic scale. An increase of 3 dB represents a doubling of sound energy levels. |
| **dBA** | **Decibel, A-weighted** | A measurement unit which weights sounds based on frequency in a manner similar to that of the human ear. |
| **$L_n$** | **Noise level percentile** | The sound level exceeded by *n* percent of the noise measurement duration. For example, $L_{10}$ indicates that 10 |

| | | |
|---|---|---|
| | | percent of the noise measurements exceeded this level. |
| $L_{eq}$ | **Equivalent Energy Noise Level** | The average acoustic energy content of noise for a stated period of time. Thus, the $L_{eq}$ of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. |
| | **Intrusive Noise** | That noise which intrudes over the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, time of occurrence, and other factors, as well as the prevailing noise level. |
| $L_{max}$ | **Maximum Noise Level** | The highest noise level reached during a noise event. |
| **SENEL** | **Single Event Noise Exposure Level** | A measure of the highest noise level during a noise event and the duration of the event. |

## B. The Noise Environment

Sound is created when objects vibrate and produce pressure variations that move outward into the surrounding air. The main characteristics of these air pressure waves are amplitude (loudness) and frequency (pitch). Amplitude is measured using decibels (dB). Human sensitivity to sound amplitude is frequency-dependent; A-weighted decibels (dBA) account for this variation in sensitivity. Additionally, a measurement called Community Noise Equivalent Level (CNEL) is used to modify dB and dBA measures to allow for increased sensitivity to noise during evening, nighttime, and early morning hours.

Typical noise levels for various activities are shown in Figure 1, *Typical Noise Environments.*

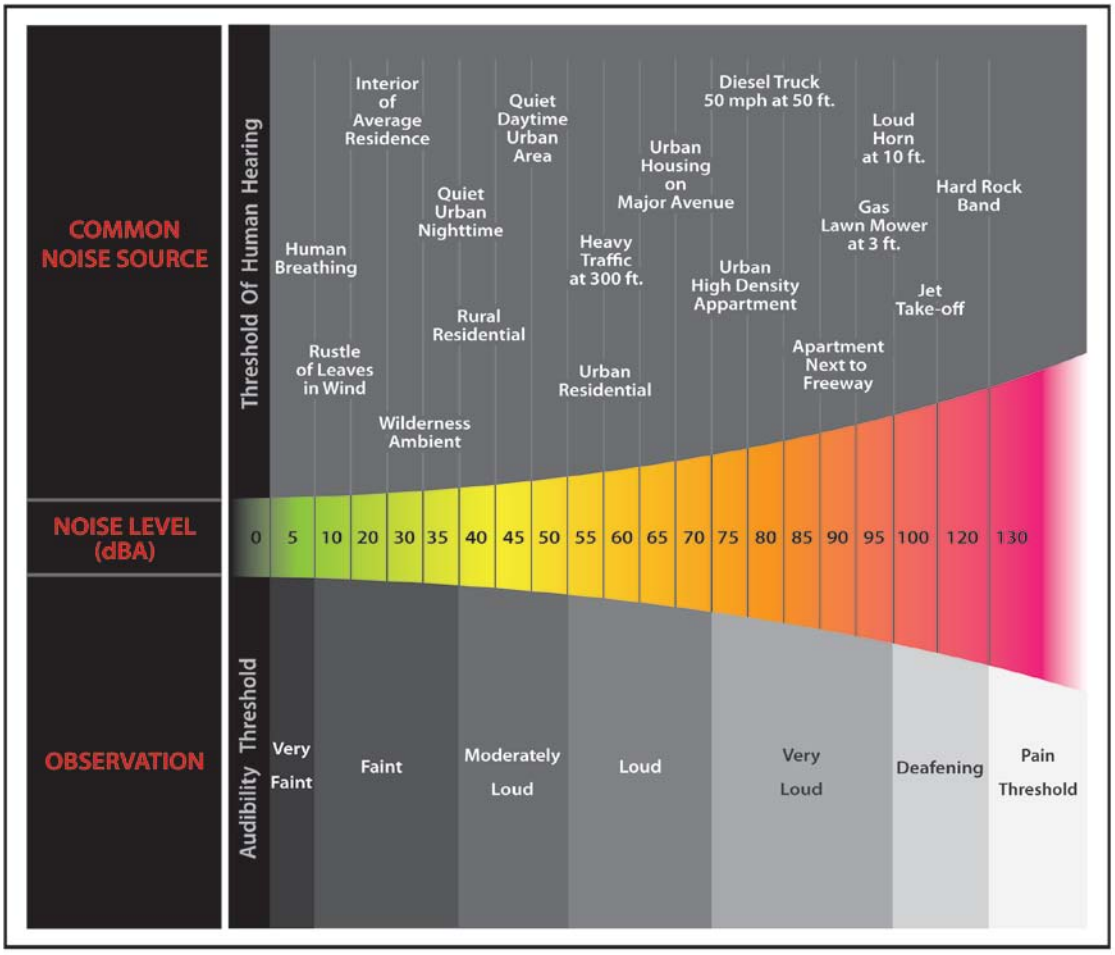



**Figure 1 Typical Noise Environments**

## C. Regulatory Framework

The State of California has mandated that each city and county prepare a Noise Element as part of its general plan. Section 65302(f) of the California Government Code requires that the element:

> [...] identify and appraise noise problems in the community. The Noise Element shall recognize the guidelines established by the Office of Noise Control and shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:
>
> 1. Highways and freeways.
>
> 2. Primary arterials and major local streets.

3. Passenger and freight on-line railroad operations and ground rapid transit systems.

4. Commercial aviation, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.

5. Local industrial plants, including, but not limited to, railroad classification yards.

6. Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

This Noise Element identifies and evaluates current and projected future noise levels for Signal Hill, with a particular emphasis on noise produced by Interstate 405 (I-405, the San Diego Freeway), major roadways, Long Beach Airport, and oilfield operations. Noise levels, which are measured in decibels, are stated in terms of Community Noise Equivalent Level, and contours maps were developed in conformance with State-prescribed noise modeling techniques

## Noise Level Standards

Federal, State, and local governments have various responsibilities for measuring and mitigating noise impacts. The following summarizes these standards.

### *Federal Regulations*

The negative impacts of noise were recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

1. Establishing noise emission standards for interstate commerce,

2. Assisting state and local noise abatement activities, and

3. Promoting noise education and research.

Federal noise policies and programs are developed by a range of agencies. A list of the agencies with most relevance to the City of Signal Hill is provided in Table 2, *Federal Agencies with Noise Policies Affecting Signal Hill*.

TABLE 2 **Federal Agencies with Noise Policies Effecting Signal Hill**

| Agency | Responsibility |
|---|---|
| **Federal Aviation Administration (FAA)** | Regulates noise generated by aircraft and airports, including Long Beach Airport. |
| **Federal Transit Administration (FTA)** | Regulates operations of rail systems receiving federal funding, including light rail lines operated by the Metropolitan Transportation Authority (Metro).<br>Regulates transit noise, including Long Beach Transit buses. |
| **Federal Highway Administration (FHWA)** | Regulates freeways that are part of the interstate highway system, including the I-405. |
| **Department of Labor (DOL)** | Establishes noise standards for workplaces. |
| **Department of Housing and Urban Development (HUD)** | Establishes noise standards for federally-assisted housing projects. |

### *State Regulations*

State codes related to noise abatement primarily concern noise from airports, aircraft, and vehicles. A list of State codes related to noise is provided in Table 3, *State Codes Regulating Noise*.

