DRAFT 4
City of Goleta
Thursday, May 7, 2004

BACKGROUND REPORT NUMBER 20

Noise

The purpose of this background report is to describe the existing (2003) noise environment within the City of Goleta as it has been characterized by various agencies and other sources. The content of this report was prepared for the City of Goleta by RBF Consulting with modifications by the City. The material addressed in this report will be part of the City's Noise Element.

NOISE SCALES AND DEFINITIONS

While loudness is subjective, sound pressure can be measured. Sound levels are determined with electronic instruments that measure the intensity of sound pressure in Decibels (dB) on a logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. A sound that is 10 Decibels higher than another indicates that the intensity of the pressure is 10 times higher; a sound that is 20 decibels higher indicates that the intensity of the sound is 100 times higher, and so forth.

Human perception of sound loudness is more subjective. In terms of human response, the perception of noise is different than the logarithmic scale of sound intensity measured electronically:

> "A change in sound level of less than 3 dB is not likely to be perceptible, but a change of 5 db will be noticeable. An increase in 10 dB will appear to be twice as great as an increase of 5 dB and an increase in 20 dB much greater than an increase of 10dB—not quite proportionately."[1]

Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). The A-weighted sound pressure level is the sound pressure level, in decibels, as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear. Examples of various sound levels in different environments are shown in Table 1, *Sound Levels and Human Response*.

[1] Frederick S. Merritt, editor, Standard Handbook for Civil Engineers, McGraw-Hill Book Company, New York, 1983, page 15-93.

Many methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time;
- The influence of periodic individual loud events; and
- The community response to changes in the community noise environment.

Numerous methods have been developed to measure sound over a period of time. These methods include: 1) the community noise equivalent level (CNEL); 2) the equivalent sound level (Leq); and 3) the day/night average sound level (Ldn).

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL)

The predominant community noise rating scale used in California for land use compatibility assessment is the Community Noise Equivalent Level (CNEL). The CNEL rating represents the average of 24 hourly readings of equivalent levels, known as Leq's, for a 24-hour period based on an A-weighted decibel with upward adjustments added to account for increased noise sensitivity in the evening and night periods. These adjustments are +5 dBA for the evening, 7:00 p.m. to 10:00 p.m., and +10 dBA for the night, 10:00 p.m. to 7:00 a.m. CNEL may be indicated by "dBA CNEL" or just "CNEL."

EQUIVALENT SOUND LEVEL (LEQ)

The Leq is the sound level containing the same total energy over a given sample time period. The Leq can be thought of as the steady sound level, which in a stated period of time would contain the same acoustic energy as the time-varying sound level during the same period. Leq is typically computed over 1-, 8- and 24-hour sample periods.

DAY NIGHT AVERAGE (LDN)

Another commonly used method is the day/night average level or LDN. The LDN is a measure of the 24-hour average noise level at a given location. It was adopted by the United States Environmental Protection Agency (EPA) for developing criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the Leq. The LDN is calculated by averaging the Leq's for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 p.m. to 7:00 a.m.), by 10 dBA to account for the increased sensitivity of people to noises that occur at night.

Table 1
SOUND LEVELS AND HUMAN RESPONSE

Noise Source	Db(A) Noise Level	Response
	150	
Carrier Jet Operation	140	Harmfully Loud
	130	Pain Threshold
Jet Takeoff (200 feet; thence.) Discotheque	120	
Unmuffled Motorcycle Auto Horn (3 feet; thence.) Rock 'n Roll Band Riveting Machine	110	Maximum Vocal Effort Physical Discomfort
Loud Power Mower Jet Takeoff (2000 feet; thence.) Garbage Truck	100	Very Annoying Hearing Damage (Steady 8-Hour Exposure)
Heavy Truck (50 feet; thence.) Pneumatic Drill (50 feet; thence.)	90	
Alarm Clock Freight Train (50 feet; thence.) Vacuum Cleaner (10 feet; thence.)	80	Annoying
Freeway Traffic (50 feet; thence.)	70	Telephone Use Difficult
Dishwashers Air Conditioning Unit (20 feet; thence.)	60	Intrusive
Light Auto Traffic (100 feet; thence.)	50	Quiet
Living Room Bedroom	40	
Library Soft Whisper (15 feet; thence.)	30	Very Quiet
Broadcasting Studio	20	
	10	Just Audible
	0	Threshold of Hearing

Source: Melville C. Branch and R. Dale Beland, Outdoor Noise in the Metropolitan Environment, 1970, page 2.

SOUND EXPOSURE LEVEL (SEL)

The most frequently used measure of noise exposure for an individual aircraft noise event is the Sound Exposure Level, or SEL. SEL is a measure of the total noise energy produced during an event, from the time when the A-weighted sound level first exceeds a threshold level (normally just above the background or ambient noise) to the time that the sound level drops back down below the threshold. To allow comparison of noise events with very different durations, SEL "normalizes" the duration in every case to one second; that is, it is expressed as the steady noise level with just a one-second duration that includes

the same amount of noise energy as the actual longer duration, time-varying noise. SEL "squeezes" the entire noise event into one second.

Because the SEL is normalized into one second, it will always be larger in magnitude than the Lmax for an event longer than one second. For most aircraft overflights, the SEL is normally on the order of 7 to 12 dB higher than Lmax. SEL values vary with the noise level during an event, and also with the duration of an event. Therefore, not only do louder flyovers have higher SELs than do quieter ones, but also flyovers that stretch out longer in time have greater SELs than do shorter ones. Aircraft noise models use SEL as the basis for computing exposure from multiple events.

SINGLE-EVENT NOISE EXPOSURE LEVEL (SENEL)

One of the most controversial aspects of quantifying noise exposure in terms of CNEL or LDN is that persons respond to individual noise events (usually called single events) rather than to the average CNEL or LDN. The State of California uses the Single-Event Noise Exposure Level (SENEL) in place of the SEL and the FAA has allowed this substitution for noise analyses conducted within the State. The SENEL is the noise exposure of a single event, such as an aircraft flyby, measured over the time interval between the initial and final times for which the noise level of the event exceeds a predetermined threshold noise level. For most applications, including aircraft noise analyses, the SEL and SENEL are identical.

OTHER NOISE METRICS

The maximum noise level recorded during a noise event is typically expressed as Lmax. The sound level exceeded over a specified time frame can be expressed as Ln (i.e., L_{90}, L_{50}, L_{10}, etc.). L_{50} equals the level exceeded 50 percent of the time, L_{10} ten percent of the time, etc.

As previously mentioned, people tend to respond to changes in sound pressure in a logarithmic manner. In general, a 1 dBA change in the sound pressure levels of a given sound is detectable only under laboratory conditions. A 3 dBA change in sound pressure level is considered a detectable difference in most situations. A 5 dBA change is readily noticeable and a 10 dBA change is considered a doubling (or halving) of the subjective loudness. It should be noted that a 3 dBA increase or decrease in the average traffic noise level is realized by a doubling or halving of the traffic volume; or by about a 7 mile per hour (mph) increase or decrease in speed.

