

PEARU TERTS

BA, Grad. Dip. Env. Stud. (Hons.), MIE Aust., CPENG, MAAS
Consulting Engineer

33 Falcon Rd
Claremont 7011
Tasmania AUSTRALIA

**ARCHITECTURAL ACOUSTICS
NOISE CONTROL**

Phone 03 6249 7165
Fax 03 6249 1296
Email pterts@southcom.com.au

11/7/2017

S U M M A R Y

1. Mean impulse noise level at 31 m (nearest residence) = 73.9 dB(A) Imp. for 53 skateboard/concrete impact noise events. The log. ave = 76 dB(A) Imp.
2. Mean Lmax noise level for 58 skateboard noise events = 69.4 dB(A) at 31 m.
3. The daytime background noise level L90 = 35 dB(A) which reduces to about 30 dB(A) at night. The daytime ambient noise level is about Leq = 45 dB(A) which reduces to about 35 dB(A) at night.
4. Construction of a 'U' shaped noise barrier 2.4 m high is likely to reduce the skateboard impact noise at the nearest neighbour by a further 10 to 13 dB(A) depending on location of the skateboard..
5. Construction of a 4.2 m high noise barrier is likely to reduce the skateboard impact noise between 14 and 16 dB(A)
6. The impulse noise level at nearest house facade is +2.5 dB(A) higher because of the noise reflection off the facade.
7. The proposed site is at a long established sports ground.
8. The noise level from skateboard impacts is likely to be $76 - 14 = 62$ dB(A) Imp. This is close to the Victoria EPA, 7 day established shooting range noise of 60 dB(A) Imp..
9. Male speech at 1 m is about 60 dB(A).
10. It is suggested that provision be made for a noise barrier should the use of the park approach that of the intensity of use at North Hobart.

CLIENT: Mr. Ian Preece
Manager Environment and Sustainability
Clarence City Council
P.O. Box 96, Rosny Park
Tasmania 7018

Tel: 6217 9688

BRIEF: Assess likely noise impact of proposed skate park at South Arm, on nearby residents, based in part on measurements conducted at other skate parks.

INTRODUCTION:
Noise annoyance depends on the following factors:

- the existing noise level
- the new noise level
- whether the new noise has tonal components
- whether the new noise has impulsive components
- the number of impact noise events per unit time
- the time of the day the new noise occurs
- whether the new noise carries unwanted intelligence such as announcements, warnings or music
- annoyance is also dependent on the listener's perception of whether the noise is regretfully caused, imposed in ignorance or inflicted as an act of aggression.

Skateboard/concrete contact noise if loud has the potential to be annoying.

There are no specific noise criteria relating to skate parks. There are guidelines relating to shooting ranges.

In the opinion of the author, the sound of distant shooting range is somewhat similar to the impact noise coming from a nearby skate park.

The Victorian Environmental Protection Authority (EPA) has issued guidelines for shooting ranges which are based on the measurements of impulse noise expressed as dB(A) Imp. The Guidelines require the measurement of the logarithmic average of at least 40 shots or the log. average obtained over a 30 minute period.

For 7 days of shooting per week, the logarithmic average should not exceed 60 dB(A) Imp. during the day and 55 dB(A) Imp. during the evening.

The weather conditions were good for the noise measurements, that is, no rain and no strong winds.

INSTRUMENTS:

The instruments used on the day are given on page A 1.

RESULTS:

The main results are shown on page A 15 and A 16, which shows the results of the impulse and L_{max} noise measurements at 31 m from the North Hobart Skate Park. The distance of 31m was chosen as being a similar distance to the nearest houses at the proposed South Arm skate park.

Page A 2 to A 7 shows the aerial photographs and measuring site photographs

Page A 9 gives the results of statistical noise at the proposed skate park site (day and night) and at the Tolosa Street Park and North Hobart skate park.

In the table, L_n is the noise level exceeded for n % of the sampling time. For example, for the time period starting at 1242 h, L₁₀ = 46.1 dB(A).

This means that for 10 % of the time, or 1 minutes, the noise level was 46.1 dB(A) or more. L₉₀ is a good indicator of the base or background noise level and L₁₀ is a good

indicator of the average of the higher noise levels encountered. L10 is a metric often used in traffic noise studies.

