MARSHALL DAY Acoustics

KAPITI COAST AIRPORT NOISE MONITORING 2018 COMPLIANCE MONITORING REPORT

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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 Kapiti Coast Airport[1] in accordance with the relevant rules set out in the Kapiti Coast District Plan.

Noise monitoring was carried out between 2 February and 26 March 2018 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 Proposed Kapiti Coast District Plan Appeals Version March 2018 and are copied below:

Table 12D.1.6 Aircraft Operations within the Airport Zone

1. *"The Day/Night noise level (L_{dn}) from aircraft operations at Kapiti Coast Airport shall not exceed 65 dBA at or outside the Air Noise Boundary as shown on the District Plan maps.*
2. *....*
3. *....*
4. *....*
5. *Kapiti Coast Airport Holdings Ltd must 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 consisting of a 01dB CUBE sound level meter with an outdoor microphone on a 6m high mast was deployed on 2 February until 26 March 2018. Full day data was not recorded on 2 February and 13 and 26 March therefore a total of 50 whole days were recorded. As explained further in Section 4, seven of these days were affected by strong winds and have been excluded from the final results.

The noise monitor location is shown in Appendix C. In relation to the District Plan Noise Boundaries the monitor location is about 1 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 1 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 01dB CUBE 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 by the sound level meter software 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 1 dB to represent the level at the ANB.

There was a total of 7190 noise events recorded for the 50 days of data analysed. Using all 50 days of data, the average daily noise level at the ANB was 63 dB L_{dn} and the average number of events per day was 144. The maximum daily noise level was 72 dB L_{dn} recorded on the 20 of February 2018. The minimum daily noise level was 53 dB L_{dn} recorded on the 17 of February 2018.

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

	Daily L_{dn}	Number of Measured Noise Events (50 days)	Number of Aircraft Movements (50 days)
Total	-	7190	3282
Average	63	144	68
Maximum	72	563	214
Minimum	53	16	4

The aircraft movement records show that there were about twice as many triggered noise events as there were aircraft movements. This is most likely due to extraneous (non-aircraft) noise sources triggering the meter particularly on windy days. Further scrutiny of the data showed there were several days where high noise levels were recorded (i.e. 63 dB L_{dn} or greater) but only a small number

of aircraft movements (i.e. less than 20). Cross checking with wind records for these dates confirmed that strong winds were present. Removing seven such days from the dataset results in an average measured level of 61 dB L_{dn} over 43 days.

Based on close review of the data, MDA is confident that the noise monitoring has sufficiently captured noise from aircraft movements during the monitoring period. Removing seven wind affected days from the data is appropriate to provide results that are more representative of aircraft noise.

The District Plan noise rules require that noise monitoring captures operations of the glider tug plane. We have been informed that the glider tug plane no longer operates regularly at Kapiti Coast Airport as the gliding club has relocated to another airfield.

During the monitoring period there were 3282 movements over 50 days. If this level of activity was maintained throughout the year the total annual movements would be 23,959.

The measured noise level was 61 dB L_{dn} at the ANB which is 4 dB below the limit. In theory the Airport's noise boundaries could accommodate two and a half times the current number of movements before reaching the limit depending on fleet mix and ratio of day versus night movements.

