MARSHALL DAY Acoustics

KAPITI COAST AIRPORT IN-FIELD NOISE MONITORING

2012 Monitoring Results

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Project: **KAPITI COAST AIRPORT IN-FIELD NOISE MONITORING**

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1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged by Kapiti Coast Airport[1] Limited to monitor noise from aircraft operations at the Airport in accordance with the relevant rules set out in the Kapiti Coast District Plan.

Noise monitoring was carried out between January 19th and March 1st 2012 for the purpose of measuring the average L_{dn} noise level from aircraft activity at the Airport.

This report details the monitoring setup, monitoring results and assesses compliance with the relevant noise rules.

A glossary of terminology is given in Appendix A.

2.0 NOISE RULES

The rules that apply to noise emissions from aircraft activity and monitoring of aircraft noise at Paraparaumu Airport are contained in the Kapiti Coast District Plan and are copied below:

> *D9 - 11 Noise from Aircraft Operations*
>
> *"The Day/Night noise level (L_{dn}) from aircraft operations at Paraparaumu Airport shall not exceed 65 dBA at or outside the Air Noise Boundary as shown on the Paraparaumu Planning maps.*
>
> *…*
>
> *PAL shall undertake field monitoring of aircraft noise within 12 months of these rules becoming operative, then every 36 months until such time as there are three consecutive calendar years when the total aircraft movements at the Airport exceed 70,000 in each calendar year. At that time, monitoring shall be undertaken annually. On each occasion, monitoring shall take place for a sufficient duration to adequately demonstrate compliance with the L_{dn} noise limit which shall be a period not less than one month and shall be undertaken during the busier times of the year (expected to be during the summer months). The monitoring undertaken shall include, as part of that overall assessment, the noise from the operation of the glider tug. The monitoring shall occur at the 65 dBA L_{dn} contour only."*

Plan Change 73 introduced revised airport noise boundaries with which noise from aircraft operations shall comply. These revised District Plan noise contours are shown in Appendix B.

It is noted that the monitoring summarised in this report constitutes the initial monitoring within 12 months of the Plan Change becoming operative although it is 12 months later than intended.

The monitoring was intended to take place in January and February 2011. However due to the unavailability of equipment, followed by the runway resealing works in March and April 2011, it was agreed with KCDC that the monitoring be postponed to January 2012. This

[1] Formally Paraparaumu Airport

arrangement is detailed more thoroughly in an MDA letter 'Lt002 2008442A LJS 110316 KCDC' dated 16 March 2011.

3.0 NOISE MONITORING METHODOLOGY

A noise monitor was deployed on 19 January until 2 March 2012. Data was not recorded for 3 days from 7-9 February due to issues with the mobile phone network. A total of 39 whole days of data were recorded.

The noise monitor location is shown in Appendix C. In relation to the District Plan Noise Boundaries the monitor location is on the Air Noise Boundary where a noise limit or 65 dB L_{dn} applies.

The monitor location was selected by MDA using the following criteria:

- Proximity to Air Noise Boundary (i.e. near the 65 dBA L_{dn} contour)
- Background noise environment must generally not be affected by sources other than aircraft (i.e. not next to busy road)
- Safety for airborne aircraft (as advised by the airport manager).

The noise monitor consisted of a Norsonic 140 sound level meter with an outdoor microphone kit. The microphone was suspended 6 metres in the air via a metal mast in accordance with the requirements of International Standards ISO/FDIS 20906 *"Acoustics - Unattended monitoring of aircraft sound in the vicinity of airports"*.

The sound level meter recorded the noise level every second during the monitoring period. Noise events meeting certain level and duration criteria that are typical of aircraft events were identified during post processing of the data and the L_{dn} noise level calculated from these aircraft events.

The day-night noise level (L_{dn}) is expressed in decibels and represents the 24hour average noise level that includes a weighting for noise at night-time (between 10pm and 7am) to account for increased annoyance due to noise during the night hours.

The decibel scale is used to quantify sound levels relative to a 0db reference which represents the threshold of hearing. Appendix D shows a typical range of human hearing relative to the decibel scale where 0 dB is the threshold of hearing and 140 dB is the threshold of pain.

Generally a change in noise level of 3 decibels is just perceptible whilst a 10 decibel change is perceived as a doubling in the noise level.

L_{dn} is calculated by identifying aircraft events for each hour of the day and calculating an overall average L_{Aeq} value for these events. This ensures that non aircraft noise is not included in the calculation. A 10 decibel adjustment is then added to each hour between 10pm and 7am and the average level over the whole day is the L_{dn}. Appendix E shows a diagram demonstrating this.