For each doubling of distance from a point noise source, the sound level will decrease by 6 dBA. In other words, if a person is 100 feet from a machine, and moves to 200 feet from that source, sound levels will drop approximately 6 dBA. For each doubling of distance from a line source, like a roadway, noise levels are

reduced by 3 to 5 decibels, depending on the ground cover between the source and the receiver.

Noise barriers can provide approximately 5 dBA CNEL noise reduction (additional reduction may be provided with a barrier of appropriate height, material, location and length). A row of buildings provides up to 5 dBA CNEL noise reduction with a 1.5 dBA CNEL reduction for each additional row up to a maximum reduction of approximately 10 dBA. The exact degree of noise attenuation depends on the nature and orientation of the structure and intervening barriers.

NOISE STANDARDS

Federal Noise Standards

The United States Noise Control Act of 1972 (NCA) recognized the role of the Federal government in dealing with major commercial noise sources in order to provide for uniform treatment of such sources. As Congress has the authority to regulate interstate and foreign commerce, regulation of noise generated by such commerce also falls under congressional authority. The Federal government specifically preempts local control of noise emissions from aircraft, railroad and interstate highways.

Table 2
HUD EXTERNAL NOISE EXPOSURE STANDARDS FOR NEW RESIDENTIAL CONSTRUCTION

HUD Approval	Site Noise Exposure	Noise Level (Ldn)	Special Approval/ Requirements
Standard	Acceptable	Not exceeding 65 dB	None
Discouraged	Normally Acceptable	65 dB to 75 dB	Building sound attenuation of 5 dB for 65-70 dB noise level and 10 dB for 70-75 dB noise level Special Environmental Clearance Approval of Regional Administration
Prohibited	Unacceptable	75+ dB	Approval of Assistant Secretary of Community Planning EIS required

Source: HUD External Noise Exposure Standards for New Residential Construction July 12, 1979, as amended at 50 FR 9268, March 7, 1985.

The U.S. Environmental Protection Agency (EPA) has identified acceptable noise levels for various land uses, in order to protect public welfare, allowing for an adequate margin of safety, in addition to establishing noise emission standards for interstate commerce activities.

The U.S. Department of Housing and Urban Development (HUD) has established policies for granting financial support for the construction of dwelling units in noise-impacted areas. Table 2, *HUD External Noise Exposure Standards for New Residential Construction*, shows noise exposure levels used by HUD to determine eligibility for financial backing for new or rehabilitative residential construction in noise-impacted areas, in addition to providing special requirements. As indicated in Table 2, financial assistance from HUD would still be possible when noise exposure is between 65 dBA and 75 dBA, if adequate sound attenuation is provided to achieve appropriate noise reduction.

State Noise Standards

The Office of Noise Control in the State Department of Health Services has developed criteria and guidelines for local governments to use when setting standards for human exposure to noise and preparing noise elements for General Plans. These guidelines include noise exposure levels for both exterior and interior environments. In addition, Title 25, Section 1092 of the California Code of Regulations, sets forth requirements for the insulation of multiple-family residential dwelling units from excessive and potentially harmful noise. The State indicates that locating units in areas where exterior ambient noise levels exceed 65 CNEL is undesirable. Whenever such units are to be located in such areas, the developer must incorporate into building design construction features which reduce interior noise levels to 45 dBA CNEL. Tables 3 and 4 summarize standards adopted by various State and Federal agencies. Table 3, *Noise and Land Use Compatibility Matrix*, presents criteria used to assess the compatibility of proposed land uses with the noise environment. Table 4, *State Interior and Exterior Noise Standards*, indicates standards and criteria that specify acceptable limits of noise for various land uses throughout Cerritos. These standards and criteria will be incorporated into the land use planning process to reduce future noise and land use incompatibilities. These tables are the primary tools that allow the City to ensure integrated planning for compatibility between land uses and outdoor noise.

City Noise Standards

The City of Goleta currently follows the noise thresholds from the Santa Barbara County Environmental Thresholds Manual. Until the General Plan is comleted, the following thresholds of significance assist the City in the determination of significant noise impacts.

- A proposed development that would generate noise levels in excess of 65 dBA CNEL and could affect sensitive receptors would generally be presumed to have a significant impact.

- Outdoor living areas of noise sensitive uses that are subject to noise levels in excess of 65 dBA CNEL would generally be presumed to be significantly impacted by ambient noise. A significant impact would also generally occur where interior noise levels cannot be reduced to 45 dBA CNEL or less.

- A project will generally have a significant effect on the environment if it will increase substantially the ambient noise levels for noise-sensitive receptors adjoining areas. This may generally be presumed when ambient noise levels affecting sensitive receptors are increased to 65 dBA CNEL or more. However, a significant effect may also occur when ambient noise levels affecting sensitive receptors increase substantially but remain less than 65 dBA CNEL, as determined on a case-by-case level.

- Noise from grading and construction activity proposed within 1600 feet of sensitive receptors, including schools, residential development, commercial lodging facilities, hospitals or care facilities, would generally result in a potentially significant impact. According to EPA guidelines average construction noise is 95 dBA at a 50-foot distance from the source. A 6 dB drop occurs with a doubling of the distance from the source. Therefore, locations within 1600 feet of the construction site would be affected by noise levels over 65 dBA. To mitigate this impact, construction within 1600 feet of sensitive receptors shall be limited to weekdays between the hours of 8 AM to 5 PM only. Noise attenuation barriers and muffling of grading equipment may also be required. Construction equipment generating noise levels above 95 DBA may require additional mitigation.

Table 3
NOISE AND LAND USE COMPATIBILITY MATRIX

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE			
	LDN OR CNEL, DB			
	NORMALLY ACCEPTABLE	CONDITIONALLY ACCEPTABLE	NORMALLY UNACCEPTABLE	CLEARLY UNACCEPTABLE
RESIDENTIAL-LOW DENSITY	50-60	60-65	65-75	75-85
Residential-Multiple Family	50-60	60-65	65-75	75-85
Transient Lodging-Motel, Hotels	50-65	65-70	70-80	80-85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-60	60-65	65-80	80-85
Auditoriums, Concert Halls, Amphitheaters	NA	50-65	NA	65-85
Sports Arenas, Outdoor Spectator Sports	NA	50-70	NA	70-85
Playgrounds, Neighborhood Parks	50-70	NA	70-75	75-85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-70	NA	70-80	80-85
Office Buildings, Business Commercial and Professional	50-67.5	67.5-75	75-85	NA
Industrial, Manufacturing, Utilities, Agriculture	50-70	70-75	75-85	NA

Source: Modified from U.S. Department of Housing and Urban Development Guidelines and State of California Standards.

NOTES: 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. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New Construction or development should 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 should generally not be undertaken.

