Noise Analysis Report
October 2007

1.0 Introduction

This project was undertaken to determine the extent of noise impact in the City of Huntington Beach resulting from aircraft flyovers, primarily those approaching Long Beach Airport. At this stage of the study Veneklasen has accomplished the following:

1. We reviewed the project goals with the City.
2. Aircraft operations data were obtained from Long Beach (LGB) and John Wayne airports (SNA). Tracking data were obtained from the ARTS system at John Wayne airport.
3. An analysis was performed using the FAA's Integrated Noise Model (INM) and contours were generated. The assumptions for aircraft tracks were obtained from observations of the SNA Passur system.
4. Four measurement locations were selected and noise data were obtained for 3 days. These data were analyzed and used to adjust the contours.
5. An additional day of measurements was made with observations of flight activity to determine where aircraft lower their landing gear and flaps.

The tasks performed on the project are described in the sections below.

2.0 Aircraft Operations

Personnel at Long Beach and John Wayne airports were contacted to obtain flight activity data. Only aircraft operations data were obtained from Long Beach airport, whereas SNA also provided tracking data from the FAA tracking system (ARTS) that contained flights for both SNA and LGB. It was necessary to write a program to translate these data into a format that was compatible with the requirements of INM. The tracking data provided by SNA included operations extending to the area of Long Beach airport. It was necessary to filter this data by altitude to eliminate the large number of high altitude flyovers in the area.

On a daily basis there are about 45 arrivals and 45 departures for Long Beach and about 26 of these flights are A320 type of aircraft. The predominant direction for landings at Long Beach is to the NW directly over the city of Huntington Beach. Almost all aircraft approaching LGB pass over the area near the intersection of Bolsa Chica and Edinger. About 75% of aircraft approaching LGB fly over the city from the East and Southeast, the remaining aircraft approach from the South and Southwest.

The intersection of Bolsa Chica and Edinger is about 7.5 miles from the airport and for a 3 degree glide slope, this being the altitude track that aircraft must follow when landing, the altitude here should be approximately 2100 feet. At this point the observed average aircraft altitude is approximately 2000 feet with many aircraft well below this at an altitude of only 1600 feet.

Many aircraft flying over the main part of the city are at an altitude less than 3000 feet. At the intersection of Brookhurst and Adams, the 3 degree glide slope altitude is about 4000 feet. Many aircraft at this point are at an altitude of about 3500 feet or less.

1711 Sixteenth Street • Santa Monica California 90404 • tel: 310.450.1733 • fax: 310.396.3424 • www.veneklasen.com

Other aircraft also fly over this Bolsa Chica/Edinger area; there are a large number of flights that pass over at altitudes of about 7,000 feet on a NNW heading for an approach to Los Angeles International Airport (LAX). In other parts of the city, there are numerous flights that pass over the center of the city on a Northeast heading on the downwind leg for an approach to SNA to land from the NE. These flights are almost all at an altitude of about 5000 feet. There are also flights that fly SE over the city approximately parallel to the beach at an altitude of about 20,000 feet; these are LAX departures heading East.

A call to Long Beach Airport provided some information relative to altitudes used to approach their airport. The FAA has complete control over all aircraft in this area. They stated that aircraft approaching JWA have priority and that aircraft approaching Long Beach must stay under them. This means that aircraft approaching Long Beach would need to be at an altitude of less than 4000 feet in the southern part of the City.

3.0 Contour Generation

Aircraft operations and tracking data were input to the latest version of INM. Aircraft flight tracks were refined by observing operations on the SNA Passur web site. This site portrays flight activity in most of the Los Angeles Basin. It utilizes a passive radar reception system that receives both the ARTS radar interrogating signal from the FAA antenna at the airport and the returning transponder signals from aircraft. The measurement of time differentials between these signals allows the system to accurately determine the aircraft position. Other data about the aircraft such as altitude, airline, and aircraft type is also transmitted by the transponder. These data are also accessible using the Passur site. The web site can be accessed to observe both real-time (delayed by 10 minutes) and historical data from previous days.

After INM was run, contours were generated. Following the noise measurements, it was found that the assumptions for the number of arrivals on the 2 primary tracks to Long Beach were in error. It was originally assumed the traffic was split equally between the track approaching from the Northeast and the one approaching from the South. During analysis of data following the noise measurements it was found that over 75% of the flights arrive from the Northeast. A map showing the CNEL contours generated by the INM program and adjusted to match the noise measurements is shown in Figure 1. We also calculated the maximum A-weighted noise levels produced by the aircraft using INM; these data are shown in Figure 2.

The noise metrics illustrated in the two figures are standard portrayals of airport noise impact, CNEL is the metric required by the State of California for large airports, these airports are required to provide an annual report. The annual report must contain a map illustrating the location of contours showing the 65 CNEL. They must also provide the number of homes impacted by a CNEL of 65 or greater. Some airports also calculate a 60 CNEL contour, though this is not required. CNEL is calculated by averaging the Hourly Noise Levels (HNL) for a 24 hour period. HNL is the average level of the noise for each hour of the day. For hours between 7 p.m. and 10 p.m. (evening hours), a penalty of 5 dB is added to the HNL values. For hours between 10 p.m. and 7 a.m. (night hours), a penalty of 10 dB is added to the HNL values. These penalties adjust the hourly values to account for the increased sensitivity of people to noise occurring during evening and night hours. Long Beach Airport has a curfew for flights occurring between 10 p.m. and 7 a.m.

Although not required by the State, the contour shown in Figure 2 illustrates the maximum noise level that communities are exposed to from aircraft approaching Long Beach airport. This contour is also a prediction generated by INM. Noise levels measured in the community were very close to this prediction. It is possible that some aircraft noise events could be higher than indicated by this contour. The Maximum Noise Level (Lmax) is considered to be an additional factor in estimating the impact of noise in the community, this being what many people notice about intermittent noise sources.

4.0 Noise Measurements

The predicted contours and some complaints received by the City were used to identify 4 areas in the community to be used for noise monitoring. These areas were near the intersection of the tracks arriving from the Northeast and the tracks arriving from the South. Homes were selected and the monitors were placed in the back yards where they were somewhat removed from heavily traveled streets. The monitors were set to record hourly values of Leq, statistical levels, and single event values. The monitors were contained in environmental enclosures with batteries to provide sufficient power for several days of operation. Data were recorded for 3 days although one monitor stored data for only one day. The instruments used for the measurements meet the requirements of ANSI S1.4, 1983 for Type I sound level meters and microphones equipped with wind screens were placed on stands at a height of 4 feet above the ground.

The sites where noise measurements were made are:

1 -- 16791 Robert
2 -- 17172 Twain
3 -- 5152 Robinwood
4 -- 4772 Scenario

5.0 Data Results

A summary of the data results are shown in the following table.

