MARSHALL DAY Acoustics

KAPITI COAST AIRPORT IN-FIELD NOISE MONITORING

2015 Monitoring Results

Rp001 2014518A

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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 Holdings Limited to monitor noise from aircraft operations at the Kapiti Coast Airport[1] in accordance with the relevant rules set out in the Kapiti Coast District Plan.

Noise monitoring was carried out between 10 February and 25 March 2015 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 Kapiti Coast 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."

The Air Noise Boundary from the District Plan is shown in Appendix B.

3.0 NOISE MONITORING METHODOLOGY

A noise monitor was deployed on 10 February until 25 March 2015. Full day data was not recorded on 10 February and 25 March therefore a total of 42 whole days were recorded.

The noise monitor location is shown in Appendix C. In relation to the District Plan Noise Boundaries the monitor location is about 4 dB outside the Air Noise Boundary. Therefore in order to assess the noise level at the ANB for compliance with the 65 dB L_{dn} limit we have added 4 dB to the measured levels.

[1] Formally Paraparaumu Airport

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)
- Likelihood that the aircraft noise exposure would be representative of what the community experiences
- 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 noise events. By aiming to include all aircraft related noise events there will inevitably be a number of non-aircraft events included in the analysis.

The day-night noise level (L_{dn}) is expressed in decibels and represents the 24 hour average level that includes a weighting for noise between 10pm and 7am to account for increased sensitivity to noise at night. Diagrams in Appendix E demonstrate how L_{dn} is calculated.

The decibel scale is used to quantify sound levels relative to a 0 dB 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.

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 the actual aircraft movement records provided by the Airport Company. Note that measured noise levels have been increased by 4 dB to represent the level at the ANB.

There were a total of 3,752 noise events recorded for the 42 days of data analysed.

The average daily noise level at the ANB was 60 dB L_{dn} and the average number of events per day was 89. The maximum daily noise level was 63 dB L_{dn} recorded on the 8 of March 2015. The minimum daily noise level was 58 dB L_{dn} recorded on the 22 of March 2015.

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

	Daily L_{dn}	Number of Measured Noise Events (42 days)	Number of Aircraft Movements (42 days)
Total	-	3752	2672
Average	60	89	63
Maximum	63	164	150
Minimum	58	48	10

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. Further analysis could be undertaken to remove non-aircraft noise sources from the results however this additional scrutiny is not warranted considering the measured noise readily complies with the limit.

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 176 movements throughout the measurement period which was 7% of all movements. Therefore it is considered that the glider tug has been adequately represented in the overall assessment.

During the monitoring period there were 2672 movements over 42 days. If this levels of activity was continuous throughout the year the total annual movements would be 23,220.

The measured noise level was 60 dB L_{dn} at the ANB which is 5 dB below the limit. In theory the Airport's noise boundaries could accommodate three times the current number of movements before reaching the limit depending on fleet mix and ratio of day versus night movements.