NA: Not Applicable

Table 4
STATE INTERIOR AND EXTERIOR NOISE STANDARDS

Land Use Categories		CNEL	
Categories	**Uses**	**Interior[1]**	**Exterior[2]**
Residential	Single family Duplex, Multiple Family	45 - 55	50 – 60
	Mobile Home	45	65
Commercial Industrial Institutional	Hotel, Motel, Transient Lodging	45	--
	Commercial Retail, Bank, Restaurant	55	--
	Office Building, Research and Development, Professional Offices, City Office Building	50	--
	Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	--
	Gymnasium (Multipurpose)	50	--
	Sports Club	55	--
	Manufacturing, Warehousing, Wholesale, Utilities	65	--
	Movie Theaters	45	--
Institutional	Hospital, Schools' Classrooms	45	65
	Church, Library	45	--
Open Space	Parks	--	65

NOTES:

1. Indoor environmental including: Bedrooms, living areas, bathrooms, toilets, closets, corridors.
2. Outdoor environment limited to: Private yard of single family
   Multi-family private patio or balcony which is served by a means of exit from inside the dwelling
   Balconies 6 feet deep or less are exempt
   Mobile home park
   Park's picnic area
   School's playground
3. Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided as of Chapter 12, Section 1205 of UBC.
4. Exterior noise levels should be such that interior noise levels will not exceed 45 CNEL.

Airport Noise Standards

Title 21, Subchapter 6 of the California Administrative Code establishes noise standards for airports. According to Title 21, an airport should maintain a noise impact area no greater than zero (defined as no residential uses within the 65 CNEL corridor) based on a 65 CNEL standard. The noise area is defined as that total area of incompatible land uses within the 65 CNEL contour of the airport.

For purposes of determining the size of the noise impact area, the following land uses are incompatible:

a) Residences, including but not limited to, detached single-family dwellings, multi-family dwellings, high-rise apartments or condominiums and mobile homes, unless:

    1) An aviation easement for aircraft noise has been acquired by the airport proprietor, or

    2) the dwelling unit was in existence at the same location prior to January 1, 1989, and has adequate acoustic insulation to ensure an interior CNEL due to aircraft noise of 45 dB or less in all habitable rooms. However, acoustic treatment alone does not convert residences having an exterior CNEL of 75 dB or greater due to aircraft noise to a compatible land use if the residence has an exterior normally occupiable private habitable area such as a backyard, patio or balcony, or

    3) the residence is a high rise apartment or condominium having an interior CNEL of 45 dB or less in all habitable rooms due to aircraft noise, and an air circulation or air conditioning system as appropriate, or

    4) the airport proprietor has made a genuine effort as determined by the department in accordance with adopted land use compatibility plans and appropriate laws and regulations to acoustically treat residences exposed to an exterior CNEL less than 80 dB (75 dB if the residence has an exterior normally occupiable private habitable area such as a backyard, patio or balcony) or acquire avigation easements, or both, for the residences involved, but the property owners have refused to take part in the program, or

    5) the residence is owned by the airport proprietor.

b) Public and private schools of standard construction for which an avigation easement for noise has not been acquired by the airport

proprietor, or that do not have adequate acoustic performance to ensure an interior CNEL of 45 dB or less in all classrooms due to aircraft noise;

c) Hospitals and convalescent homes for which an avigation easement for noise has not been acquired by the airport proprietor, or that do not have adequate acoustic performance to provide an interior CNEL of 45 dB or less due to aircraft noise in all rooms used for patient care;

d) Churches, synagogues, temples and other places of worship for which an avigation easement for noise has not been acquired by the airport proprietor, or that do not have adequate acoustic performance to ensure interior CNEL of 45 dB or less due to aircraft noise.

EXISTING NOISE CONDITIONS

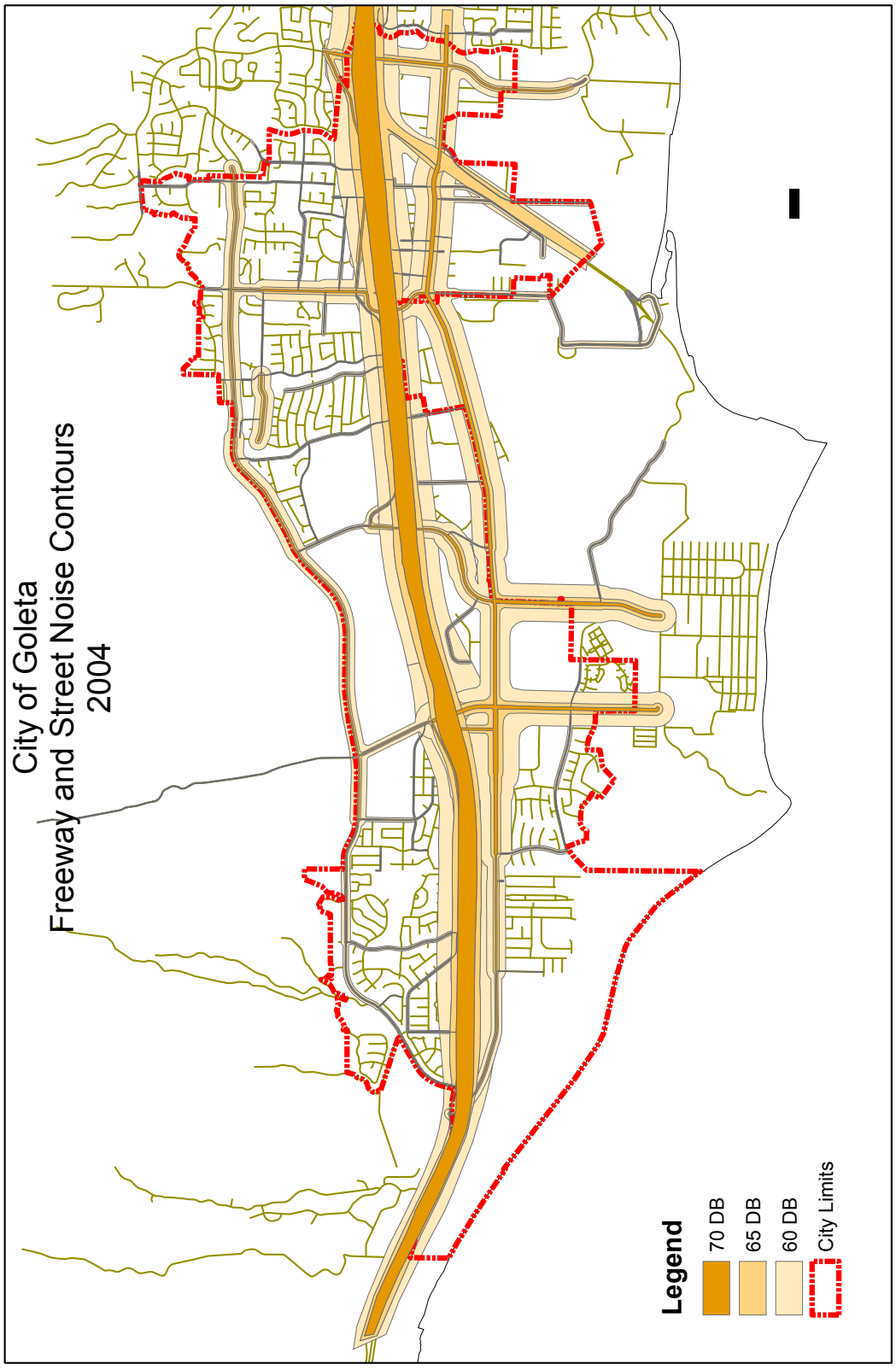
Mobile Noise Sources

Transportation systems are the dominant noise source in Goleta. Noise related to vehicular and rail traffic, as well as activities at the Santa Barbara Municipal Airport contribute most significantly to the local noise environment. Exhibit 1, *Noise* shows the noise associated with the street and freeway system in the City. Santa Barbara Airport has recently updated its noise information as illustrated below in Exhibit 4 below.