Table 1
Measured and Aircraft CNEL

Site	Measured Total CNEL			A/C CNEL
	3-5-07	3-6-07	3-7-07	
1	53.1	N/A	N/A	44.7
2	53.1	55.3	55.4	45.8
3	60.2	58.9	56.4	47.7
4	52.1	53.6	55.4	44.3

Table 1 shows the measured CNEL at the 4 measurement locations and the calculated aircraft CNEL based upon the measured event levels of aircraft for a single 24 hour period. Further details of the long-term measurements are contained in Tables A1 through A4 in the Appendix.

All commercial aircraft flights approaching Long Beach for the 24 hour period from 3/5 to 3/6 were identified on the Passur web site and their tracks were noted. The data from these sites are contained in Table A5 in the Appendix. Data derived from the individual noise events were used to calculate the Aircraft CNEL values shown in Table 1 above. It is noted that the higher measured CNEL at all four locations is controlled by noise from sources other than aircraft on the approach to Long Beach. Of course we did not identify all aircraft flying in the areas of measurement, only commercial flights that were landing at Long Beach. It is possible that GA aircraft could contribute some noise and some could result from aircraft approaching LAX though most interfering noise is likely due to street traffic, dogs, and human activity.

Noise levels from the flights approaching LAX or those heading SE at high altitudes are considerably below those generated by LGB arrivals, at least 10 dB lower. GA aircraft flying in the area also produce noise levels much lower than the commercial and jet aircraft.

An additional day of data was obtained in a parking lot at a school/park near the intersection of Bolsa Chica and Edinger. During this period, four hours of noise data were obtained and flights passing over this location were logged and later identified using the Passur site. The average hourly noise levels during this session were higher than those measured during the long-term monitoring; this difference agrees with this position relative to the predicted contours and the long-term measurements. Details of the data obtained at this location are contained in Table A-6.

It is known that aircraft on the final approach to an airport are noisier when landing gear are down and flaps are extended. During this day of observations it was noted that some aircraft had their gear down and extended their flaps shortly after passing overhead. Many aircraft are at an altitude of about 1600 feet. The following table shows the difference in maximum noise levels for aircraft at other pertinent altitudes compared to 1600 feet. For this table the noise level of an A320 aircraft is assumed; the level shown at 1600 feet is the average level measured during the one day of measurements.

Table 2
A320 Noise Level vs. Altitude

Altitude	Noise Level
1600 ft.	72 dBA
2000 ft.	- 2 dBA
3000 ft.	- 5.5 dBA
5000 ft.	- 10 dBA
7000 ft.	- 13 dBA

6.0 Mitigation Measures

There are some possible mitigation measures, although their feasibility may be limited due to the airspace restrictions in the area and compatibility with FAA rules. Some mitigation topics for discussion are:

1. The area near the intersection of Bolsa Chica and Edinger is the focal point for almost all aircraft landing at Long Beach airport. This intersection is 7.5 miles from the airport and for

a 3 degree glide slope, this being the altitude track that aircraft must follow when landing, the altitude here would be at an altitude of 2100 feet. At this point the average aircraft altitude is approximately 2000 feet although many aircraft are well below this at an altitude of only 1600 feet. If these aircraft were at an altitude of 2000 feet instead of 1600, their noise level would be 2 dB less as shown in Table 2 above.

2. Aircraft flying over the main part of the city should be at an altitude of 3000 feet or higher. At the intersection of Brookhurst and Adams, the 3 degree glide slope altitude is about 4000 feet. Aircraft in this area are at an altitude of about 3500 feet. If all aircraft were at or above 4000 feet here their altitude over most of the city would be over 3000 feet and their noise levels would be approximately 6 dB lower.

3. Many aircraft approaching from the south fly over the Seacliff development area. This area is between Seapoint, Garfield, and Goldenwest streets. A slight shift in this approach track to the north would have aircraft approaching over the Bolsa Chica Reserve and they would thus avoid this populated area.

4. Aircraft should be able to delay the deployment of landing gear and flaps until they are over the Naval Weapons Station and thus reduce the noise levels produced over the community. The reduction in noise level for this alternative procedure is not known though it should be noticeable.

7.0 Conclusions

There are some conclusions that should be noted. These are:

1. This report shows that there are a large number of aircraft that pass over the City of Huntington Beach on departures or approaches to at least 3 major airports, LGB, LAX, and SNA. Some of these aircraft are at an altitude of less than 2000 feet. There have been verbal reports that some aircraft on the approach to LGB are at an altitude of only 1000 feet, though these have not been officially identified. Jet aircraft at an altitude of less than 2000 feet are very noisy, approaching 80 dBA. Many aircraft, approaching LAX and SNA, are at altitudes higher than 7,000 feet. These aircraft do not make as much noise but they are still noticed and can be an irritant to residents.

2. The control of aircraft flying over the City, and thus the noise they produce, are under the jurisdiction of the FAA. Counties, cities and other municipalities have no authority over these operations.

3. The highest aircraft CNEL value monitored in the City was 47.7 dB. Standards established by the Federal Government and the State of California identify the CNEL 65 as the boundary where significant noise impact exists. Airports are starting to show the CNEL 60 contour to identify further impact areas. This does not mean that impact does not exist beyond the CNEL 60 or 65 since some people are more sensitive to noise than others and individual noise events can be disturbing.

4. Long Beach Airport had a study performed for terminal improvements in 2005. An appendix to this document contains a noise analysis with CNEL contours for all aircraft and

SEL contours for some individual aircraft. SEL is the sound exposure level for an individual aircraft noise event. It represents the energy of the noise event normalized to a one second duration. Although not exact, the SEL of an aircraft noise event is about 10 dB higher than the Lmax value. In the Long Beach document, they show SEL contours of 85 and 90 dB. We measured SEL values of almost 87 dB for some A320 aircraft at all but one site. This is higher than values shown in the LGB report. This report does not address areas outside of the City of Long Beach.

It may be concluded that the City of Huntington Beach is exposed to a considerable amount of aircraft noise. However, there is no evidence that it would be considered a significant impact according to established noise impact guidelines. It is possible that a meeting with Long Beach and FAA officials could provide some relief if these authorities could modify and enforce more stringent landing procedures at LGB.

