Aircraft Noise Analysis For

Tidewater Crossing

City of Stockton, California

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Prepared for:

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1.0 Introduction

Arnaiz Development Company (Arnaiz) is a real estate development company which develops residential projects in the northern California area. Arnaiz is currently working on a project site in the City of Stockton that will include a combination of attached multi-family and single-family detached residential products within the Tidewater Crossing development.

The subject project is located between Interstate 5 and Highway 99, on the west side of Stockton Metropolitan Airport. The location of the project site is shown in **Figure 1**. The project site is currently undeveloped land; however there are several residential homes currently existing in the surrounding areas. The site plan for the project is shown in **Figure 2**.

The purpose of this analysis is to determine the existing and potential future impact on the project site from noise generated by aircraft activities on the southwest side of Stockton Metropolitan Airport. The project site will be exposed to noise from commercial and military aircraft departing the airport and from single and twin propeller aircraft practicing takeoffs and landings. The location of the project site relative to the airport is shown in **Figure 3**.

This report is presented in six major sections, including this introduction.

Section 1	Introduction
Section 2	Background on Sound
Section 3	Noise/Land Use Compatibility Standards and Guidelines
Section 4	Noise Monitoring Survey
Section 5	Aircraft Noise Modeling
Section 6	Future Airport Noise

1.1 About BridgeNet International

BridgeNet International is an acoustical consulting firm specializing in noise analyses for airports as well as for residential and commercial developments. The firm has conducted numerous noise and land uses compatibility studies for both general aviation and international airports all over the country which have been submitted and approved by the FAA. In addition, BridgeNet International has completed over 600 residential noise studies for single family and multi-family projects for major home builders resulting in the successful mitigation of noise for these noise sensitive developments.

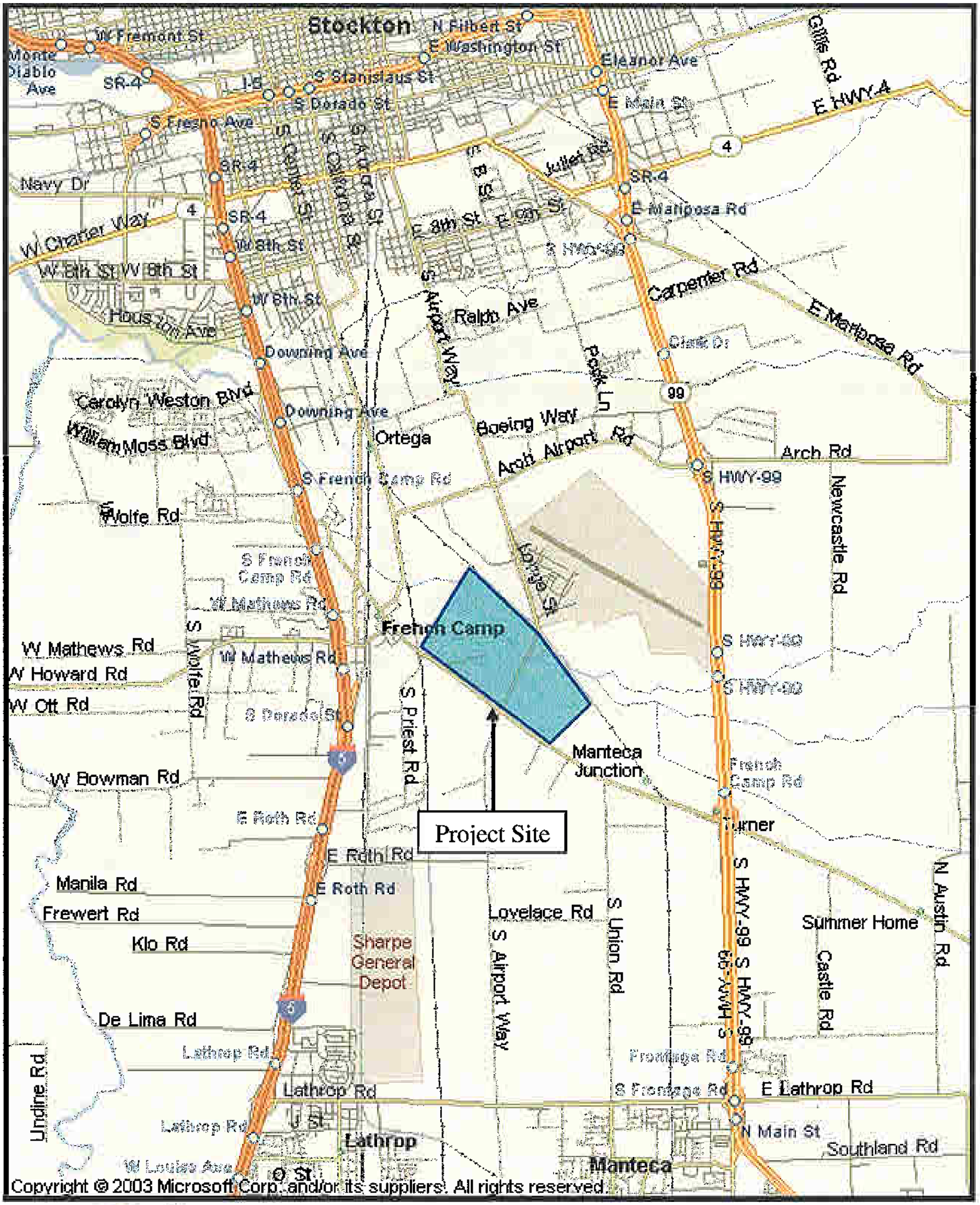

Figure 1
Location of Project Site

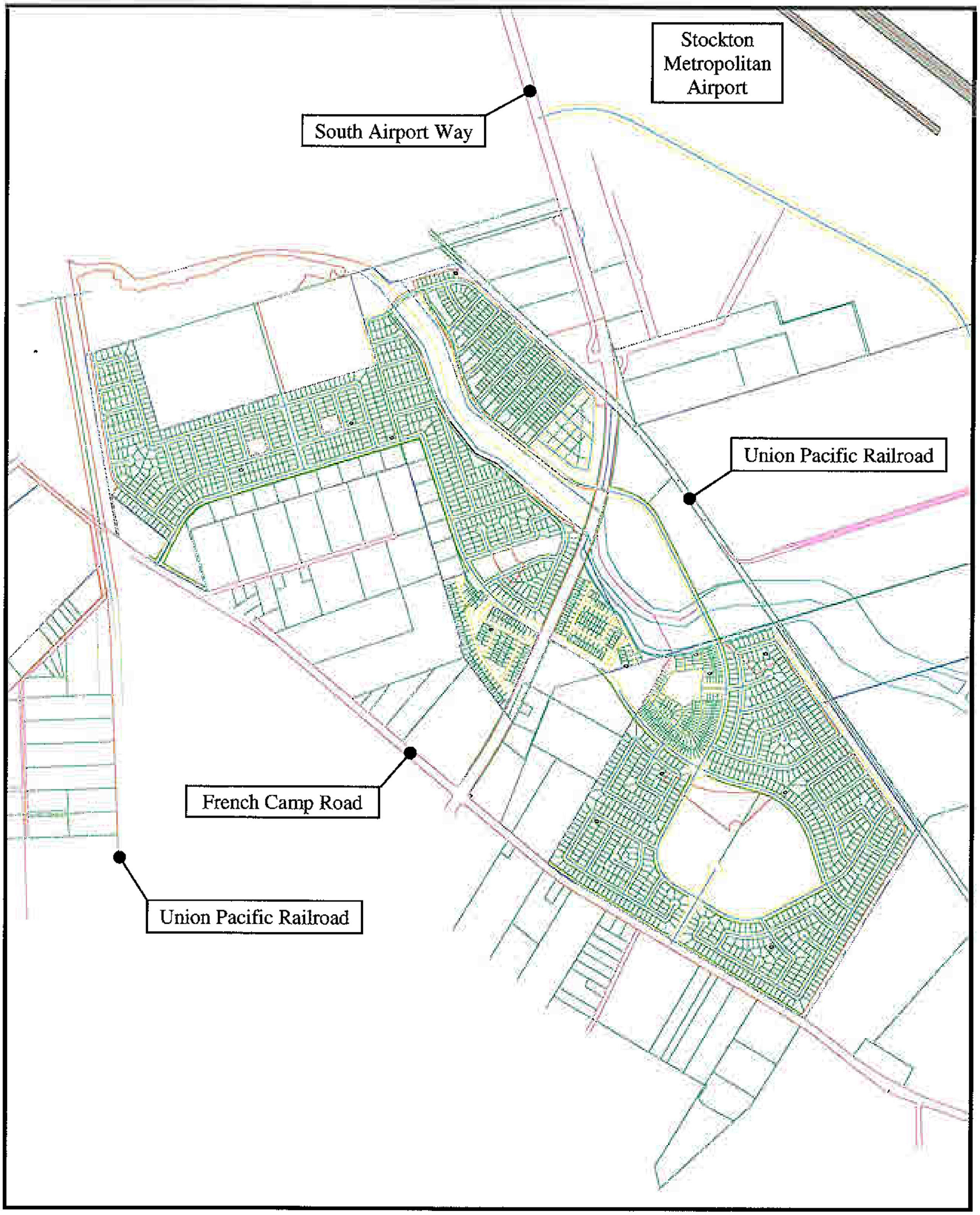

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Figure 2
Project Site Plan

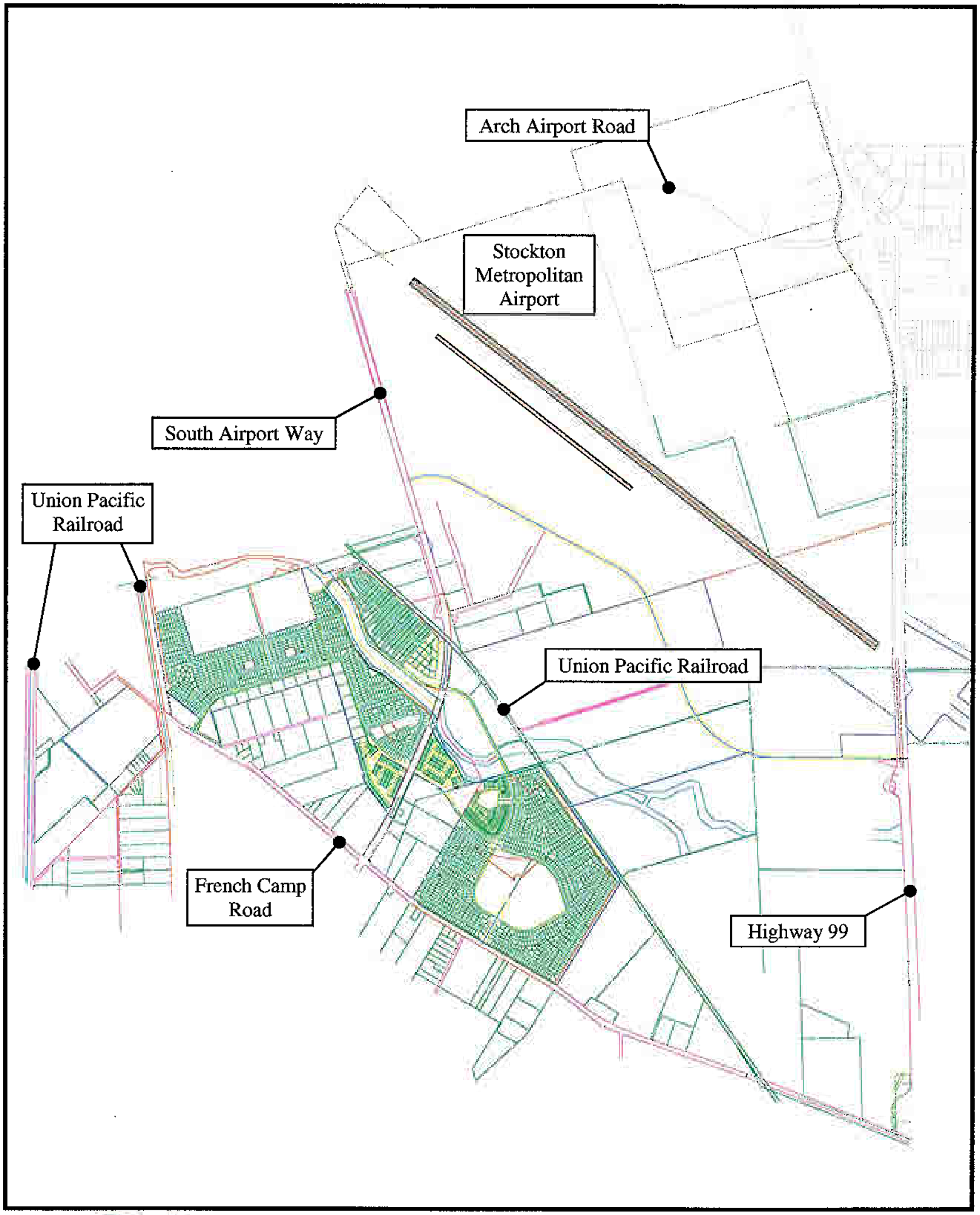


Figure 3
Project Site and Stockton Metropolitan Airport

2.0 Background on Sound

The purpose of this section is to present background information on the characteristics of noise as it relates to the project site and summarize the methodologies that were used to study the noise environment. This section is intended to give the reader a greater understanding of the noise metrics and methodologies used to assess noise impacts. This section is divided into the following sub-sections:

- Characteristics of Sound
- Factors Influencing Human Response to Sound
- Sound Rating Scales

2.1 Characteristics of Sound

Sound Level and Frequency. Sound can be technically described in terms of the sound pressure (amplitude) and frequency (similar to pitch). Sound pressure is a direct measure of the magnitude of a sound without consideration for other factors that may influence its perception.

The range of sound pressures that occur in the environment is so large that it is convenient to express these pressures as sound pressure levels on a logarithmic scale. The standard unit of measurement of sound is the Decibel (dB). The sound pressure level in decibels describes the pressure of a sound relative to a reference pressure. The logarithmic scale compresses the wide range in sound pressures to a more usable range of numbers.

The frequency of a sound is expressed as Hertz (Hz) or cycles per second. The normal audible frequency range for young adults is 20 Hz to 20,000 Hz. The prominent frequency range for community noise, including aircraft and motor vehicles, is between 50 Hz and 5,000 Hz. The human ear is not equally sensitive to all frequencies, with some frequencies judged to be louder for a given signal than others. As a result of this, various methods of frequency weighting have been developed. The most common weighting is the A-weighted decibel scale (dBA). The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. In the A-weighted decibel, every day sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Most community noise analyses are based upon the A-weighted decibel scale. Examples of various sound environments, expressed in dBA, are presented in **Figure 4**.

Propagation of Noise. Outdoor sound levels decrease as a function of distance from the source, and as a result of wave divergence, atmospheric absorption, and ground attenuation. If sound is radiated from a point source in a homogeneous and undisturbed manner, the sound travels as spherical waves. As the sound wave travels away from the source, the sound energy is distributed over a greater spherical surface area dispersing the sound power of the wave. Spherical spreading of the sound wave reduces the noise level according to the inverse square law, resulting in a noise level reduction of 6 dB per doubling of the distance from the source. As an example, if a point noise source is measured at 76 dBA at a distance of 100 feet, then it would be 70 dBA at 200 feet, 64 dBA at 400 feet, and about 62 dBA at 500 feet.

SOUND LEVELS AND LOUDNESS OF ILLUSTRATIVE NOISES IN INDOOR AND OUTDOOR ENVIRONMENTS
(A-Scale Weighted Sound Levels)

dB(A)	OVER-ALL LEVEL Sound Pressure Level Approx. 0.0002 Microbars	COMMUNITY (Outdoor)	HOME OR INDUSTRY	LOUDNESS Human Judgement of Different Sound Levels
130	UNCOMFORTABLY	Military Jet Aircraft Take-Off With After-burner From Aircraft Carrier @ 50 Ft. (130)	Oxygen Torch (121)	120 dB(A) 32 Times as Loud
120 110	LOUD	Turbo-Fan Aircraft @ Take Off Power @ 200 Ft. (90)	Riveting Machine (110) Rock-N-Roll Band (108-114)	110 dB(A) 16 Times as Loud
100	VERY	Jet Flyover @ 1000 Ft. (103) Boeing 707. DC-8 @ 6080 Ft. Before Landing (106) Bell J-2A Helicopter @ 100 Ft. (100)		100 dB(A) 8 Times as Loud
90	LOUD	Power Mower (96) Boeing 737, DC-9 @ 6080 Ft. Before Landing (97) Motorcycle @25 Ft. (90)	Newspaper Press (97)	90 dB(A) 4 Times as Loud
80		Car Wash @ 20 Ft. (89) Prop. Airplane Flyover @ 1000 Ft. (88) Diesel Truck, 40 MPH @ 50 Ft. (84) Diesel Train, 45 MPH @ 100 Ft. (83)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	80 dB(A) 2 Times as Loud
70	MODERATELY LOUD	High Urban Ambient Sound (80) Passenger Car, 65 MPH @ 25 Ft. (77) Freeway @ 50 Ft. From Pavement Edge, 10:00 AM (76 +or- 6)	Living Room Music (76) TV-Audio, Vacuum Cleaner	70 dB(A)
60		Air Conditioning Unit @ 100 Ft. (60)	Cash Register @ 10 Ft. (65-70) Electric Typewriter @ 10 Ft. (64) Dishwasher (Rinse) @ 10 Ft. (60) Conversation (60)	60 dB(A) 1/2 as Loud
50	QUIET	Large Transformers @ 100 Ft. (50)		50 dB(A) 1/4 as Loud
40		Bird Calls (44) Lower Limit Urban Ambient Sound (40)		40 dB(A) 1/8 as Loud
	JUST AUDIBLE	(dB[A] Scale Interrupted)		
10	THRESHOLD OF HEARING			

SOURCE: Reproduced from Melville C. Branch and R. Dale Beland, Outdoor Noise in the Metropolitan Environment, Published by the City of Los Angeles, 1970, p.2.