One of the major noise sources identified by the State is airports. California Code of Regulations (CCR) Title 21 requires each county in California to establish an Airport Land Use Commission (ALUC); the ALUC for Los Angeles County is the Regional Planning Commission. The ALUC is responsible for protecting public health, safety, and welfare by ensuring the orderly development of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public use airports.

TABLE 3 **State Codes Regulating Noise**

| Code | Regulations |
|---|---|
| **CCR, Title 21** | Regulates noise levels for land uses in the vicinity of airports. |
| **CCR, Title 24 (California Building Standards Code)** | Regulates noise insulation measures in residential construction. |
| **California Vehicle Code** | Regulates noise levels from motor vehicles. |

### *Local Regulations*

Noise is regulated in Signal Hill by Chapter 9.16 (Noise Ordinance) of the Signal Hill Municipal Code (SHMC). The Noise Ordinance establishes standards related to:

- Construction of or repairs to buildings.
- Vehicular and industrial noise sources.
- Machinery and equipment which emit noise beyond the property lines of the facility operating them.
- New residential construction near oil wells.
- Servicing and redrilling of existing oil wells.

Additional noise regulation is provided in Chapters 16.16 (Drilling Standards) and 16.20 (Operating and Safety Standards) of the Oil Code in the SHMC.

Noise regulations established by the City of Long Beach also affect noise levels in Signal Hill. The City of Long Beach has implemented an Airport Noise Compatibility Ordinance (Chapter 16.43, Long Beach Municipal Code) which effectively limits noise for neighborhoods in both Long Beach and Signal Hill. The Airport Noise Compatibility Ordinance has two major components which substantially limit noise impacts:

- Establishment of a Single Event Noise Exposure Level (SENEL) standard for non-governmental aircraft operating at the airport. These noise limits vary by time of day and runway location, with lower limits during evening and night hours and on runways whose flight paths have a greater impact on noise-sensitive land uses.
- Requiring the Airport to comply with a "noise budget," which limits the noise contributions of various types of airport users.

## D. Relationship to Other Elements

General plan elements provide important policy guidance to assist in decision-making. All of the elements of the general plan are related and interdependent to some degree. However, the Noise Element is closely related to the Land Use, Housing, Circulation, and Environmental Resources elements.

The objective of the Noise Element is to provide guidelines to achieve noise-compatible land use. The Land Use and Noise Elements are, therefore, closely related. The noise element, by identifying noise-sensitive land uses and establishing compatibility guidelines for land use and noise, will influence the general distribution, location, and intensity of future land use. Effective land use planning can alleviate noise problems.

Residential areas are one of the most noise-sensitive land uses found in the city; therefore, the Housing Element is directly affected by the Noise Element. The housing element policies and programs should include safeguards against noise intrusion. Enforcement of land use and noise compatibility guidelines can reduce noise impacts in residential locations. In addition, effective noise insulation in housing construction can mitigate exterior-to-interior noise transmission.

The circulation system within a city is one of the major sources of noise. The existing and future circulation system identified in the circulation element will, therefore, greatly influence the noise environment. The circulation routes, such as the freeway, highways, and truck routes, should be located to minimize noise impacts upon noise-sensitive land uses. The location and design of new transportation facilities and possible mitigation of noise from existing and planned facilities will greatly influence the overall noise environment within the city.

Since noise can adversely affect the enjoyment of quiet outdoor activities, the noise element is also closely related to the Environmental Resources Element. Open spaces can be used as a noise buffer between incompatible land uses. This technique can reduce community noise impacts and also provide usable open space for recreation and visual relief.

## E. Element Organization

This element is organized into four sections:

**Section I, Introduction** – a discussion of the purpose and scope, regulatory framework, and organization of this document.

**Section II, Defining and Measuring Noise** – a discussion of existing noise sources in the area, noise measurement methods, noise sensitive receptors, and noise attenuation methods.

**Section III, Goals and Policies** – goals and policies which will serve to minimize noise impacts.

**Section IV, Implementation Program** – a list of specific, practical action steps that, when implemented, achieve the goals and policies identified in Section III.

**Section V, Enforcement** – a discussion of mechanisms available to enforce the City's adopted noises standards.

# II. DEFINING AND MEASURING NOISE

## A. Noise Sources

The noise environment comprises background, or ambient, noise and intrusive noise sources.

The following discussion of intrusive noise sources developed from an analysis of noise measurements and noise contours, and from discussions with City staff. The major noise sources in the Signal Hill vicinity, as shown in Figure 2, *Major Noise Sources*, include roadways, the Long Beach Airport, and oil drilling and maintenance operations.

### Roadways

Roadways are one of the major sources of noise in Signal Hill. The I-405 is the most heavily trafficked roadway in Signal Hill, and produces the most noise. However, because the highway is placed below-grade where it runs through the city, and because the City successfully lobbied Caltrans to construct a sound wall to protect the North End Neighborhood, noise impacts on adjacent uses are reduced. Principal Arterial and Minor Arterial also carry significant amounts of traffic and may produce high noise levels. Collector and Local Streets carry much less traffic and generally do not exceed noise standards.

City of Signal Hill
# GENERAL PLAN

Noise Element
*December 2009*


Noise Sources

- Major Roadways
- I-405 Freeway
- Long Beach Airport
- City of Signal Hill Boundary

*Note: Oil operations occur throughout the city and are not depicted on this map.*

Figure 2
## Major Noise Sources

## Long Beach Airport

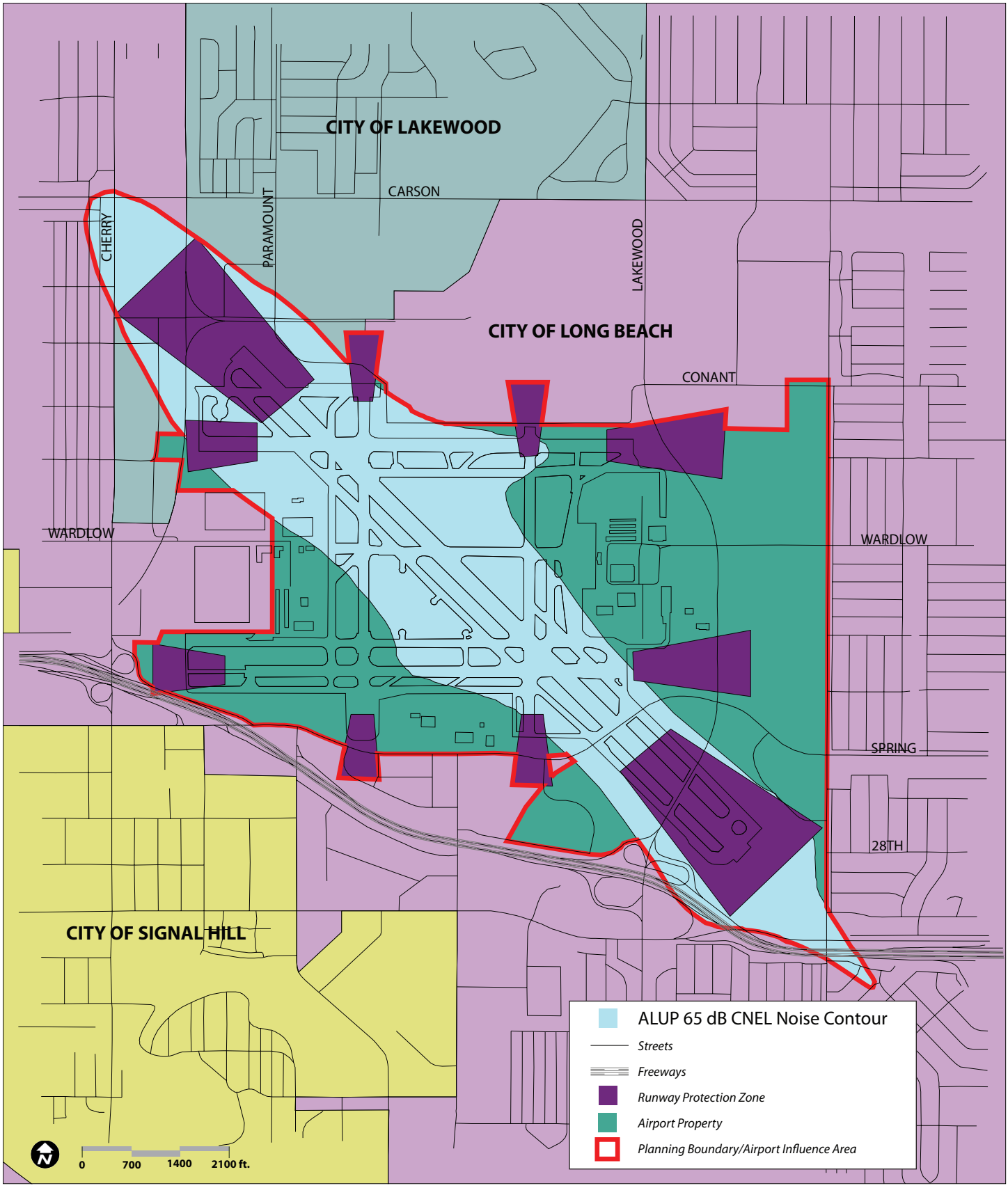
Long Beach Airport is located approximately ½ mile northeast of Signal Hill. The airport, which is owned by the City of Long Beach, primarily serves commercial, air cargo, and general aviation users. Annual aircraft operations trends are detailed in Table 4, *Long Beach Airport Annual Aircraft Operations*.