Appendix A

Table A1 Noise Data from Site 1

1 16791 Robert
March 5-8, 2007

	5-6 March								6-7 March								7- 8 March							
Hour	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}
12	52.8	81.2	59	50	43.7	39.6	37.5	36.9																
13	47	69.9	57.8	48.6	42.6	39.1	37.2	35.7																
14	47.6	66.3	57.8	50.3	44.1	39.9	38.2	37.3																
15	49	73.7	59.6	50.2	44.2	41.1	39.5	38.5		No	Data							No	Data					
16	51.3	81.4	57.8	50.6	43.7	40.1	38.4	37.6																
17	52.9	81.8	63.1	52	43.7	40.6	39.1	37.4																
18	45.8	70.8	53.9	47.7	43.1	40.8	39.3	38.9																
19	49.1	67.7	58.6	52.3	45.1	40.6	39.2	38.6																
20	53.7	83.3	63.2	51.8	45.2	41.9	40.4	39.9																
21	48.3	73.2	56.6	49.3	42.5	40.3	39.2	37.8																
22	46.7	78.4	51.8	45.5	41.4	39.3	38.1	37.3																
23	42.4	58.3	53.2	42.7	40	38.1	36.5	35.7																
0	38.4	52.3	48.1	39.6	36.5	34.7	33.5	32.5																
1	37.5	51.8	45.4	39.5	35.8	33.8	32.6	31.8																
2	34.8	48.2	44	35.8	33.4	32.1	31.1	30.7																
3	35.4	52.3	44.4	37.3	33.5	32.2	31.2	30.5																
4	39	61.2	49.2	39.5	36.5	33.6	32.3	31.8																
5	42.3	60	50.5	44.2	39.7	37.6	36.5	36																
6	47.7	60.7	54.5	50.5	46.3	43.6	42	41.2																
7	50.4	68.5	59.8	52.4	47.7	44.7	43.1	42.1																
8	54.3	77	67.5	53.9	47.7	42.3	40.1	39.5																
9	49.6	67.6	62.4	50.7	42	37.9	36.5	36.3																
10	50.4	70.6	60.5	52.8	43.9	36	33.1	31.2																
11	49.7	70.1	60.7	51.1	45.3	41.5	38.5	37.2																
12	56.5	75.2	68.2	58.6	48.9	42.8	39.7	37.8																
13	51.9	75.9	61.4	52.3	46.1	42.4	40.1	39.1																
14																								
Avg.	50.0	68.4	56.5	48.0	42.4	39.1	37.4	36.5																
CNEL	53.1																							

Table A2 Noise Data from Site 2

2 17172 Twain
5-8 March, 2007

	5-6 March								6-7 March								7-8 March							
Hour	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}
12	45.0	76.3	54.0	45.8	40.3	37.7	36.0	33.8	55.2	79.8	67.4	56.1	44.0	40.0	37.9	36.0	52.3	80.5	60.3	51.5	44.1	41.3	40.1	38.9
13	46.7	66.7	58.1	48.2	41.6	38.0	36.5	34.8	52.4	75.4	65.9	52.5	44.2	41.2	39.2	37.9	54.6	80.8	64.5	57.7	46.2	42.9	40.7	39.1
14	49.4	70.2	60.5	50.5	47.0	41.6	39.4	38.2	53.1	71.9	64.5	55.7	47.4	44.4	42.1	40.1	58.8	82.4	73.4	54.5	44.9	41.9	40.4	39.3
15	48.9	69.4	61.3	48.6	43.8	41.8	40.5	38.9	52.6	74.4	65.9	51.9	47.5	45.6	44.4	43.5	59.5	82.4	73.5	59.3	48.6	45.2	42.8	41.0
16	55.0	79.1	69.0	52.0	45.8	42.7	41.3	40.1	56.8	81.1	71.3	53.5	48.9	46.8	45.3	43.9	54.2	76.6	68.0	53.5	45.4	42.6	41.1	39.8
17	54.2	79.2	65.2	54.7	49.1	45.9	43.9	41.6	57.4	82.1	69.9	57.0	48.6	45.7	43.9	42.4	56.7	81.3	70.4	57.1	47.5	44.3	43.0	41.7
18	48.5	70.5	57.6	48.9	45.6	43.7	42.1	41.1	49.0	66.4	59.4	51.3	45.7	43.3	41.6	40.5	50.6	69.7	62.6	51.9	44.4	42.3	41.1	39.8
19	49.7	80.7	59.8	49.8	45.4	43.3	42.0	40.8	53.7	77.4	67.0	54.3	44.6	42.1	40.5	39.0	51.4	74.1	64.9	52.5	44.0	41.4	40.2	39.6
20	49.4	70.8	63.2	48.8	43.7	41.2	39.8	38.5	53.9	77.7	68.0	52.5	43.5	41.5	40.4	39.2	50.2	72.1	60.8	51.7	43.4	40.3	39.1	37.8
21	47.9	67.4	60.1	49.4	42.0	39.9	38.4	36.9	49.5	74.3	58.3	47.8	43.8	42.0	40.9	39.3	50.9	73.5	64.3	49.7	41.6	37.8	36.2	35.2
22	41.1	59.8	48.2	42.8	39.9	38.3	37.3	36.7	45.9	66.0	57.8	45.8	41.6	39.0	37.7	36.9	47.9	71.8	59.5	44.0	40.3	39.0	36.8	34.4
23	42.5	61.9	54.0	42.7	39.1	37.4	36.2	35.1	45.3	64.5	58.5	44.8	39.0	36.5	35.2	34.0	41.7	65.8	51.4	42.5	38.7	36.4	34.9	33.4
0	38.3	55.3	46.6	40.0	36.8	35.0	34.1	32.9	39.9	61.5	49.5	41.3	37.3	34.4	32.8	31.2	37.1	59.5	43.5	39.0	35.6	33.5	32.4	31.5
1	38.1	53.2	44.8	39.9	37.2	35.6	34.4	33.4	43.8	65.9	58.7	40.7	35.8	33.8	32.5	31.6	48.8	74.2	52.9	37.8	34.3	32.2	30.8	29.5
2	37.5	53.2	44.4	38.7	36.8	35.3	34.1	32.8	36.6	55.2	48.5	36.3	34.3	32.6	31.5	30.5	40.5	61.2	53.9	39.7	35.9	34.0	32.9	31.6
3	37.6	56.8	46.0	39.5	35.9	34.3	33.2	31.9	36.7	61.6	43.0	35.9	34.2	32.7	31.4	30.2	37.7	51.7	43.7	39.4	36.9	35.3	34.2	33.5
4	41.5	63.1	52.1	43.3	39.0	36.1	34.2	33.3	39.6	65.7	50.0	39.6	36.9	34.4	33.2	32.2	39.2	51.7	44.5	40.9	38.5	36.5	34.9	33.3
5	46.5	69.5	51.6	48.9	45.6	41.7	39.7	38.6	43.5	64.2	56.7	41.1	38.9	37.6	37.0	36.3	44.4	66.3	52.4	46.5	42.5	39.4	38.1	36.8
6	48.6	61.9	55.3	50.9	47.5	45.1	43.4	41.9	45.9	64.7	56.7	47.6	42.4	39.6	38.1	36.6	47.3	65.9	53.9	49.0	46.4	44.4	43.1	41.9
7	51.5	75.4	60.9	52.0	48.8	46.6	45.4	44.3	50.1	70.9	62.9	49.6	43.2	40.6	38.7	37.2	55.5	76.1	67.1	58.5	45.8	42.0	39.5	37.8
8	51.8	82.8	60.4	51.0	45.6	42.6	40.7	39.1	54.4	80.5	67.3	52.4	43.6	39.9	38.3	37.0	52.7	77.8	65.6	53.0	42.1	38.1	36.3	34.6
9	57.2	79.4	69.2	60.7	45.8	40.1	38.1	36.8	61.9	83.4	74.9	62.4	44.5	39.7	38.0	36.1	57.4	81.6	70.0	57.1	44.8	38.6	36.4	34.7
10	55.7	71.0	66.1	61.7	45.1	38.6	36.2	34.2	56.5	81.1	70.2	56.0	47.4	43.5	39.4	37.1	53.1	71.6	66.4	54.4	42.7	37.5	35.8	34.2
11	53.5	70.4	64.4	57.9	45.6	40.8	39.0	37.8	52.0	73.9	63.1	53.8	43.7	40.6	39.2	37.9	53.0	74.9	64.1	54.8	44.7	41.6	40.2	38.9
12																								
13																								
14																								
Avg.	50.6	68.5	57.2	48.6	43.0	40.1	38.6	37.2	53.4	71.7	61.5	49.2	42.5	39.9	38.3	36.9	53.3	71.8	60.5	49.8	42.5	39.5	38.0	36.6
CNEL	53.1								55.3								55.4							