Figure 4
Typical Outdoor Noise Levels, dBA

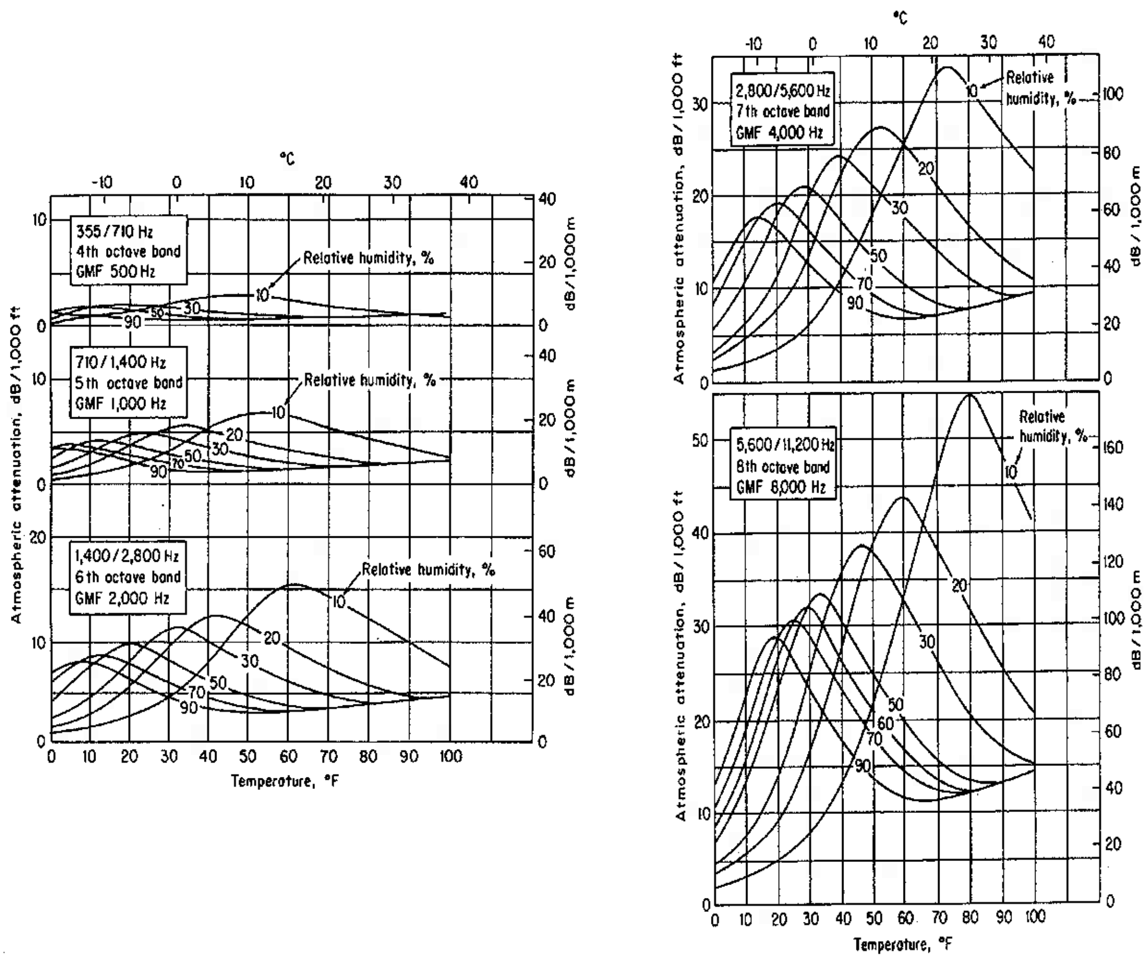
Atmospheric absorption also influences the levels that are received by the observer. The greater the distance sound travels, the greater the influence atmospheric conditions have on the resultant fluctuations. Atmospheric absorption becomes important at distances of greater than 1,000 feet. The degree of atmospheric absorption is dependent upon the frequency of the sound as well as the humidity and temperature of the air. For example, atmospheric absorption is highest at high humidity and higher temperatures. Sample atmospheric attenuation graphs are presented in **Figure 5**. These graphs show that as the temperature increases, and the level of humidity decreases, the overall absorption of the atmosphere increases with distance from the source. Absorption effects in the atmosphere vary with frequency. The higher frequencies are more readily absorbed than the lower frequencies. Over large distances, the lower frequencies become the dominant sound as the higher frequencies are attenuated. Turbulence and gradients of wind, temperature and humidity also play a significant role in determining the degree of attenuation. Certain conditions, such as inversions, can also result in higher noise levels than would result from spherical spreading as a result of channeling or focusing the sound waves.

Duration of Sound. The annoyance from a noise event increases with increased duration of the noise event, i.e., and the longer the noise event lasts the more annoying it is. The "effective duration" of a sound is the time between when a sound rises above the background sound level until it drops back below the background level. Psycho-acoustic studies have determined a relationship between duration and annoyance. These studies determined the amount a sound must be reduced to be judged equally annoying for increased duration. Duration is an important factor in describing sound in a community setting.

The relationship between duration and noise level is the basis of the equivalent energy principal of sound exposure. Reducing the acoustic energy of a sound by one-half results in a 3 dB reduction in the sound level. Doubling the duration of the sound increases the total energy of the event by 3 dB. This equivalent energy principal is based upon the premise that the potential for a noise to impact a person is dependent on the total acoustical energy content of the noise. HNL, DNL, LEQ and SEL are all based upon the equal energy principle and defined in subsequent sections of this study.

Change in Noise. The concept of change in ambient sound levels can be understood with an explanation of the hearing mechanism's reaction to sound. The human ear is a far better detector of relative differences in sound levels than absolute values of levels. Under controlled laboratory conditions, listening to a steady unwavering pure tone sound that can be changed to slightly different sound levels, a person can just barely detect a sound level change of approximately one decibel for sounds in the mid-frequency region. When ordinary noises are heard, a young healthy ear can detect changes of two to three decibels. A five-decibel change is readily noticeable while a 10-decibel change is judged by most people as a doubling or a halving of the loudness of the sound.

Recruitment of Loudness. Recruitment describes the perception of loudness in situations where masking elevates the threshold of hearing of a sound from a background sound. A listener's judgment of the loudness of a sound will vary with different levels of background noise. In low level background situations that are near the threshold of hearing, the loudness level of a sound increases gradually.



Source: "Noise and Vibration Control", by Leo Beranek

Figure 5
Atmospheric Attenuation Graphs

In these situations, a desired sound, such as music that is a level of 40 to 60 dB above the background, would be judged as comfortable. In loud background settings, a sound that is approximately 20 dB above the masking threshold will be perceived as the same loudness as the sound would have been if no masking sound were present.

Masking Effect. A characteristic of sound is the ability of a sound to interfere with the ability of a listener to hear another sound. This is defined as the masking effect. The presence of one sound effectively raises the threshold of audibility for the hearing of a second sound. For a signal to be heard, it must exceed the threshold of hearing for that particular individual and exceed the masking threshold for the background noise.

The masking characteristics of sound is dependent upon many factors, including the spectral (frequency) characteristics of the two sounds, the sound pressure levels and the relative start time of the sounds. The masking affect is greatest when the masking frequency is closest to the frequency of the signal. Low frequency sounds can mask higher frequency sounds, however, the reverse is not true

2.2 Sound Rating Scales

The description, analysis, and reporting of community sound levels is made difficult by the complexity of human response to sound and the myriad of sound-rating scales and metrics that have been developed for describing acoustic effects. Various rating scales have been devised to approximate the human subjective assessment to the "loudness" or "noisiness" of a sound. Noise metrics have been developed to account for additional parameters such as duration and cumulative effect of multiple events.

Noise metrics can be categorized as single event metrics and cumulative metrics. Single event metrics describe the noise from individual events, such as an aircraft flyover. Cumulative metrics describe the noise in terms of the total noise exposure throughout the day. Noise metrics used in this study are summarized below:

2.2.1 Single Event Metrics

- Frequency Weighted Metrics (dBA). Decibel (dB) is a single number rating for the total amount of energy in a broadband sound level. "A-weighting" (dBA) is a frequency correction that filters the broadband sound level that correlates to the frequency response of the human ear, so the filtered dBA value is normally less than the unfiltered dB value. This scale has become the standard in community noise analysis. Its advantages are that it has shown good correlation with community response and is easily measured. All of the metrics used in this study are based upon the dBA scale

- Maximum Noise Level. The highest noise level reached during a noise event is, not surprisingly, called the "Maximum Noise Level," or Lmax. For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient noise levels. The closer the aircraft gets the louder it is until the aircraft is at its closest point directly overhead. Then as the aircraft passes, the noise level decreases until the sound level again settles to ambient levels.

Such a history of a flyover is plotted at the top of **Figure 6**. It is this metric to which people generally instantaneously respond when an aircraft flyover occurs.

- Single Event Level (SEL). Another metric that is reported for aircraft flyovers is the Single Event Level (SEL) metric. It is computed from dBA sound levels. Referring again to the top of **Figure 6** the shaded area, or the area within 10 dB of the maximum noise level, is the area from which the SEL is computed. The SEL value is the integration of all the acoustic energy contained within the event. Speech and sleep interference research can be assessed relative to single event noise exposure level data.

The SEL metric takes into account the maximum noise level of the event and the duration of the event. For aircraft flyovers, the SEL value is typically about 10 dBA higher than the maximum noise level. Single event metrics are a convenient method for describing noise from individual aircraft events. This metric is useful in that airport noise models contain aircraft noise curve data based upon the SEL metric. In addition, cumulative noise metrics such as LEQ, CNEL and DNL can be computed from SEL data.

2.2.2 Cumulative Metrics

- Cumulative noise metrics have been developed to assess community response to noise. They are useful because these scales attempt to include the loudness of the noise, the duration of the noise, the total number of noise events and the time of day these events occur into one single number rating scale. They are designed to account for the parameters, such as level and durations, that are factors in determining the annoyance noise events have on people.

- Equivalent Noise Level (LEQ). LEQ (or Leq) is the sound level corresponding to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given sample period. Mathematically Leq is the "energy" average, or logarithmic average noise level during the time period of the sample. Practically it can be thought of as just the average noise level value of a given noise measurement. LEQ is the average of all noise events for a specified period of time.

This is graphically illustrated in the middle graph of **Figure 6**. LEQ can be measured for any time period, but is typically measured for 15 minutes, 1 hour or 24-hours. Leq for one hour is called Hourly Noise Level (HNL) and is used to develop the Community Noise Equivalent Level (CNEL) values for aircraft operations.

- Community Noise Equivalent Level (CNEL). The CNEL index is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. It is a measure of the overall noise experienced during an entire day. The time-weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized for occurring at these times. In the CNEL metric, noise occurring in the evening time period (7 p.m. to 10 p.m.) is increased by 5 dB, while noise occurring in the nighttime period (10 p.m. to 7 a.m.) is increased by 10 dB. This penalty was selected to attempt to account for the higher sensitivity to noise in the nighttime. The CNEL metric will be referred to at length in this report.

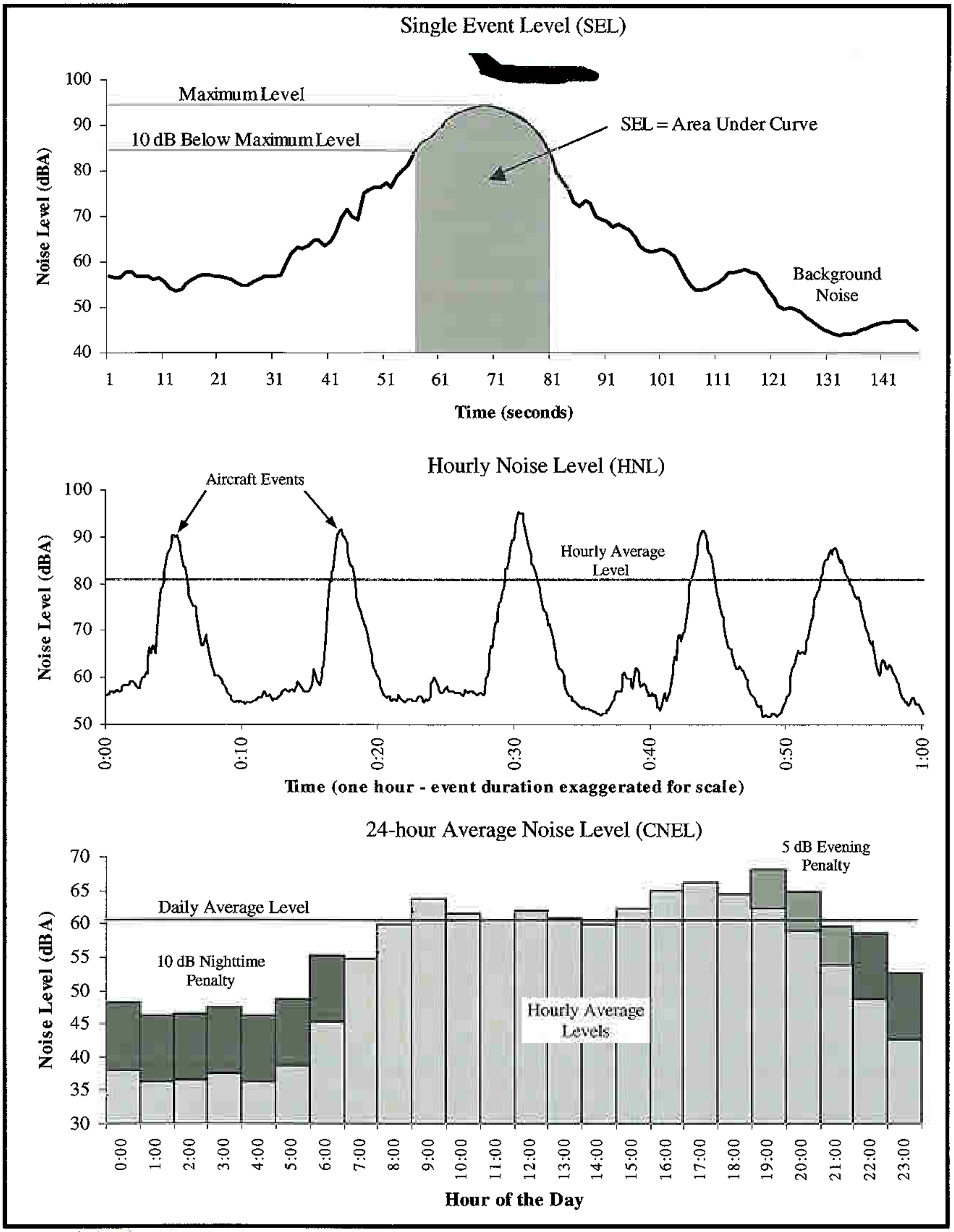


Figure 6
Examples of Lmax, SEL, Leq, and CNEL Noise Levels

• Day Night Noise Level (DNL). Like CNEL, the DNL index is also a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. In the DNL metric, also referred to as LDN, noise occurring in the nighttime period (10 p.m. to 7 a.m.) is increased by 10 dB, however there is no evening time penalty. In most calculations, the difference between the CNEL metric and the DNL metric is less than 0.5 dB. The FAA for airport noise assessment specifies DNL while CNEL is used throughout California. Examples of various noise environments in terms of CNEL are presented in **Figure 7**.

2.2.3 Supplemental Metrics

• Time Above (TA). The FAA has developed the Time Above metric as a second metric for assessing impacts of aircraft noise around airports. The Time Above index refers to the total time in seconds or minutes that aircraft noise exceeds certain dBA noise levels in a 24-hour period. It is typically expressed as Time Above 75 and 85 dBA sound levels. While this index is not widely used, it may be used by the FAA in environmental assessments of airport projects that show a significant increase in noise levels. There are no noise/land use standards in terms of the Time Above index.

• Percent Noise Level (Ln). To account for intermittent or fluctuating noise, another method to characterize noise is the Percent Noise Level (Ln). The Percent Noise Level is the level exceeded n% of the time during the measurement period. It is usually measured in the A-weighted decibel, but can be an expression of any noise rating scale. Percent Noise Levels are another method of characterizing ambient noise where, for example, L_{90} is the noise level exceeded 90 percent of the time, L_{50} is the level exceeded 50 percent, and L_{10} is the level exceeded 10 percent of the time. L_{90} represents the background or minimum noise level, L_{50} represents the median noise level, and L_{10} the peak or intrusive noise levels. Percent noise level is commonly used in community noise ordinances which regulate noise from mechanical equipment, entertainment noise sources, and the like. It is not normally used for transportation noise regulation (although the FHWA Leq criterion for roadways was originally stated as an L_{10} criterion).

3.0 Noise/Land Use Compatibility Standards and Guidelines

The use of noise metrics is an attempt to quantify community response to various noise exposure levels. The public reaction to different noise levels has been estimated based upon extensive research on human responses to exposure of different levels of aircraft noise. Community noise standards are derived from tradeoffs between community response surveys and economic considerations for achieving these levels. These standards generally are in terms of the CNEL 24-hour averaging scale that is based upon the A-weighted decibel. Utilizing these metrics and surveys, agencies have developed standards for assessing the compatibility of various land uses within the noise environment.

City or county noise standards are often adopted to protect sensitive land uses from the impacts of noise generated by two primary sources: transportation related sources, that include vehicular traffic and aircraft events; and non-transportation related, or fixed sources, that include sources like generators, fans, compressors and air conditioners.

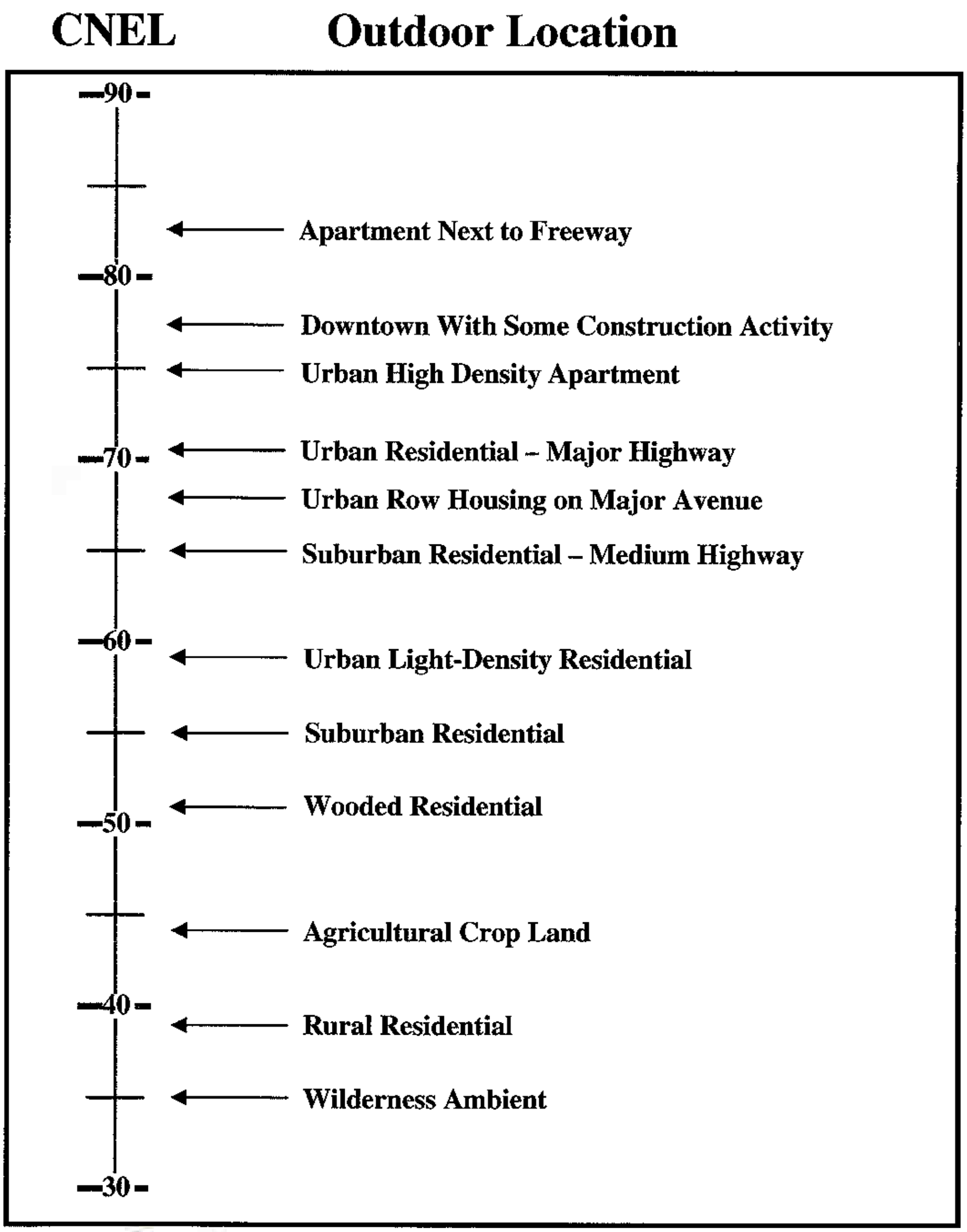


Figure 7
Typical Noise Levels, CNEL

Noise criteria relating to transportation related sources generally deal with noise exposure types of metrics, such as CNEL, which take into account both the level of noise and the time of day the noise occurs. This type of metric are weighted averages that deal with noises which occur over a time period of at least 24-hours. Noise criteria relating to non-transportation related sources, such as Leq and L%, take into account the level and duration of the noise. These types of metrics deal with the statistical distribution of measured noise levels and are for noises that occur for durations less than one hour. Given that the primary sources of noise that will effect the project site are transportation related and will occur at all hours of the day and night, standards that address exposure to noise over long periods of time should be developed for this project site to minimize the impact to the potential uses on the site. The entire noise ordinance for the City of Stockton is presented in Appendix 1.