Vehicular Traffic

In addition to aircraft noise, one of the most pervasive noise sources in Goleta are motor vehicles, including automobiles, trucks, buses and motorcycles. The noise produced by these sources occurs primarily on roadways and may be of sufficient magnitude to expose various land uses to excessive noise levels. As a general observation, the speed of the vehicle is directly correlated to the noise level; an increase in speed causes an increase in noise levels. Roadways generating significant noise levels in the project area include U.S. Highway 101, State Route 217, Hollister Avenue, Fairview Avenue and Patterson Avenue. Noise levels adjacent to U.S. Highway 101 range from 75 to 90 dB(A), while noise levels adjacent to major arterials in the City can be as high as 85 dB(A).

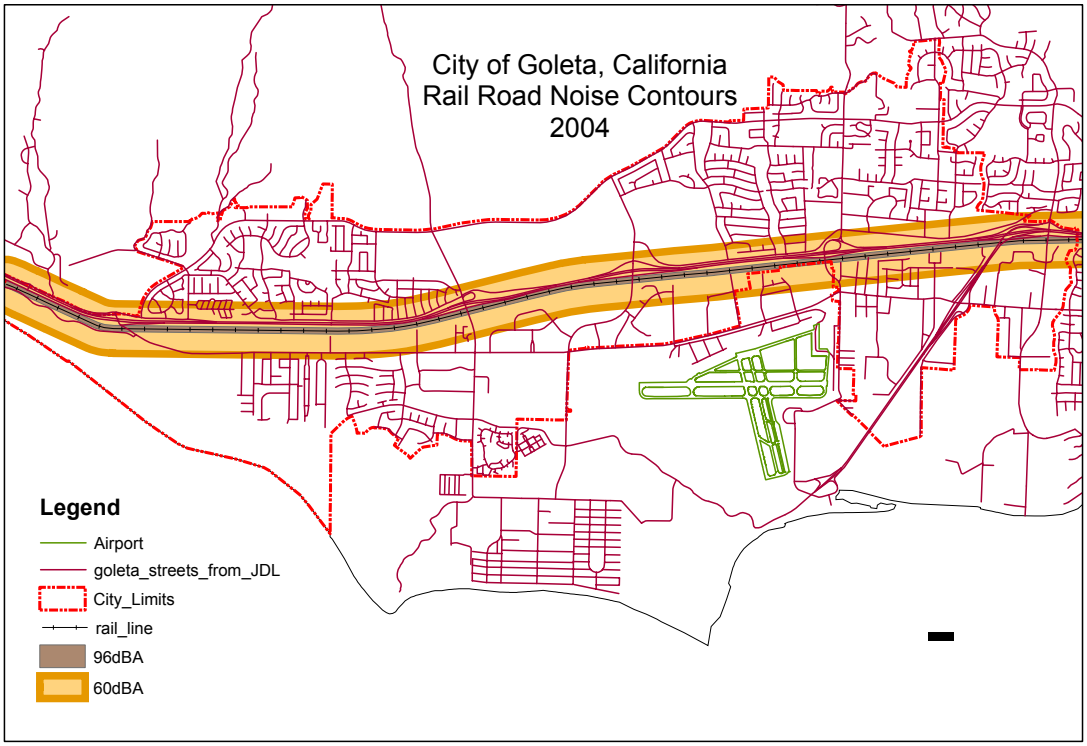
Exhibit 1, Street Noise



Rail

The Southern Pacific Railroad (SPRR) Company provides service through the Goleta area, with tracks south of Highway 101. The maximum sound level of passing trains ranges from 96 to 100 dBA at 100 feet from the tracks. At this location the CNEL ranges from 70 to 75 dBA. The CNEL is less than 60 dBA at approximately 800 feet from the tracks. Amtrak also utilizes the tracks, operating four trips (northbound and southbound) daily. No sound levels are available for an Amtrak train, but the sound levels are expected to be similar to Southern Pacific. Exhibit 1A illustrates these noise levels along the rail corridor—for the most part the 60dBA contour illustrated on Exhibit 1A overlaps the 60dB contour or higher on Exhibit 1

Exhibit 1A, Rail Noise



Santa Barbara Municipal Airport

The primary source of aircraft noise within the City of Goleta is the Santa Barbara Municipal Airport. The Santa Barbara Municipal Airport is the busiest commercial service airport on the California coast between San Jose and Los Angeles and has been owned and operated by the City of Santa Barbara for 60 years. The

airport is comprised of 950 acres: 400 acres are wetlands (Goleta Slough Reserve) and 95 acres have been established as the Airport's commercial/industrial area. The Airport is located approximately 10 miles from downtown Santa Barbara and is surrounded by the City of Goleta. The Airport has three runways: one runway capable of serving large commercial and corporate jet aircraft and two parallel runways serving small general aviation aircraft (refer to Exhibit 2, *Flight Approach*).

In 2003, Alaska Commuter, America West Express, American Eagle, Northwest Airlink, United Shuttle, United Express and USAirways Express serve the airport with close to 100 daily commercial flights. Three fixed base operations provide services for private aircraft owners: Mercury Air Center, Signature Flight Support and Stratman Aero Service. Flight schools are Above All Aviation, Santa Barbara Pilot's Center and Spitfire Aviation. The airport is equipped with an Instrument Landing System, Approach Lighting System and FAA Control Tower. Many companies headquarter their aircraft at the airport.[2]

According to the Santa Barbara Airport Draft F.A.R. Part 150 Noise Compatibility Study (November 2003), air transportation for the Santa Barbara Airport is expected to increase in the future. Table 5, *Activity Forecast Summary Santa Barbara Airport*, summarizes the activity forecasts for Santa Barbara Airport. General aviation operations are classified by the airport traffic control tower (ATCT) as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away form the airport. Generally, local operations are characterized by training operations.

Passenger enplanements are projected to average 3.3 percent annual growth, while cargo volume will grow at 4.8 percent annually. Based aircraft will grow at a 1.1 percent average rate. Overall, operations are forecast to grow at 1.25 percent annually.

A noise measurement program was conducted over a five-day period from March 19, 2001 through March 24, 2001. Noise measurement sites were selected on the basis of background information, local observations during the field effort and suggestions from Airport Management based on noise complaint history (refer to Exhibit 3, *Noise Monitor Locations*). The monitoring program documents existing noise exposure within areas around the Airport where noise-sensitive land uses are located and provide a means for validating the accuracy of the computer model for preparing noise exposure contours.

[2] Goleta Valley Chamber of Commerce website www:\\goletavalley.com

Table 5
ACTIVITY FORECAST SUMMARY SANTA BARBARA AIRPORT[1]

	2002	2008	2015	2025
Annual Operations[2] General Aviation				
Itinerant	71,007	75,200	82,400	92,700
Local	49,890	54,000	59,000	66,000
Total General Aviation	120,967	129,200	141,400	158,700
Airline	26,880	30,400	32,800	38,000
Air Cargo	2,692	3,200	3,600	4,100
Air Taxi	10,643	11,400	12,600	14,100
Military	1,136	1,100	1,100	1,100
Total Operations	162,319	175,300	191,500	216,000
Enplanements	367,172	465,000	575,000	780,000
Based Aircraft	188	198	215	241
Air Cargo (tons)	2,832	4,410	5,850	8,250

[1] Santa Barbara Airport Draft F.A.R. Part 150 Noise Compatibility Study (November 2003)
[2] Includes estimated operations not counted by tower.