Table A3 Noise Data from Site 3

3 5152 Robinwood

5-8 March, 2007

	5-6 March								6-7 March								7-8 March							
Hour	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}
12																								
13	48.5	66.8	58.1	49.9	46.6	42.4	41.1	40.5	53.2	71.3	66.4	54.8	47.0	44.1	42.4	41.7	58.2	74.3	68.9	59.8	53.0	47.4	43.9	42.2
14	48.2	68.6	58.9	50.2	43.9	41.9	40.2	39.5	53.2	71.7	64.2	57.1	48.5	44.8	42.7	41.7	54.2	74.7	66.3	55.7	49.3	45.6	43.5	42.4
15	50.2	68.1	61.2	52.1	45.5	42.8	41.1	40.0	53.9	74.2	67.0	54.2	47.5	45.0	43.4	42.6	55.9	78.4	65.5	56.9	50.1	45.8	42.8	41.4
16	72.3	93.3	86.2	65.2	47.6	41.8	39.6	38.8	52.3	75.8	63.7	52.1	48.5	46.1	44.1	42.3	53.6	72.6	66.3	54.7	47.7	44.4	42.2	40.9
17	54.5	79.0	66.9	53.7	44.9	42.3	41.0	39.8	55.3	73.4	68.4	55.0	46.6	44.4	42.5	40.5	59.0	76.7	73.0	59.8	47.6	44.2	42.1	40.4
18	52.3	74.6	61.9	53.5	50.4	45.3	42.6	40.6	53.8	70.0	63.0	55.4	51.4	49.1	42.5	41.2	54.0	72.8	65.9	54.6	49.1	45.1	43.5	42.5
19	55.6	74.3	67.0	56.8	52.5	48.7	45.1	43.6	54.1	70.7	66.7	54.7	50.4	48.8	44.5	42.4	54.8	81.5	65.5	54.9	48.9	46.6	43.1	41.8
20	53.0	69.9	63.2	53.5	51.4	48.3	42.7	41.0	60.4	84.8	72.1	58.4	54.2	45.3	42.3	40.9	52.5	70.9	63.9	53.4	49.8	45.5	43.1	41.8
21	51.6	70.3	60.3	52.9	50.6	44.9	42.2	41.3	61.2	91.6	69.7	52.9	51.5	49.0	42.1	40.5	52.4	71.9	65.4	52.4	45.8	43.5	42.1	40.3
22	49.4	57.4	52.7	51.3	49.8	43.5	42.0	41.1	48.9	57.6	53.0	51.3	48.6	43.7	40.5	39.2	48.3	60.5	56.4	49.8	47.6	44.8	43.2	42.4
23	48.8	62.6	56.6	51.0	48.2	40.8	38.6	38.1	50.2	60.3	57.7	51.4	49.9	47.2	38.5	37.6	44.9	50.8	49.4	47.1	44.5	41.1	39.0	37.7
0	44.2	51.3	49.4	47.5	43.2	37.8	35.8	35.0	49.5	55.7	54.0	52.8	48.7	41.1	32.1	31.0	45.1	52.1	50.9	49.1	42.9	36.8	33.0	31.4
1	41.0	51.4	45.8	43.8	40.0	37.7	36.5	35.8	41.6	52.1	49.7	47.6	36.4	33.1	31.6	31.1	39.3	52.8	47.6	42.3	37.1	33.5	32.2	32.0
2	45.8	52.1	49.5	48.1	45.6	41.4	37.1	36.2	49.5	54.9	52.7	51.3	49.4	47.2	38.4	33.2	38.3	46.5	42.7	39.7	38.0	36.6	35.6	35.3
3	45.9	54.4	50.6	48.6	46.0	37.2	35.3	35.2	44.9	52.3	51.0	48.5	43.8	35.9	34.2	32.2	38.4	47.0	43.2	39.8	38.1	37.0	36.1	36.0
4	43.7	58.6	49.2	45.9	42.3	40.0	38.1	36.6	40.2	50.8	47.0	43.2	39.1	35.5	34.2	33.7	39.4	58.1	43.8	41.4	38.8	36.7	36.0	35.4
5	45.5	52.1	49.7	47.4	44.9	43.2	42.1	41.6	46.7	51.9	50.6	49.3	46.6	42.3	40.8	39.0	46.9	69.7	51.9	45.6	41.0	38.8	37.0	35.7
6	50.0	71.5	56.4	51.2	48.5	46.5	45.2	45.0	50.9	73.5	63.4	48.4	44.5	42.5	41.4	40.9	53.2	71.6	64.1	56.7	47.0	44.3	43.0	42.4
7	51.8	70.9	62.9	52.6	48.8	46.1	44.2	43.5	49.3	67.7	61.1	51.0	45.5	43.1	41.6	41.3	56.6	72.0	66.0	60.7	50.4	42.5	41.1	40.0
8	52.7	71.6	65.3	53.2	47.9	44.4	43.1	42.6	50.9	70.0	61.5	53.6	46.3	43.9	42.3	41.5	53.1	70.8	63.4	57.1	46.8	40.5	39.0	38.2
9	50.0	69.6	62.7	50.6	44.0	40.3	39.1	38.5	52.7	72.2	65.1	55.0	44.9	41.1	39.1	38.2	54.5	74.5	67.8	54.5	43.9	40.8	39.3	38.7
10	52.0	72.7	63.2	54.2	46.2	41.8	37.8	37.2	55.3	68.6	64.0	59.1	52.0	42.2	39.9	38.7	50.9	68.4	62.5	53.5	44.8	41.5	40.0	39.0
11	52.7	72.2	63.1	56.5	45.9	43.3	40.8	39.4	55.1	68.7	63.7	59.3	51.0	44.8	41.3	40.0	53.4	71.1	66.2	54.7	43.9	41.5	40.3	39.6
12	53.5	79.3	63.6	55.9	46.8	42.7	41.4	41.0	63.0	75.4	73.2	66.2	55.8	48.1	45.1	43.6	56.6	70.2	65.2	60.8	52.5	46.3	42.8	41.5
13																								
14																								
Avg.	59.2	67.2	59.4	51.9	46.7	42.7	40.5	39.7	55.1	67.3	61.2	53.4	47.8	43.7	40.3	39.0	53.5	67.1	60.1	52.3	45.8	42.1	40.2	39.1
CNEL	60.2								58.9								56.4							