3.1 Local Noise Standards

The City of Stockton noise standards relating to transportation related noise sources is found within the Stockton Municipal Code, Chapter 16 – Development Code, Division 16-340 – Noise Standards. Within Noise Ordinance Section 16-340.040 – Standards, the following noise standards are listed with regard to transportation related noise sources.

> *The following provisions shall apply to all uses and properties, as described below, and shall establish the City's standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses and transportation-related sources:*
>
> *A. Standards for proposed noise-sensitive land uses on noise-impacted sites (except infill areas). Excluding proposed noise-sensitive land uses on infill sites, which shall comply with paragraph C, below:*
>
> *1. Existing transportation-related noise sources. Proposed noise sensitive land uses that will be impacted by existing or projected transportation noise sources shall be required to mitigate the noise levels from these transportation noise sources so that the resulting noise levels on the proposed noise-sensitive land use(s) do not exceed the standards in Table 3-7, Part 1.*

TABLE 3-7
Maximum Allowable Noise Exposure for Noise-Sensitive Land Uses
PART I: Transportation-Related Noise Standards

	Maximum Allowable Noise Exposure (LdndB)	
Noise-Sensitive Land Use Type	**Outdoor Activity Areas**	**Indoor Spaces**
Residential (all types)	65	45
Child care	—	45
Educational facilities	—	45
Libraries and museums	—	45
Live-work facilities	65	45
Lodging	65	45
Medical services	---	45
Multi-use (with residential)	65	45

The City of Stockton exterior noise standard has established the exterior noise standard for residential land uses to be 65 dB Ldn (same as DNL) for transportation related noise sources.

3.2 Federal Aviation Administration Noise Standards

With respect to airports, the Federal Aviation Administration (FAA) has a long history of publishing noise/land use assessment criteria. These laws and regulations provide the basis for local development of airport plans, analyses of airport impacts, and the enactment of compatibility policies. Other agencies, including the Environmental Protection Agency (EPA) and the Department of Defense, have developed noise/land use criteria. The most common noise/land use compatibility standard or criteria used is 65 dB DNL (CNEL in California) for residential land use with outdoor activity areas.

As a means of implementing the Aviation Safety and Noise Abatement Act, the FAA adopted Regulations on Airport Noise Compatibility Planning Programs. These regulations are spelled out in Federal Aviation Regulations (FAR) Part 150. The guidelines specify a maximum amount of noise exposure (in terms of the cumulative noise metric DNL) that will be considered acceptable to, or compatible with, people in living and working areas. Residential land use is deemed acceptable for noise exposures up to 65 DNL.

As part of the FAR Part 150 Noise Control program, the FAA published noise and land use compatibility charts to be used for land use planning with respect to aircraft noise. An expanded version of this chart appears in Aviation Circular 150/5020-1 (dated August 5, 1983) and is reproduced in **Figure 8**. These guidelines represent recommendations to local authorities for determining acceptability and permissibility of land uses.

The guidelines specify a maximum amount of noise exposure (in terms of the cumulative noise metric DNL) that will be considered acceptable or compatible to people in living and working areas.

These noise levels are derived from case histories involving aircraft noise problems at civilian and military airports and the resultant community response. Note that residential land use is deemed acceptable for noise exposures up to 65 dB DNL. Recreational areas are also considered acceptable for noise levels above 65 dB DNL (with certain exceptions for amphitheaters that are recommended not to exceed 65 dB DNL).

Land Use	Yearly Day-Night Average Sound Level (Ldn) in Decibels Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile Home Parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and Nursing Homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail - building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade - general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusement parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

TABLE KEY

SLUCM	Standard Land Use Coding Manual.
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land use and related structures generally compatible; measures to achieve NLR or 25, 30, or 35 dB must be incorporated into design and construction of the structure.

NOTES

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is recieved, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permited.

SOURCE: FAR Part 150

Figure 8
FAA FAR Part 150 Noise Compatibility Guidelines

4.0 Noise Measurement Survey

The existing noise environment around the project site was determined through a noise measurement survey and noise modeling assessment. The foundation of this type of noise study is the accurate prediction of source noise levels from aircraft and roadway noise. The noise environment at the Tidewater Crossing project site has been depicted through the employment of noise measurement surveys of aircraft events and ambient noise levels, collection of aircraft operational data, and the incorporation of this information into an airport noise computer model.

The noise environment is commonly depicted in terms of lines of equal noise levels, or noise contours. Generating accurate noise contours is largely dependent upon the use of a reliable, validated, and updated noise model. Testing the validity of the computer model results using on-site noise measurements is one of the most effective methods of ensuring accurate noise contours. The following section details the methodology that was used in the measurement survey and the computer modeling of these results into noise contours. The operational data used in the analysis is also presented.

4.1 Noise Measurement Methodology

A noise measurement survey was conducted at several locations both within the Stockton Metropolitan Airport grounds and around the Tidewater Crossing project site. The purpose of measurement survey was to collect site specific data regarding the noise events as well as the ambient environment. Noise measurements were conducted at a total of nine (9) sites over several days between July 14 and July 22, 2006.

The location of the noise measurement sites are shown throughout the project site in **Figure 9**. The measurement sites were locations where the noise measurement equipment monitored and recorded noise data on a continuous basis for several days in a row. The noise monitors located on the airport property collected data which was used to establish a database of noise levels for the various types of aircraft types that fly 24 hours a day, and to estimate the overall average noise level at the site. During the daytime hours of the survey, a log of aircraft events, including arrivals and departures, was generated by an engineer on site. The noise measurements located within the Tidewater Crossing project site collected data that determined aircraft, traffic, and ambient noise levels.

4.2 Instrumentation

The noise measurement systems at the semi-permanent sites utilized Solo Precision Sound Level Meters manufactured by 01dB as well as Type 2236 precision noise level meters manufactured by Brüel & Kjær. These noise measurement systems include software and sufficient internal memory which provides for the continuous storage of the 1-second Leq noise levels data for the duration of the noise measurement survey. This data can then be processed to calculate any noise level metric of interest.

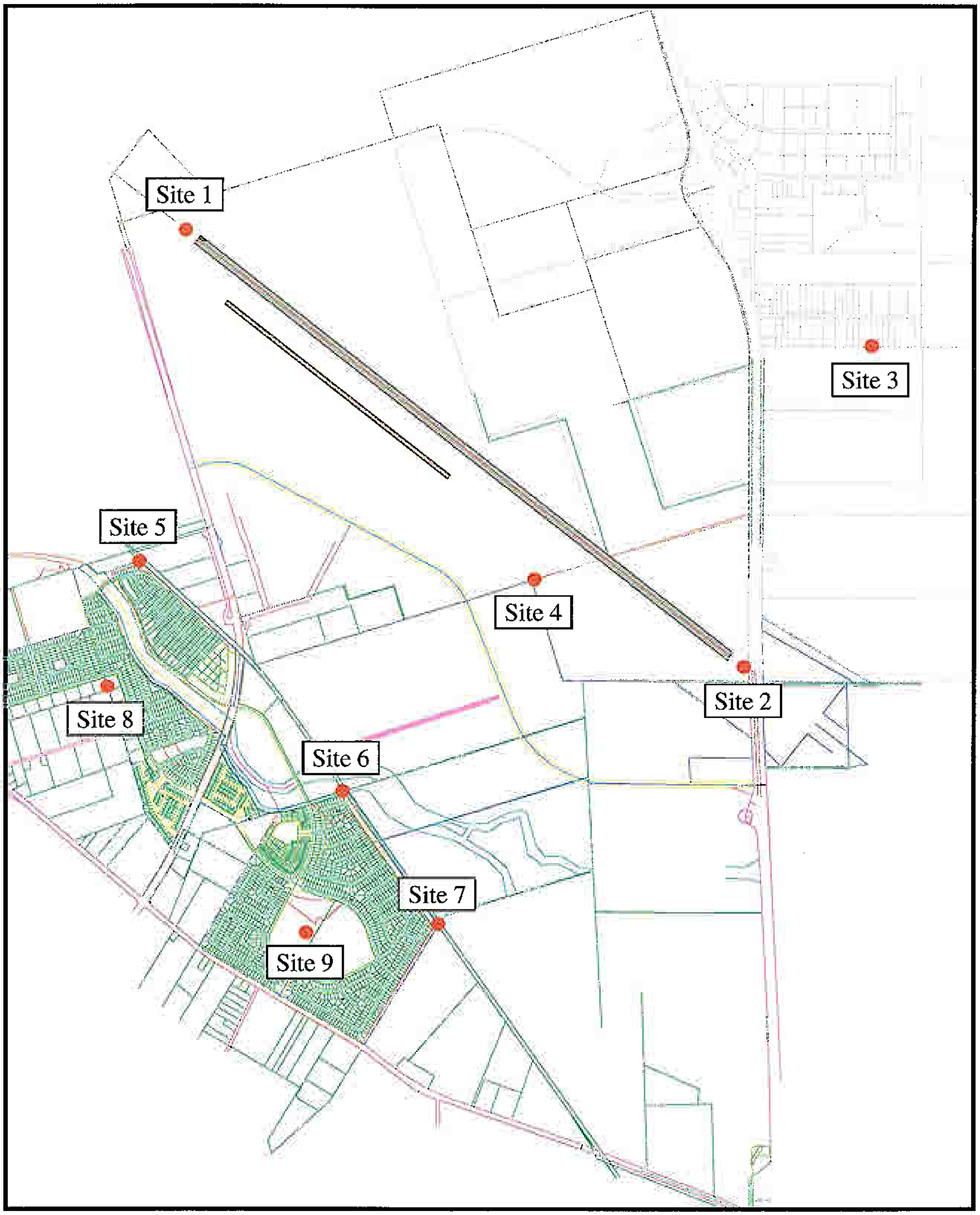


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Figure 9
Noise Measurement Sites

The noise measurement equipment was checked on a daily basis and was calibrated at the beginning and end of each measurement cycle by an acoustic engineer. Noise source identification was determined from on-site field observations by the acoustical engineer. The monitoring program was consistent with state-of-the-art noise measurement procedures and equipment. The measurements consisted of monitoring the A-weighted decibel in accordance with procedures and equipment which comply with specific International Standards (IEC), and measurement standards established by the American National Standards Institute (ANSI) for Type 1 instrumentation. During the survey the noise monitoring instrumentation was calibrated at the start and end of each measurement cycle. This calibration was traceable to the National Institute of Standards and Technology, formerly the National Bureau of Standards.

A noise measurement survey is an integral part of the airport noise study. The purpose of the noise survey is to:

- Determine aircraft noise levels specific to the local environment
- Log aircraft events and corresponding flight information for processing
- Determine the noise level at example locations around the project
- Give confidence to the community in the accuracy of the results of the study

4.3 Noise Measurement Results

Once all of the noise measurement data was collected, these measured values could be processed. The results of the noise measurement survey were calculated and the recorded 1-second noise levels were first correlated with respect to time and plotted with respect to time of day. The measured noise levels were then correlated with the noise source event logs taken during the measurement which allowed for the differentiation of aircraft events from ambient events.

The overall results for the range of noise levels measured at all of the sites is presented in **Figure 10.** This figure shows the range and statistical distribution of noise levels which were measured during the entire noise measurement survey. The top of the bar represents the maximum noise level measured while the bottom of the bar represents the quietest noise level measured. The top of the gray section represents the noise level exceeded 10 percent of the time (L_{10}) while the bottom of the gray section represents the noise level exceeded 90 percent of the time(L_{90}). The dark bar in the middle represents the median noise level (L_{50}) which is the noise level exceeded 50 percent of the time.

The results show that at each of the sites, the median noise level ranged from a low of 42 dBA up to a high of 59 dBA for the entire week. During the week, the measured noise levels normally ranged from about 35 dBA at night to over 80 dBA during the daytime. In one case, the noise level due to particularly loud aircraft events exceeded 100 dBA. This same statistical distribution was calculated at each noise measurement site for each day data was collected, and the results are presented in Appendix 2.

Periodic Airport Noise Report
Airport SCK
Period: July 14, 2006 to July 22, 2006
Neighborhood: Permanent Sites

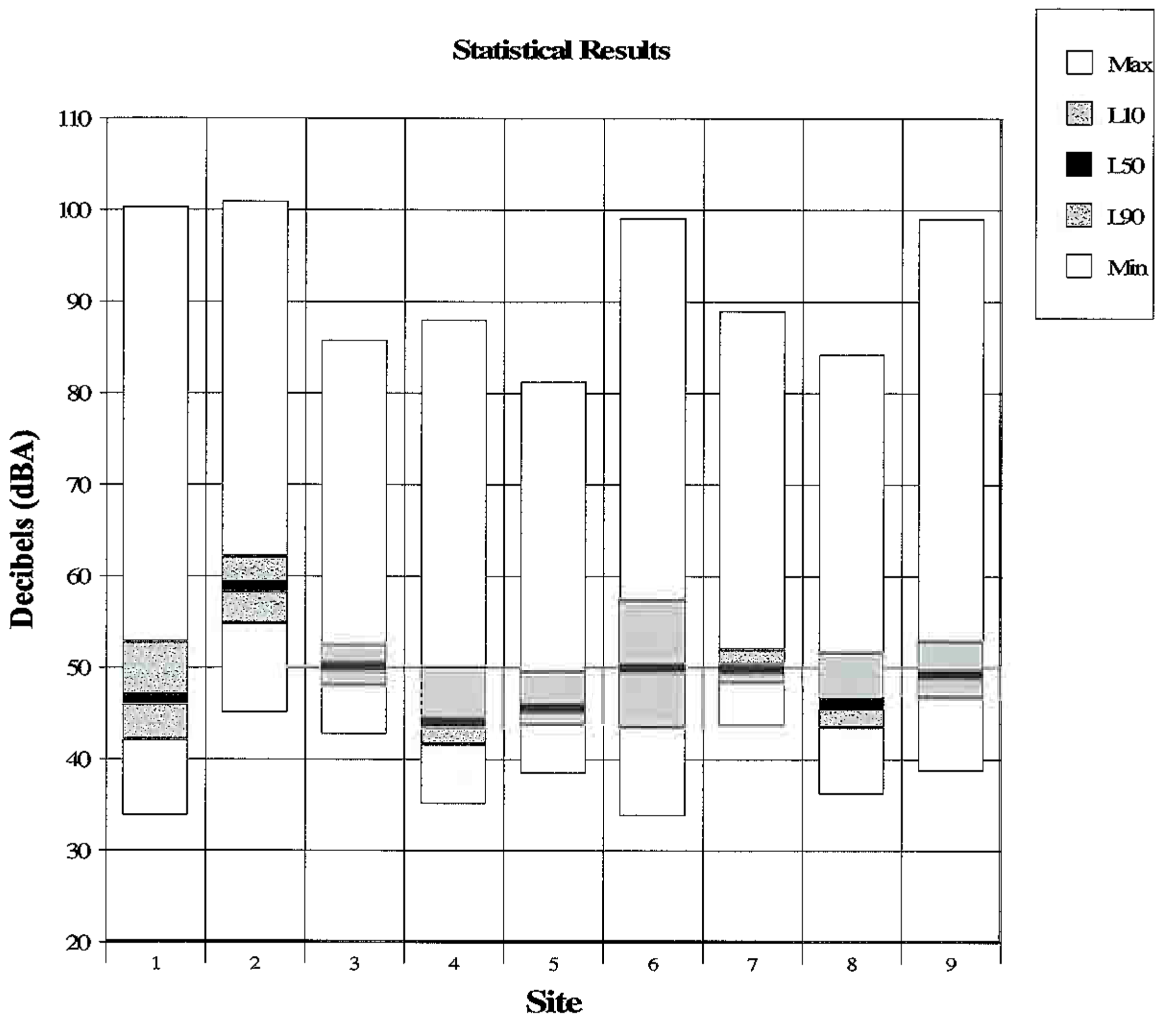

Figure 10
Range of Measured Noise Levels for the Week – All Sites

The measured noise level data was then used to calculate the average noise levels (Leq) for each hour noise data was measured. These hourly noise levels were then used to calculate the Community Noise Equivalent Level (CNEL) at that site for the duration of the noise measurement period. The overall average noise level results listed by hour for Sites 1, 2 and 4 are listed in **Figures 11, 12** and **13**, respectively. In each of these tables, the data listed presents the hourly average noise levels for all noise sources along with the overall CNEL value for all noise sources measured at that location averaged over the entire time period. The average level exhibits for the remaining sites are presented in Appendix 3. The average level was then calculated at all of the noise measurement sites for the noise level due only to the correlated aircraft events. These tables are presented in Appendix 4.

The overall CNEL noise levels measured at each of the nine sites is listed in **Table 1**. The values shown in Table 1 are for all noise sources measured at that location, and the values shown in **Table 2** are for aircraft events only. The values shown in Table 2 represent the measured noise levels which were correlated to the aircraft departure and arrivals logged during the measurement survey. The measured noise events were then compared with the modeled number of events, and the measured noise levels were compared to the modeled noise levels. The number of aircraft events that were measured and logged averaged about 50 events per day, which is significantly below the modeling average of 269 events per day. This results in the identified aircraft event noise level being so low at the locations further from the airport.