4.0 NOISE MONITOR RESULTS

The results from each day of monitoring are shown in Appendix F. Table 1 below summarises the measurement results and actual aircraft movements.

There were a total of 3,495 noise events recorded for the 39 days of data analysed.

The average daily noise level was 57 dB L_{dn} and the average number of events per day was 90. The maximum daily noise level was 60 dB L_{dn} recorded on the 27 of February 2012. The minimum daily noise level was 52 dB L_{dn} recorded on the 28 of January 2012.

Table 1: Measured L_{dn} Noise Levels & Number of Measured Noise Events and Aircraft Movements

	Daily L_{dn}	Number of Measured Noise Events (39 days)	Number of A/C Movements (38 days)*
Total	-	3495	3042
Average	57	90	80
Maximum	60	182	196
Minimum	52	35	6

*Excludes data from 7 - 9 February when the noise monitor wasn't operating

The aircraft movement records show that there were slightly fewer movements than identified noise events. This is most likely due to extraneous (non-aircraft) noise sources triggering the meter. Based on close review of the data, MDA is confident that the noise monitoring has captured the majority of aircraft movements during the monitoring period and is representative of aircraft noise at the Airport.

The District Plan noise rules require that noise monitoring captures operations of the glider tug plane. According to the aircraft movement records, the glider tug performed 284 movements throughout the measurement period therefore it is considered that this aircraft has been adequately represented in the overall assessment.

During the monitoring period there were 3042 movements over 38 days. If this levels of activity was continuous throughout the year the total annual movements would be 29,000. The measured noise level is 57 dB which is 8 dB below the limit.

Generally when the number of aircraft movements is doubled there will be a corresponding increase in noise level by approximately 3 decibels. Therefore in theory the Airports noise boundaries could accommodate more than four times the current number of movements before reaching the 65 dBA L_{dn} limit. This would depend on fleet mix and ratio of day versus night movements.

The paragraph above does not aim to prove that Kapiti Coast airport will comply with the noise limits at all times in the future, but merely to shown that the measured noise levels are within the ballpark of what would be expected for the current movement numbers.

5.0 CONCLUSION

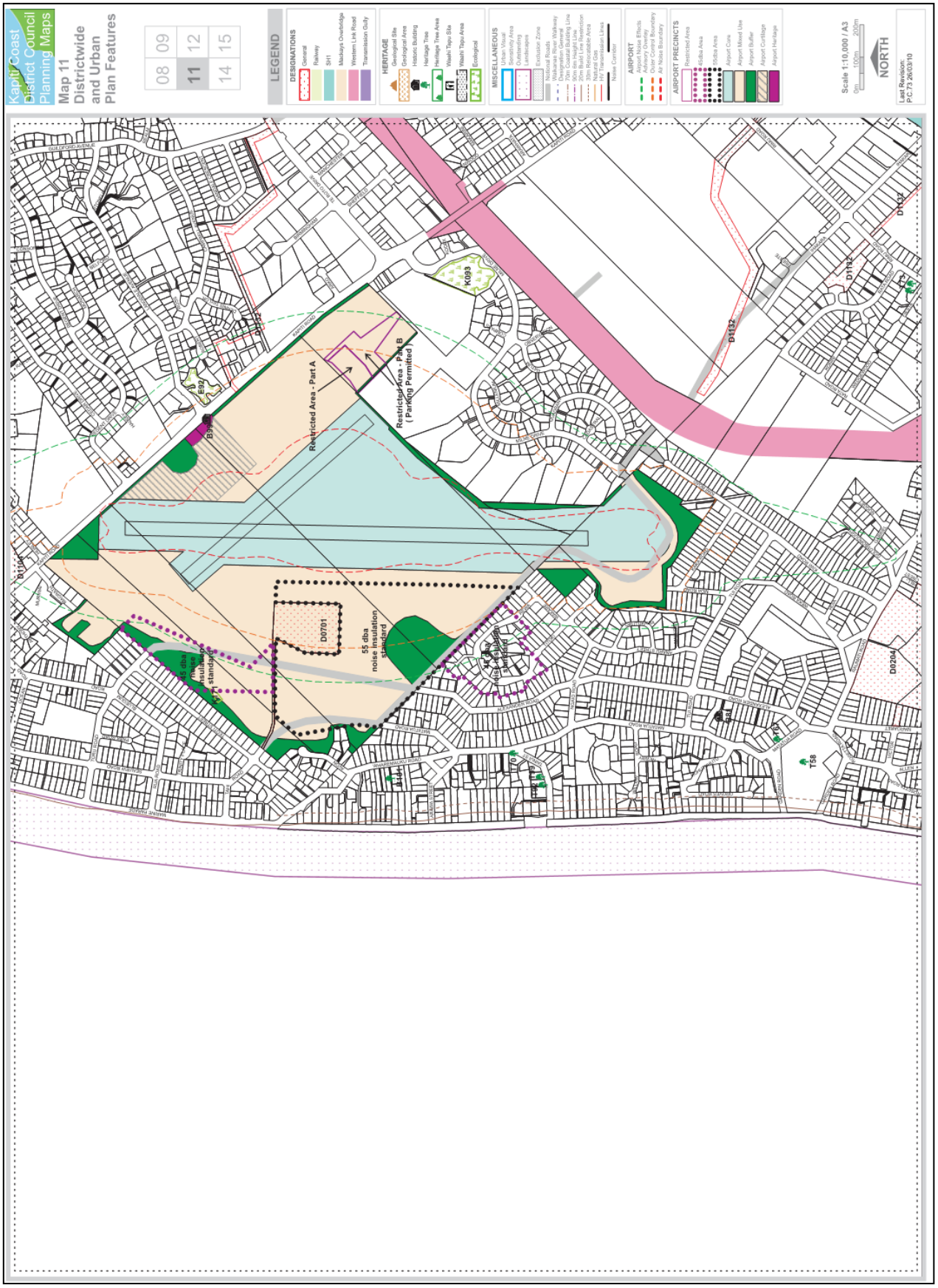
Marshall Day Acoustics has monitored noise from aircraft operations at Kapiti Coast Airport to determine compliance with the relevant rules set out in the District Plan.