Table A4 Noise Data from Site 4

4 4772 Scenario 5-8 March, 2007																										
	5-6 March								6-7 March								7-8 March									
Hour	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}	L_{max}	L_1	L_{10}	L_{50}	L_{90}	L_{99}	L_{min}		
12																										
13	48.6	77.9	58.4	49.8	43.4	40.3	39.1	37.9	53.9	71.8	65.4	56.3	47.7	42.9	40.9	39.6	51.2	75.7	63.3	51.9	45.4	42.8	41.2	40.2		
14	48.2	69.7	59.8	49.6	42.8	40.4	39.1	38.7	52.2	68.6	63.2	54.9	48.1	42.6	41.1	40.0	54.6	68.9	67.6	56.5	46.3	43.0	41.4	40.4		
15	49.4	71.8	62.1	50.0	43.5	41.1	39.3	38.4	51.2	71.6	62.7	52.3	45.1	42.2	40.9	40.1	53.7	74.5	63.9	56.1	47.0	43.1	40.2	38.8		
16	46.9	65.0	58.9	47.7	41.8	38.6	37.1	36.4	50.3	69.8	62.4	51.1	45.1	43.0	42.0	41.3	54.5	74.6	69.0	53.8	45.4	42.0	40.3	39.7		
17	52.5	75.2	65.2	53.5	44.8	42.3	40.0	38.6	54.8	72.2	68.1	56.0	46.6	44.3	43.0	42.1	55.8	72.8	69.3	57.4	46.9	42.6	41.2	40.3		
18	45.9	67.4	55.7	46.2	42.8	40.9	39.2	38.5	49.8	72.7	61.4	50.8	44.8	42.9	41.7	40.7	51.1	71.9	62.6	51.2	43.7	41.3	40.1	39.0		
19	48.2	64.6	59.4	50.2	44.7	42.5	41.1	39.8	52.0	70.5	65.0	53.4	44.5	42.1	40.4	38.1	52.3	68.3	65.1	53.9	43.9	41.4	40.3	39.9		
20	50.0	69.1	63.5	49.3	44.6	42.2	40.9	40.1	53.5	73.2	67.5	52.7	44.6	41.7	39.6	38.6	49.0	70.0	57.5	50.8	43.1	39.4	38.1	37.3		
21	47.0	63.2	56.8	48.9	43.5	41.4	39.9	39.2	49.7	71.7	60.4	48.5	44.9	42.9	41.5	40.5	51.3	73.7	63.9	49.4	41.0	38.5	37.2	36.5		
22	43.4	55.2	50.8	45.0	42.3	40.7	39.8	39.1	45.0	62.8	54.7	45.7	42.5	39.9	38.5	37.7	40.7	58.0	49.1	42.7	38.7	36.7	35.3	35.2		
23	43.1	58.1	54.2	44.6	41.0	38.6	37.0	36.0	43.6	61.8	58.1	42.9	38.2	34.8	32.5	31.7	40.7	57.7	49.5	41.7	39.4	37.8	36.3	35.7		
0	40.3	54.1	48.0	42.6	38.7	36.6	36.0	35.2	36.6	44.9	41.0	38.7	36.0	34.0	32.6	31.5	39.3	48.2	43.9	40.8	39.1	36.7	34.9	34.4		
1	39.8	46.9	44.8	41.6	39.1	37.7	37.0	36.4	37.0	50.5	44.5	39.1	35.6	33.5	32.3	31.4	38.5	47.0	42.8	40.4	38.0	36.2	35.1	34.0		
2	41.2	49.8	46.3	43.7	40.3	38.2	37.1	36.3	37.9	51.2	48.3	40.6	35.3	33.5	32.3	31.6	38.7	56.9	44.1	40.8	37.8	35.6	34.5	34.1		
3	39.2	53.1	47.3	41.6	37.5	35.0	34.0	33.2	41.3	48.9	46.7	44.5	39.9	36.0	35.0	33.9	39.6	54.0	45.5	41.8	38.7	36.6	35.2	34.1		
4	41.6	56.8	49.4	43.8	40.0	36.0	34.5	33.8	40.5	49.0	45.7	42.7	40.3	36.7	35.3	34.1	42.2	62.7	48.3	43.3	40.7	38.1	36.4	35.2		
5	44.7	56.8	50.1	46.6	44.1	41.5	40.2	39.4	43.4	64.1	49.2	44.7	42.5	40.6	39.5	38.5	44.9	65.6	49.4	46.3	44.0	41.9	40.2	39.0		
6	48.9	66.3	60.0	49.7	46.6	44.4	43.0	41.7	49.8	73.8	61.1	48.2	44.9	43.4	42.2	41.1	48.8	63.2	55.0	50.6	47.8	45.9	44.3	42.7		
7	50.6	68.7	59.0	51.7	48.3	46.2	44.5	43.7	49.9	69.6	62.0	49.8	45.0	43.0	41.8	41.0	55.2	73.4	66.3	56.6	49.3	47.1	45.6	44.5		
8	49.8	70.6	61.3	51.0	45.3	42.2	40.3	40.0	49.1	66.8	61.3	51.5	44.0	41.5	40.2	39.8	55.6	76.1	65.4	57.6	52.9	50.1	48.5	47.5		
9	49.4	69.7	63.3	48.9	43.1	39.9	38.3	37.5	49.2	68.6	61.2	49.5	44.1	41.4	39.3	36.8	62.3	84.9	73.8	64.7	57.1	51.6	42.1	38.4		
10	52.3	71.5	64.3	54.5	47.6	41.0	37.8	36.5	49.1	71.1	58.8	50.5	42.8	38.7	37.0	35.6	59.0	79.7	69.6	61.7	54.4	45.6	40.7	38.7		
11	50.3	70.9	62.3	51.7	44.6	41.0	39.1	37.8	55.9	74.9	69.8	57.4	43.9	39.9	37.6	36.0	55.0	73.1	66.2	58.6	46.2	40.6	39.1	37.8		
12	50.0	69.0	59.9	52.1	45.5	41.3	39.3	38.4	48.9	66.7	60.6	50.7	44.3	41.4	40.1	39.1	56.6	70.2	65.2	60.8	52.5	46.3	42.8	41.5		
13																										
14																										
Avg.	48.2	64.2	56.7	48.1	43.2	40.4	38.9	38.0	50.3	65.3	58.3	48.9	42.9	40.1	38.6	37.5	54.0	67.5	59.0	51.2	45.0	41.7	39.6	38.5		
CNEL	52.1								53.6								55.4									