Table 1
Measured Noise Levels – All Sources

Measurement Site	Average Noise Level (CNEL)
1	63.4
2	67.8
3	59.5
4	58.4
5	49.9
6	62.0
7	58.4
8	58.1
9	59.7

Hourly Noise Level Site Report
Airport SCK
Period: July 14, 2006 to July 21, 2006
Site: 1
Metric: Total LEQ

DATE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	CNEL
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	72	59	58	60	56	54	51	46	64.1
Jul 15	47	49	47	50	50	51	51	60	60	60	48	63	60	54	61	63	60	60	56	49	45	45	45	54	59.5
Jul 16	45	56	47	49	46	48	59	56	56	54	62	49	72	60	57	60	59	60	43	44	46	54	46	44	61.9
Jul 17	45	54	49	50	51	54	53	61	55	52	66	67	61	58	66	67	65	54	52	53	51	47	47	47	61.8
Jul 18	47	48	51	50	52	54	62	55	54	57	66	62	56	58	68	66	61	56	51	61	51	59	61	47	63.7
Jul 19	46	46	47	52	55	51	64	53	60	63	58	71	73	55	61	62	58	71	54	47	72	57	47	48	66.3
Jul 20	46	47	47	48	49	52	58	56	50	61	68	69	64	61	61	67	58	59	54	55	60	57	61	48	63.5
Jul 21	46	45	46	49	50	51	55	65	57	57	63	67	72	63	57	--	--	--	--	--	--	--	--	--	64.2
Energy Average	46	51	48	50	51	52	59	60	57	59	64	67	69	59	63	65	65	64	54	56	64	55	56	49	63.4

Figure 11
Calculated CNEL from Measured Hourly Leqs – All Sources – Site 1

Hourly Noise Level Site Report
Airport SCK
Period: July 14, 2006 to July 21, 2006
Site: 2
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	80	63	63	64	65	62	62	63	72.3
Jul 15	60	60	61	59	61	63	63	60	60	59	58	60	63	60	57	69	62	63	62	62	62	61	56	56	67.2
Jul 16	58	59	60	60	59	60	61	58	58	56	60	65	65	61	56	58	62	64	61	63	62	63	61	61	66.9
Jul 17	59	62	60	60	63	62	62	61	63	70	63	63	60	63	67	65	64	61	61	64	62	60	59	55	67.8
Jul 18	57	59	60	59	57	62	62	60	63	62	62	58	56	58	65	65	60	59	63	68	65	64	63	59	67.3
Jul 19	58	57	56	56	60	59	59	60	62	65	66	67	69	62	65	60	63	70	64	63	73	61	62	58	67.5
Jul 20	59	59	58	59	60	62	62	61	58	63	69	69	62	58	67	64	62	59	65	61	63	63	63	60	67.7
Jul 21	58	58	58	59	62	60	62	61	59	58	66	67	65	60	62	--	--	--	--	--	--	--	--	--	67.5
Energy Average	59	59	59	59	61	61	62	60	61	64	65	66	64	60	64	65	72	64	63	64	67	62	61	60	67.8

Figure 12
Calculated CNEL from Measured Hourly Leqs – All Sources – Site 2

Hourly Noise Level Site Report
Airport SCK
Period: July 14, 2006 to July 22, 2006
Site: 4
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	50	52	44	43	51.9
Jul 15	43	43	44	49	49	47	48	47	47	49	50	49	51	66	65	57	50	50	48	40	44	45	44	47	57.4
Jul 16	43	42	43	46	45	46	46	48	50	41	47	56	67	61	44	45	49	50	41	45	43	48	44	45	55.9
Jul 17	43	46	46	46	46	49	55	60	56	55	53	55	57	44	54	52	47	46	46	56	44	45	44	43	56.1
Jul 18	44	46	47	49	49	48	53	54	48	56	64	54	48	47	54	56	47	53	60	60	60	61	54	61	60.8
Jul 19	46	48	49	50	52	50	54	58	62	58	59	66	62	47	52	54	52	59	52	50	50	52	46	56	59.8
Jul 20	46	49	46	45	47	49	52	49	49	57	56	63	48	48	66	54	52	50	51	50	58	49	56	45	58.7
Jul 21	46	44	43	47	47	47	48	57	59	58	58	57	57	55	60	58	54	54	46	65	49	48	48	48	57.5
Jul 22	49	48	48	48	47	53	58	57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61.5
Energy Average	45	46	46	48	48	49	53	56	56	56	58	61	60	59	61	55	51	54	53	58	54	54	50	54	58.4

Figure 13
Calculated CNEL from Measured Hourly Leqs – All Sources – Site 4

Table 2
Measured Noise Levels – Aircraft Only

Measurement Site	Average Noise Level (CNEL)
1	58.5
2	55.9
3	53.4
4	55.5
5	37.8
6	38.7
7	28.0
8	27.1
9	22.0

5.0 Aircraft Noise Modeling

Contour modeling is a key element of this noise study. Generating accurate noise contours is largely dependent on the use of a reliable, validated, and updated noise model. It is imperative that these contours be accurate for the meaningful analysis of airport, roadway and rail noise impacts. The computer model can then be used to predict the changes to the noise environment as a result of any of the development alternatives under consideration.

The Federal Aviation Administration's Integrated Noise Model (INM) Version 6.2 was used to model the flight operations contours at Stockton Metropolitan Airport. The INM has an extensive database of civilian aircraft noise characteristics and this most recent version of INM incorporates the advanced plotting features that are part of the Air Forces Noisemap computer model.

Airport noise contours were generated in this study using the INM Version 6.2. The original INM was released in 1977. The latest version, INM Version 6.2, was released for use in May 2006 and is the state-of-the-art in airport noise modeling. The INM is a large computer program developed to plot noise contours for airports. The program is provided with standard aircraft noise and performance data for over 200 aircraft types that can be tailored to the characteristics of the airport in question. Version 6.2 includes an updated data base that includes some newer aircraft, the ability to include run-ups in the computations, the ability to include topography in the computations, and the provision to vary aircraft profiles in an automated fashion.

One of the most important factors in generating accurate noise contours is the collection of accurate operational data. The INM programs require the input of the physical and operational characteristics of the airport. Physical characteristics include runway coordinates, airport altitude, and temperature and optionally, topographical data. Operational characteristics include various types of aircraft data. This includes not only the aircraft types and flight tracks, but also departure procedures, arrival procedures and stage lengths that are specific to the operations at the airport. Aircraft data needed to generate noise contours include:

- Number of aircraft operations by type
- Types of aircraft
- Day/Evening/Night time distribution by type
- Runway use percentages
- Flight tracks
- Flight track utilization by type
- Flight profiles
- Typical operational procedures
- Average Meteorological Conditions

5.1 INM Modeling Assumptions

The Integrated Noise Model Version 6.2 was used to develop CNEL contours for the existing conditions. Operations data in the Existing Conditions Section describe the runway use percentages, aircraft types, and time of day of operations used in the INM to develop the CNEL contours. Topographic effects were not included in the DNL computations, however average wind effects were included. These are described in the following paragraphs:

Topographic Effects - The effect of topography on noise levels near an airport may be important where there are significant elevation differences between the airport and surrounding environs. The INM Version 6.2 has the optional capability to include topographic effects on sound propagation from aircraft. The INM modeling completed for these analyses did not include using the topographic feature of the INM, since the changes in the elevation surrounding the airport is relatively insignificant.

Average Wind Effects - The Integrated Noise Model includes standard takeoff and approach profiles. The takeoff and approach profiles include a description of the aircraft altitude and airspeed along the flight path. These profiles are based on an assumed eight knot headwind for all operations. INM Version 6.2 allows the use of other headwind assumptions that result in changes in aircraft profiles. Stockton Metropolitan Airport site has no unique runway, topographic, or winds characteristics that will result in aircraft operating into headwinds significantly different than eight knots. Therefore, for all approach and departure profiles, it was assumed that the average headwind for all operations on all runways was eight knots.

5.2 Existing Aircraft Operations

Stockton Metropolitan Airport is a commercial and general aviation airport that is owned and operated by the County of San Joaquin. The airport is approximately 1,549 acres in size and is located between Interstate 5 and Highway 99, south of the City of Stockton and east of the project site. The airport has two parallel runways which are designated Runway 11L/29R and Runway 11R/29L. Runway 11L/29R is the primary runway for the airport and is 10,650 feet long, and 150 feet wide. Runway 11R/29L is 4,454 feet long, 75 wide, and is the runway used primarily for general aviation operations.

Stockton Metropolitan Airport is designed to accommodate large multi-engine commercial, heavy military and corporate jet aircraft on its main runway as well as general aviation aircraft including single and twin engine propeller aircraft on its short runway. The majority of aircraft that operate at the airport are single and twin engine propeller aircraft, such as a Cessna 152 or the Beech Baron, by pilots that use the airport for landing and takeoff practice.

The existing noise environment for Stockton Metropolitan Airport was analyzed based upon 2005 operational conditions, the last full year for which there are complete counts. The airport is currently in the process of conducting an FAR Part 150 Noise and Land Use Compatibility study in order to update the previous analysis which was completed in 1992. This document will include a summary of aircraft operations for the past several years, and includes projection of potential aircraft operations in the future.

A variety of operational data is necessary in order to determine the noise environment around the airport. This data includes the following summary information and is discussed in detail in the following paragraphs:

- Aircraft Activity Levels
- Fleet Mix
- Time of Day
- Runway Use
- Flight Path Utilization

5.3 Aircraft Activity Levels.

The total aircraft operational levels were derived directly from discussions with the manager at Stockton Metropolitan Airport. According to the information compiled from actual tower counts and discussions with the airport manager, in the year 2005 there were approximately 98,059 total aircraft operations at the airport, which is an average of about 269 operations per day. An operation is defined as either one takeoff or one landing. The majority of these operations are touch-and-go operations by single or twin engine propeller driven aircraft used to practice takeoffs and landings. The 2005 aircraft operations were broken down into five categories of aircraft: air carrier, air taxi, general aviation, military and helicopter. Each of the operations by category are listed in **Table 3**.

Table 3
Stockton Metropolitan – Existing (2005) Airport Operations

Aircraft Category	Daily Operations	Annual Operations	Percent of Operations
Air Carrier	3.0	1,079	1.1%
Air Taxi	5.9	2,157	2.2%
General Aviation	243.7	88,940	90.7%
Military	8.1	2,942	3.0%
Helicopter	8.1	2,942	3.0%
Total	**268.7**	**98,059**	**100.00%**

5.4 Fleet Mix

The fleet mix of aircraft that operate at the airport is one of the most important factors in terms of the aircraft noise environment. Fleet mix data was determined from an extensive analysis of tower counts, discussions among airport, tower, Air National Guard, and FBO personnel, and calculations of operations which occur during the hours the air traffic control tower is closed. This data collected by the airport, which was used in the development of the latest Part 150 analysis, was provided to us and the results are listed in **Table 4**. This table lists the aircraft group, the specific model of aircraft, and the existing number of daily operations.

5.5 Time of Day

In either the Community Noise Equivalent Level (CNEL) or the Day-Night Level (DNL) metric, any operations that occur after 10 p.m. and before 7 a.m. the next morning are considered more intrusive and are weighted by 10 dBA. One nighttime operation equals 10 daytime operations for the purpose of calculations in both CNEL and DNL; the CNEL metric counts operations between the hours of 7 p.m.-10 p.m. as equaling 5 daytime operations. CNEL is the metric that is used in California to determine noise impacts. Therefore, the number of nighttime operations is very critical in determining the overall noise environment around the airport. Stockton Metropolitan Airport does have a control tower which is open from 7:00 a.m. to 9:00 p.m., therefore the type and number of operations that occur during the nighttime hours must be estimated.

According to the information we received, it is estimated that twenty percent (20%) of the operations take place during nighttime hours. During the noise measurement survey, it was observed that all of the existing commercial operations were measured during daytime hours. Therefore, for noise modeling purposes it was estimated that all of the air carrier operations were conducted during the daytime hours, and twenty percent (20%) of all remaining operations were conducted during the nighttime hours. The daytime and nighttime split for aircraft operations by aircraft category is listed in **Table 5**.

Table 4
Existing (2005) Fleet Mix

Aircraft Category	Aircraft Type	Annual Operations
Itinerant Air Carrier	757PW	139
	A30062	559
	MD87	139
Itinerant Air Taxi	BEC200	2,146
Itinerant General Aviation	GV	6,499
	Lear25	3,249
	GASEPF	25,995
	BEC58P	25,995
	CNA750	3,250
Itinerant Fixed Wing Military	C-17	1,074
	T-38A	1,074
Itinerant Military Helicopter	CH47D	18
Itinerant Civilian Helicopter	B206L	2,502
Local Air Carrier	757PW	100
Local General Aviation	GASEPF	23,955
Local Fixed Wing Military	C-17	385
	T-38A	385
Local Military Helicopter	CH47D	595
Total		**98,059**

Table 5
Daytime / Nighttime Percentages

Aircraft Category	Daytime Percentage	Nighttime Percentage
Air Carrier	100%	0%
Air Taxi	80%	20%
General Aviation	80%	20%
Military	80%	20%
Helicopter	80%	20%

5.6 Runway Use

An additional important consideration in developing the noise contours is the percentage of time each runway is utilized. Runway headings are determined by the magnetic compass heading the aircraft would be facing while on the runway, divided by 10. The speed and direction of the wind dictate the runway direction that is utilized by an aircraft. From a safety and stability standpoint, it is desirable for aircraft to arrive and depart into the wind. Therefore, when the wind direction changes, the operations are shifted to the runway that favors the new wind direction.

Given that wind patterns tend to remain constant over long periods of time, the runway use percentages used in this analysis are based upon the percentages used in the previous Part 150 noise analysis completed in 1992. In that analysis, Runways 29L and 29R were used 85% of the time while Runways 11L and 11R were used 15% of the time. The larger commercial, military, and corporate jet aircraft use only Runway 11L/29R; however the single and twin propeller aircraft can use either runway depending upon availability. The runway utilization assumptions used in the study are presented in **Table 6**. This table presents the percentage of operations by aircraft utilizing each of the runways.

5.7 Flight Track Utilization

The airport has established paths for aircraft arriving to and departing from Stockton Metropolitan Airport. These paths are not precisely defined ground tracks, but represent a broad area over which the aircraft will generally fly. The modeling analysis includes a total of nineteen (19) departure flight tracks and three (3) arrival flight tracks to model the aircraft flight paths at the airport. Aircraft flight tracks were obtained from the flight tracks used in the previous Part 150 noise analysis and observations made during the noise measurement survey. These flight tracks are presented in **Figures 14** and **15** for departure and arrival tracks, respectively. The touch-and-go flight tracks with the smaller radius turns were used to model the majority of the single and twin engine propeller aircraft departure and arrivals where they made close turns either right after departure or right before landing.

Table 6
Runway Utilization - 2005

Aircraft	**29R**	**11L**	**29L**	**11R**
GASEPF	17%	3%	68%	12%
GASEPV	17%	3%	68%	12%
BEC58P	76%	14%	9%	1%
GV	85%	15%		
Lear25	85%	15%		
CNA750	85%	15%		
DHC6	85%	15%		
C130	85%	15%		
A30062	85%	15%		
MD87	85%	15%		
757PW	85%	15%		
1900D	85%	15%		
C17A	85%	15%		
T38	85%	15%		

The flight tracks were assigned to each aircraft type for both daytime and nighttime hours, and for each of these for both departures and arrivals.

5.8 Noise Contour Modeling Results

All of the aforementioned aircraft data and flight parameters were entered into the INM Noise Model to calculate the total aircraft noise exposure around the airport. A description of the noise model and the operational data used to develop these contours was presented in previous sections. The existing noise contours are based upon 2005 operational conditions. The cumulative noise levels were determined in terms of CNEL. This is also the primary noise criteria that will be used in the noise analysis to describe the existing noise environment which is very similar to the DNL metric that is required by the FAA to be used in the their noise and land use compatibility studies. The existing annual 2005 CNEL noise contours for Stockton Metropolitan Airport are presented in **Figure 16**. This exhibit presents the 55, 60, 65, 70 and 75 CNEL noise contours relative to the airport.

The results of the noise modeling show that the entire Tidewater Crossing project site is located outside of the existing 55 dB CNEL airport noise contour. The modeled existing (2005) aircraft noise level at each of the noise measurement sites is listed in **Table 7**.

Figure 14
Departure Flight Tracks

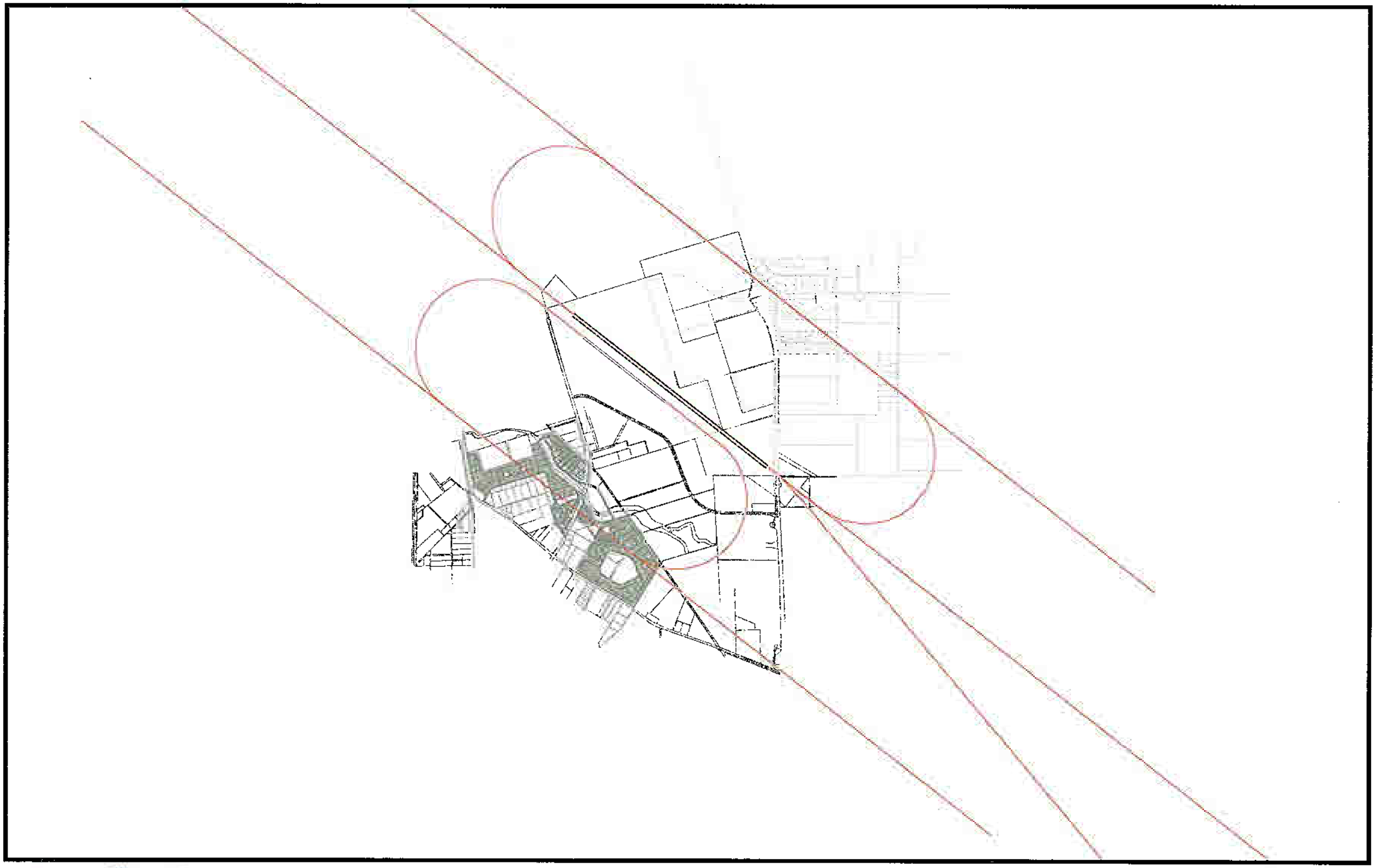

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Figure 15
Arrival Flight Tracks

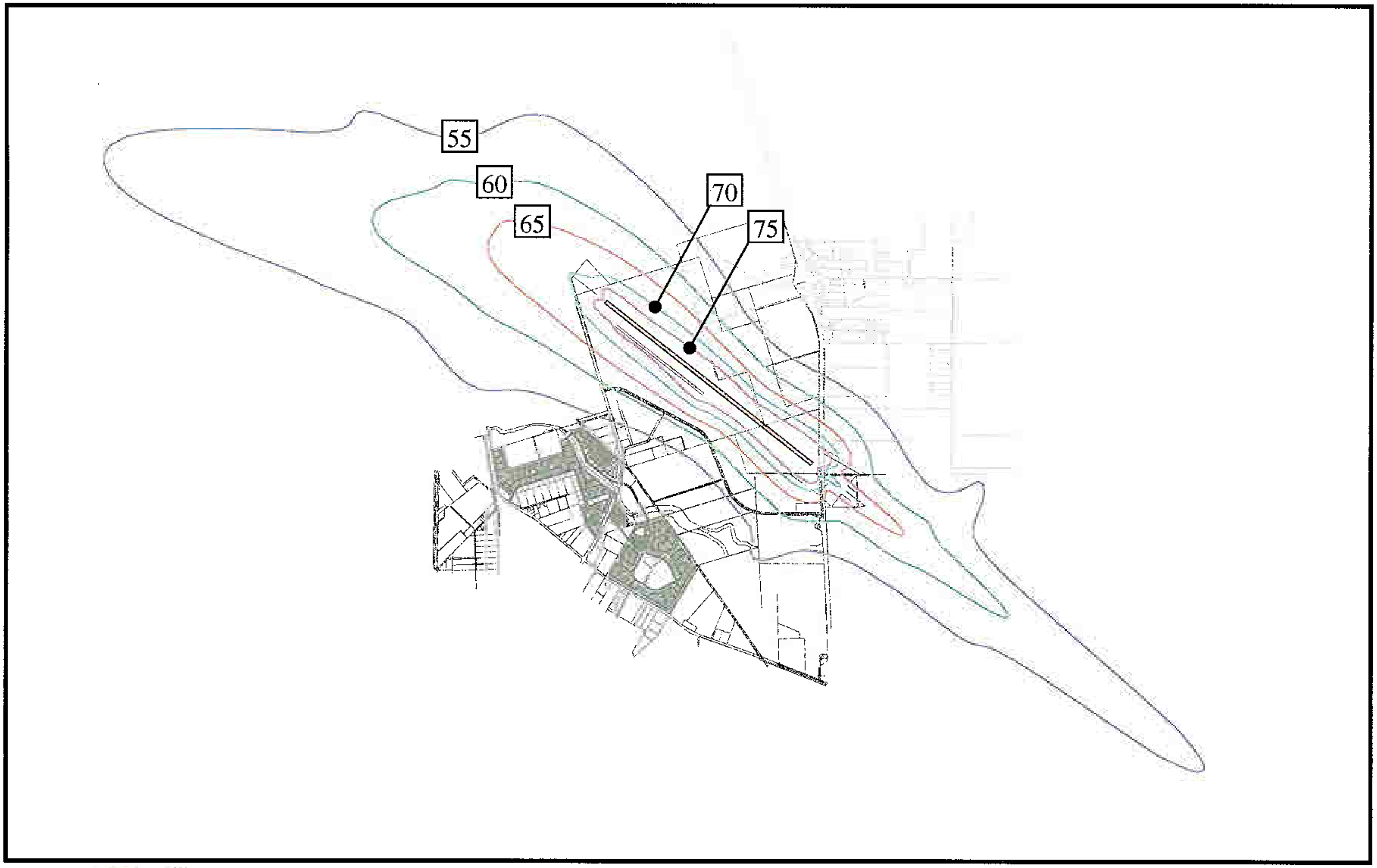


Figure 16
Existing (2005) CNEL Contours – Stockton Metropolitan Airport

Table 7
Existing (2005) Aircraft Noise Levels at Each Site

Measurement Site	Noise Level (CNEL)
1	73.2
2	75.2
3	52.5
4	68.9
5	53.7
6	52.3
7	53.6
8	53.2
9	51.3

6.0 Future Airport Noise

6.1 Future Airport Operations

The future aircraft operational levels were obtained from the future levels to be used in the current update to the Part 150 noise analysis. For planning purposes the airport has decided to use the year 2035 as its planning horizon. According to the operational information received, the airport expects there to be 132,860 annual operations during the year 2035. The future operations broken down by aircraft category is presented in **Table 8**, using the same groups that were used for the existing case. The projection of 132,860 operations represents an increase of 35.5% over the existing 98,059 operations.