5.0 CONCLUSION

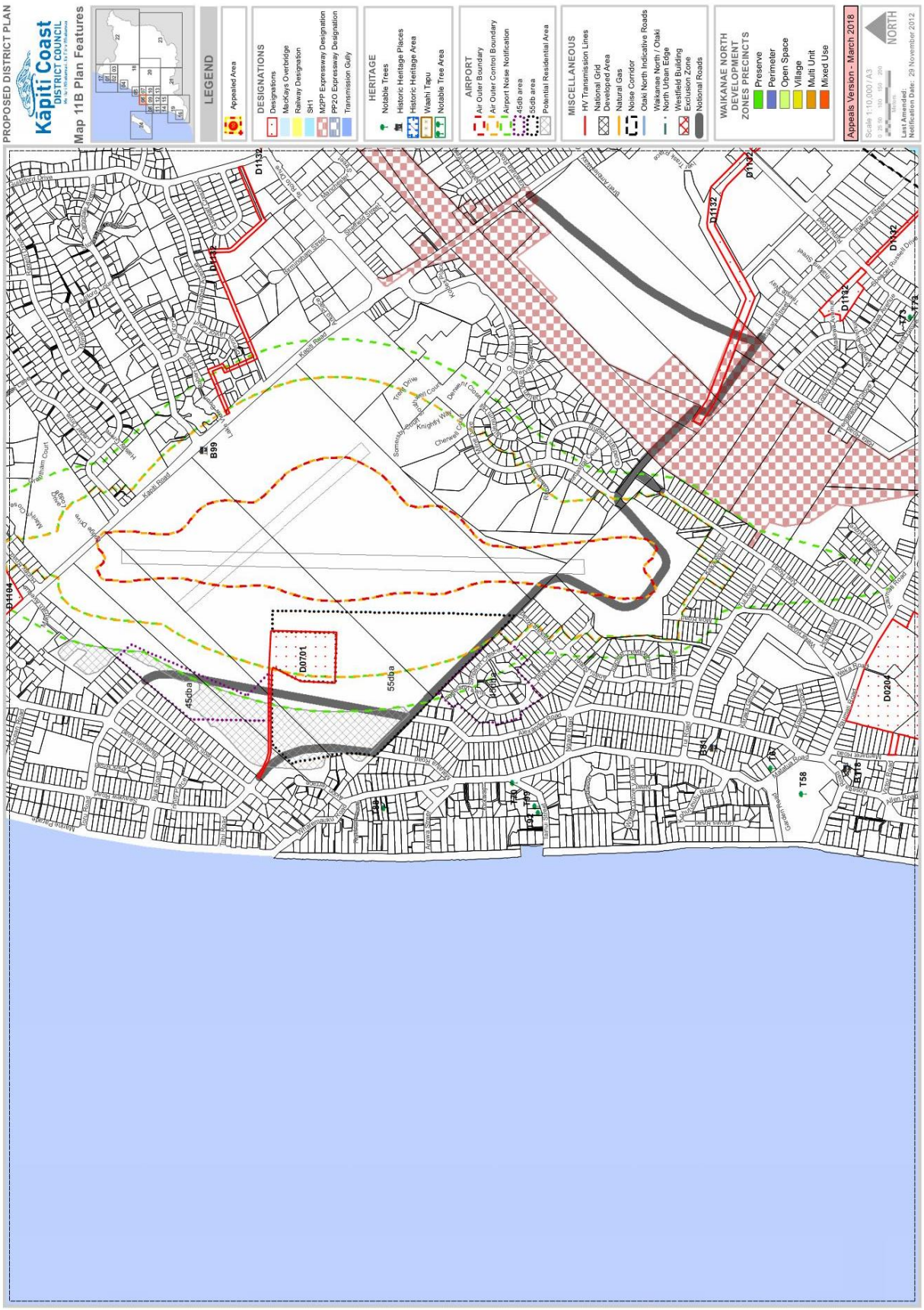
Marshall Day Acoustics has monitored noise from aircraft operations at Kapiti Coast Airport to determine compliance with the relevant rules set out in the District Plan.

The monitor was located approximately 1 dB outside the Air Noise Boundary therefore in order to assess noise at the ANB for compliance we have added 1 dB to the measured levels. The average measured level over 43 days (excluding 7 wind affected days) was 61 dB L_{dn} which comfortably complies with the 65 dB L_{dn} limit.