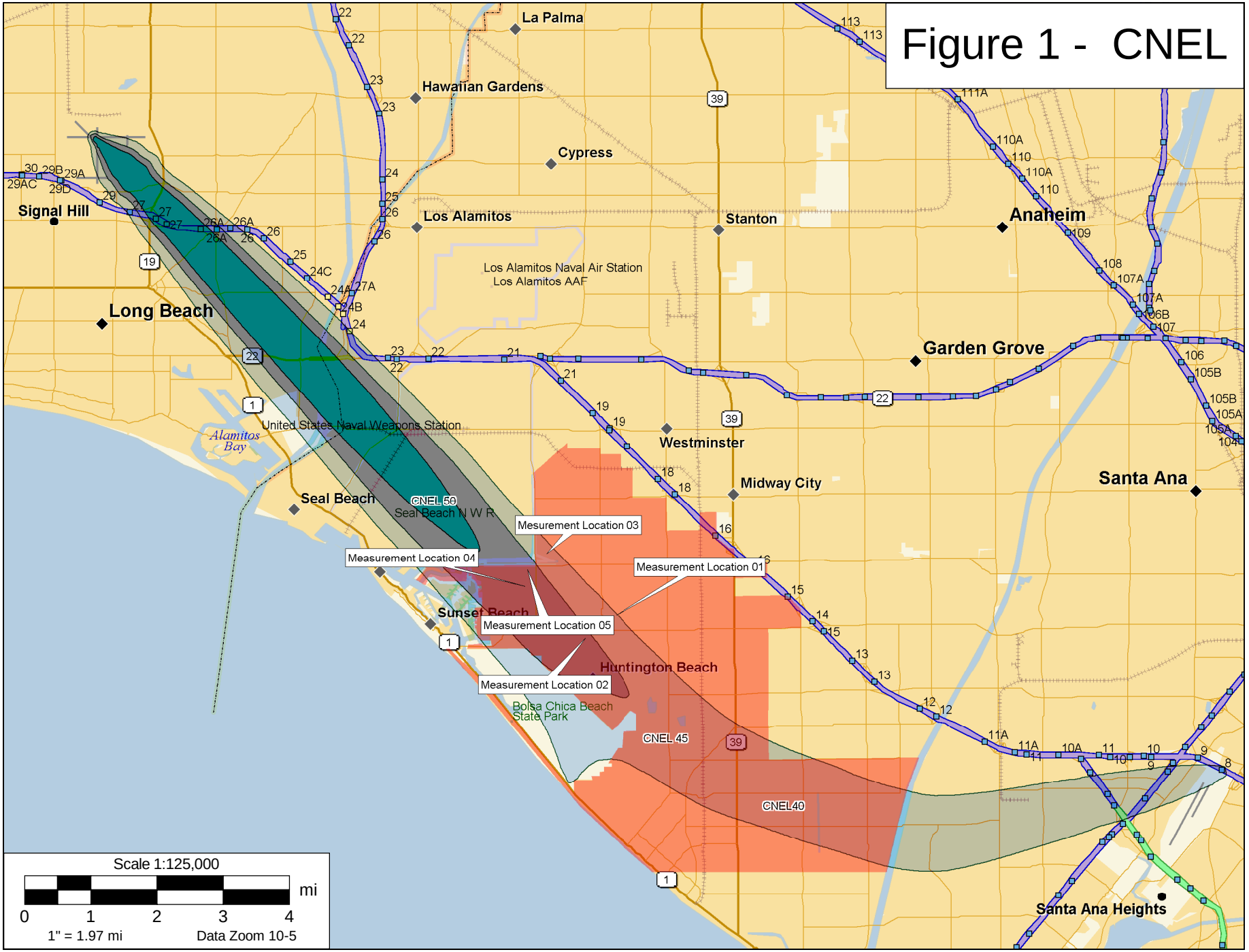
Table A5 Aircraft Noise Event Levels at Long Term Sites