Two methods were used to attempt to minimize the potential for non-aircraft noise sources in the measurements. For single-event analysis, minimum noise thresholds of five to ten decibels (dB) greater than ambient levels were programmed. Therefore, a single noise event had to exceed a threshold of 65 dB at each site before being recorded. For ambient single events, a noise event had to exceed the prescribed threshold, generally five sections for it to be included in the calculation for aircraft noise exposure.

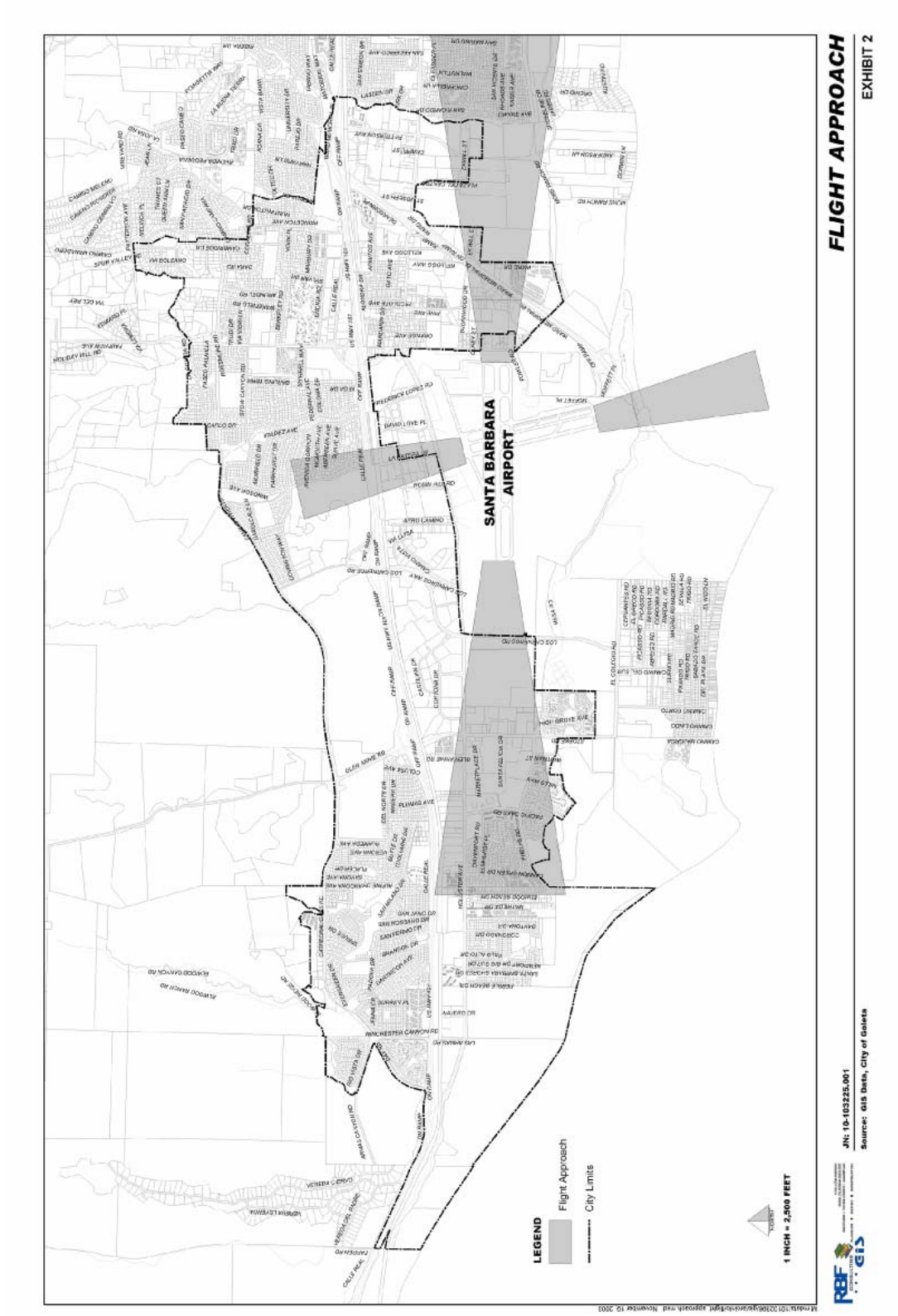
Table 6
MEASUREMENT RESULTS SUMMARY SANTA BARBARA AIRPORT[1]

	Site 1	Site 2	Site 2	Site 3	Site 4	Site 5	Site 6
Measurement Date	4/24	2/19	2/20	2/27	2/22	5/7	4/30
Cumulative Data							
Total LEQ (24)	56.7	59.5	58.2	57.1	56.8	53.0	51.4
Event LEQ (24)	55.6	57.7	56.4	54.1	53.4	46.9	47.0
Total CNEL (24)	58.9	63.4	61.6	61.0	62.1	56.4	55.2
Event CNEL (24)	57.3	60.6	58.6	57.9	55.9	50.6	50.9
L(50)	45.2	53.1	51.7	51.5	52.5	45.8	44.8
Single Events Data							
Number of Single Events	117	460	392	285	94	49	21