6.2 Fleet Mix

The future fleet mix of aircraft expected to operate was similar to that used for the existing noise contours. The changes include a percentage increase expected due to growth at the airport, and the addition of additional air carrier and commuter operators at the airport. The fleet mix for the future (2035) case, listed by aircraft category and aircraft type is listed in **Table 9**.

6.3 Time of Day

The time of day the aircraft operate for the future case was expected to remain the same as the distribution by aircraft category which was used for the existing case.

Table 8
Future (2035) Airport Operations

Aircraft Category	Daily Operations	Annual Operations	Percent of Operations
Air Carrier	41.0	14,965	11.3%
Air Taxi	7.0	2,555	1.9%
General Aviation	296.0	108,040	81.3%
Military	10.0	3,650	2.7%
Helicopter	10.0	3,650	2.7%
Total	**364.0**	**132,860**	**100.00%**

Table 9
Future (2035) Fleet Mix

Category	Aircraft Type	Annual Operations
Air Carrier - Itinerant	757PW	364
	767CF6	728
	737300	2,084
	737500	5,096
	737700	468
	A30062	364
	A319	499
	A32023	499
	CL601	1,820
	MD83	728
	HS748A	1,820
Air Taxi - Itinerant	BEC200	2,605
General Aviation - Itinerant	GV	7,888
	LEAR25	3,944
	GASEPF	31,552
	BEC58P	31,552
	CNA750	3,944
Fixed Wing Military - Itinerant	C17	1,304
	T-38A	1,304
Military Helicopter - Itinerant	CH47D	22
Civilian Helicopter - Itinerant	B206L	3,037
Air Carrier - Local	757PW	100
General Aviation - Local	GASEPF	29,076
Fixed Wing Military - Local	C17	467
	T-38A	467
Military Helicopter - Local	CH47D	722
Air Carrier - Additions	MD83AM	156
	757MEX	250
	Total	**132,860**

6.4 Future Runway Utilization

The runway use percentages used for the future (2035) case are expect to be the same by aircraft category as those used in the existing case. These percentages were listed in Table 6.

6.5 Future Flight Tracks

The flight tracks used in the future (2035) case are expected to be the same as those used in the existing case. The departure and arrival flight tracks were presented in Figures 14 and 15, respectively.

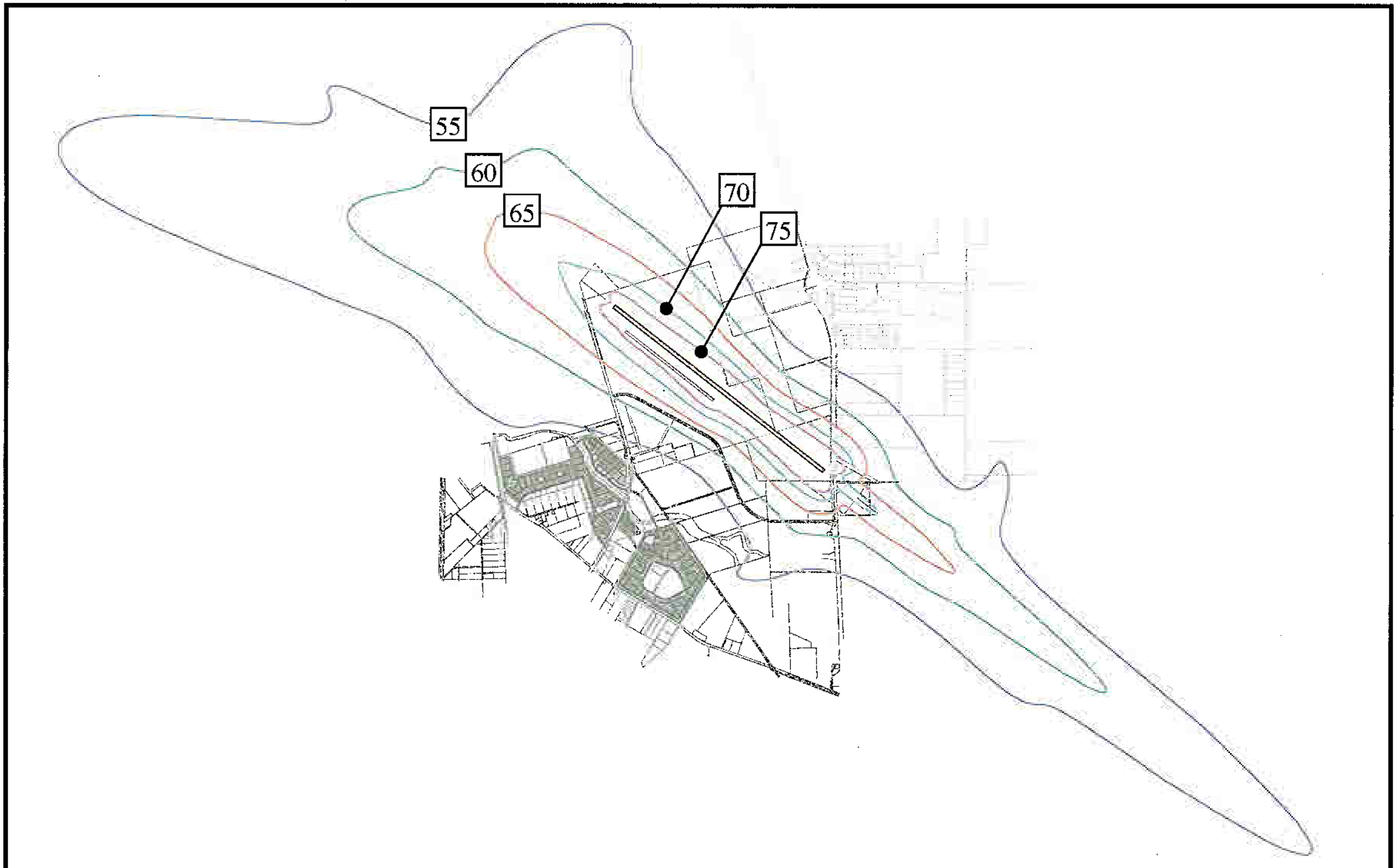
6.6 Future Aircraft Contours

The future (2035) annual CNEL noise contours for Stockton Metropolitan Airport were calculated incorporating all of the future operational projections, and the results are presented in **Figure 17**. This exhibit presents the 55, 60, 65, 70 and 75 CNEL noise contours relative to the airport. The future noise contours will be about 1.1 dB louder throughout the project site as compared to the existing noise contours. This increase is an insignificant level of noise however it does increase the amount of noise at the project site.

The future (2035) aircraft noise levels were calculated at each of the noise measurement locations, and the results are listed in **Table 10**. The projected aircraft noise exposure level for the year 2035 is expected to be 55 dB CNEL or less throughout the project site.

Table 10
Future (2035) Aircraft Noise Levels at Each Site

Measurement Site	Noise Level (CNEL)
1	74.4
2	77.0
3	53.5
4	70.0
5	54.8
6	53.2
7	54.4
8	54.0
9	52.1



BridgeNet International

Figure 17
Future (2035) CNEL Contours – Stockton Metropolitan Airport

APPENDIX 1

City of Stockton – Noise Ordinance

DIVISION 16-340 NOISE STANDARDS

Sections:

16-340.010 - Purpose

The purpose of this Division is to:

A. Establish standards to protect the health, safety, and welfare of those living and working in the City;

B. Implement goals and policies of the General Plan Noise Element;

C. Facilitate compliance with the State Noise Insulation Standards (California Code of Regulations, Title 24) and Chapter 35 of the Uniform Building Code (UBC);

D. Provide community noise control regulations and standards which are consistent with, or exceed, the guidelines of the State Office of Noise Control and the standards adopted by the Federal Highway Administration (FHWA), California Department of Transportation (CalTrans), or other government or regulatory agencies; and

E. Consolidate and/or reference all applicable City noise regulations.

16-340.020 - Activities Exempt from Noise Regulations

The following activities shall be exempt from the provisions of this Division:

A. **Emergency exemption.** The emission of sound for the purpose of alerting persons to the existence of an emergency, or the emission of sound in the performance of emergency work. Does not include permanently-installed emergency generators.

B. **Warning device.** Warning devices necessary for the protection of public safety, (e.g., police, fire and ambulance sirens, properly operating home and car burglar alarms, and train horns).

C. **Outdoor play/school ground activities.** Activities conducted on parks and playgrounds and school grounds, between 7:00 a.m. and 10:00 p.m., except for additional hours that may be granted by the City Manager. Otherwise, outdoor activities shall meet standards in Table 3-7, below.

D. **Railroad activities.** The operation of locomotives, rail cars, and facilities by a railroad that is regulated by the State Public Utilities Commission.

E. **State or Federal pre-exempted activities.** Any activity, to the extent the regulation of it has been preempted by State or Federal law.

F. **Public health and safety activities.** All transportation, flood control, and utility company maintenance and construction operations at any time on public rights-of-way, and those situations that may occur on private property deemed necessary to serve the best interest of the public and to protect the public's health and well being, including, debris and limb removal, removal of damaged poles and vehicles, removal of downed wires, repairing traffic signals, repair of water hydrants and mains, gas lines, oil lines, and sewers, restoring electrical service, street sweeping, unplugging sewers, vacuuming catch basins, etc. The regular testing of motorized equipment and pumps shall not be exempt.

G. **Maintenance of residential real property.** Noise sources associated with the minor maintenance of residential real property, provided the activities take place between the hours of 7:00 a.m. and 10:00 p.m.

16-340.030 - Activities Deemed Violations of this Division

The following acts are a violation of this Division and are therefore prohibited.

A. **Construction noise.** Operating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work between the hours of 10:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, except for emergency work of public service utilities.

B. **Loading and unloading operations.** Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects on private property between the hours of 10:00 p.m. and 7:00 a.m. in a manner to cause a noise disturbance.

C. **Public nuisance noise.** Public nuisance noise is noise that is generally not associated with a particular land use but creates a nuisance situation by reason of its being disturbing, excessive, or offensive. Examples would include excessively loud noise from alarms, animals, horns, musical instruments, stereos, tape players, televisions, vehicle or motorboat repairs and testing, and similar noise as required by Sections 5-173, 5-173.1, 5-193, and 5-700 et seq. of the Municipal Code.

D. **Stationary non-emergency signaling devices.** Sounding or allowing the sounding of an electronically amplified signal from a stationary bell, chime, siren, whistle, or similar device intended primarily for non-emergency purposes, from private property for more than 10 consecutive seconds in any hourly period as required by Section 5-702B of the Municipal Code.

E. **Refuse collection vehicles.**

1. Operating or allowing the operation of the compacting mechanism of any motor vehicle that compacts refuse and that creates, during the compacting cycle, a sound level in excess of 85 dBA when measured at 50 feet from any point of the vehicle.
2. Collecting refuse, or operating or allowing the operation of the compacting mechanism of any motor vehicle that compacts refuse in a residential zoning district between the hours of 5:00 p.m. and 5:00 a.m. the following day.

F. **Sweepers and associated equipment.** Operating or allowing the operation of sweepers or associated sweeping equipment (e.g., blowers) on private property between the hours of 10:00 p.m. and 7:00 a.m. the following day in, or adjacent to, a residential zoning district.

G. **Vehicle or motorboat repairs and testing.** Modifying, rebuilding, repairing, or testing any motor vehicle, motorcycle, or motorboat in a manner as to cause a noise disturbance across the property line of a noise-sensitive use greater than the noise level standards in Table 3-7, below.

16-340.040 - Standards

The following provisions shall apply to all uses and properties, as described below, and shall establish the City's standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses and transportation-related sources:

A. **Standards for proposed noise-sensitive land uses on noise-impacted sites (except infill areas).** Excluding proposed noise-sensitive land uses on infill sites, which shall comply with paragraph C, below:

   1. **Existing transportation-related noise sources.** Proposed noise sensitive land uses that will be impacted by existing or projected transportation noise sources shall be required to mitigate the noise levels from these transportation noise sources so that the resulting noise levels on the proposed noise-sensitive land use(s) do not exceed the standards in Table 3-7, Part 1.

   2. **Existing land use-related noise sources.** Proposed noise sensitive land uses that will be impacted by existing land use-related noise sources shall be required to mitigate the noise levels from those noise sources so that the resulting noise levels on the proposed noise-sensitive land use(s) do not exceed the standards in Table 3-7, Part II.

B. **Standards for proposed noise-generating land uses and transportation-related sources.** Excluding noise-generating projects on infill sites, which shall comply with paragraph C, below, the following shall apply:

   1. **Transportation-related noise sources (except infill sites).** Transportation-related projects that include the development of new transportation facilities or the expansion of existing transportation facilities shall be required to mitigate their noise levels so that the resulting noise:

      a. Does not adversely impact noise-sensitive land uses; and

      b. Does not exceed the standards in Table 3-7, Part 1.

   Noise levels shall be measured at the property line of the nearest site, which is occupied by, and/or zoned or designated to allow the development of, noise-sensitive land uses.

TABLE 3-7
MAXIMUM ALLOWABLE NOISE EXPOSURE FOR NOISE-SENSITIVE LAND USES

PART I: Transportation-Related Noise Standards

Maximum Allowable Noise Exposure (LdndB)

Noise-Sensitive Land Use Type	Outdoor Activity Areas	Indoor Spaces
Residential (all types)	65	45
Child care	—	45
Educational facilities	—	45
Libraries and museums	—	45
Live-work facilities	65	45
Lodging	65	45
Medical services	---	45
Multi-use (with residential)	65	45

PART II: Land Use-Related Noise Standard

Noise Level Descriptor	Outdoor Activity Areas	
	Day (7 a.m. to 10 p.m.)	Night (10 p.m. to 7 a.m.)
Hourly equivalent sound level (Leq), dB	55	45
Maximum sound level (Lmax), dB	75	65

Notes:

(1) The noise standard shall be applied at the property line of the receiving land use. When determining the effectiveness of noise mitigation measures, the standards shall be applied on the receiving side of noise barriers or other property line noise mitigation measures.

(2) Each of the noise level standards specified shall be increased by 5 for impulse noise, simple tone noise, or noise consisting primarily of speech or music.

2. **Commercial, industrial, and other land use-related noise sources (except infill sites).**

   a. **New and expanded noise sources.** Land use-related projects that will create new noise sources or expand existing noise sources shall be required to mitigate their noise levels so that the resulting noise:

      1) Does not adversely impact noise-sensitive land uses; and

2) Does not exceed the standards specified in Table 3-7, Part II.

Noise levels shall be measured at the property line of the nearest site which is occupied by, zoned for, and/or designated on the City's General Plan Diagram to allow the development of, noise-sensitive land uses.

b. **Maximum sound level.**

1) **Commercial.**

a) The Maximum Sound Level (Lmax) produced by commercial land uses or by other permitted noise-generating activities on any retail commercial zoning district (i.e., CO, CN, CG, CD, CL, or CA Districts) shall not exceed 75 dB; and

b) The Hourly Equivalent Sound Level (Leq) from these land uses shall not exceed 65 dB during daytime or nighttime hours as measured at the property line of any other adjoining retail commercial zoning district (CO, CN, CG, CD, CL, or CA Districts).

2) **Industrial.**

a) The Maximum Sound Level (Lmax) produced by industrial land uses or by other permitted noise-generating activities on any industrial (IL, IG, or PT) or public facilities (PF) zoning district shall not exceed 80 dB; and

b) The Hourly Equivalent Sound Level (Leq) from these land uses shall not exceed 70 dB during daytime or nighttime hours as measured at the property line of any other adjoining IL, IG, PT, or PF District.

c) Where industrial or public facilities uses abut a retail commercial use or zone, the maximum noise levels shall not exceed the above-listed standards for commercial uses and zones (i.e.; Lmax = 75 dB and Leq = 65 dB).

c. **Adjacent to other uses.** If commercial, industrial, or public facilities land uses are adjacent to any noise-sensitive land uses or vacant residential (RE, RL, RM, or RH) or open space (OS) zoning districts, these uses shall comply with the performance standards contained in Table 3-7, Part II.

C. **Standards for infill sites.**

1. **Noise-sensitive land uses on noise-impacted infill sites.** Noise-sensitive land uses which are approved for development or expansion on noise-impacted infill sites shall only be required to mitigate the existing and projected noise levels from those sources so that the resulting noise levels within the interior of the noise-sensitive land uses do not exceed the indoor space standards in Table 3-7, Part II.

2. **Noise-generating land uses impacting noise-sensitive infill sites.** Noise generating land uses and transportation-related projects, which are approved for development or expansion in the vicinity of existing noise-sensitive infill sites, shall be required to mitigate:

   a. Exterior noise levels (measured at the property line nearest the noise source) so that the ambient noise levels at the time of development and the maximum exterior noise standards for Commercially and Industrially-zoned properties are not exceeded; and

   b. Interior noise levels (measured at least four feet from the interior side of the wall nearest the noise source) so that the resulting noise levels within the interior of any impacted noise-sensitive land uses do not exceed the interior space standards in Table 3-7.