TABLE 4 **Long Beach Airport Annual Aircraft Operations**

| | 2008 | 2007 | 2006 | % Change (2006-2008) |
|---|---|---|---|---|
| **Passengers** | **2,913,926** | **2,906,556** | **2,758,362** | **5.6%** |
| **Cargo Traffic (tons)** | **46,263** | **51,652** | **49,947** | **-4.9%** |
| **Air Operations** | **344,897** | **398,433** | **369,738** | **-6.7%** |
| *Air Carrier* | *30,205* | *26,636* | *25,833* | *16.9%* |
| *Air Taxi* | *13,781* | *11,546* | *9,431* | *46.1%* |
| *General Aviation* | *299,460* | *359,580* | *333,824* | *-10.3%* |
| *Military* | *1,451* | *671* | *650* | *123.2%* |

After a significant increase in passenger travel early in the 2000s, travel has remained stable in recent years, ranging from approximately 2.7 million to 3.0 million passengers per year. Air cargo transport has similarly been stable, at approximately 46,000 to 52,000 tons per year. The number of air operations (arrivals and departures) can fluctuate widely from year to year, as general aviation uses are highly variable. The Southern California Association of Governments' 2008 Regional Transportation Plan Airport and Aviation Ground Access Report forecasts that airport passenger traffic will increase to 4.2 million passengers per year in 2035; air cargo traffic is forecast to increase from 50,000 tons per year to 139,000 tons per year in 2035.

CCR, Title 21 establishes a maximum 65 dB CNEL noise exposure level around airports for sensitive land uses such as homes, schools, hospitals, and places of worship. Airport noise contours are mapped by the ALUC; a map depicting Long Beach Airport's 65 dB CNEL noise contour is provided in Figure 3, *Long Beach Airport Influence Area*. The map shows that Signal Hill currently lies completely outside of the airport's 65 dB CNEL noise contour line.




*Adapted from* Airport Influence Area *map, Los Angeles County Airport Land Use Commission (2003).*

Figure 3

# Long Beach Airport Influence Area

City of Signal Hill
**GENERAL PLAN**

The City of Long Beach maintains an Airport Noise and Operations Monitoring System, which performs 24-hour monitoring of noise levels from 18 sites in the airport area. Noise violations are tracked, and fines are assessed to air carriers, commuter flights, charter flights, and general aviation aircraft which exceed noise standards established by the Long Beach Municipal Code. Complaints received from members of the public are also tracked and compiled by ZIP code, with monthly updates published on the Airport's website. For the six-month period from December 2008 through May 2009, a total of 1,014 complaints were received, with only six (fewer than one percent of all complaints) coming from within the city of Signal Hill's ZIP code of 90755. The small number of complaints from within Signal Hill suggests that airport noise is not a major concern for city residents.

## Oil Operations

Drilling, pumping, and well-servicing operations occur throughout the city and are regulated by the SHMC Oil Code and Zoning Ordinance. Noise levels from these sources vary depending on the type and maintenance of the equipment involved. The SHMC prohibits the drilling of new wells in residential districts. However, existing wells and drill sites are interspersed with residential and other noise-sensitive land uses and wells are sometimes located close to homes. This creates potential noise conflicts.

### *Operations*

Most pumping units operate with electric motors to reduce noise; however, occasionally, a unit may develop an audible annoying squeak if a lubricated joint becomes dry between scheduled maintenance periods. Periodic well servicing, generally lasting from three to five days, is necessary to maintain petroleum production but produces short-term noise disruptions. In the past, operators have been responsive to citizen or City complaints to service or repair noisy units. Well servicing in residential areas is limited to weekdays from 7:00 am to 7:00 pm. The City maintains contact information for the operators to facilitate repairs should a citizen complaint be filed, and oil operators' emergency contact information is posted on all well enclosures. As part of the update to this Noise Element, the City conducted noise measurements of a typical pumping unit (Redrill Well 17-7) on August 17, 2009; the results of these noise measurements are presented in Table 5, *Oil Derrick Noise Measurements.* The

measurement locations shown in the table are at the boundaries of the well enclosure. Figure 4, *Typical Oil Well Redrilling Noise Levels*, graphically depicts the contours listed in the table.

### *Drilling and Redrilling Activities*

Well drilling and redrilling activities are considerably noisier than typical pumping operations because the power source is a large, portable generator powered by an internal combustion engine. Redrilling noise can be perceived as intrusive to a radius of 150 feet from the rig.

Drilling or redrilling of wells is accomplished with multiple pieces of equipment working in support of the drill rig itself. Drilling and redrilling generally produce the same level of noise, but redrilling takes a shorter period of time.

Noise testing was performed during redrilling operations conducted at a well in the parking lot of the Costco/The Home Depot center located at the southeast corner of Cherry Avenue and Willow Street. Testing locations were along the fence of the derrick enclosure, a chain-link fence. This well is located in an open area, with no buildings or topographical changes impacting noise levels. The testing revealed that a marked variation in noise levels occurs in the vicinity of the well. Major factors influencing noise levels are distance from the generators and intervening barriers, such as buildings.

TABLE 5 **Oil Derrick Noise Measurements**

| Location | | $L_{eq}$ | $L_{max}$ | $L_{min}$ |
|---|---|---|---|---|
| 120' | SSW | 65 | 75 | 60 |
| 120' | SSE | 62 | 70 | 58 |
| 80' | SE | 65 | 76 | 60 |
| 60' | E | 68 | 86 | 62 |
| 80' | NE* | 76 | 78 | 74 |
| 120' | NNE* | 76 | 81 | 75 |
| 120' | NNW* | 75 | 78 | 74 |
| 80' | NW | 73 | 82 | 70 |
| 60' | W | 73 | 77 | 71 |
| 80' | SW | 69 | 79 | 62 |

** Closest to generator trailers.*

As shown in Figure 4, the generator noise of 76 dB $L_{eq}$ derived from an apparent source location approximately 30 feet from the measurement point. The distance of noise intrusion (65 dB $L_{eq}$) is

approximately 100 feet from the source. With the use of high-quality mufflers on the generators, the area of substantial well drilling noise impact is relatively small.