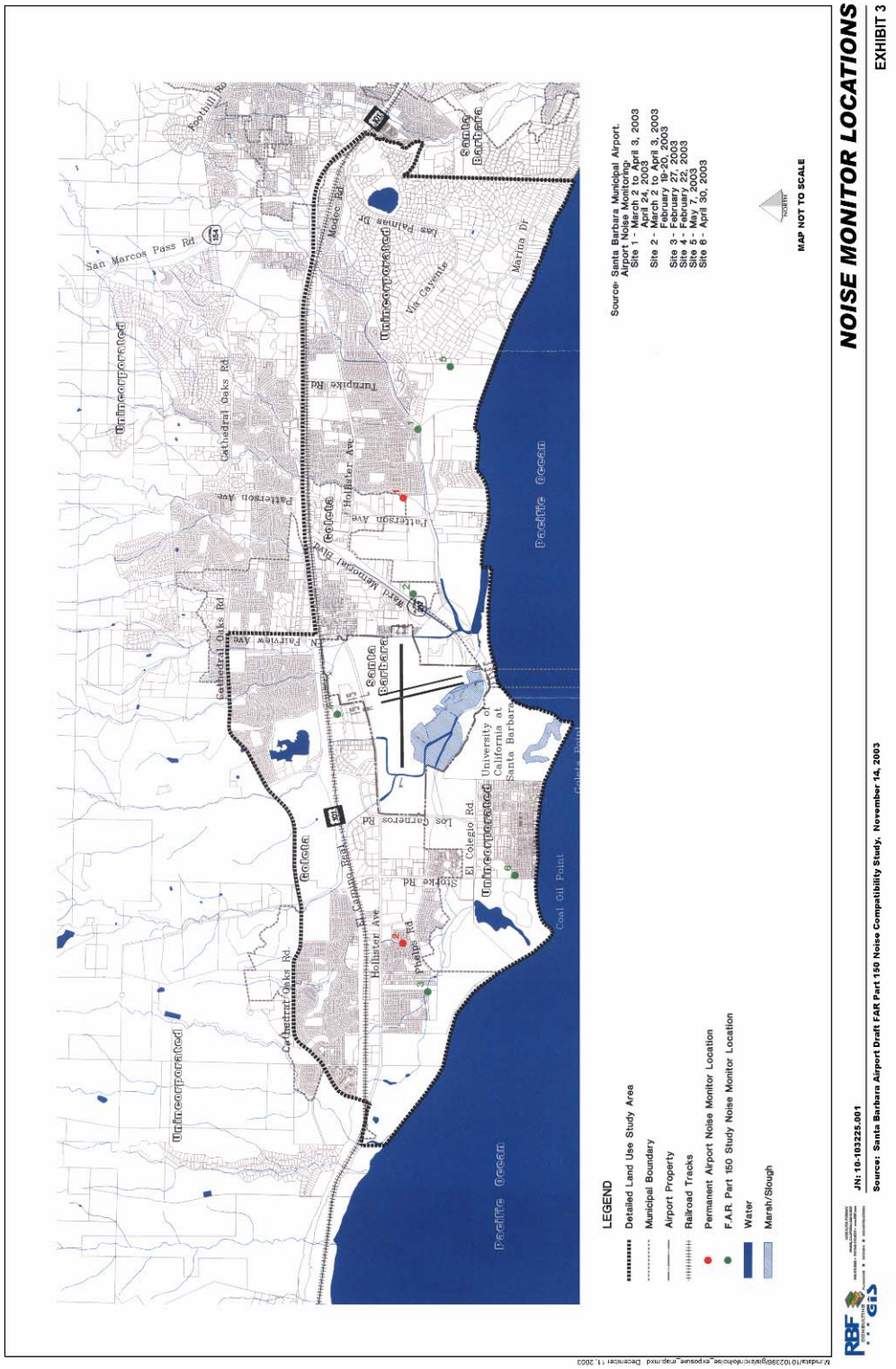
[1] Santa Barbara Airport Draft F.A.R. Part 150 Noise Compatibility Study (November 2003)
Source: Santa Barbara Airport Noise Van- March 19, 20, 22, 27; April 24, 30 and May 7, 2003.

The noise data collected during the measurement period is presented in Table 6, *Measurement Results Summary Santa Barbara Airport*.

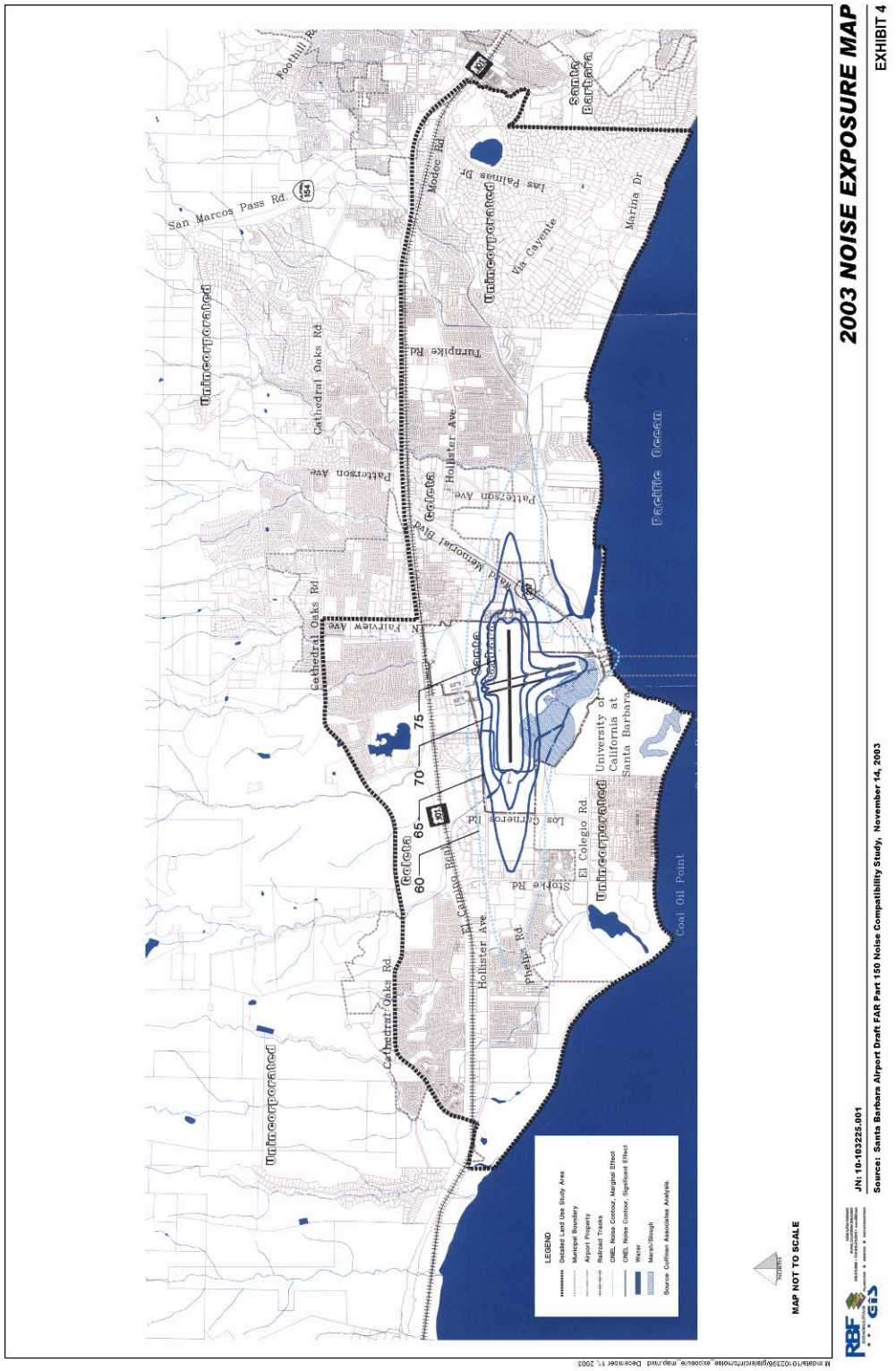
Insert Exhibit 2, Flight Approach



Insert Exhibit 3, Noise Monitor Locations



Insert Exhibit 4, 2003 Noise Exposure Map



The FAA Integrated Noise Model (INM) is used to predict aircraft noise levels in the vicinity of an airport. The INM accounts for such variables as airfield elevation, temperature, headwinds and local topography in predicting noise levels at a given located. The INM was used to prepare an existing conditions noise exposure map for the Santa Barbara Airport. Exhibit 4, *2003 Noise Exposure Map*, shows the noise contours calculated by the INM for the base year 2003.

STATIONARY NOISE SOURCES

Industrial Noise

Industrial land uses have the potential to exert a relatively high level of noise impact within their immediate operating environments. The scope and degree of noise impacts generated by industrial uses is dependent upon various critical factors, including the type of industrial activity, hours of operation and the sites' location relative to other land uses.