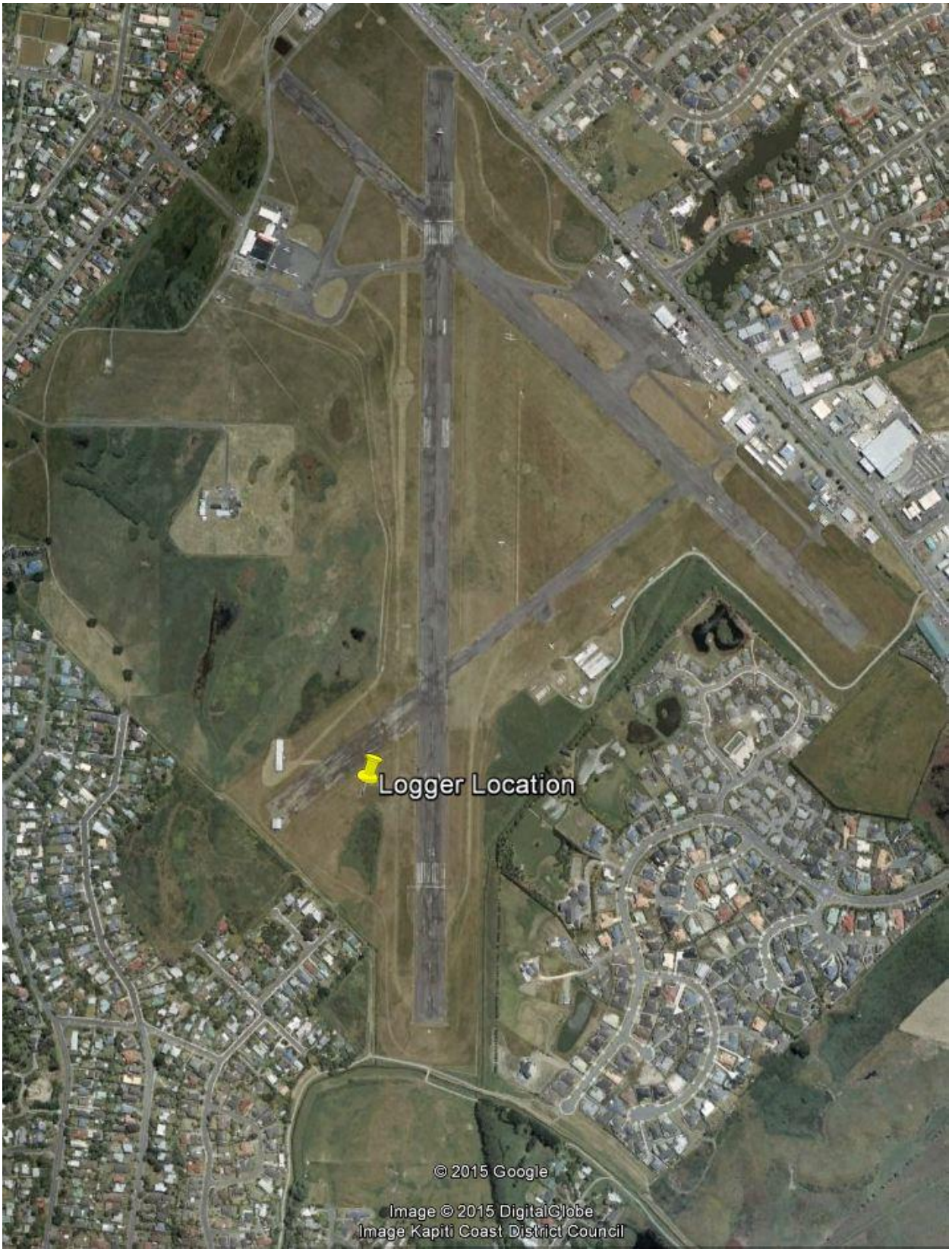
APPENDIX A GLOSSARY OF TERMINOLOGY

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"*

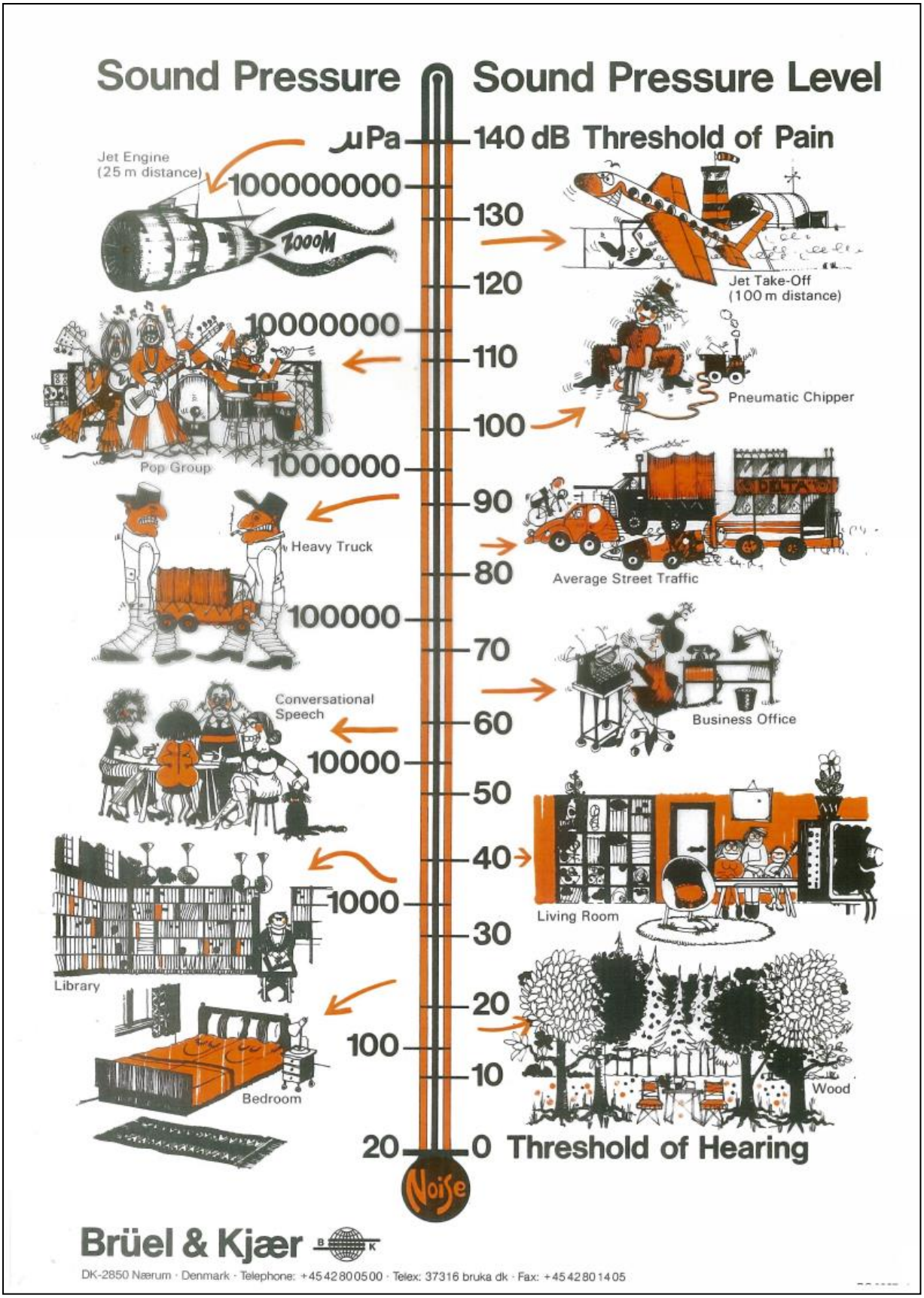
APPENDIX B DISTRICT PLAN CONTOUR MAP



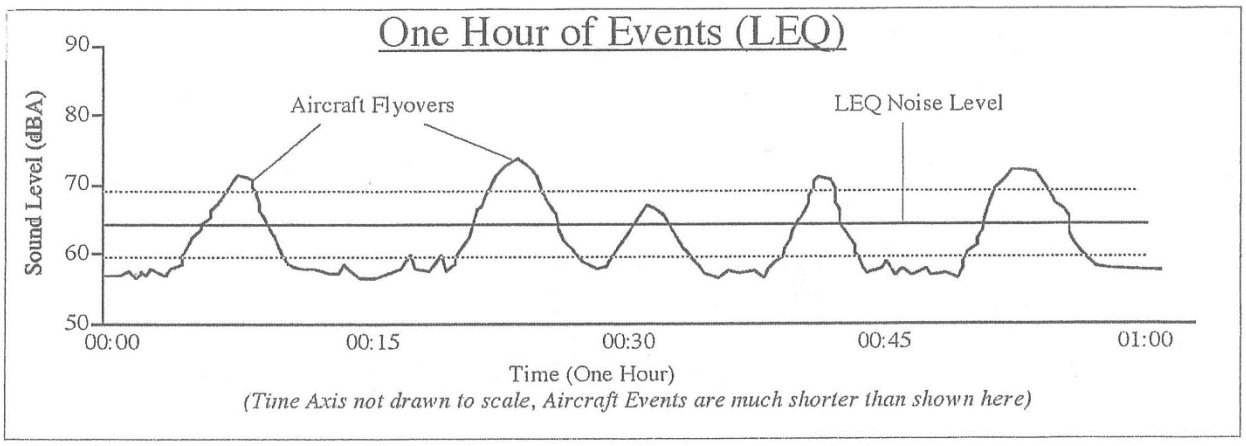
APPENDIX C NOISE MONITOR LOCATION

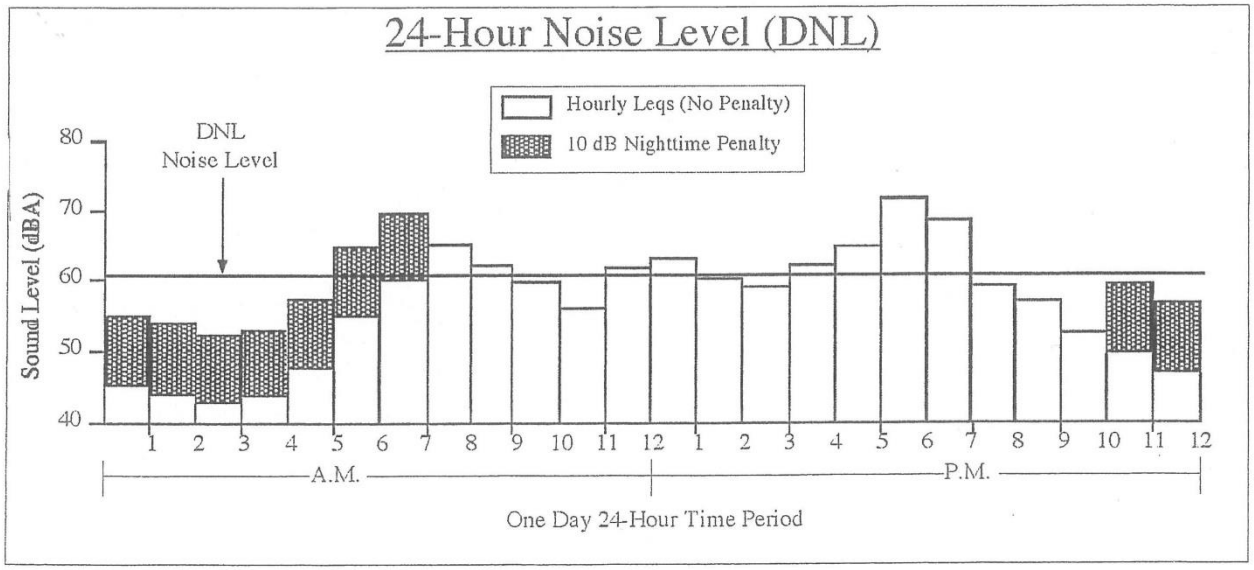


APPENDIX D NOISE THERMOMETER



APPENDIX E CALCULATION OF L_{DN}





APPENDIX F NOISE MEASUREMENT RESULTS

Date	Daily L_{dn}	Number of Measured Noise Events	Number of Aircraft Movements
3/02/2018	68	496	54