16-340.050 - Acoustical Study

The Director or other Review Authority, as applicable, shall require the preparation of an acoustical study in instances where it has been determined that a project may expose existing or proposed noise-sensitive land uses to noise levels exceeding the noise standards specified above and in Table 3-7. This determination shall be based on the existing and future sixty-five (65) dB Ldn transportation-related noise contours contained in the Noise Section of the City's General Plan Background Document, the proximity of new noise-sensitive land uses to known noise sources, and/or the knowledge that a potential for adverse noise impacts exists (e.g.; as determined in an environmental document prepared in compliance with the California Environmental Quality Act). The study shall be paid for by the project applicant and shall be prepared by a qualified acoustical consultant, as determined by, and under the supervision of, the applicable City Review Authority. At a minimum, the acoustical study shall include the following:

A. **Project and site description.** A general description of the project's physical and operational characteristics and of the site's location, physical features, and land use setting (including appropriately scaled maps);

B. **Identification of noise sources.** Identification of the noise sources from the project and from the area surrounding the site;

C. **Description of noise assessment methodology.** A description of the methodology that will be used to assess noise impacts, including a listing of all assumptions and data used in any computer models:

   1. Computer models that will be used for noise predictions shall be standard versions approved by the Federal Highway Administration (FHWA), Federal Aviation Administration (FAA), California Department of Transportation (CalTrans), or other government agencies;

   2. For traffic noise studies, the computer models, SOUND32 or other proprietary models based on the 1978 "FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108)," as amended, shall be used. The FHWA's new "Traffic Noise Model" (TNM) shall be used after its phase-in period. For aircraft noise studies, the latest version of the FAA's "Integrated Noise Model" (INM) shall be used;

   3. If standard government approved models do not exist (e.g., railroad and industrial noise sources), a description of the model shall be provided;

D. **Existing and projected noise levels.** A description of existing and future (10 to 20 years) noise levels together with a comparison of these noise levels to the noise level standards specified above and in Table 3-7;

E. **Impacts of or impacts on the project.** Discussion of the noise impacts generated by the project and/or the impacts of existing and future noise levels on the project, including anticipated quantifiable changes in the noise environment, shall be presented; and

F. **Noise attenuation/mitigation measures.** Recommended noise attenuation/mitigation measures to achieve compliance with the standards specified above and in Table 3-7 (e.g., noise barriers/walls, site design, setbacks, enclosure of noise-generating uses and equipment, equipment modification and muffling, structure sound proofing), or a detailed explanation stating why mitigation is infeasible.

16-340.060 - Evaluation of Proposed Projects

Applicants for projects requiring discretionary approval shall be required by the Review Authority to submit evidence to determine whether the proposed project complies or will comply with the provisions of this Division. Failure to submit the requested information within a specified time period may render the application incomplete.

A. **Information.** Required information may include the following:

1. **Construction plans.** Plans of construction and development;

2. **Production plans.** A description of the machinery, processes, or products to be used or produced on the premises;

3. **Operational characteristics.** A description of the project's operational characteristics (e.g., hours of operation, work shifts, number of truck, rail, or other deliveries, etc.);

4. **Noise emission levels.** Estimation of the expected noise levels produced by the proposed project; and

5. **Noise emission mitigation.** Description of the methods to be used in restricting the emission of noise from the premises.

B. **Noise thresholds of significance.** The threshold for determining the potential significance of a noise impact under CEQA shall be:

1. An incremental increase of 3 dB Ldn or greater to exterior or interior noise levels; or

2. Any exceedence of existing maximum noise standards, which may constitute a significant cumulative noise impact.

16-340.070 - Noise Attenuation/Mitigation Measures

If the existing noise levels affecting a project are greater than those allowed, the developer shall mitigate the noise as follows:

A. **Infill projects.** For infill projects, site planning and construction techniques shall be used to reduce sound levels to allowed maximum interior sound levels or below. Examples of noise reducing techniques include orienting building openings away from the noise source, appropriate subdivision design for noise avoidance, landscape setbacks and berms, use of acoustical barriers and walls, enclosure of noise-generating uses and equipment, and use of appropriate building construction technology and materials to reduce interior noise levels.

B. **Other projects.** For other projects, a noise attenuation barrier shall be constructed and/or noise attenuation measures described above shall be applied to the structures, as applicable, to bring sound levels down to allowed maximum interior and exterior sound levels or below.

16-340.080 - Enforcement of Regulations

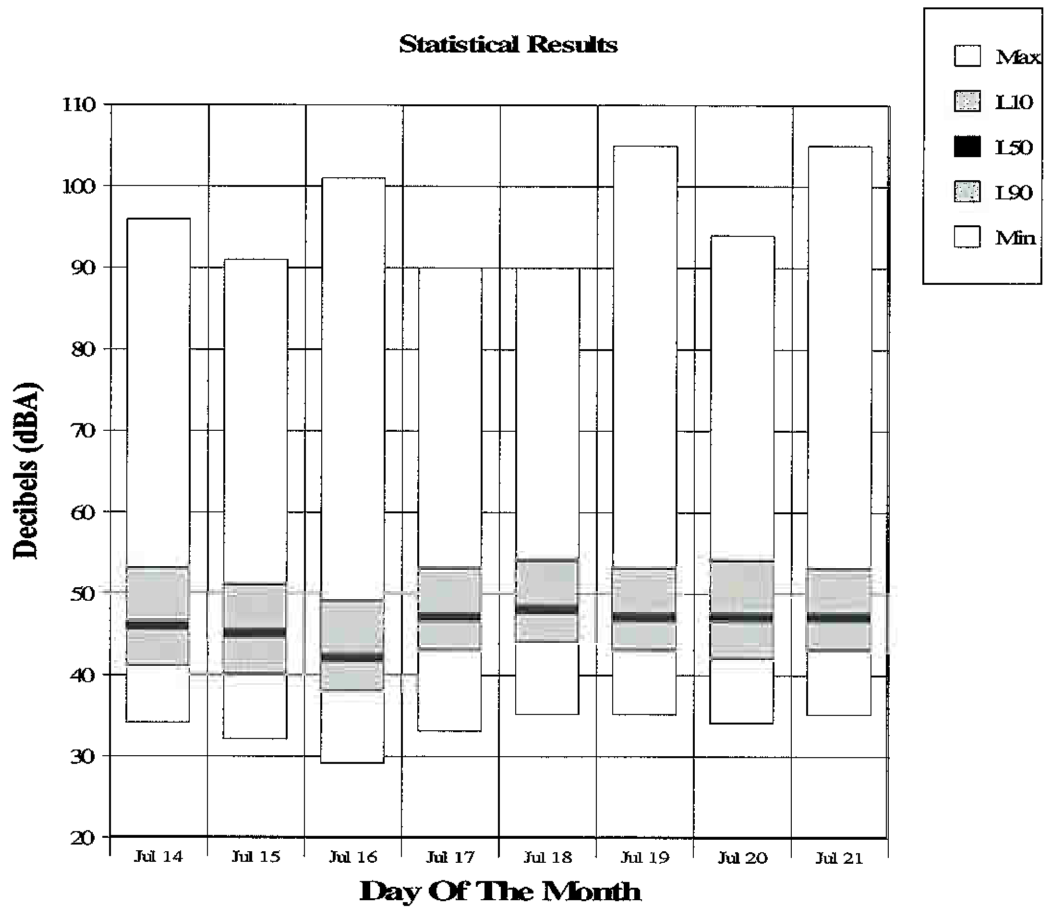
A Code Enforcement Officer or Police Officer, as applicable, shall have responsibility for the enforcement of the noise regulations identified in this Division in compliance with Division 16-740 (Enforcement). Unless otherwise specified, the Code Enforcement Officer shall make all noise-level measurements required for the enforcement of this Division.

APPENDIX 2

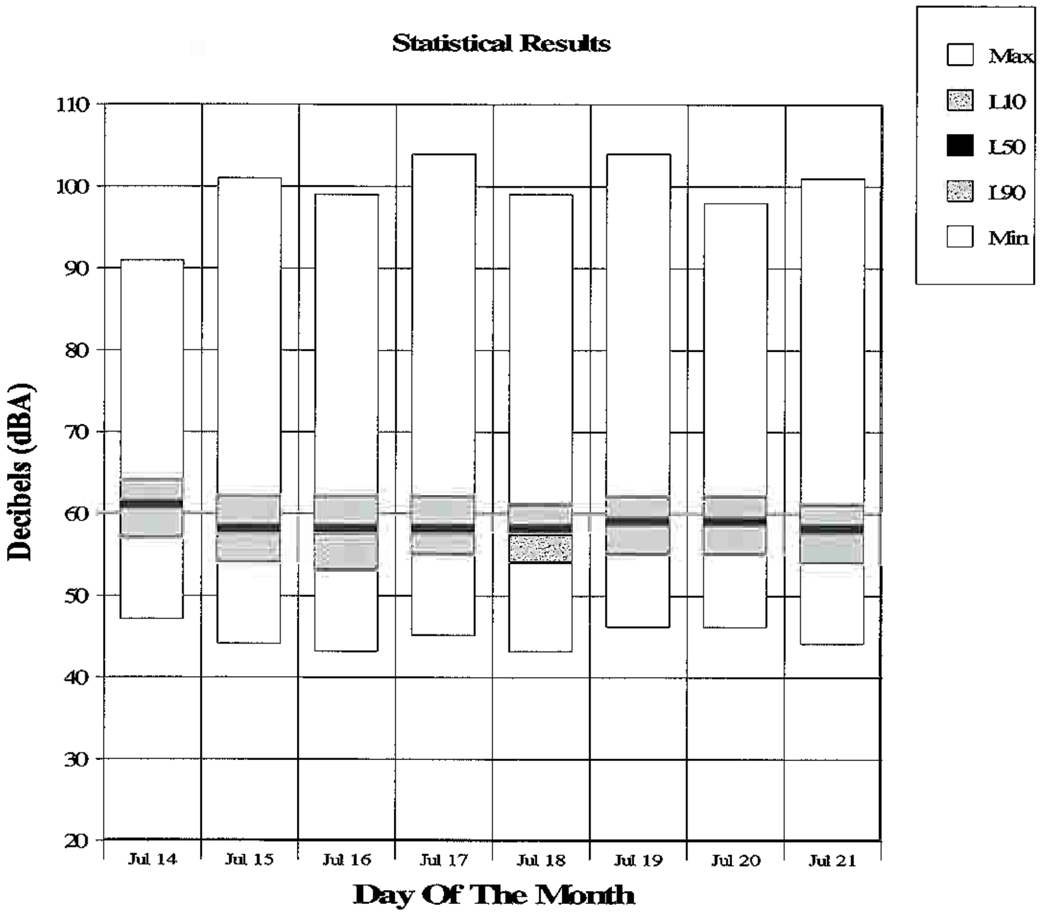
Statistical Distribution of Measured Noise Level

Noise Measurement Sites 1 – 9

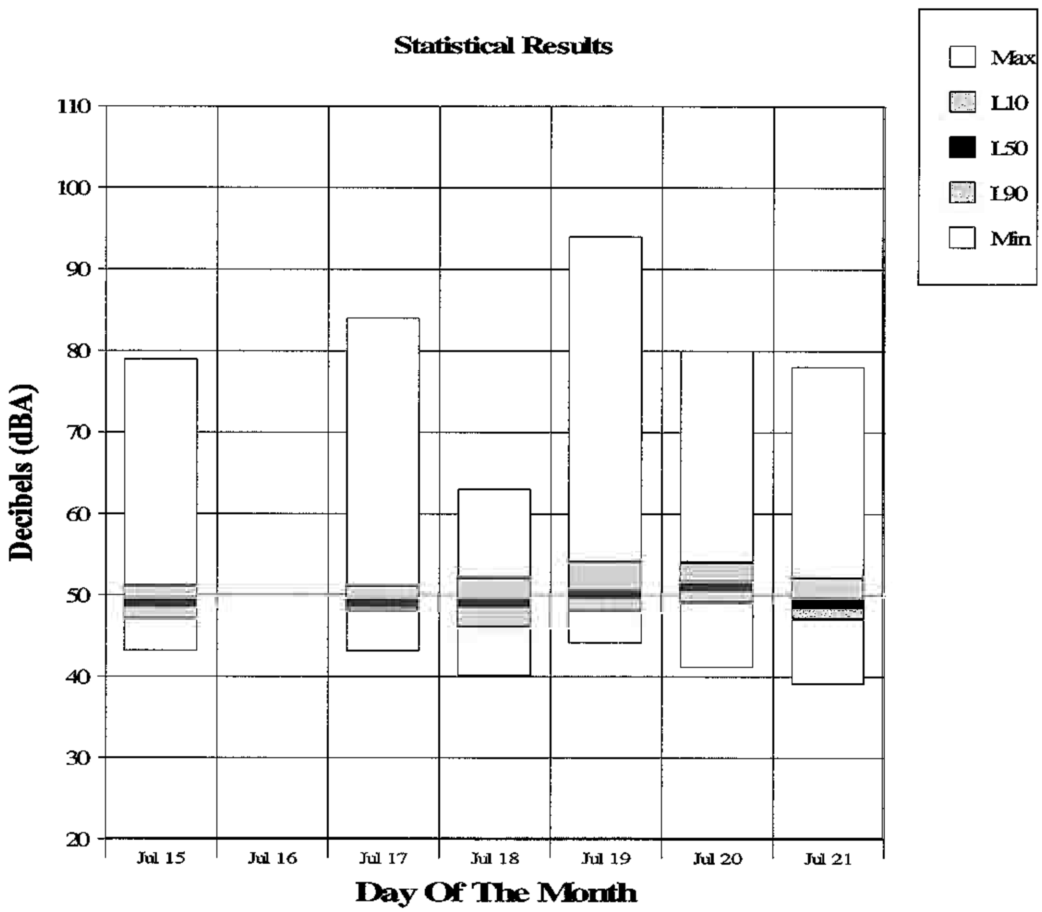
Periodic Site Noise Report
SCK
Period: July 14, 2006 to July 21, 2006
Site: 1



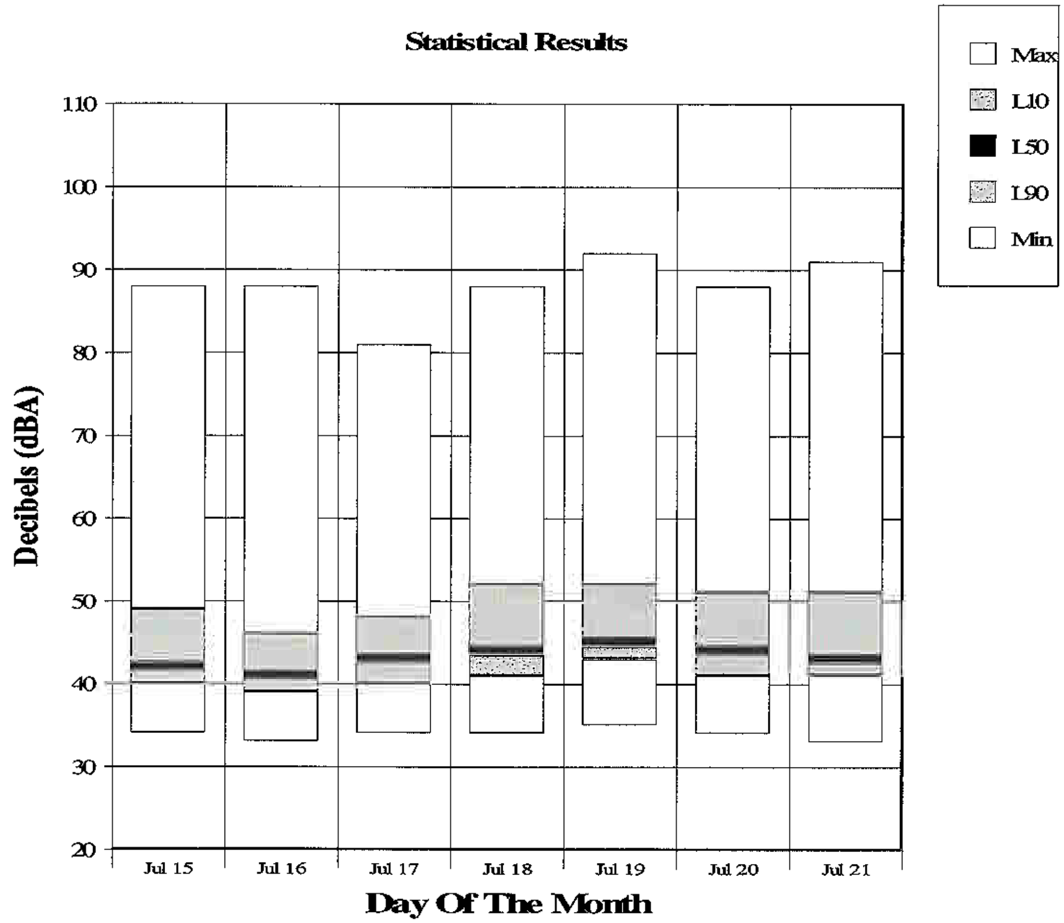
Periodic Site Noise Report
SCK
Period: July 14, 2006 to July 21, 2006
Site: 2



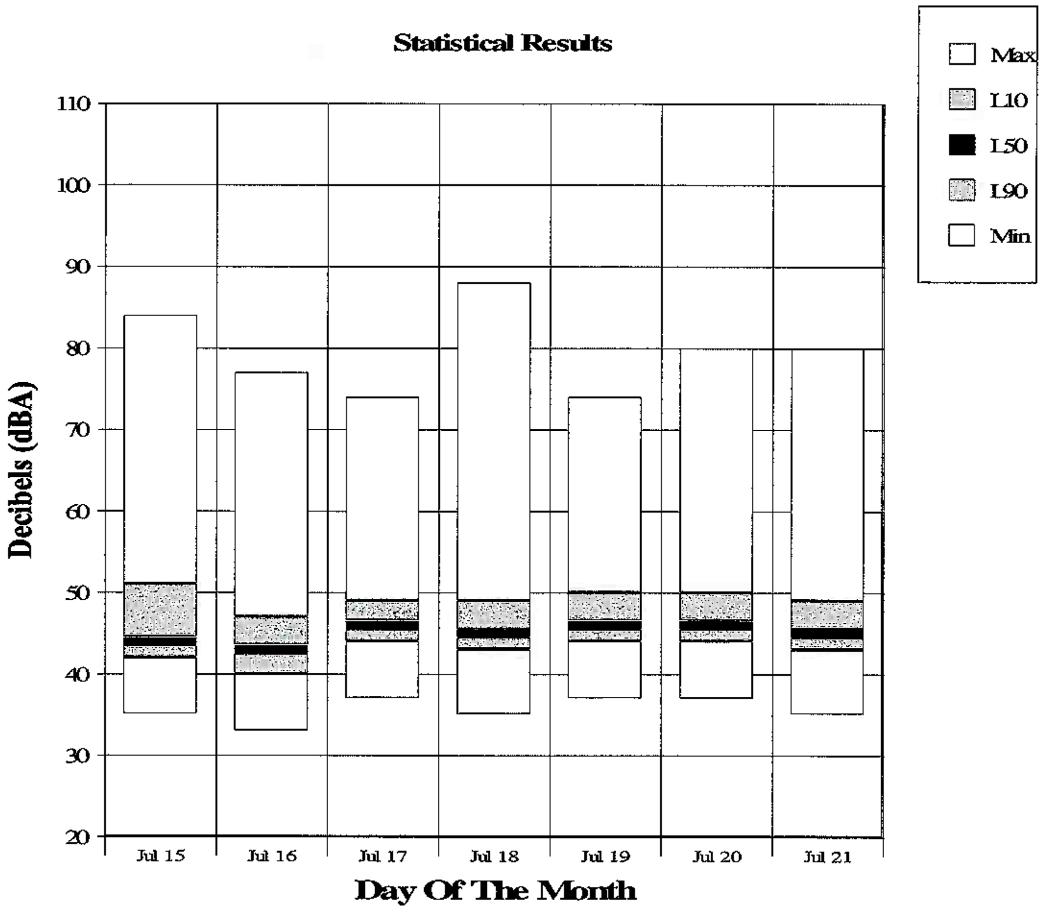
Periodic Site Noise Report
SCK
Period: July 15, 2006 to July 21, 2006
Site: 3