The monitor was located on the air noise boundary where noise from aircraft operations must comply with 65 dB L_{dn}. The average level for 39 measured days was 57 dB L_{dn} which comfortably complies with the limit. Noise from the glider tug was included in the overall assessment.

APPENDIX A GLOSSARY OF TERMINOLOGY

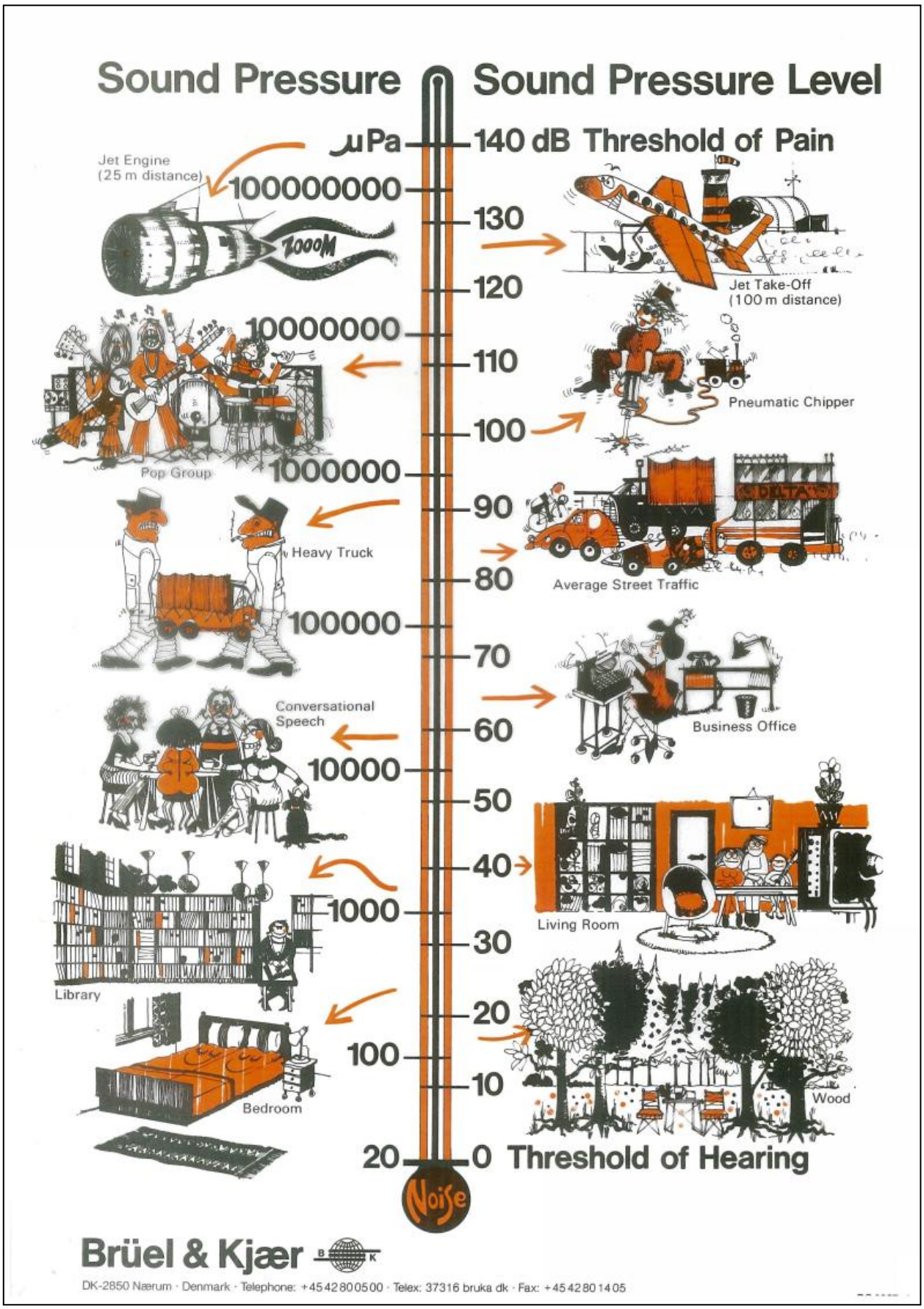
Noise	A sound that is unwanted by, or distracting to, the receiver.
Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
L_{dn}	The day night noise level which is calculated from the 24 hour L_{Aeq} with a 10 dB penalty applied to the night-time (2200-0700 hours) L_{Aeq}.
L_{den}	The day evening night noise level which is calculated from the 24 hour L_{Aeq} with a 5 decibel penalty applied to the evening (1800-2200 hours) L_{Aeq} and a 10 decibel penalty applied to the night-time (2200-0700 hours) L_{Aeq}.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 *"Acoustics – Measurement of environmental sound"*
NZS 6802:2008	New Zealand Standard NZS 6802:2008 *"Acoustics – Environmental Noise"*
NZS 6805:1992	New Zealand Standard NZS 6805:1992 *"Airport Noise Management and Land Use Planning"*