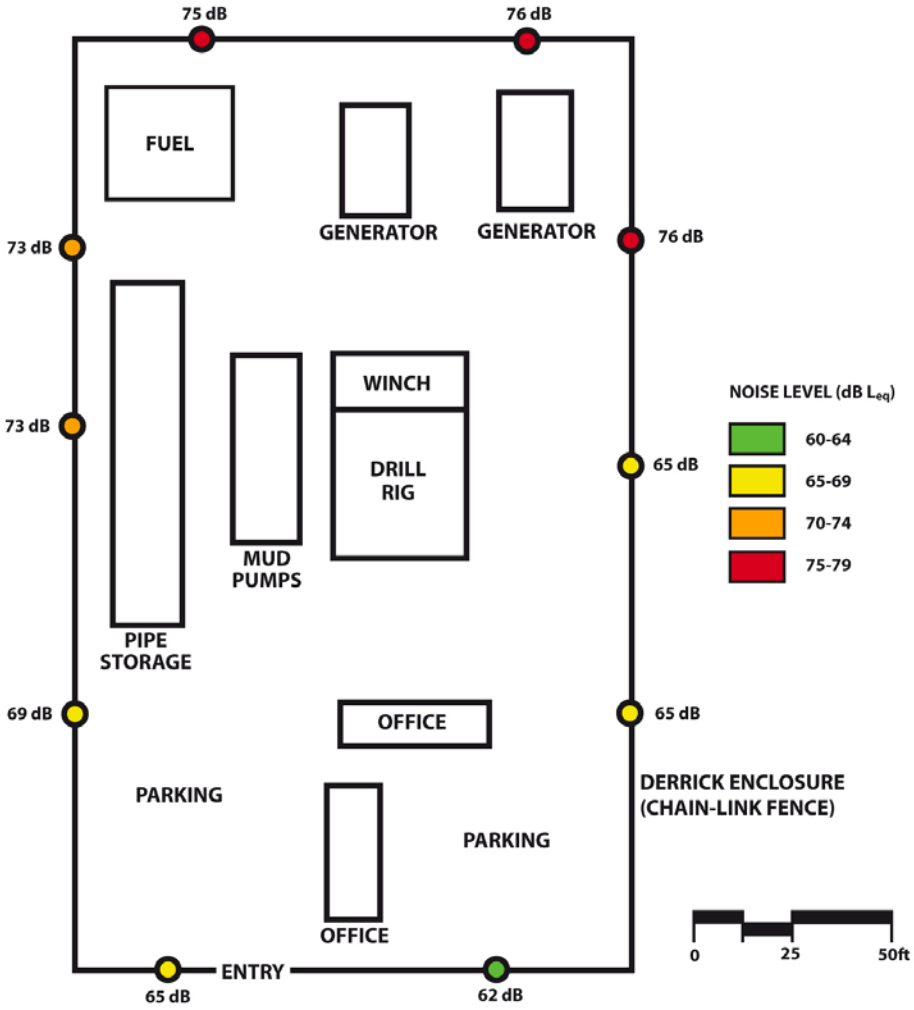



**Figure 4 Typical Oil Well Redrilling Noise Levels**

## Other Noise Sources

Other noise sources impacting Signal Hill include:

- **Commercial and industrial uses.** In general, these operations and activities are not considered a citywide noise problem. Isolated conflicts occur where commercial and industrial uses are located near noise-sensitive sites. Additionally, the Noise Ordinance, Zoning Ordinance, and other portions of the SHMC provide standards that limit noise production from commercial and industrial uses.

- **Construction.** Construction noise can be annoying to noise-sensitive land uses; however, construction noise is typically short-term. The Noise Ordinance generally restricts construction to weekdays between 7:00 am and 6:00 pm.

## B. Noise Measurements

Ambient noise measurements were conducted in 1985 during the development of the Noise Element of the Signal Hill General Plan. These measurements focused on differentiating among areas that were predominately residential or commercial/industrial and those that were a mix of multiple uses. The 1985 field survey found that suburban noise-environments in residential areas ranged from 54 to 56 dB Leq. More urbanized areas recorded levels ranging from 56 to 66 dB $L_{eq}$. As a rule of thumb, weighted 24-hour CNEL levels are 2 or 3 dB higher than $L_{eq}$ levels during the daytime. Even with this adjustment, any areas of the City exceeding the 65 dB CNEL noise compatibility standard for noise-sensitive uses were highly localized.

An update of the now almost 25-year old field survey was conducted on June 7, 2009. As much as possible, each location from the 1985 survey was revisited to evaluate any historical changes in noise patterns. The locations of the current noise survey are summarized in Table 6, *Short-Term Noise Measurement Locations*. Each noise measurement has been assigned the same number as the 1985 measurement at that approximate location. The results and a comparison to the 1985 survey are shown in Table 7, *Noise Measurement Results by Site*.

Without precise documentation of the 1985 monitoring location, it is difficult to accurately determine historical trends in ambient noise. However, 10 of the 13 monitoring sites recorded an increase in noise levels in the last 25 years. The most typical increase was in the range of 1 to 3 dB. However, even with an increase over time, and adjusting $L_{eq}$ to CNEL, residential and mixed use areas have noise exposures considered acceptable for noise-sensitive land uses.

TABLE 6 **Short-Term Noise Measurement Locations**

| Monitor No. | Location |
|---|---|
| 1 | Intersection: Lemon & 33rd/Meter Placed on Southwest Corner |
| 2 | Intersection: Willow & Signal Parkway/Meter Placed on Northwest Corner |
| 3 | Intersection: Burnett & Walnut/Meter Placed on Northwest Corner |
| 4 | Signal Hill Library/Meter Placed at Front Entrance |
| 5 | Intersection: Junipero & 21st/Meter Placed on Northeast Corner |
| 6 | Intersection: Ohio & 21st/Meter Placed on South Side of 21st |
| 7 | Intersection: Walnut & Hill/Meter Placed on Northwest Corner, at Signal Hill Elementary |
| 8 | Intersection: Burnett & Lemon/Meter Placed on Northeast Corner |
| 9 | Intersection: Temple & 19th/Meter Placed on Northeast Corner |
| 10 | Intersection: Walnut & 28th/Meter Placed on Northwest Corner |
| 11 | Intersection: Hathaway & Llewellyn/Meter Placed on North Side of Hathaway |
| 12 | Intersection: Hill & Skyline/Meter Placed on South Side of Skyline |
| 13 | Signal Hill City Hall/Meter Placed at East End of Jesse Nelson Circle |

TABLE 7 **Noise Measurement Results by Site**

| Site No. | $L_{max}$ | $L_{10}$ | $L_{50}$ | $L_{90}$ | $L_{eq}$ | 1985 $L_{eq}$ | $\Delta L_{eq}$ |
|---|---|---|---|---|---|---|---|
| 1 | 75 | 63 | 56 | 52 | **60** | **57** | **+3** |
| 2 | 84 | 70 | 62 | 56 | **68** | **60** | **+8** |
| 3 | 82 | 73 | 68 | 60 | **70** | **67** | **+3** |
| 4 | 82 | 70 | 63 | 55 | **67** | **55** | **+12** |
| 5 | 76 | 62 | 54 | 48 | **59** | **54** | **+5** |
| 6 | 68 | 60 | 53 | 50 | **56** | **55** | **+1** |
| 7 | 74 | 64 | 54 | 44 | **60** | **57** | **+3** |
| 8 | 65 | 55 | 50 | 46 | **53** | **56** | **-3** |
| 9 | 76 | 60 | 54 | 48 | **59** | **60** | **-1** |
| 10 | 69 | 64 | 58 | 53 | **60** | **59** | **+1** |
| 11 | 79 | 67 | 60 | 55 | **64** | **63** | **+1** |
| 12 | 76 | 67 | 61 | 54 | **64** | **56** | **+8** |
| 13 | 69 | 60 | 51 | 46 | **56** | **56** | **0** |