04/02/2018	61	96	140
05/02/2018	61	405	24
06/02/2018	66	340	56
07/02/2018	57	48	66
08/02/2018	61	28	54
09/02/2018	59	48	72
10/02/2018	57	60	94
11/02/2018	59	45	28
12/02/2018	53	64	12
13/02/2018	53	32	46
14/02/2018	55	53	70
15/02/2018	56	59	58
16/02/2018	57	62	30
17/02/2018	52	95	32
18/02/2018	60	54	98
19/02/2018	59	44	32
20/02/2018*	71	79	0
21/02/2018*	69	563	10
22/02/2018	60	103	20
23/02/2018	61	67	76
24/02/2018	61	150	208
25/02/2018*	61	470	20
26/02/2018*	61	379	16
27/02/2018	55	50	80
28/02/2018	62	41	62
01/03/2018	54	41	56
02/03/2018	57	56	98
03/03/2018	54	82	150
04/03/2018	61	103	148
05/03/2018	56	53	70
06/03/2018	58	71	68
07/03/2018*	64	451	6
08/03/2018*	65	451	4
09/03/2018	63	523	22
10/03/2018	60	80	118
11/03/2018	58	121	214
12/03/2018	57	80	76
13/03/2018	55	64	0

14/03/2018	60	167	116
15/03/2018	68	267	38
16/03/2018*	69	276	18
17/03/2018	59	64	72
18/03/2018	54	49	128
19/03/2018	61	53	88
20/03/2018	58	32	98
21/03/2018	56	16	24
22/03/2018	54	40	8
23/03/2018	55	32	58
24/03/2018	55	87	54
25/03/2018	68	496	146

* Wind affected day excluded from overall L_{dn}