Industrial uses within Goleta consist primarily of high tech light industrial manufacturing firms in the computer, electronic and/or defense industries with many local facilities devoted to office and research use. Industrial uses are located south of US 101 with industrial uses in Old Town, along Aero Camino and large industrial/research parks along Hollister Avenue and around the Santa Barbara Airport. Although industrial uses are distributed throughout the area, several large industrial parks are located in west Goleta. These include the Delco complex, Raytheon complex, ACE-ABLE Industrial, Airport Plaza Industrial and Thornwood Industrial Park.

Additionally, industrial uses within Goleta include auto body, welding and machine shops, concrete mixing operations, lumberyards, etc. Delivery trucks, air compressors, generators, outdoor loudspeakers and gas venting are common noise sources associated with industrial land uses.

Commercial and Residential Related Noise

The daytime population of the City results in medium level background noise generated by commercial and office uses. Commercial noise sources may include mechanical equipment and engines in non-moving motors such as power tools. Stationary noise sources associated with residential areas are primarily due to air conditioners and pool/spa equipment. Additional stationary noise sources include animals, stereos, musical instruments, sporting events and horns. These noise sources have the potential to temporarily disrupt the quietness of an area.

The Old Town area is quiet during evening hours due to a relatively undeveloped commercial nightlife component. Evening activity is limited to restaurants and bars, with little pedestrian activity along Hollister. However, the general area is affected by mobile noise, such as the airport, highway and rail line.

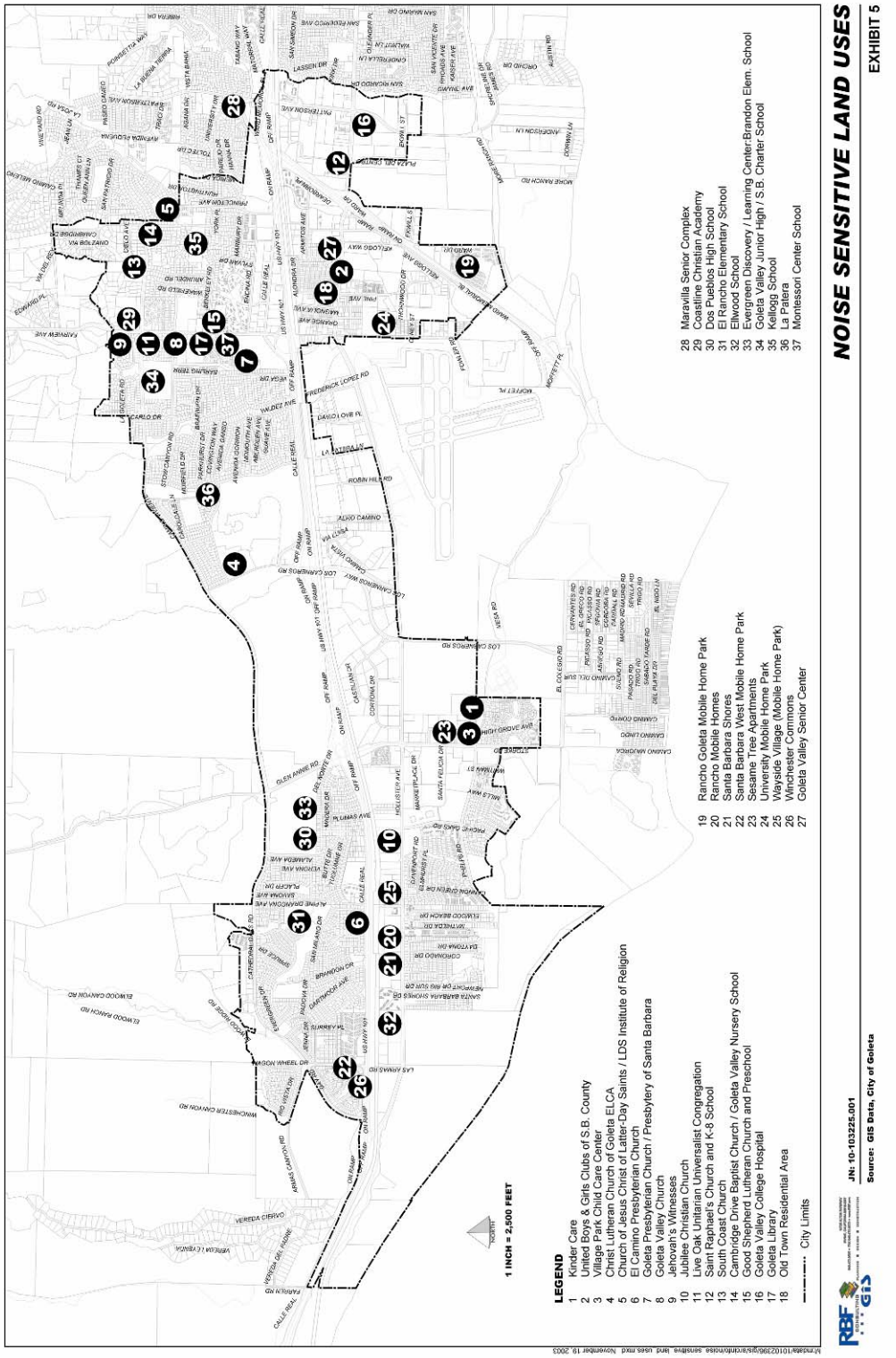
Ambient Noise

In order to describe the ambient or background noise level throughout the City, noise measurement samples were taken. The locations included a mix of public schools, private schools, preschools (childcare centers), churches, hospitals and parks. The locations shown in Exhibit 5, *Noise Sensitive Land Uses*, are distributed throughout the City in order to provide an overall understanding of the noise environment. Noise monitoring equipment used for the ambient noise survey consisted of a Larson Davis Laboratories Model LDL 820 sound level analyzer equipped with a Bruel & Kjaer (B&K) Type 4176 ½" microphone. The instrumentation was calibrated prior to use with a B&K Type 4230 acoustical calibrator to ensure the accuracy of the measurements and complies with applicable requirements of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters. The noise measurement locations also functioned as noise sensitive indicators. These noise sensitive indicators are uses such as schools and hospitals, which have a lower tolerance for noise than do industrial and commercial activities or normal residential uses. Noise levels measured at lease locations are reported in Table 7, *Field Noise Measurements*.

NOISE ATTENUATION

Transportation systems are the dominant noise source in Goleta. However, local government has little direct control of transportation noise at the source. State and federal agencies have the responsibility to control vehicle noise emission levels. The most effective method the City has to mitigate transportation noise is by reducing noise impact on the community. Mitigation through site planning and the design and construction of a noise barrier (generally a wall or berm) are the most common ways of alleviating traffic noise impacts in existing urban environments.

Insert Exhibit 5, Noise Sensitive Land Uses



Typical Noise Attenuation Techniques

Noise impacts can be mitigated in three basic ways: by reducing the sound level of the noise generator, by increasing the distance between the source and receiver, and by insulating the receiver.