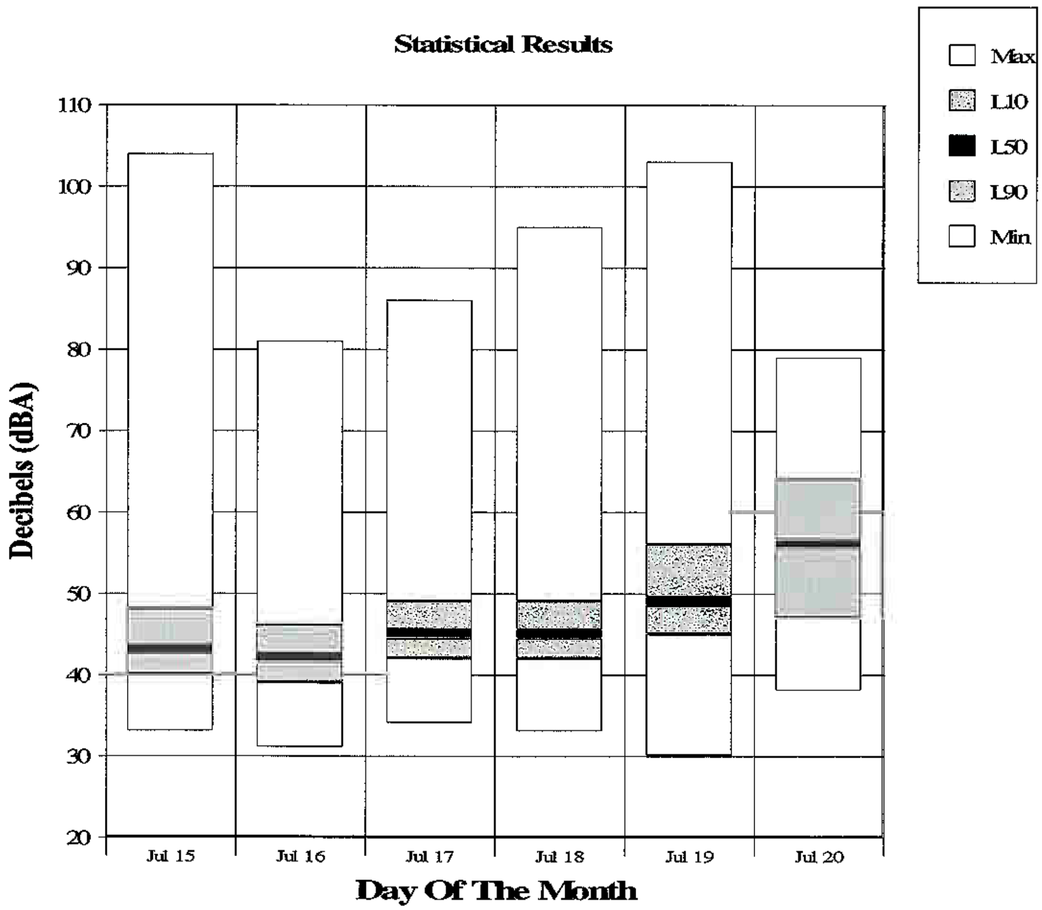
Periodic Site Noise Report
SCK
Period: July 15, 2006 to July 21, 2006
Site: 4



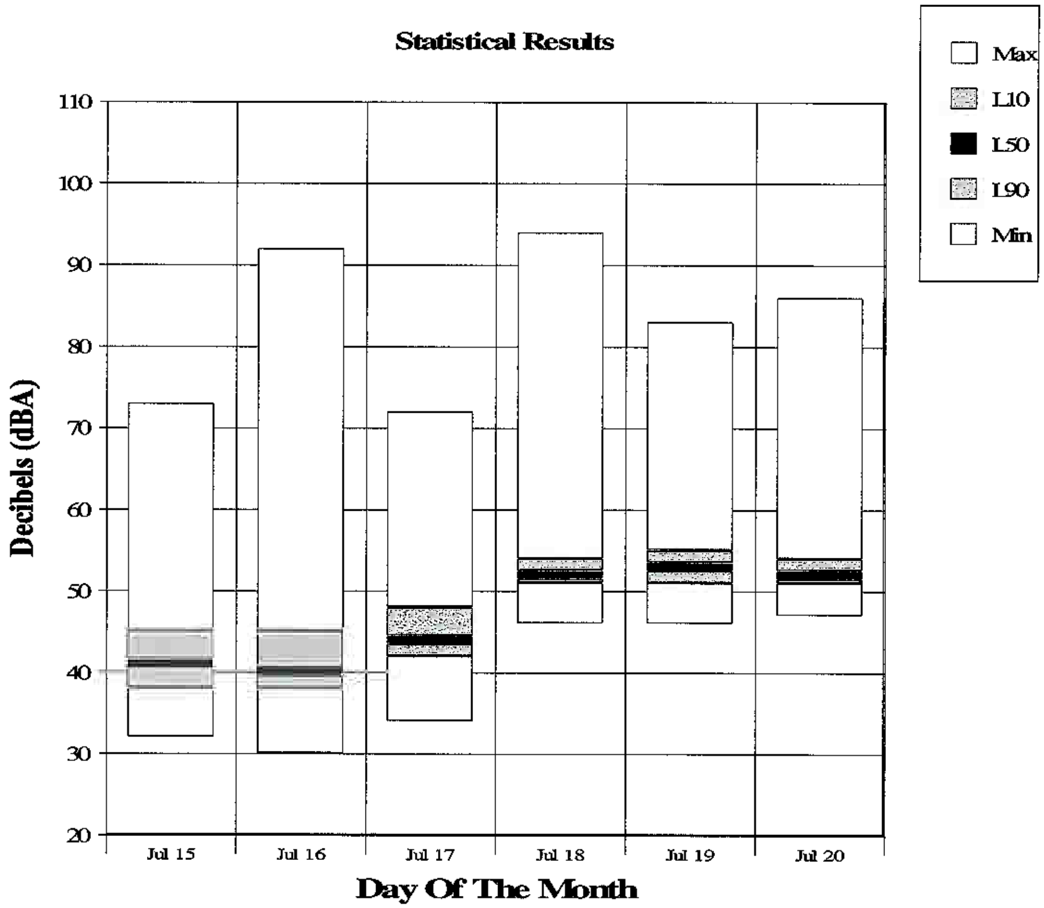
Periodic Site Noise Report
SCK
Period: July 15, 2006 to July 21, 2006
Site: 5



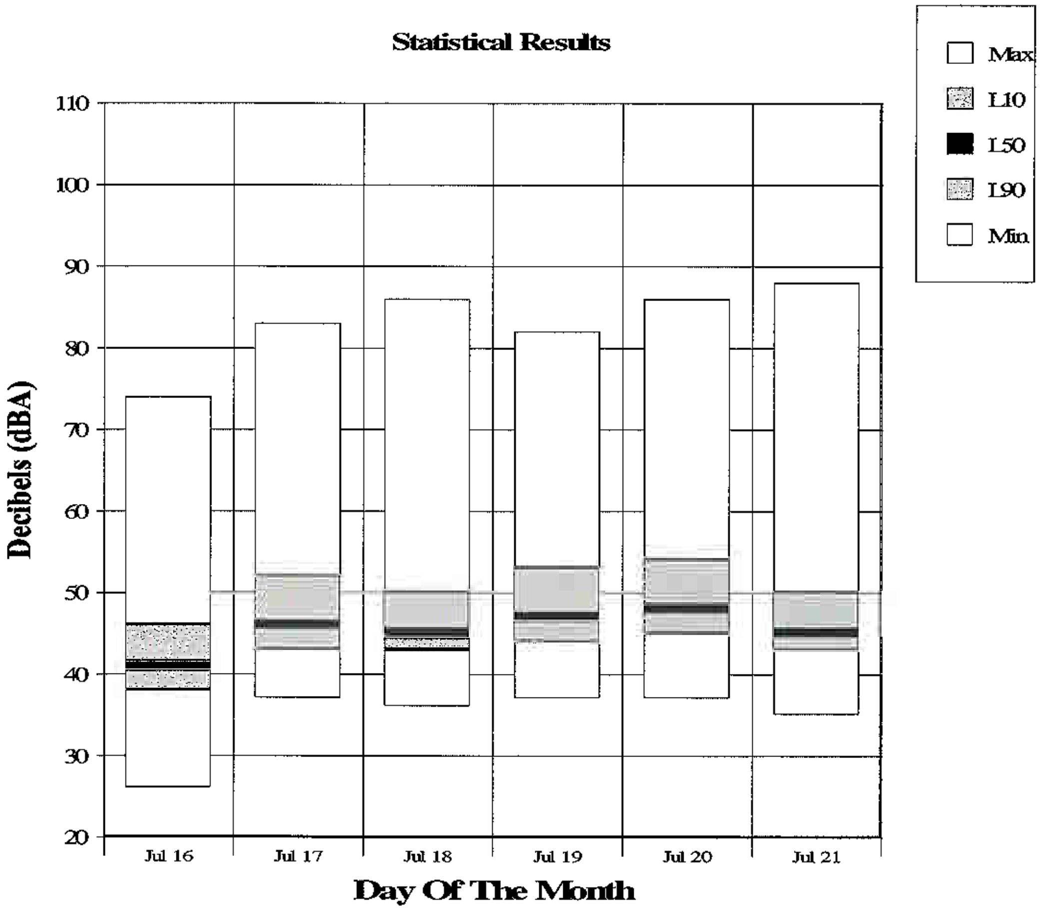
Periodic Site Noise Report
SCK
Period: July 15, 2006 to July 20, 2006
Site: 6



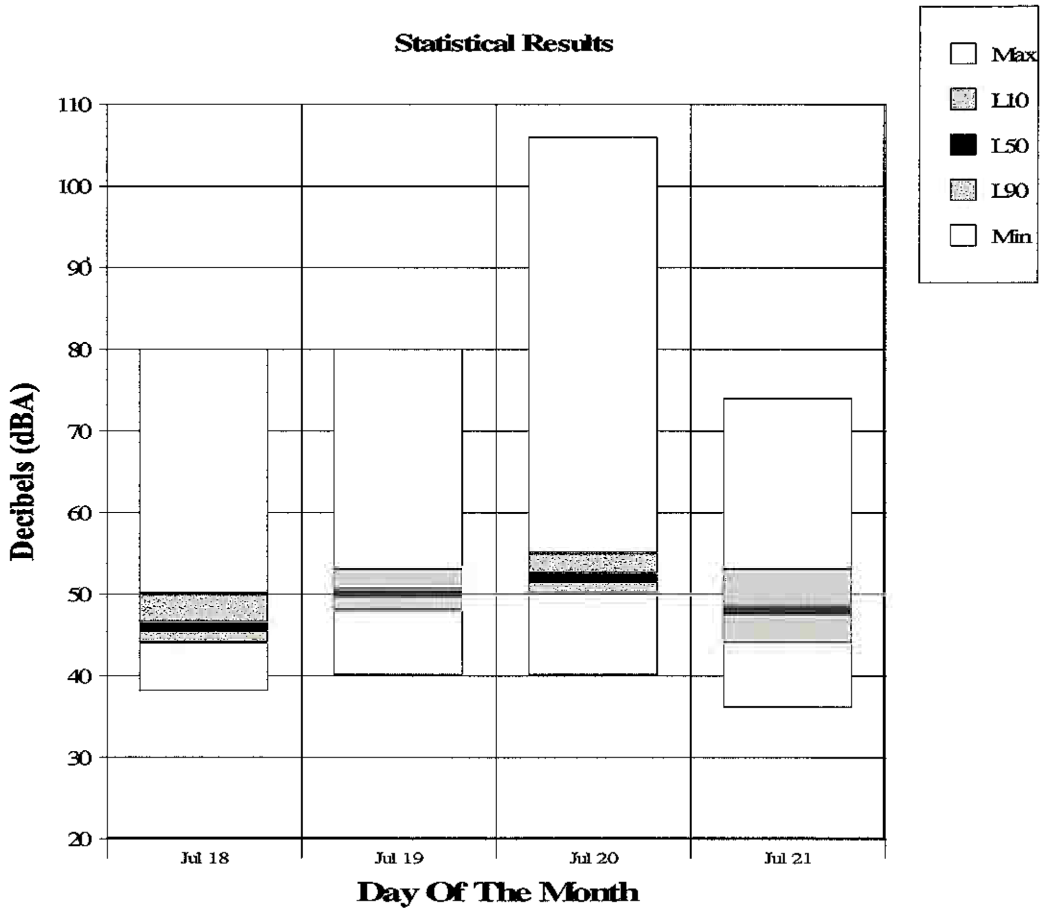
Periodic Site Noise Report
SCK
Period: July 15, 2006 to July 20, 2006
Site: 7



Periodic Site Noise Report
SCK
Period: July 16, 2006 to July 21, 2006
Site: 8



Periodic Site Noise Report
SCK
Period: July 18, 2006 to July 21, 2006
Site: 9



APPENDIX 3

Calculated CNEL from Measured Hourly Leqs – All Sources

Noise Measurement Sites 1 – 9

Hourly Noise Level Site Report
SCK
Period: July 14, 2006 to July 21, 2006
Site: 1
Metric: Total LEQ

DATE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	CNEL
	Hour Of The Day																								
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	72	59	58	60	56	54	51	46	64.1
Jul 15	47	49	47	50	50	51	51	60	60	60	48	63	60	54	61	63	60	60	56	49	45	45	45	54	59.5
Jul 16	45	56	47	49	46	48	59	56	56	54	62	49	72	60	57	60	59	60	43	44	46	54	46	44	61.9
Jul 17	45	54	49	50	51	54	53	61	55	52	66	67	61	58	66	67	65	54	52	53	51	47	47	47	61.8
Jul 18	47	48	51	50	52	54	62	55	54	57	66	62	56	58	68	66	61	56	51	61	51	59	61	47	63.7
Jul 19	46	46	47	52	55	51	64	53	60	63	58	71	73	55	61	62	58	71	54	47	72	57	47	48	66.3
Jul 20	46	47	47	48	49	52	58	56	50	61	68	69	64	61	61	67	58	59	54	55	60	57	61	48	63.5
Jul 21	46	45	46	49	50	51	55	65	57	57	63	67	72	63	57	--	--	--	--	--	--	--	--	--	64.2
Energy Average	46	51	48	50	51	52	59	60	57	59	64	67	69	59	63	65	65	64	54	56	64	55	56	49	63.4

Hourly Noise Level Site Report
Airport SCK
Period: July 14, 2006 to July 21, 2006
Site: 2
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	80	63	63	64	65	62	62	63	72.3
Jul 15	60	60	61	59	61	63	63	60	60	59	58	60	63	60	57	69	62	63	62	62	62	61	56	56	67.2
Jul 16	58	59	60	60	59	60	61	58	58	56	60	65	65	61	56	58	62	64	61	63	62	63	61	61	66.9
Jul 17	59	62	60	60	63	62	62	61	63	70	63	63	60	63	67	65	64	61	61	64	62	60	59	55	67.8
Jul 18	57	59	60	59	57	62	62	60	63	62	62	58	56	58	65	65	60	59	63	68	65	64	63	59	67.3
Jul 19	58	57	56	56	60	59	59	60	62	65	66	67	69	62	65	60	63	70	64	63	73	61	62	58	67.5
Jul 20	59	59	58	59	60	62	62	61	58	63	69	69	62	58	67	64	62	59	65	61	63	63	63	60	67.7
Jul 21	58	58	58	59	62	60	62	61	59	58	66	67	65	60	62	--	--	--	--	--	--	--	--	--	67.5
Energy Average	59	59	59	59	61	61	62	60	61	64	65	66	64	60	64	65	72	64	63	64	67	62	61	60	67.8

Hourly Noise Level Site Report
SCK
Period: July 14, 2006 to July 22, 2006
Site: 3
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	51	50	50	52	52	51	51	56.6
Jul 15	51	51	52	48	49	51	51	49	49	49	50	50	50	49	57	51	49	54	50	49	--	--	--	--	57.0
Jul 16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul 17	--	--	--	--	--	--	--	--	--	--	51	50	49	49	51	55	50	48	48	51	51	52	52	52	55.4
Jul 18	50	48	49	51	54	54	54	52	48	46	47	48	48	49	50	--	--	--	--	--	--	--	--	--	59.0
Jul 19	--	--	--	--	--	--	--	--	--	74	58	52	50	50	50	49	50	52	50	50	51	52	51	49	62.7
Jul 20	52	56	55	51	53	54	57	53	50	49	53	60	60	55	50	50	49	48	46	50	51	50	51	49	60.0
Jul 21	50	50	50	50	53	56	55	54	50	50	50	47	45	50	51	54	47	48	47	49	49	51	51	51	58.4
Jul 22	51	51	52	52	52	52	52	49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61.1
Energy Average	51	52	52	50	52	54	54	52	49	67	53	54	54	51	52	53	49	51	49	50	51	52	51	51	59.5

Hourly Noise Level Site Report
Airport SCK
Period: July 14, 2006 to July 22, 2006
Site: 4
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	50	52	44	43	51.9
Jul 15	43	43	44	49	49	47	48	47	47	49	50	49	51	66	65	57	50	50	48	40	44	45	44	47	57.4
Jul 16	43	42	43	46	45	46	46	48	50	41	47	56	67	61	44	45	49	50	41	45	43	48	44	45	55.9
Jul 17	43	46	46	46	46	49	55	60	56	55	53	55	57	44	54	52	47	46	46	56	44	45	44	43	56.1
Jul 18	44	46	47	49	49	48	53	54	48	56	64	54	48	47	54	56	47	53	60	60	60	61	54	61	60.8
Jul 19	46	48	49	50	52	50	54	58	62	58	59	66	62	47	52	54	52	59	52	50	50	52	46	56	59.8
Jul 20	46	49	46	45	47	49	52	49	49	57	56	63	48	48	66	54	52	50	51	50	58	49	56	45	58.7
Jul 21	46	44	43	47	47	47	48	57	59	58	58	57	57	55	60	58	54	54	46	65	49	48	48	48	57.5
Jul 22	49	48	48	48	47	53	58	57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61.5
Energy Average	45	46	46	48	48	49	53	56	56	56	58	61	60	59	61	55	51	54	53	58	54	54	50	54	58.4

Hourly Noise Level Site Report (P)
SCK
Period: July 14, 2006 to July 22, 2006
Site: 5
Metric: Aircraft LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	38	45	29	0	39.5
Jul 15	40	50	44	40	0	0	34	48	52	64	47	52	45	50	56	51	63	44	38	57	59	0	0	0	55.5
Jul 16	0	0	0	30	0	0	0	45	39	42	44	32	49	36	44	44	41	45	0	44	49	0	40	42	44.0
Jul 17	0	35	0	45	41	0	45	0	45	37	44	48	44	47	42	42	41	43	0	44	0	38	0	0	46.6
Jul 18	41	0	0	0	0	38	0	0	0	43	46	64	33	52	44	48	52	44	37	45	0	0	0	0	51.5
Jul 19	0	35	0	39	47	41	41	0	41	42	48	47	45	38	41	36	40	0	28	0	0	46	45	35	47.8
Jul 20	35	40	0	0	0	0	0	0	0	54	51	47	49	32	52	39	46	42	40	46	0	41	36	37	46.2
Jul 21	0	0	0	0	0	38	43	0	48	49	50	44	47	55	47	44	35	40	39	0	41	0	0	43	47.0
Jul 22	0	0	0	0	0	35	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35.5
Energy Average	35	42	35	38	39	35	39	41	45	56	48	56	46	50	50	46	55	43	36	49	50	40	38	38	49.9