3/5/07							Site 1			Site 2			Site 3			Site 4		
Time	A/C	Alt	Location	Heading	Track	Airports	Leq	SEL	Lmax	Leq	SEL	Lmax	Leq	SEL	Lmax	Leq	SEL	Lmax
1354	B350	2100	War/Spr	NW	2	SNA-LGB	55.0	66.8	59.0	52.0	63.1	54.6	57.1	68.7	61.7	52.6	63.2	55.5
1441	A320	2000	Bol/Edin	NW	2	JFK-LGB	57.4	70.5	62.2	61.6	75.3	67.6	61.9	75.8	68.6	62.6	76.6	69.7
1454	CRJ9	2600	Bol/War	W&NW	3	PHX-LGB	54.6	71.9	59.7	51.9	62.3	54.7	54.5	67.5	58.6	56.9	71.5	62.0
1545	A320	2700	War/Spr	W&NW	3	SLC-LGB	57.5	72.3	62.8	61.4	76.1	68.5	61.9	77.3	67.3	61.6	77.9	67.9
1556	A320	2100	War/Spr	W&NW	3	LAS-LGB	63.3	79.4	73.7	62.5	77.9	69.4	63.0	78.3	68.1	61.9	77.7	67.6
1649	CRJ2	1500	Bol/Edin	W&NW	3	SLC-LGB	50.7	62.0	52.5	55.7	70.5	61.5				56.1	69.0	59.2
1657	A320	1900	Edin/Spr	WNW	1	IAD-LGB	53.7	67.0	56.7	51.5	58.5	53.0	53.3	59.3	57.8	56.6	70.6	61.7
1659	A320	1600	Bol/Edin	N&NW	4	OAK-LGB	55.1	70.6	58.9	59.1	76.1	66.1	59.6	74.9	64.4	59.1	76.1	65.0
1700	C56X	1600	Bol/Edin	N&NW	4	SMX-LGB	50.5	66.1	53.7	58.1	73.7	66.5	57.2	70.9	62.7	58.7	73.1	64.0
1730	B763	2500	War/Spr	W&NW	3	SDF-LGB	56.6	72.2	61.1	57.2	75.4	65.0	61.1	76.2	65.7	59.8	75.5	64.7
1731	B763	1600	War/Spr	W&NW	3	ONT-LGB	59.0	75.4	63.6	59.9	79.6	69.1	62.5	78.4	68.4	61.7	78.6	67.3
1740	A310	2400	War/Spr	W&NW	3	ABQ-LGB	58.7	74.8	63.0	55.4	79.2	68.3	63.6	80.6	71.3	63.5	80.4	69.8
1748	CRJ9	2600	War/Spr	W&NW	3	PHX-LGB	53.7	68.1	56.5	63.2	78.6	79.2	68.6	86.1	79.0	58.2	73.3	63.0
1756	GLF3	2700	War/Spr	W&NW	3	LAS-LGB	58.8	73.7	64.7	57.3	72.6	65.6	62.3	77.2	68.1	60.8	76.0	65.8
1816	C560	2600	War/Spr	W&NW	3	SDL-LGB	53.6	65.2	59.5	51.6	64.6	54.5	52.1	65.6	54.6	52.1	64.3	55.2
1845	A320	2100	Bol/Edin	NNE&NW	5	OAK-LGB	52.7	64.9	55.9	62.7	77.2	70.0	59.2	78.8	70.5	61.5	76.2	67.4
1918	MD83	2400	Bol/Edin	N&NW	4	SEA-LGB	53.1	68.1	55.4	57.7	73.7	62.7				58.7	75.4	64.6
1940	A320	2600	War/Spr	W&NW	3	ORD-LGB	54.4	69.3	60.0	56.3	71.2	61.8	53.3	79.8	62.8	57.4	73.2	62.4
2002	A320	2000	War/Spr	W&NW	3	SMF-LGB	70.9	86.7	83.3	63.6	79.0	70.8	53.8	78.0	63.5	60.9	76.8	67.6
2005	A320	1700	Bol/Edin	W&NW	3	JFK-LGB	61.7	77.6	71.5	63.0	78.1	70.1	54.5	86.9	69.9	62.6	78.4	68.3
2025	A320	2600	War/Spr	W&NW	3	LAS-LGB	52.8	68.3	58.2	54.7	68.8	58.9				55.2	70.1	58.8
2106	CRJ9	2500	War/Spr	W&NW	3	PHX-LGB	54.8	68.1	58.6	53.8	66.8	57.1	49.8	56.5	51.3	53.8	69.5	57.3
2147	CRJ2	1900	War/Spr	W&NW	3	SLC-LGB	54.3	68.3	57.7	58.5	72.5	64.0	51.9	79.6	61.1	58.3	72.3	62.0
3/6/07							Avg.	70.8	61.2		72.6	64.3		74.8	64.8		73.7	63.8
0645	BE20	1900	Bol/War	NNE&NW	5	VNY-LGB				53.5	75.6	61.9	53.4	76.9	62.0	55.4	72.3	61.2
0708	A320	2700	War/Spr	W&NW	2	??-LGB	61.9	78.6	68.5	62.1	80.9	71.5	55.6	80.4	67.6	62.1	79.9	68.7
0815	A320	1500	Bol/War	NNE&NW	5	SMF-LGB	50.9	59.6	55.5	52.1	65.7	56.3	58.3	74.5	63.4	57.8	73.1	61.4
0856	CRJ2	2300	Bol/Edin	W&NW	2	PHX-LGB	52.1	67.9	55.7	56.0	70.8	60.1	53.5	75.6	62.4	57.5	72.6	60.7
0917	A320	2500	War/Spr	W&NW	3	FLL-LGB	61.2	76.6	67.2	66.6	83.1	78.0	63.2	79.0	69.5	63.0	79.0	69.1
0939	LJ31	2800	War/Spr	W&NW	3	SDL-LGB	51.4	59.5	54.1	50.5	66.1	52.8	52.3	64.4	54.3	53.5	67.6	56.7
0949	A320	2600	War/Spr	W&NW	3	ORD-LGB	59.7	76.0	66.7	62.9	79.0	69.6	63.0	78.8	69.6	62.6	79.2	69.7
0959	A320	2800	War/Spr	W&NW	3	IAD-LGB	60.5	77.8	67.6	62.7	80.2	72.1	65.5	81.0	72.7	64.8	80.6	71.5
1009	H25B	1700	Bol/Edin	NE&NW	6	SFO-LGB	50.5	66.1	52.9	55.4	71.5	61.2	57.2	74.3	63.3	57.1	74.2	62.4
1019	A320	2700	War/Spr	W&NW	3	BOS-LGB	59.5	75.9	65.4	61.3	77.7	67.1	63.0	78.4	68.1	58.8	74.3	64.2
1027	MD83	2300	Bol/War	NE&NW	6	SEA-LGB	51.8	69.5	56.7	62.6	86.8	67.7	57.2	75.0	63.7	59.1	77.3	66.3
1038	RV10	1700	War/Spr	NW	2	HHR-LGB	54.8	69.6	57.3	57.5	74.7	64.6	57.9	73.6	61.7	58.3	75.0	65.2
1137	CRJ9	2800	War/Spr	NW	2	PHX-LGB	57.5	73.0	61.7	60.1	85.4	69.6	58.2	67.0	62.1	60.4	76.2	64.9
1158	A320	2400	War/Spr	W&NW	3	JFK-LGB	58.5	75.3	66.4	62.6	78.6	70.4	59.0	74.9	62.7	58.2	74.5	63.0
1201	CRJ2	2700	War/Spr	W&NW	3	SLC-LGB	50.6	63.1	52.2	53.8	67.7	58.4	52.4	57.8	55.3	56.4	70.8	60.8
1211	A320	1600	Bol/Edin	NE&NW	6	SMF-LGB	52.9	66.3	58.0	62.8	77.5	69.9	64.2	80.6	69.7	63.4	79.5	69.0
1242	C560	1800	War/Spr	W&NW	3	COD-LGB	54.1	78.2	61.3	53.7	66.6	56.9	59.8	86.0	79.3	54.0	68.2	57.0
							Avg.	70.8	60.5		75.8	65.2		75.2	65.1		75.0	64.2