*Note: All measurements in dB.*
*$L_n$ indicates that* n *percent of noise measurements were above that level. See Table 1 for additional definitions.*

## C. Noise-Sensitive Receptors

Noise-sensitive receptors are those uses that have associated human activities that may be subject to stress or significant interference from noise. Potentially sensitive uses in Signal Hill include residences, schools, churches, and libraries. Table 8, *Noise Compatibility Criteria by Land Use*, presents standards used by the City of Signal Hill in assessing noise compatibility. Figure 5, *Community Noise Exposure Levels*, presents more detailed criteria to assess the compatibility of proposed land uses with the noise environment, as developed by the Governor's Office of Planning and Research.

TABLE 8 **Noise Compatibility Criteria by Land Use**

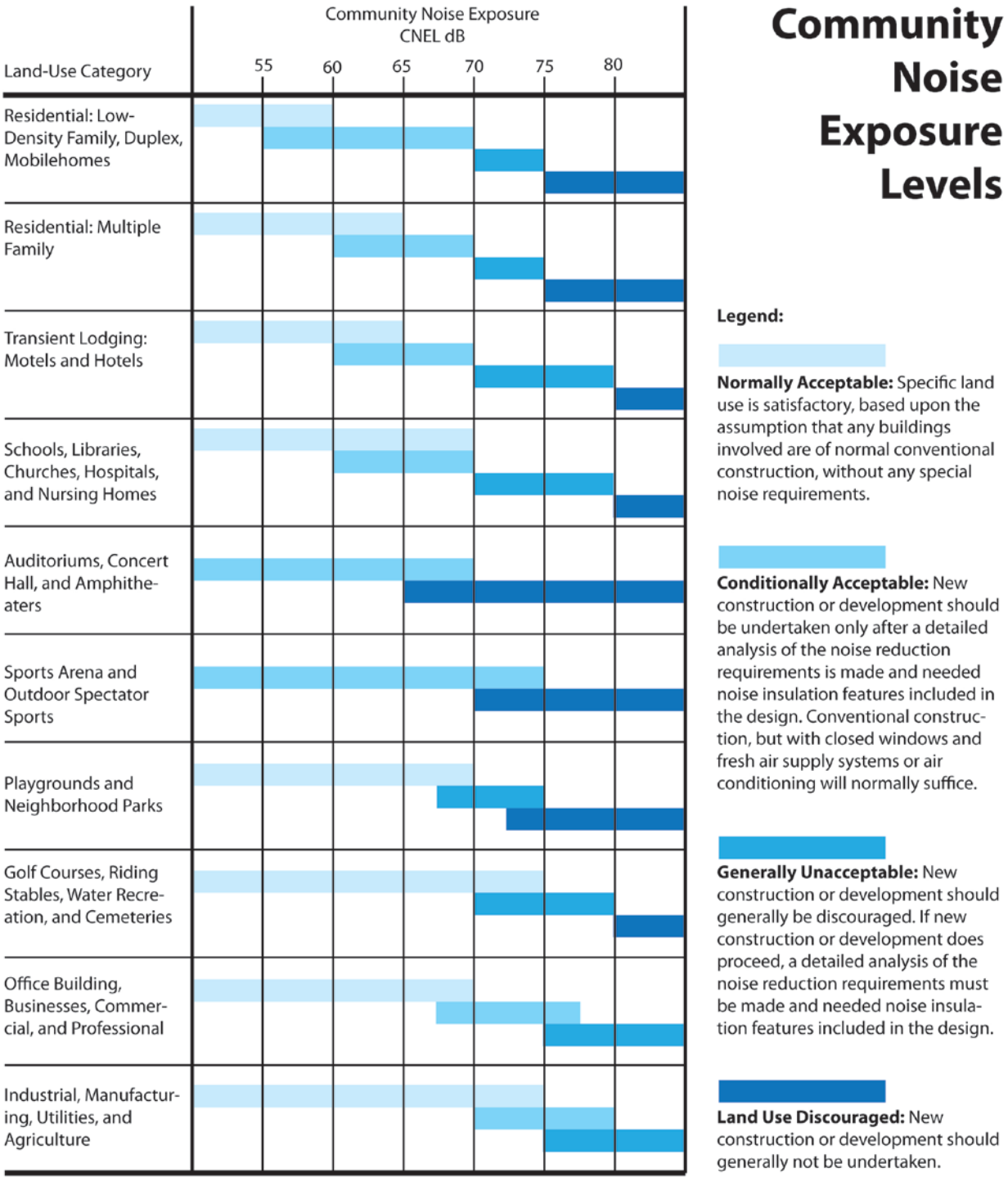
| Land Use | Compatibility Criteria |
|---|---|
| **RESIDENTIAL** | |
| Exterior | Outdoor living areas must be mitigated to 65 dB CNEL or less. |
| Interior | Habitable rooms must be mitigated to 45 dB CNEL or less. |
| **OTHER NOISE-SENSITIVE USES** | |
| Exterior | Same as residential criterion. |
| Interior | Same as residential criterion. |
| **COMMERCIAL** | |
| Exterior | A noise level of 70 dB CNEL or less, or one that does not interfere with normal business activity. |
| **INDUSTRIAL** | |
| Exterior | A noise level of 75 dB CNEL or less, or one that does not interfere with normal business activity.<br>Public access areas should be 65 dB CNEL or less. |

## D. Traffic Noise Levels

The most pervasive noise source in all of Southern California is on-road traffic. The major producers of traffic noise in Signal Hill are the I-405 freeway and arterial roadways.

### I-405 Freeway

Although I-405 is a major traffic noise source, it is shielded from residential and other Signal Hill noise-sensitive uses by grade separation, distance, and intervening structures. Noise-sensitive land uses near the I-405 in Signal Hill include residences in the North End Neighborhood and Burroughs Elementary




*Adapted from* General Plan Guidelines, *Governor's Office of Planning and Research, 2003.*

**Figure 5 Community Noise Exposure Levels**

School. The limited distance between the uses and the 405 Freeway would normally result in significant noise levels; however, the combination of a depressed freeway, soundwalls, and school buildings set back from the roadway reduce noise to satisfactory levels.

The freeway currently carries almost 300,000 vehicles per day, of which slightly fewer than 10,000 per day are heavy trucks. The calculated mid-day noise level at the edge of the freeway travel lanes using the FHWA traffic noise model is 86 dB $L_{eq}$. Measured freeway noise hum (the 90$^{th}$ percentile noise level, October 7, 2009) at various residential locations within the community were compared to the expected noise level that would occur in the absence of grade separation and noise barrier effects. The results are detailed in Table 9, *Expected vs. Observed Freeway Noise Levels.*

TABLE 9 **Expected vs. Observed Freeway Noise Levels**

| Location | Distance | Expected dB $L_{eq}$ | Observed dB $L_{eq}$ | Difference between Expected and Observed |
|---|---|---|---|---|
| 32$^{nd}$ Street/Orange Ave | 370' | 73 | 63 | -10 |
| Burroughs Elementary School | 1,025' | 66 | 52 | -14 |
| 33$^{rd}$ Street/Lemon Avenue | 975' | 66 | 54 | -12 |
| 32$^{nd}$ Street/California Avenue | 440' | 72 | 62 | -10 |
| 32$^{nd}$ Street/Cerritos Avenue | 315' | 74 | 60 | -14 |
| Alley behind 32$^{nd}$ Street/Soundwall | 205' | 76 | 65 | -11 |

Noise shielding of the community creates sound levels that are 10 to 14 dB lower than the level that would be expected without such protection. The federal noise abatement criterion for noise sensitive land uses is 67 dB $L_{eq}$. Except at the garages on the alley adjacent to the freeway soundwall, the freeway noise level does not approach or exceed this threshold. Should future noise levels rise above 67 dB $L_{eq}$, mitigations such as improved or expanded soundwalls, berms, and noise-reducing pavements may be introduced.