5.0 CONCLUSION

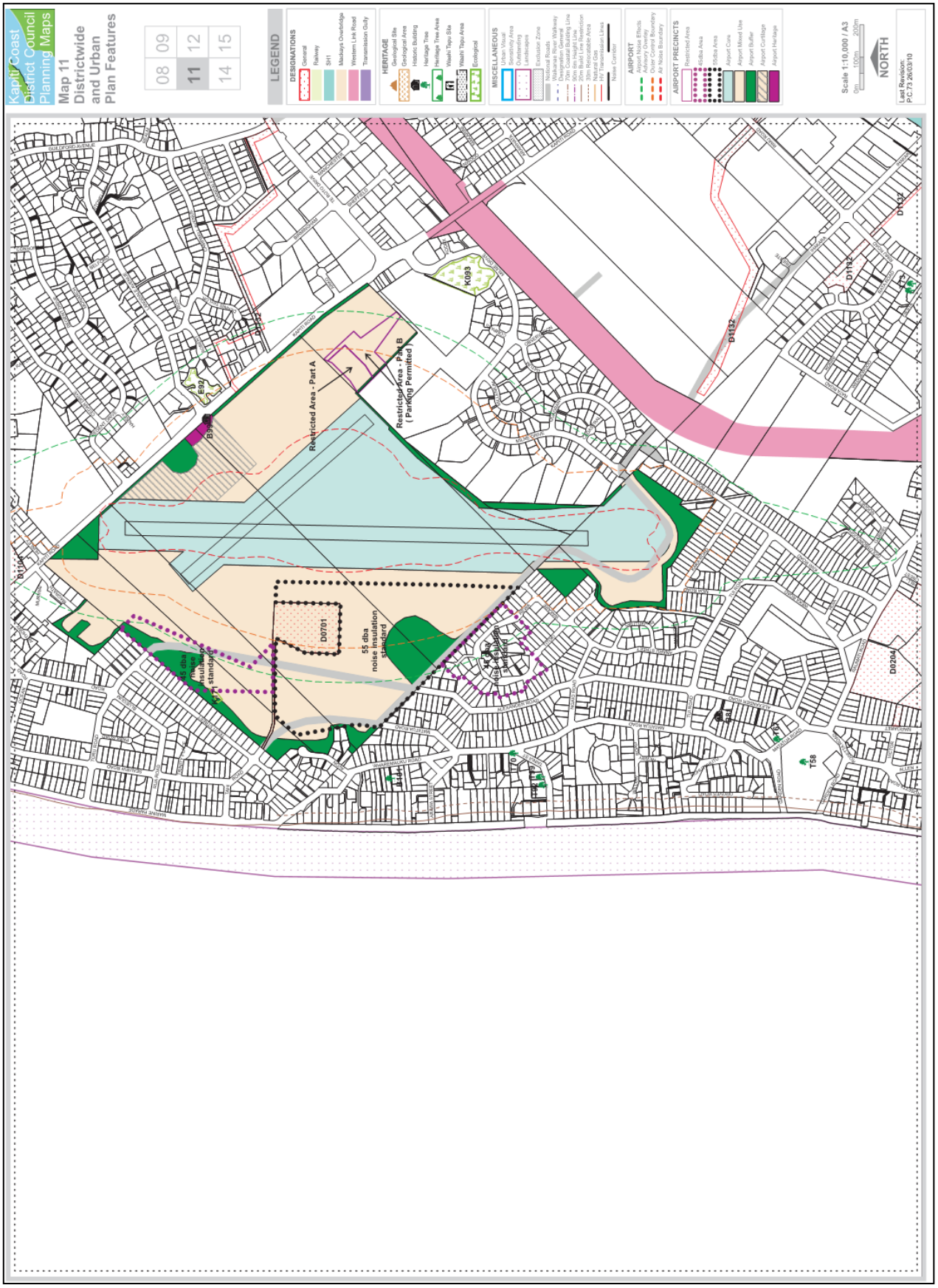
Marshall Day Acoustics has monitored noise from aircraft operations at Kapiti Coast Airport to determine compliance with the relevant rules set out in the District Plan.

The monitor was located approximately 4 dB outside the Air Noise Boundary therefore in order to assess noise at the ANB for compliance we have added 4 dB to the measured levels. The average measured level over 42 days was 60 dB L_{dn} which comfortably complies with the 65 dB L_{dn} limit. Noise from the glider tug was included in the overall assessment.