APPENDIX B DISTRICT PLAN CONTOUR MAP

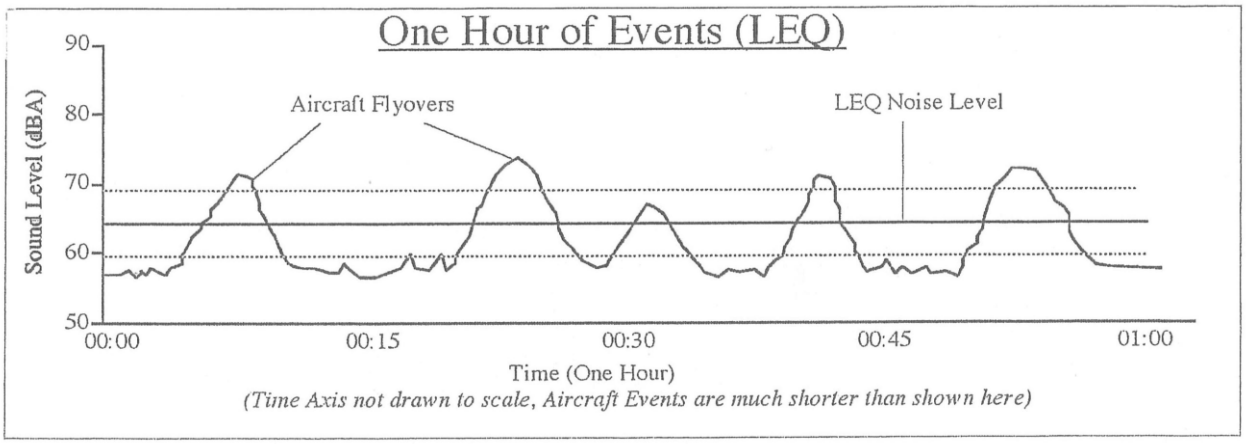


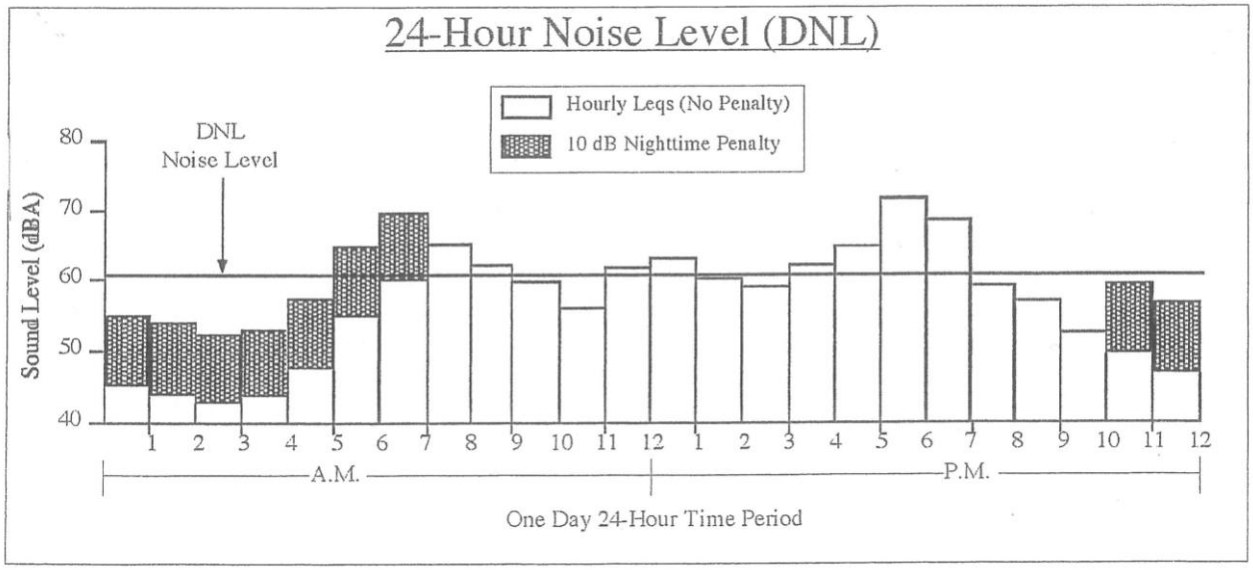
APPENDIX C NOISE MONITOR LOCATION

APPENDIX D NOISE THERMOMETER



APPENDIX E CALCULATION OF L_{DN}





APPENDIX F NOISE MEASUREMENT RESULTS

Date	Daily L_{dn}	Number of Measured Noise Events	Number of Aircraft Movements
Friday, 20 January 2012	56	79	62
Saturday, 21 January 2012	59	91	86
Sunday, 22 January 2012	54	56	26
Monday, 23 January 2012	56	49	52
Tuesday, 24 January 2012	56	110	118
Wednesday, 25 January 2012	58	182	136
Thursday, 26 January 2012	56	103	46
Friday, 27 January 2012	57	137	50
Saturday, 28 January 2012	52	86	108
Sunday, 29 January 2012	53	85	72
Monday, 30 January 2012	57	115	122
Tuesday, 31 January 2012	55	91	76
Wednesday, 1 February 2012	54	48	8
Thursday, 2 February 2012	57	73	56
Friday, 3 February 2012	58	96	90
Saturday, 4 February 2012	53	35	6
Sunday, 5 February 2012	55	98	72
Monday, 6 February 2012	58	82	78
Friday, 10 February 2012	57	53	38
Saturday, 11 February 2012	58	78	74
Sunday, 12 February 2012	57	96	154
Monday, 13 February 2012	57	108	110
Tuesday, 14 February 2012	54	72	36
Wednesday, 15 February 2012	55	107	64
Thursday, 16 February 2012	57	106	108
Friday, 17 February 2012	57	116	136
Saturday, 18 February 2012	53	51	92
Sunday, 19 February 2012	57	76	60
Monday, 20 February 2012	57	67	122
Tuesday, 21 February 2012	56	59	72
Wednesday, 22 February 2012	57	47	22
Thursday, 23 February 2012	57	154	12
Friday, 24 February 2012	57	75	48
Saturday, 25 February 2012	58	121	180
Sunday, 26 February 2012	58	129	196
Monday, 27 February 2012	60	79	84
Tuesday, 28 February 2012	56	91	86
Wednesday, 29 February 2012	58	105	84
Thursday, 1 March 2012	59	89	No data