Hourly Noise Level Site Report (P)
SCK
Period: July 15, 2006 to July 20, 2006
Site: 6
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 15	--	--	--	--	--	--	--	--	--	49	47	50	49	73	48	49	48	46	44	44	55	44	46	46	61.7
Jul 16	44	43	45	44	43	47	53	51	45	43	47	46	53	45	54	51	52	43	42	41	45	48	45	43	53.7
Jul 17	46	45	46	47	47	51	53	54	52	47	50	53	46	50	50	49	47	46	47	54	46	47	45	45	55.0
Jul 18	46	46	47	47	50	52	53	51	47	47	50	55	42	48	53	49	64	48	48	51	57	49	48	46	56.8
Jul 19	45	46	44	47	52	50	53	52	51	52	55	52	48	47	53	76	74	67	61	60	59	60	58	57	65.7
Jul 20	57	55	56	58	58	61	62	61	60	60	61	61	62	61	62	62	61	60	60	60	--	--	--	--	65.5
Energy Average	51	50	50	52	53	56	57	56	54	53	55	55	55	66	56	68	67	60	56	56	56	54	52	51	62.0

Hourly Noise Level Site Report (P)
SCK
Period: July 15, 2006 to July 20, 2006
Site: 7
Metric: Total LEQ

DATE	Hour Of The Day																							CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 15	--	--	--	--	--	--	--	--	--	--	47	46	48	44	42	46	41	42	43	42	42	43	44	45	48.1
Jul 16	41	41	41	44	45	48	50	52	48	43	61	44	44	41	45	40	43	42	42	40	44	43	43	41	52.7
Jul 17	41	41	44	45	45	48	50	53	51	45	46	44	43	47	43	44	44	40	44	45	52	53	54	54	55.5
Jul 18	52	50	52	55	56	54	55	55	53	51	51	61	52	52	52	53	64	53	53	58	53	53	53	52	60.7
Jul 19	53	52	51	52	56	54	58	55	56	51	52	55	53	54	53	54	53	54	53	55	54	54	54	54	60.6
Jul 20	53	51	51	52	54	54	54	55	53	51	58	54	53	--	--	--	--	--	--	--	--	--	--	--	60.6
Energy Average	50	49	49	51	53	53	54	54	53	50	56	55	50	50	49	50	58	50	50	53	51	52	52	51	58.4

Hourly Noise Level Site Report (P)
SCK
Period: July 16, 2006 to July 22, 2006
Site: 8
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 16	--	--	--	--	--	--	--	--	--	--	48	46	48	41	47	42	42	46	42	45	52	48	47	47	50.6
Jul 17	48	50	49	54	49	54	57	59	63	56	46	53	45	46	45	43	44	55	56	51	48	48	46	46	58.8
Jul 18	52	49	49	49	49	53	57	56	55	53	48	57	40	51	48	45	42	46	52	58	47	50	49	47	58.2
Jul 19	46	48	44	46	52	51	54	54	58	52	60	56	58	46	48	47	61	57	50	49	49	50	50	51	57.9
Jul 20	50	52	50	48	49	52	55	55	47	52	51	53	53	61	58	50	64	55	48	51	51	51	50	50	58.9
Jul 21	47	46	49	49	50	52	54	54	66	50	59	47	49	58	46	44	45	47	43	43	45	49	49	48	58.2
Jul 22	46	48	46	47	49	49	54	50	59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	59.0
Energy Average	49	49	48	50	50	52	55	56	61	53	56	54	52	56	52	46	58	53	51	52	49	49	49	49	58.1

Hourly Noise Level Site Report (P)
SCK
Period: July 18, 2006 to July 22, 2006
Site: 9
Metric: Total LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 18	--	--	--	--	--	--	--	--	--	--	--	49	46	46	48	52	48	48	46	55	48	48	48	47	52.2
Jul 19	45	48	49	51	54	53	55	54	53	52	51	51	52	50	50	51	52	51	52	52	51	51	51	54	58.4
Jul 20	54	56	56	56	57	58	59	57	54	54	52	52	52	51	51	52	53	52	53	54	72	49	48	48	63.4
Jul 21	47	46	47	49	50	56	55	56	54	52	50	52	52	51	51	51	49	50	48	48	48	48	48	47	57.3
Jul 22	47	46	46	47	45	48	51	51	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	56.9
Energy Average	50	51	51	52	54	55	56	55	53	53	51	51	51	50	50	51	51	50	51	53	66	49	49	50	59.7

APPENDIX 4

Calculated CNEL from Measured Hourly Leqs – Aircraft Only

Noise Measurement Sites 1 – 9

Hourly Noise Level Site Report (P)
SCK
Period: July 14, 2006 to July 21, 2006
Site: 1
Metric: Aircraft LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	50	0	0	0	41.4
Jul 15	0	0	0	0	0	0	0	0	41	0	0	0	49	0	59	62	56	0	0	0	0	0	0	0	50.6
Jul 16	0	0	0	0	0	0	0	0	0	0	0	0	36	50	53	42	0	51	0	0	0	0	0	0	42.6
Jul 17	0	0	0	0	0	0	0	56	51	25	57	57	54	55	66	66	65	53	0	0	0	0	0	0	57.5
Jul 18	0	0	0	0	0	0	0	0	0	46	63	50	53	57	68	66	59	0	0	0	0	0	51	0	57.8
Jul 19	0	0	0	0	0	0	0	0	55	60	52	71	0	53	61	61	57	67	0	0	72	0	0	0	62.1
Jul 20	0	0	0	0	0	0	0	0	0	60	68	69	58	61	61	67	58	58	0	0	0	0	0	0	59.9
Jul 21	0	0	0	0	0	0	53	0	0	0	0	60	72	62	55	--	--	--	--	--	--	--	--	--	61.6
Energy Average	0	0	0	0	0	0	45	47	48	55	61	65	64	58	63	64	59	60	0	0	64	0	42	0	58.5

Hourly Noise Level Site Report (P)
SCK
Period: July 14, 2006 to July 21, 2006
Site: 2
Metric: Aircraft LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	58	0	0	0	0	0	0	0	49.3
Jul 15	0	0	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30.8
Jul 16	0	0	0	0	0	0	0	0	0	0	0	65	44	0	0	51	0	0	0	61	0	0	0	0	52.6
Jul 17	0	0	0	0	0	0	0	0	47	69	57	0	0	0	49	0	0	0	0	60	0	0	0	0	56.3
Jul 18	0	0	0	0	0	0	0	0	60	0	0	0	43	0	0	53	0	0	0	0	0	0	0	0	47.2
Jul 19	0	0	0	0	0	0	0	0	0	63	64	0	0	50	62	56	59	0	0	0	73	0	0	0	60.5
Jul 20	0	0	0	0	0	0	0	0	0	53	67	62	59	0	64	63	60	0	0	0	0	0	0	0	57.3
Jul 21	0	0	0	0	0	0	0	0	0	44	52	66	64	51	59	--	--	--	--	--	--	--	--	--	57.2
Energy Average	0	0	0	0	0	0	0	0	52	62	61	61	57	45	58	57	55	0	0	55	64	0	0	0	55.9

Hourly Noise Level Site Report (P)
SCK
Period: July 14, 2006 to July 22, 2006
Site: 3
Metric: Aircraft LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0.0
Jul 15	0	0	0	0	0	0	0	0	41	41	0	0	45	38	56	48	42	52	46	0	--	--	--	--	45.8
Jul 16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul 17	--	--	--	--	--	--	--	--	--	--	0	0	0	0	44	45	0	0	0	47	34	0	0	0	39.2
Jul 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--	--	--	--	--	--	0.0
Jul 19	--	--	--	--	--	--	--	--	--	74	57	45	37	0	0	0	0	44	0	0	0	0	0	0	62.1
Jul 20	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	42	0	0	0	36	46	37	0	0	46.7
Jul 21	0	0	0	0	0	0	0	41	36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28.1
Jul 22	0	0	0	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0
Energy Average	0	0	0	0	0	0	43	34	36	67	49	38	38	31	49	43	35	45	38	40	39	30	0	0	53.4

Hourly Noise Level Site Report (P)
SCK
Period: July 14, 2006 to July 22, 2006
Site: 4
Metric: Aircraft LEQ

DATE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	CNEL
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0.0
Jul 15	0	0	0	0	0	0	0	41	45	48	49	47	50	49	65	54	44	0	0	0	0	0	0	0	52.3
Jul 16	0	0	0	0	0	0	0	41	49	33	31	56	66	60	44	44	49	48	0	42	37	0	0	0	54.1
Jul 17	0	40	0	0	0	0	47	0	49	41	32	0	37	0	44	50	45	44	44	53	0	32	34	0	46.7
Jul 18	0	0	0	0	0	0	0	47	42	0	0	0	40	46	54	56	46	39	48	60	59	60	52	61	58.6
Jul 19	0	0	0	42	49	0	0	55	60	58	57	66	62	32	49	47	50	43	0	46	49	51	0	55	57.4
Jul 20	0	44	0	0	0	0	45	41	47	44	54	52	35	43	66	54	52	50	50	49	57	45	55	33	56.0
Jul 21	0	0	0	0	40	27	0	56	58	56	50	52	55	0	47	0	0	47	45	65	48	0	36	0	53.4
Jul 22	0	0	0	0	0	52	57	57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	59.5
Energy Average	0	36	0	33	41	43	49	52	55	52	51	59	60	53	61	52	48	46	45	57	53	51	48	53	55.5

Hourly Noise Level Site Report (P)
SCK
Period: July 14, 2006 to July 22, 2006
Site: 5
Metric: Aircraft LEQ

DATE	Hour Of The Day 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	CNEL
Jul 14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0.0
Jul 15	0	0	0	0	31	0	0	0	0	0	0	39	35	0	35	40	0	0	0	55	0	0	0	0	42.0
Jul 16	0	0	0	0	0	0	0	44	0	39	43	28	46	29	28	0	0	30	0	0	0	0	0	0	36.1
Jul 17	0	0	0	0	0	0	0	0	43	0	37	0	39	0	41	40	41	0	0	0	0	0	0	0	34.5
Jul 18	0	0	0	0	0	0	0	37	0	0	40	0	0	33	45	40	0	0	0	0	0	0	0	0	33.6
Jul 19	0	0	0	0	0	0	0	0	0	41	26	47	0	30	40	33	35	37	0	0	36	0	0	0	35.5
Jul 20	0	0	0	0	0	0	0	0	0	41	46	47	36	35	32	42	36	34	0	0	0	0	0	0	37.5
Jul 21	0	0	0	0	0	0	0	0	0	0	31	33	47	51	36	0	0	0	0	0	0	0	33	0	39.0
Jul 22	0	0	0	0	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0
Energy Average	0	0	0	0	22	0	0	36	34	37	40	42	42	43	39	38	34	31	0	47	27	0	24	0	37.8

Hourly Noise Level Site Report (P)
SCK
Period: July 15, 2006 to July 20, 2006
Site: 6
Metric: Aircraft LEQ

DATE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	CNEL
Jul 15	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 16	0	0	0	0	0	0	0	0	0	0	0	41	41	0	0	0	0	30	0	0	0	0	0	0	30.4
Jul 17	0	35	0	0	0	0	0	0	40	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	32.5
Jul 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0	0	0	0	0	0	0	0	32.4
Jul 19	0	0	0	0	0	0	0	0	0	40	36	41	0	0	0	40	0	0	0	0	45	0	0	0	34.6
Jul 20	0	0	0	0	0	0	0	0	0	43	54	53	0	40	51	53	48	0	0	0	--	--	--	--	46.3
Energy Average	0	28	0	0	0	0	0	0	33	37	46	46	33	32	43	46	40	22	0	0	38	0	0	0	38.7

The hour columns above are grouped under the heading "Hour Of The Day".

Hourly Noise Level Site Report (P)
SCK
Period: July 15, 2006 to July 20, 2006
Site: 7
Metric: Aircraft LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 15	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	0	0	0	0	0	0	0	0	35.0
Jul 20	0	0	0	0	0	0	0	0	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	0.0
Energy Average	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	0	0	0	0	0	0	0	28.0

Hourly Noise Level Site Report (P)
SCK
Period: July 16, 2006 to July 22, 2006
Site: 8
Metric: Aircraft LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 16	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 17	0	0	0	0	0	0	0	0	47	0	0	0	38	0	0	31	0	0	0	0	0	0	0	0	33.7
Jul 18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 20	0	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	18.4
Jul 21	0	0	0	0	0	0	0	0	0	0	0	0	42	0	0	0	0	0	0	0	0	0	0	0	28.2
Jul 22	0	0	0	0	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0
Energy Average	0	0	0	0	0	0	0	0	39	0	0	24	36	0	0	23	0	0	0	0	0	0	0	0	27.1

Hourly Noise Level Site Report (P)
AirportSCK
Period: July 18, 2006 to July 22, 2006
Site: 9
Metric: Aircraft LEQ

DATE	Hour Of The Day																								CNEL
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
Jul 18	--	--	--	--	--	--	--	--	--	--	--	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Jul 21	0	0	0	0	0	0	0	0	0	0	0	0	42	0	0	0	0	0	0	0	0	0	0	0	27.9
Jul 22	0	0	0	0	0	0	0	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0
Energy Average	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	22.0

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January 23, 2007

Mr. Thomas Truszkowski
Vice President of Land Development
Arnaiz Development Co.
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Stockton, CA 95212
(209) 956-9303

Subject: Response to Planning Staff Comments – Tidewater Crossing Noise Analysis.

Dear Mr. Truszkowski,

The following are the responses to the comments made by the City of Stockton Planning Staff regarding the aircraft noise analysis we conducted for the Tidewater Crossing project.

1. The noise measurement data collected for the aircraft noise analysis was collected between the dates of July 14 through July 22, 2006. The purpose of the noise measurement analysis was to obtain noise data of aircraft types at specific key locations around the airport, in addition to obtaining operational and flight track information at the airport. The noise exposure contour maps generated by the INM for the noise study were calculated based upon the flight operations for an entire year, not the noise measurement data collected that week. The noise contours are therefore based upon average conditions found at the airport, not conditions found during any one week. Therefore the noise contours are valid as the are not based only on aircraft events measured only during that week of the year.

2. Noise measurement Sites 1 & 2 were located at the north and south ends of Runway 11L/29R, respectively, on the airport property, therefore our access to these two sites were limited to when airport personnel were available to escort us on to airport property. July 22 was on a Saturday, therefore the noise monitors at Sites 1 & 2 had to be picked up on Friday, July 21 as that is when airport personnel were available. Noise monitor placement was started on the afternoon of July 14 when the first two noise monitors were placed on airport property. The remaining noise monitors were placed in the order of the site numbering when suitable monitoring locations could be found. Sites 3, 4 and 5 were set up on the afternoon/evening of July 14; Sites 6, 7 and 8 were set up on the morning of July 15, and a suitable site was not found for Site 9 until July 18. The noise monitoring equipment set up at Site 6 was moved by local migrant workers on the afternoon of July 19. After the equipment was found on July 20, the equipment was not set up again. The equipment at Site 7 was sabotaged and we were only able to recover data through July 20.

3. After the noise measurement data is collected and processed, it was correlated to specific aircraft event data taken from filtered radar data and on-site event logs made during the noise measurement survey. The filtered radar data includes only aircraft flying under IFR conditions which eliminates all of the VFR flights around the airport. The on-site event logs were only taken during daylight hours when aircraft could be identified, eliminating nighttime any operations. Most of the aircraft events modeled and monitored were single and twin engine general aviation aircraft conducting touch-and-go operations. Most of these aircraft events are not even measured at the noise monitors located away from the airport and the closed loop pattern, which is on the side of the airport away from most of the noise monitors. Most of the time, the single engine aircraft were not loud enough to be positively identified as aircraft events. The events that were most able to be identified were the commercial, military, and corporate jet aircraft events. Since most of these aircraft did not over-fly most of the noise monitors, only sideline noise from the events were measured. All of these factors result in the "identified aircraft event" level being lower at the noise monitoring site further from the airport. The measured CNEL noise levels at each of the sites was based only upon the data collected at that noise monitor. The modeled CNEL noise levels at each of the sites was based upon the annual aircraft operations entered into the INM program.

4. The noise levels listed in the tables included in Appendix 3 show all of the noise data collected at each site for the entire duration of the noise measurement. This data includes all aircraft, traffic, train, and ambient noise event data that was measured and recorded around the clock. Nothing was filtered out. The noise levels in the tables presented in Appendix 4 include only those events that were identified to be aircraft when the noise measurement data was correlated to both the filtered radar data and the on-site event log data taken during the noise measurement survey. The data in Appendix 3 shows nearly continuously data collection expect when the noise monitor was not operating, as displayed by a "- -", or when the noise level fell below the measurement threshold of 30 dBA for the entire period, as displayed by a "0". The noise data in Appendix 4 shows hourly noise levels for any hour that had at least one correlated aircraft noise event occurring during that hour, otherwise a "0" is shown.

5. The time-of-day of the air carrier operations was based upon the information received which states that the air traffic control tower is open only during the daytime hours and a couple of evening hours. A couple of the operations could have been modeled as occurring during the evening hours.

6. The noise contours do take into account the noise generated by the helicopter operations. The flight track used by the non-military helicopters was observed to be either along, or parallel to, the tracks for Runway 11R/29L. The flight tract for the National Guard Chinook helicopters was generally from the west side of the airport, departing across the airport property to the east and arriving to the airport from the east. The small number of operations (2.7%) make a minimal impact on the overall noise exposure of the airport. Most of that impact is on airport property heading away from the project site. These operations have a minimal impact on the noise exposure contours on the west side of the airport and negligible impact on the project site.

7. During the noise measurement survey, Lmax data was recorded, however it was not charted specifically for this analysis. We did not calculate the range of measured data with respect to the aircraft correlated data only, but that distribution calculation is possible if necessary. It is estimated that the aircraft events that fell within the top 10% band had Lmax levels in the top 80% of that Lmax band. It is a reasonable assumption that the larger the L_{10} band the more distributed are the L_{10} noise events.

If you have any other questions regarding this noise analysis, please feel free to give me a call.

Sincerely,
BridgeNet International

Theodore C. Lindberg, INCE.Bd.Cert.
Director of Building Acoustics

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May 3, 2007

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Subject: Response to Planning Staff Comments – Tidewater Crossing Noise Analysis.

Dear Mr. Bromann,

The following are the responses to the comments made by the City of Stockton Planning Staff regarding the aircraft noise analysis we conducted for the Tidewater Crossing project.

38. We have recently received the map showing the location of the California Air National Guard flight tracks to and from their pad on the west side of the airport. We are currently working to obtain flight operation information from the California Air National Guard with respect to the helicopter operations along the flight track which extends west (heading 235°) across the project site. When this information becomes available, we can comment further.

39. Comment noted. The small aircraft operational count data were collected by the airport, and was used in the development of the latest Part 150 analysis. A small aircraft is typically defined as one that is less than 12,500 pounds gross take-off weight.

40. Comment noted. This issue will be addressed when further flight operational information is received from the California Air National Guard.

If you have any other questions regarding this noise analysis, please feel free to give me a call.

Sincerely,
BridgeNet International

Theodore C. Lindberg, INCE.Bd.Cert.
Director of Building Acoustics