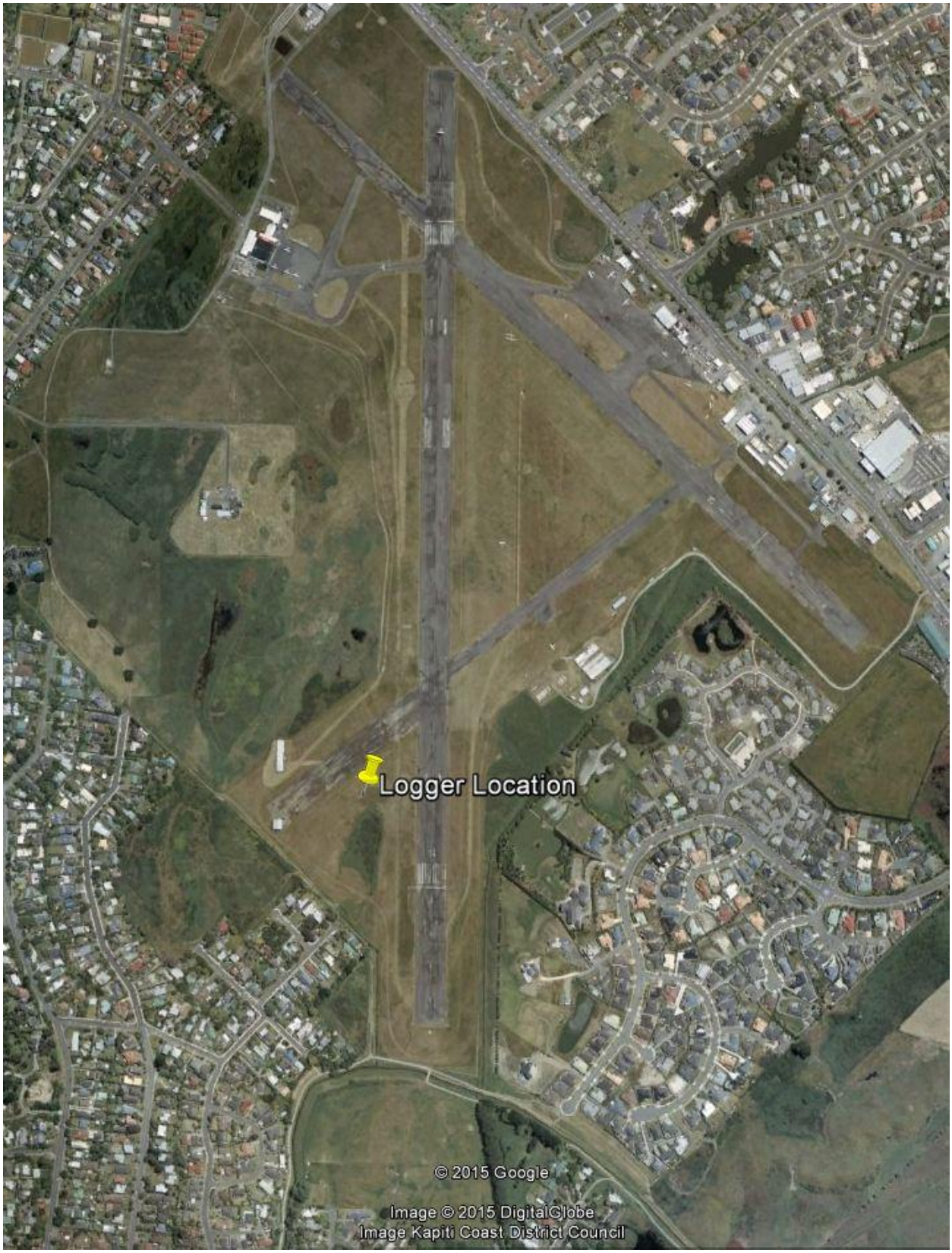
APPENDIX A GLOSSARY OF TERMINOLOGY

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}.
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"*
ISO/FDIS 20906	*"Acoustics - Unattended monitoring of aircraft sound in the vicinity of airports"*