Noise levels are logarithmically proportional to traffic volumes. It takes large changes in volumes to create any perceptible noise level difference. Traffic volume growth from 1995 to 2005 was from 255,000 per day to 295,000 vehicles per day on the I-405 at Orange Avenue. This represents a +0.6 dB theoretical noise level increase. Projecting this change forward, and assuming that the human perception threshold of +3 dB as being clearly louder, it will take 50 years of traffic growth before one might conclude that freeway noise has increased significantly. Therefore, freeway noise does not

currently significantly impact Signal Hill residents closest to the freeway, and that situation is not anticipated to change in the reasonable future.

## Other Roadways

The limited noise impacts of the I-405 suggest that noise within the city derives mainly from principal internal roadways.

Traffic noise levels were calculated for existing traffic volumes detailed in the Circulation Element, which were matched with posted speed limits on all Circulation Element roadways. The federal highway traffic noise prediction model (FHWA-RD-77-108) was initialized with California vehicle noise curves and Southern California day/night and auto/truck mixes. Consistent with projected traffic growth rates for the city, a 1.5 percent annual growth factor was applied for 2010 to 2030 to establish build-out traffic volumes. Because of the logarithmic relationship between traffic volumes and associated noise, future noise levels will be almost indistinguishable for the assumed rate of growth. Table 10, *Roadway Noise Levels,* summarizes existing and future traffic noise levels in terms of the CNEL metric. The acceptable range for noise exposure by land use is presented in Table 8.

Table 11, *Roadway Noise Impact Distances,* and Figure 6, *Traffic Noise Impact Distances,* show that noise from Willow Street, Cherry Avenue, and the portion of Spring Street east of Cherry Avenue impose potentially substantial constraints on placement of noise-sensitive land uses directly adjacent to the roadways. Orange Avenue and the rest of Spring Street are only mildly noisy, with acceptable levels noise levels readily achieved by common noise mitigation methods such as dual-pane windows and enhanced exterior doorways. Noise exposure should also be considered in placement of business or institutional uses along Willow Street, Cherry Avenue, and Spring Street west of Cherry Avenue.

Table 11 summarizes the required distance from the roadway centerline to achieve acceptable noise exposures solely via setbacks for sound propagation across a landscaped surface. Traffic noise should be a consideration in future development planning, but it is not a serious development constraint in Signal Hill with the use of reasonable mitigation.

TABLE 10 **Roadway Noise Levels**

| Street Segment | | Speed | Existing ADT | Existing CNEL[1] | 2030 ADT | 2030 CNEL[1] |
|---|---|---|---|---|---|---|
| Spring Street | W of California | 40 | 14,325 | 68.2 | 19,339 | 69.5 |
| | E of California | 40 | 13,140 | 67.8 | 17,739 | 69.1 |
| | E of Orange | 40 | 15,029 | 68.4 | 20,289 | 69.7 |
| | E of Walnut | 40 | 14,906 | 68.3 | 20,123 | 69.6 |
| | E of Cherry | 40 | 26,892 | 70.9 | 36,304 | 72.2 |
| Willow Street | W of California | 40 | 31,544 | 71.6 | 42,584 | 72.9 |
| | E of California | 40 | 30,481 | 71.4 | 41,149 | 72.7 |
| | E of Orange | 40 | 31,895 | 71.6 | 43,058 | 72.9 |
| | E of Walnut | 40 | 35,952 | 72.2 | 48,535 | 73.5 |
| | E of Cherry | 40 | 36,706 | 72.2 | 49,553 | 73.5 |
| | E of Junipero | 40 | 38,119 | 72.4 | 51,461 | 73.7 |
| | E of Temple | 40 | 32,136 | 71.7 | 43,384 | 73.0 |
| Hill Street | E of Orange | 30 | 4,101 | 59.9 | 5,536 | 61.2 |
| | E of Walnut | 30 | 4,291 | 60.1 | 5,793 | 61.4 |
| | E of Temple | 25 | 5,265 | 59.5 | 7,108 | 60.8 |
| | E of Obispo | 25 | 7,016 | 60.8 | 9,472 | 62.1 |
| California Avenue | N of 33rd | 30 | 2,440 | 57.6 | 3,294 | 58.9 |
| | S of 33rd | 30 | 2,774 | 58.2 | 3,745 | 59.5 |
| | N of Spring | 30 | 3,157 | 58.7 | 4,262 | 60.0 |
| | S of Spring | 40 | 4,112 | 62.7 | 5,551 | 64.0 |
| | N of Willow | 40 | 5,737 | 64.2 | 7,745 | 65.5 |
| | S of Willow | 30 | 5,819 | 61.4 | 7,856 | 62.7 |
| Orange Avenue | N of 33rd | 35 | 15,088 | 67.0 | 20,369 | 68.3 |
| | S of 33rd | 35 | 15,840 | 67.2 | 21,384 | 68.5 |
| | N of Spring | 35 | NA | NA | NA | NA |
| | S of Spring | 35 | 15,061 | 66.9 | 20,332 | 68.2 |
| | N of Willow | 40 | 14,185 | 68.1 | 19,150 | 69.4 |
| | S of Willow | 35 | 14,837 | 66.9 | 20,030 | 68.2 |
| | N of Hill | 35 | 15,690 | 67.1 | 21,182 | 68.4 |
| Walnut Avenue | N of 33rd | 30 | 4,739 | 60.5 | 6,398 | 61.8 |
| | S of Spring | 35 | 7,253 | 63.8 | 9,792 | 65.1 |
| | N of Willow | 35 | 6,720 | 63.4 | 9,072 | 64.7 |

TABLE 10 **Roadway Noise Levels**

| Street Segment | | Speed | Existing ADT | Existing CNEL[1] | 2030 ADT | 2030 CNEL[1] |
|---|---|---|---|---|---|---|
| | S of Willow | 35 | 6,476 | 63.3 | 8,743 | 64.6 |
| | N of Hill | 30 | 8,076 | 62.8 | 10,903 | 64.1 |
| | S of Hill | 30 | 5,845 | 61.4 | 7,891 | 62.7 |
| Cherry Avenue | S of Spring | 40 | 39,444 | 72.6 | 53,249 | 73.9 |
| | N of Willow | 40 | 40,945 | 72.7 | 55,276 | 74.0 |
| | S of Willow | 40 | 34,661 | 72.0 | 46,792 | 73.3 |
| | N of Hill | 40 | 31,195 | 71.5 | 42,113 | 72.8 |
| | S of Hill | 40 | 29,735 | 71.3 | 4,0142 | 72.6 |
| Junipero Avenue | S of Spring | 35 | 5,153 | 62.3 | 6,957 | 63.6 |
| | N of Willow | 35 | 3,061 | 60.0 | 4,132 | 61.3 |
| | N of PCH | 25 | 2,118 | 55.6 | 2,859 | 56.9 |
| PCH | Cherry – Redondo | 35 | 36,000 | 70.7 | 48,000 | 72.0 |
| Atlantic Avenue | Willow – Wardlow | 35 | 20,900 | 68.4 | 27,800 | 69.6 |
| Temple Avenue | N of Hill | 35 | 12,800(b) | 66.2 | 17,000 | 67.5 |
| | S of Hill | 25 | 3,910(a) | 58.2 | 4,800 | 59.1 |
| Obispo Avenue | PCH to Temple | 40 | 8,300 | 65.8 | 11,000 | 67.0 |
| Wardlow Road | Atlantic to Walnut | 35 | 7,270(c) | 64.9 | 12,600 | 66.2 |
| Redondo Avenue | PCH to Willow | 40 | 27,400 | 71.0 | 36,400 | 72.2 |
| I-405 Freeway | Throughout Signal Hill | 65 | 301,000(e) | 74.0[2] | 368,000 | 74.9[2] |