Table A6 Aircraft Noise Event Levels at Site 5

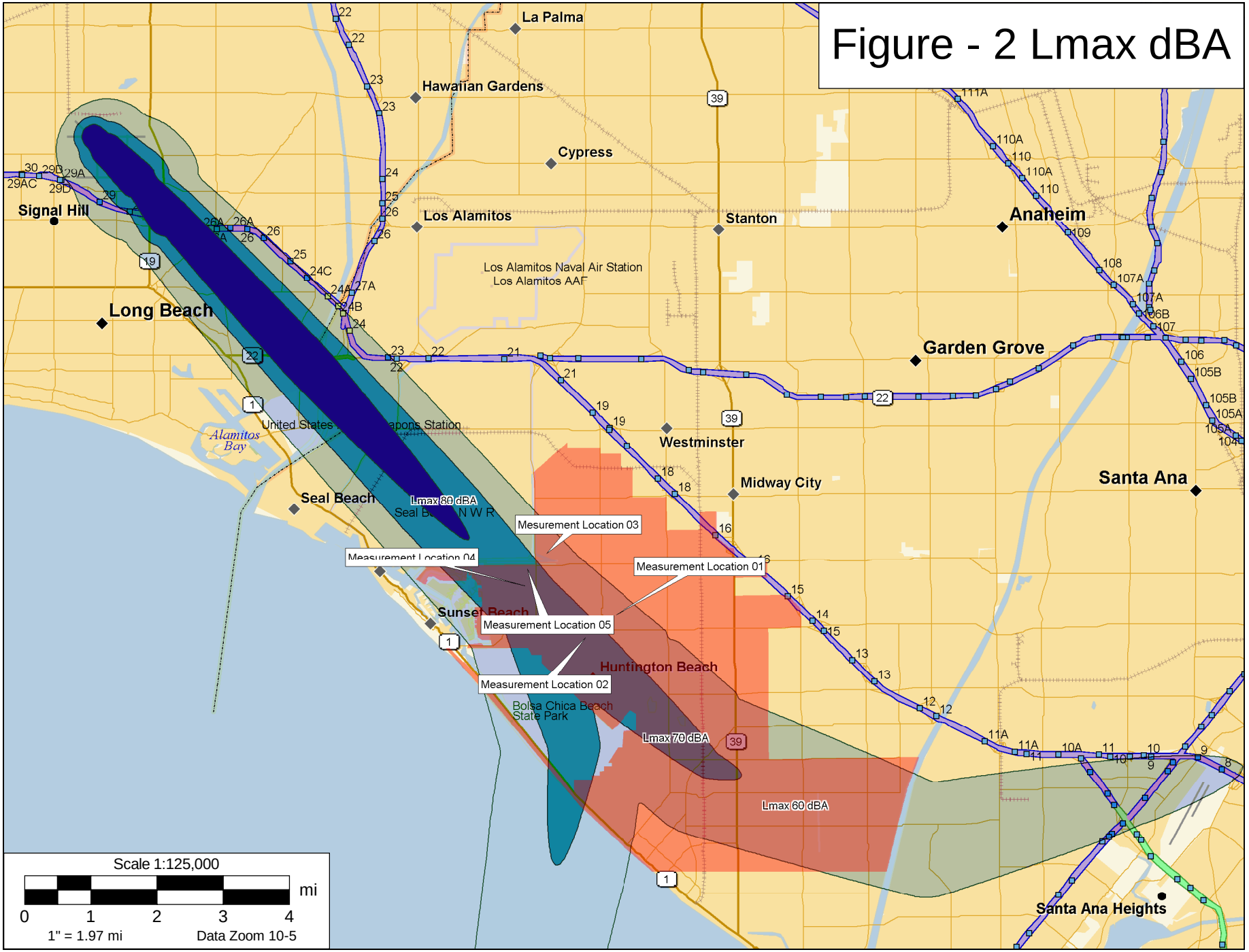
Time	A/C	Alt	Location	Heading	Airports	Leq	SEL	Lmax
0915	P46T	2400	Bol/Edin	NW	SDL-LGB	55.2	75.7	63.2
0920	A320	1600	Bol/Edin	W&NW	FLL-LGB	62.3	78.7	69.5
0939	B738	7000	Bol/Edin	NW	ONT-LGB	50.1	62.2	51.1
0947	A320	1600	Bol/Edin	W&NW	ORD-LGB	63.7	81.2	71.7
0954	PA44	1500	Bol/Edin	SW&NW	CNO-LGB	57.5	74.6	62.4
0959	A320	1600	Bol/Edin	W&NW	IAD-LGB	65.3	81.0	71.7
1001	PA24	1700	Bol/Edin	S&NW	VNY-LGB	55.4	71.6	59.9
1008	A343	7000	Bol/Edin	NNW	-LFPG	51.9	67.1	55.1
1039	F2TH	1600	Bol/Edin	W&NW	CMH-LGB	60.4	73.6	64.6
1042	C172	1800	Bol/Edin	NW	TOA-LGB	53.6	68.7	57.4
1132	A320	1600	Bol/Edin	NW	BOS-LGB	64.6	84.7	74.9
1134	PC12	1600	Bol/Edin	NW	LGB-LGB	62.8	80.1	70.4
1137	DA42	1700	Bol/Edin	N&NW	SNA-LGB	56.3	75.2	63.6
1141	MD83	1700	Bol/Edin	N&NW	SEA-LGB	66.9	84.6	73.4
1146	BE20	2600	Bol/Edin	NW	ABQ-LGB	57.3	75.3	63.3
1150	C25B	1600	Bol/Edin	NW	TOA-LGB	57.3	73.5	63.5
1152	C172	1600	Bol/Edin	N&NW	TOA-LGB	59.0	77.0	64.2
1157	A320	1600	Bol/Edin	N&NW	OAK-LGB	65.0	82.8	72.6
1159	PC12	1900	Bol/Edin	N&NW	LGB-LGB	61.7	77.9	69.2
1201	GLF3	2300	Bol/Edin	NW	CLT-LGB	61.8	81.3	69.3
1204	B734	1500	Bol/Edin	NW	CMH-LGB	52.6	70.0	56.5
1208	M20P	1800	Bol/Edin	NE&NW	CRG-LGB	55.8	74.1	61.8
1210	CRJ2	1600	Bol/Edin	NW	SLC-LGB	62.9	80.2	69.4
1213	A320	1600	Bol/Edin	N&NW	SMF-LGB	59.8	82.1	71.4
1222	PC12	1500	Bol/Edin	N&NW	LGB-LGB	59.2	77.0	66.1
1226	C172	1500	Bol/Edin	NW	HHR-LGB	56.8	75.7	62.8
1232	CL30	1600	Bol/Edin	N&NW	HOU-LGB	61.7	78.4	67.5
1243	C340	1600	Bol/Edin	NE&NW	SMO-LGB	56.5	75.3	64.5
1245	C172	1800	Bol/Edin	NW	MYF-LGB	56.0	78.0	68.8
1250	C750	1100	Bol/Edin	NE&NW	SMO-LGB	58.6	78.2	68.1
1257	BE76	2000	Bol/Edin	NW	TOA-LGB	55.1	73.3	60.7
1259	B752	7000	Bol/Edin	NNW	-LGB	52.9	64.3	55.7
						Avg.	76.0	65.1

Figure 1 - CNEL



TN
MN (12.9°E)

Figure - 2 Lmax dBA



TN
MN (12.9°E)