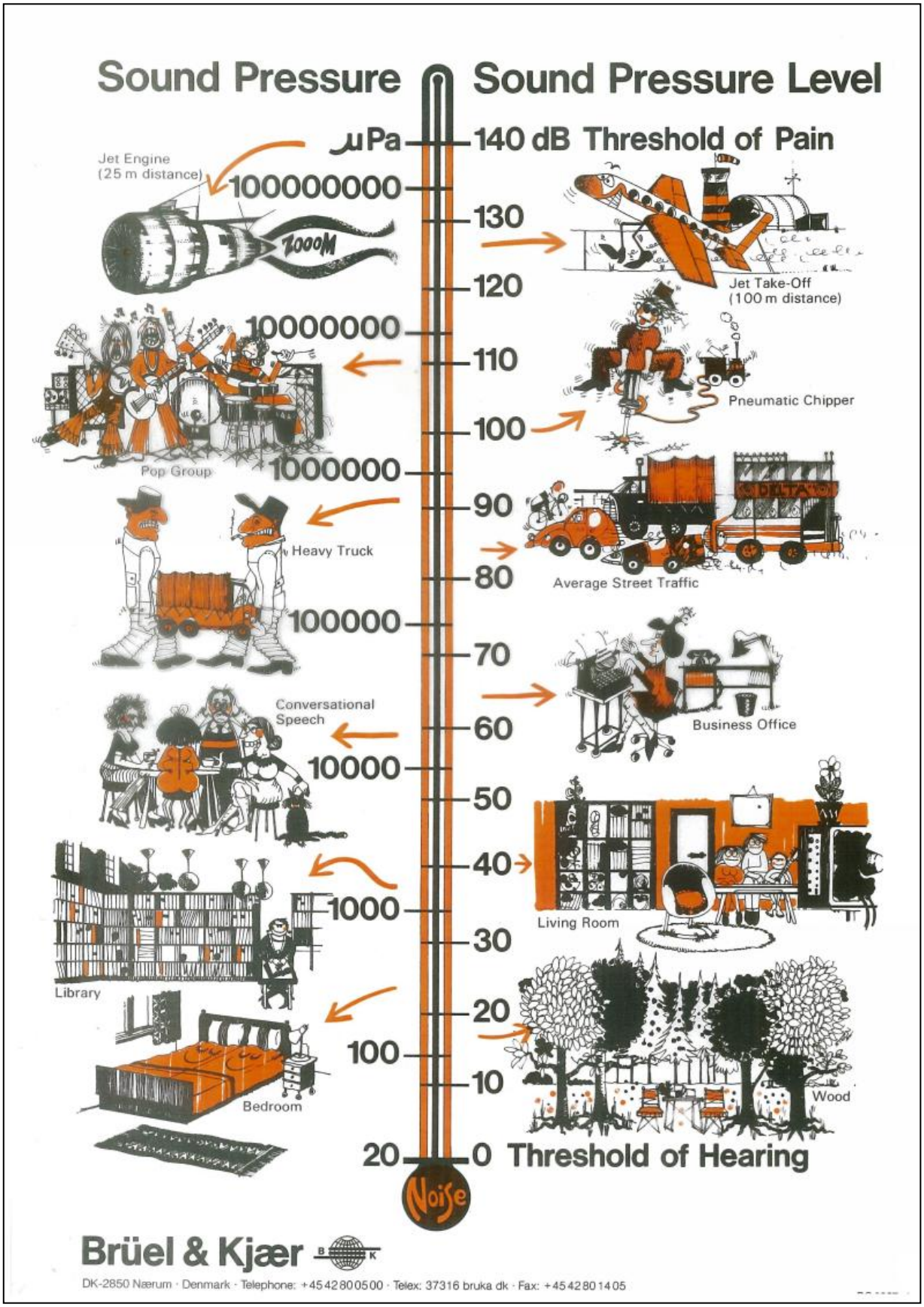
APPENDIX B DISTRICT PLAN CONTOUR MAP



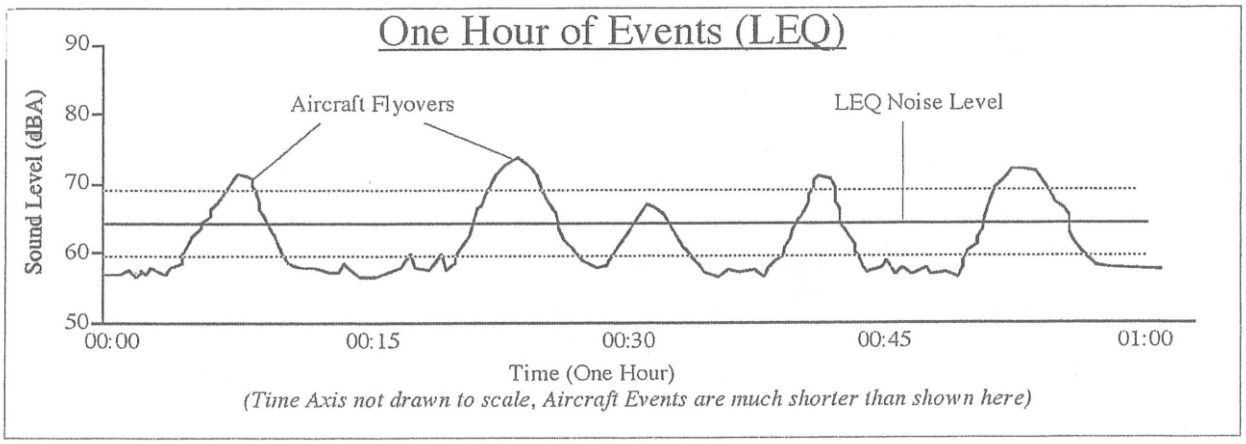
APPENDIX C NOISE MONITOR LOCATION

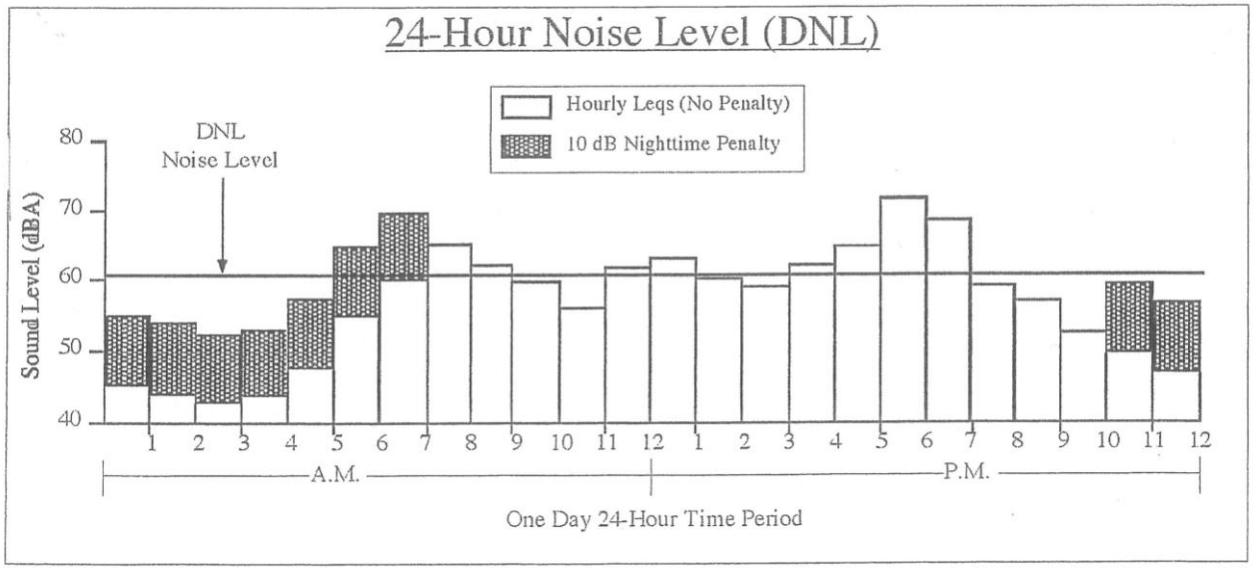


APPENDIX D NOISE THERMOMETER



APPENDIX E CALCULATION OF L_{DN}





APPENDIX F NOISE MEASUREMENT RESULTS

Date	Daily L_{dn}	Number of Measured Noise Events	Number of Aircraft Movements
Wednesday, 11 February 2015	60	84	96
Thursday, 12 February 2015	60	97	88
Friday, 13 February 2015	60	109	54
Saturday, 14 February 2015	60	164	14
Sunday, 15 February 2015	59	95	130
Monday, 16 February 2015	59	70	50
Tuesday, 17 February 2015	61	82	64
Wednesday, 18 February 2015	60	108	76
Thursday, 19 February 2015	60	90	56
Friday, 20 February 2015	62	78	70
Saturday, 21 February 2015	60	65	20
Sunday, 22 February 2015	60	70	66
Monday, 23 February 2015	59	92	84
Tuesday, 24 February 2015	62	59	38