*[1] CNEL in dBA at 50 feet from roadway centerline.*

*[2] Includes measured -12 dB average decrease from freeway depression and walls.*

*Note: Traffic volumes from 2004 Traffic Data by Newport Traffic Services and 2001 Long Beach General Plan, except as noted below:*

*(a) Kroc Center EIR, 2009 turning movements $\times$ 10.0*

*(b) North of Willow; no data available south of Willow*

*(c) Realty report, property immediately south of I-405; north side assumed identical*

*(d) EDCO Recycling MRF Traffic Study, 2009*

*(e) Caltrans 2008 freeway traffic count*

TABLE 11 **Roadway Noise Impact Distances**

| Roadway | From | To | 60 dB CNEL | 65 dB CNEL | 70 dB CNEL | 75 dB CNEL |
|---|---|---|---|---|---|---|
| Spring | e/o Cherry | - | 325' | 150' | 70' | <50' |
| " " | w/o California | e/o Walnut | 215' | 100' | <50' | <50' |
| Willow | w/o California | e/o Temple | 375' | 175' | 80' | <50' |
| Cherry | s/o Spring | s/o Hill | 385' | 180' | 85' | <50' |
| Orange | n/o 33rd | n/o Hill | 195' | 90' | <50' | <50' |
| Hill | e/o Orange | e/o Obispo | <110' | <50' | <50' | <50' |
| Walnut | n/o 33rd | s/o Hill | 110' | 50' | <50' | <50' |
| Junipero | s/o Spring | n/o PCH | <110' | <50' | <50' | <50' |
| California | n/o 33rd | s/o Willow | 110' | 50' | <50' | <50' |
| PCH | Cherry | Redondo | 325' | 150' | 70' | <50' |
| Atlantic | Willow | Wardlow | 215' | 100' | <50' | <50' |
| Obispo | PCH | Hill | 150' | 70' | <50' | <50' |
| Wardlow | Atlantic | Walnut | 130' | 60' | <50' | <50' |
| Redondo | PCH | Willow | 325' | 150' | 70' | <50' |
| Temple | PCH | Hill | <110' | <50' | <50' | <50' |
| " " | Willow | 29th | 160' | 75' | <50' | <50' |
| I-405 Freeway | Temple | Atlantic | 495' | 230' | 105' | 50' |

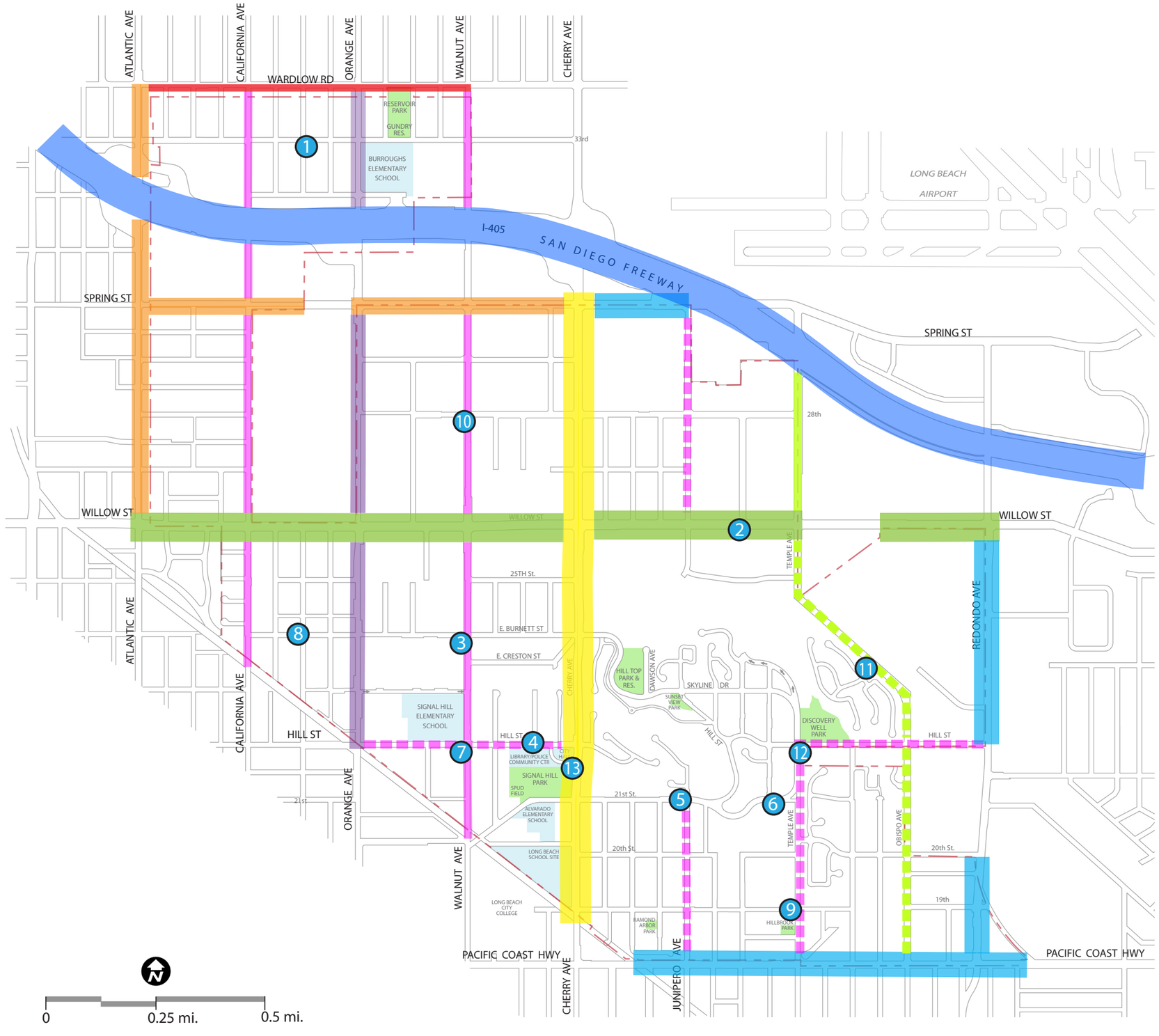
*Note: Distances measured from roadway centerlines.*

City of Signal Hill

# GENERAL PLAN

Noise Element

*December 2009*




(#) NOISE MEASUREMENT LOCATION

Distances from Roadway Centerline

| | 65 dB CNEL | 60 dB CNEL |
|---|---|---|
| | < 50′ | <110′ |
| | 50′ | 110′ |
| | 60′ | 130′ |
| | 70′ | 150′ |
| | 75′ | 160′ |
| | 90′ | 195′ |
| | 100′ | 215′ |
| | 150′ | 325′ |
| | 175′ | 375′ |
| | 180′ | 385′ |
| | 230′ | 495′ |

City of Signal Hill Boundary

Figure 6

## Traffic Noise Impact Distances

## E. Noise Mitigation Methods

Various noise mitigation methods may be used to minimize noise impacts on noise-sensitive receptors. Mitigation methods may include:

- Restrictions on the time and location of noise-producing activities, such as construction;
- Restrictions on unnecessary, excessive, or annoying noise in the city, including noise generated by motor vehicles, machinery, or sound amplification devices;
- Using sound-insulating materials in construction of noise-sensitive facilities in areas where they would be exposed to unacceptable levels of noise;
- Using site planning and the California Environmental Quality Act environmental review process to reduce noise impacts;
- Incorporating noise exposure criteria (such as shown in Figure 5) into land use planning to reduce future noise and land use incompatibilities; and,
- Continued enforcement of noise restrictions located in the Noise Ordinance, Oil Code, and other City regulations.