Noise reduction can be accomplished by placement of walls, landscaped berms, or a combination of the two, between the noise source and the receiver. Generally, effective noise shielding requires a solid barrier with a mass of at least four pounds per square-foot of surface area which is large enough to block the line of sight between source and receiver. Variations may be appropriate in individual cases based on distance, nature and orientation of buildings behind the barrier, and a number of other factors. Garages or other buildings may be used to shield dwelling units and outdoor living areas from traffic noise.

In addition to site design techniques, noise insulation can be accomplished through proper design of buildings. Nearby noise generators should be recognized in determining the location of doors, windows and vent openings. Sound-rated windows (extra thick or multi-paned) and wall insulation are also effective. None of these measures, however, can realize their full potential unless care is taken in actual construction: doors and windows fitted properly; openings sealed; joints caulked; plumbing adequately insulated from structural members.

Table 7
FIELD NOISE MEASUREMENTS

Site No.	Category	Sensitive Receptor	Leq dBA
1	Child Care	Kinder Care	51.4
2	Child Care	United Boys & Girls Clubs of S.B. County	48.3
3	Child Care	Village Park Child Care Center	64.8
4	Church	Christ Lutheran Church of Goleta ELCA	49.5
5	Church	Church of Jesus Christ of Latter-Day Saints / LDS Institute of Religion	51.3
6	Church	El Camino Presbyterian Church	58.8
7	Church	Goleta Presbyterian Church / Presbytery of Santa Barbara (Also Care Unit in back)	56.3
8	Church	Goleta Valley Church	52.9
9	Church	Jehovah's Witnesses	46.6
10	Church	Jubilee Christian Church	61.3
11	Church	Live Oak Unitarian Universalist Congregation	49.1
12	Church	Saint Raphael's Church and K-8 School	59.8
13	Church	South Coast Church	51.2
14	Church / Child Care	Cambridge Drive Baptist Church / Goleta Valley Nursery School	48.8
15	Church / Child Care	Good Shepherd Lutheran Church and Preschool	57.0
16	Hospital	Goleta Valley College Hospital	54.2
17	Library	Goleta Library	50.1
18	Residential	Old Town Residential Area	60.7
19	Residential	Rancho Goleta Mobile Home Park	55.2
20	Residential	Rancho Mobile Homes	60.1
21	Residential	Santa Barbara Shores	57.8
22	Residential	Santa Barbara West Mobile Home Park	55.4
23	Residential	Sesame Tree Apartments	65.5
24	Residential	University Mobile Home Park	59.5
25	Residential	Wayside Village (Mobile Home Park)	62.4
26	Residential	Winchester Commons	54.5
27	Retirement	Goleta Valley Senior Center	62.3
28	Retirement	Maravilla Senior Complex	57.5
29	School	Coastline Christian Academy	54.2
30	School	Dos Pueblos High School	55.5
31	School	El Rancho Elementary School	44.1
32	School	Ellwood School	55.1
33	School	Evergreen Discovery / Learning Center: Brandon Elementary School	50.0
34	School	Goleta Valley Junior High / S.B. Charter School	53.7
35	School	Kellogg School	48.8
36	School	La Patera	47.8
37	School	Montessori Center School	51.9

Source: Noise monitoring survey conducted by RBF Consulting on October 13, 14 and 15, 2003.

Insulating noise sensitive uses, such as residences, schools, libraries, hospitals, nursing and carehomes and some types of commercial activities can reduce noise impacts. But, perhaps a more efficient approach involves limiting the level of noise generation at the source. State and Federal statutes have largely preempted local control over vehicular noise emissions but commercial and industrial operations and certain residential activities provide opportunities for local government to assist in noise abatement. Local ordinances may establish maximum levels for noise generated on-site. This usually takes the form of limiting the level of noise permitted to leave the property where it may impact other uses.

Although vehicular noise emissions standards are established at the State and Federal levels, local agencies can play a significant part in reducing traffic noise by controlling traffic volume and congestion. Traffic noise is greatest at intersections due to acceleration, deceleration and gear shifting. Measures such as signal synchronization can help to minimize this problem. Likewise, reduction of congestion aids in reduction of noise. This can be accomplished through the application of traffic engineering techniques such as channelization of turning movements, parking restrictions, separation of modes (bus, auto, bicycle, pedestrian) and restrictions on truck traffic.

Noise reduction through reduction of traffic volumes can also be accomplished with incentive programs for use of public transit facilities and high-occupancy vehicles, staggering of work hours and land use controls. Vehicle trips can be turned into pedestrian trips with integration of housing and employment into the same project or area, construction of high-density, affordable housing in proximity to employment, shopping and public transit facilities and other techniques.

PLANNING IMPLICATIONS FOR THE CITY OF GOLETA

A number of issues can be considered in the subsequent General Plan work efforts, including: 1) buffering of sensitive land uses; 2) noise impacts from the Santa Barbara Airport; 3) noise impacts from traffic; and 4) noise ordinance.

Buffering of Sensitive Land Uses

Noise sensitive land uses, such as homes, schools and hospitals, should be buffered from areas where noise levels may exceed normal expectation including major thoroughfares and truck routes, industrial uses, commercial uses, etc.

Noise Impacts from the Santa Barbara Airport

The Santa Barbara Municipal Airport is a significant noise generator in the City of Goleta. In addition to ensuring compatible land uses adjacent to and in the

vicinity of the airport, the City should seek opportunities to work directly with the airport regarding reducing present and future noise impacts.

Noise Impacts from Traffic and Rail

Highway 101, Highway 154, State Route 217, Hollister Avenue as well as several other major thoroughfares in or through the City generate significant noise impacts from vehicular traffic. The Southern Pacific Railroad (SPRR), with tracks south of Highway 101, generates significant noise impacts from rail traffic. The City should incorporate noise considerations in land use planning decisions.

Noise Ordinance

The City should look to adopt a Noise Ordinance that outlines specific rules and regulations related to noise (i.e., construction, operation, daytime hours, nighttime hours). Enforcement of the City's Noise Ordinance is important to the citizens of Goleta in order to protect the serenity of the residential neighborhoods and the quality of life in the City currently experienced by residents. Education of the public (residents and businesses) may assist in the reduction of noise levels.

REFERENCE MATERIALS

Amtrak Trains and Destinations, www.amtrak.com

Goleta Community Plan, prepared by the County of Santa Barbara Resource Management Department, August 1993.

Goleta Community Plan Final Environmental Impact Report, prepared by the County of Santa Barbara, August 1992.

Goleta Old Town Revitalization Plan, Proposed Final Environmental Impact Report, prepared by the County of Santa Barbara Planning & Development, Comprehensive Planning Division, June 1997.

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The Goleta Valley Outlook, prepared by the Santa Barbara County Planning & Development, May 1998.

Santa Barbara Airport Aviation Facilities Plan, City of Santa Barbara Airport Department, March 2003.

Santa Barbara Airport Draft F.A.R. Part 150 Noise Compatibility Study, November 14, 2003.

Santa Barbara Airport Final Environmental Impact Statement / Environmental Impact Report for the Aviation Facilities Plan, City of Santa Barbara, August 2002.

Santa Barbara Airport Industrial Area Specific Plan (SP-6), City of Santa Barbara, October 1998.

Santa Barbara Airport Noise Abatement Program, http://www.flysba.com