Wednesday, 25 February 2015	59	69	36
Thursday, 26 February 2015	62	115	74
Friday, 27 February 2015	59	98	68
Saturday, 28 February 2015	60	115	150
Sunday, 1 March 2015	60	107	86
Monday, 2 March 2015	61	76	60
Tuesday, 3 March 2015	60	77	52
Wednesday, 4 March 2015	59	60	52
Thursday, 5 March 2015	59	64	56
Friday, 6 March 2015	61	106	18
Saturday, 7 March 2015	61	91	10
Sunday, 8 March 2015	63	137	104
Monday, 9 March 2015	60	91	72
Tuesday, 10 March 2015	62	86	64
Wednesday, 11 March 2015	59	128	64
Thursday, 12 March 2015	60	48	32
Friday, 13 March 2015	60	67	46
Saturday, 14 March 2015	58	60	48
Sunday, 15 March 2015	60	84	90
Monday, 16 March 2015	60	48	16
Tuesday, 17 March 2015	61	88	20
Wednesday, 18 March 2015	61	139	44
Thursday, 19 March 2015	60	100	84
Friday, 20 March 2015	62	91	74
Saturday, 21 March 2015	60	108	98
Sunday, 22 March 2015	58	67	78
Monday, 23 March 2015	60	71	38
Tuesday, 24 March 2015	60	98	86