# III. GOALS AND POLICIES

**GOAL 1: Protect the health, safety, and welfare of people living and working within the city from adverse noise impacts.**

Policy 1.a: The City will consider the severity of noise exposure in the community planning process to prevent or minimize noise impacts to existing and proposed land uses.

Policy 1.b: Noise-compatible commercial and industrial land uses will be planned along the I-405 freeway and major roadways.

Policy 1.c: Noise-sensitive land uses, including residential, transient lodging, hospitals and long-term care facilities, educational facilities, libraries, churches, and places of public assembly will not be located near major stationary noise sources.

Policy 1.d: The City will inform those living and working within the city of the effects of noise pollution and will cooperate with all levels of government to reduce or minimize impacts.

Policy 1.e: Require noise mitigation to ensure that noise-sensitive land uses are not exposed to noise levels of greater than 45 dB in habitable rooms and 65 dB in outdoor living areas.

Policy 1.f: Where needed, the City will encourage the use of noise mitigation methods that minimize visual impacts and maintain necessary access.

Policy 1.g: The City will consider planning measures such as reduced street widths and traffic calming to reduce vehicular noise impacts on noise-sensitive land uses.

# IV. IMPLEMENTATION PROGRAM

This section provides a coordinated set of action plans and programs that serve to implement the goals and policies described in Section III.

TABLE 12 **Implementation Program**

| | Action Plans/Policies | Corresponding Goal/Policy |
|---|---|---|
| 1 | Provide information to the public regarding the effects of high noise levels and means to reduce noise levels and their impacts. | 1.d |
| 2 | Utilize the site plan review process and California Environmental Quality Act review of new developments to minimize impacts of noise-generating activities whenever feasible. | 1.a, 1.c, 1.e, 1.f |
| 3 | Review City functions and activities to ensure that noise from concerts, construction, refuse collection, and street cleaning is reduced to the lowest possible level. | 1.a |
| 4 | Consider the use of noise criteria in the purchase of new equipment by City departments and agencies as part of bid evaluation. | 1.a |
| 5 | Encourage the federal and State governments to continue to provide standards of allowable industrial noise exposure so that all workers are adequately protected against noise-induced hearing loss. | 1.a |
| 6 | Review the City's noise ordinance and recommend amendments as needed. | 1.d |
| 7 | Review the Noise Element and update, if necessary, every five to ten years. | 1.a |
| 8 | Continue to review County and regional plans for transportation, airport operation, etc. to identify the environmental impact of noise and to develop alternatives for the control of major noise sources on a County and regional basis. | 1.a |
| 9 | Work closely with Caltrans in the early stages of design modification or expansion of State-owned highways to ensure proper consideration of noise impacts on the city. | 1.a, 1.c, 1.f |
| 10 | Work with Caltrans to incorporate source noise reduction, barriers, and other design elements for future freeway ramp or access alignments. | 1.b, 1.f |
| 11 | Continue enforcement procedures to effect compliance with Motor Vehicle Code noise standards for motor vehicles | 1.a |
| 12 | Review the City's truck routes to limit to the extent practicable truck traffic in noise-sensitive areas. | 1.a |
| 13 | Support the currently-adopted Aircraft Noise Compatibility Ordinance (Long Beach Municipal Code Chapter 16.43) and noise abatement procedures for Long Beach Airport. Strongly oppose the establishment of flight patterns of aircraft over the city and relocation of runways, which would include noise impacts on land uses in Signal Hill. | 1.d |

| | | |
|---|---|---|
| 14 | Encourage Long Beach Transit to use noise criteria as an important factor in their purchase of new buses. | 1.d |
| 15 | Mitigate new noise sources to an acceptable exterior level of 65 dB CNEL or less and an interior level in habitable rooms of 45 dB CNEL or less at existing noise-sensitive land uses. | 1.a, 1.e |
| 16 | Require an acoustical analysis report where the introduction or addition of a new noise source has the potential to result in exterior noise levels exceeding 60 dB CNEL at a noise-sensitive location. The report must show how noise mitigation measures have been incorporated into the design of the new noise source to reduce interior noise levels at noise-sensitive locations to 45 dB CNEL. | 1.a, 1.d, 1.e |
| 17 | For new residential structures to be located where the predicted CNEL exceeds 60 dB (as shown on Figure 6, *Traffic Noise Impact Distances*), require an acoustical analysis assuring that the proposed design will limit exterior noise to allowable levels: 45 dB in any habitable room, and to the extent practicable, 65 dB for outdoor living areas. | 1.a, 1.c, 1.d |
| 19 | Enforce the California Building Standards Code (CCR, Title 24) for sound transmission between adjacent multifamily dwellings to ensure an acceptable interior noise level of 45 dB CNEL in habitable rooms. | 1.a |
| 21 | Consider the use of reduced street widths and traffic calming to reduce vehicular noise. | 1.g |
| 22 | Enforce existing noise ordinance requirements for the construction of new single-family detached or multifamily residential dwellings within 600 feet of an operating well, injection well, or other appurtenant oil field equipment (SHMC Section 9.16.085). | 1.e |

# V. ENFORCEMENT

Noise control programs involve federal, State, County, and City agencies, as described in Section I.B, above. Primary responsibility for enforcement of City regulations and guidelines lies with the Community Development Department and the Police Department. The Community Development Department enforces zoning and subdivision ordinances, applies the California Environmental Quality Act, and incorporates the goals, policies, and implementation measures of the Noise Element into the planning process. The Police Department enforces various regulations related to noise control, including the California Vehicle Code.

The City of Signal Hill can achieve a noise-compatible environment through continued comprehensive land-use planning, including the evaluation of potential noise impacts on proposed new development relative to the City's policies and implementation measures. The City's noise compatibility objectives by land use are summarized in Table 8. Proposed residential and other noise-sensitive projects impacted by noise levels of 65 dB CNEL or greater for exterior and 45 dB CNEL for interior noise levels would require additional acoustical analysis and noise mitigations to achieve acceptable exterior and interior noise levels. Noise-sensitive land uses include residential (single- and multi-family dwellings, mobilehome parks, dormitories, and similar uses); transient lodging (hotels, motels, and similar uses); hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care; and public or private educational facilities, libraries, churches, and places of assembly. The City will continue to require that proposals near noise-sensitive land uses include an acoustical analysis prepared by a qualified acoustical engineer with experience in environmental noise assessment and noise control design.

The Community Development Department's Building and Safety Division is responsible for continued enforcement of noise insulation standards found in the California Building Code (CCR, Title 24, Part 2). The Division is also responsible for enforcing the Noise Ordinance, which is directed at controlling noise from stationary sources and its intrusion onto adjacent properties. The enforcement of the Noise Ordinance is an effective tool to control non-transportation noise sources.