Leq is the equivalent 'A' weighted noise level. A fluctuating noise having an Leq = 44.1dB(A) has the same acoustic energy as a steady noise of 44.1 dB(A).

Page A 12 shows the results of the spectral analysis of the noise at the above sites.

Page A 15 shows the main results of this noise study. The noise levels for the skateboard/concrete contact noise was recorded and the arithmetic mean, standard deviation, logarithmic average noise levels were determined.

The mean dB(A) Imp. noise level was 73.9 dB(A) Imp. and the logarithmic average (log ave.) for 53 skateboard contact noise events was determined as 76 dB(A) Imp. at 31 m with a standard deviation of 4.6 dB(A)

The mean Lmax noise level for 58 skateboard contact noise events was 69.4 dB(A) and the logarithmic average was 71.8 dB(A). The standard deviation was 4.7 dB(A).

DISCUSSION:

1. The noise climate at the proposed site was similar to the noise climate at the Tolosa skate park when comparing column 2 with column 12 on page A 9.

South Arm		Tolosa Park (42 m, 10-15 users)
53.5	L1	52.6
46.1	L10	45.7
34.9	L90	36.6
44.1	Leq	43.0

2. In the absence of designated skate park noise criteria, the use of the Victoria EPA shooting range guidelines based on measurements at North Hobart skate park, indicates that a noise barrier 5 m from the edge of the concrete and about 2.4 m high may be required. However, this assumes an intensity of use similar to the North Hobart skate park adjacent to the Elizabeth Matriculation College.

3. We calculated, as an indication, the effects of a noise barrier, erected 5 m from the edge of the concrete with the skateboarder 15 m from the barrier and the noise receiver on the other side, 26 m from the barrier.

Height (m)	Barrier attenuation (dB)
1.5	8.1
1.8	9.0
2.1	9.8
2.4	10.5
3.6	13.0
4.2	14.1
4.8	15.1

4. The barrier wall can be made out of material having a surface density of some 15 – 20 kg/m². A band of sound absorbing material can be placed on the top of the barrier (eg. MTT bus depot, Moonah).

5. Evening use of the skate park may bring about community complaints because of the low background noise level in the area as shown on page A 9, columns 10 and 11, under line L90. The background noise level L90 is about 30 dB(A) at night.

CONCLUSION:

The Victoria EPA Guidelines for shooting ranges, when applied to skate park impact noise at an existing sports facility, could permit day time use but a noise barrier is indicated for heavy use such as at the North Hobart skate park adjacent to the Matriculation College..

Pearu Terts

South Arm Skate Park proposal, 21 Harmony Lane, South Arm
Field report for site visits June 2017
Appendix A to be read in conjunction with main report

General

The locally initiated proposal under consideration is for a Skate Park to be installed in the Recreation Park at South Arm, at the eastern end among the pine trees near the tennis court. The site within the existing public recreation park is adjacent to residences, and near the primary school. Measurements of the ambient noise were conducted within the proposal site at day and evening times. Additional measurements were undertaken at existing skate parks around Hobart.

This report describes the findings of noise measurements and observations from the site visits 12:20-14:40 and 20:25-21:15, Thursday 15/6/2017, and visits to Tolosa Park 15:10-16:10, Sunday 18/6/2017 and North Hobart Cultural Park 14:15-15:15, Tuesday 20/6/2017.

Instruments used

- Brüel & Kjær Sound Level Calibrator Type 4230 s/n 1169836, Laboratory Certified May 2017;
- Norsonic Precision Sound Level Meter Nor131, s/n 1312829, Laboratory Certified May 2017;
- Rion Precision Integrating Sound Level Meter Model NL-11, s/n 00150321,
- Brüel & Kjær Precision Sound Level Meter Type 2232 s/n 1129761,
- Weather Instruments (Aneroid barometer, Zeal Wet/Dry bulb Psychrometer, Suunto KB-14/360R compass, Kaindl Windmaster 2 wind speed meter);
- 100 m fiberglass tape

Location definitions

The locations for measurements were defined as follows:

Location	Definition/comment
Loc 1	2.5 m setback from each boundary at SE corner of South Arm park; Microphone at 1.75 m height
Loc 2	2.0 m setback from rear corner of 43A Harmony Lane by South Arm Park tennis court; Microphone at 1.75 m height
Tolosa	On manhole in turf oval, 42 m from Tolosa skate park, Glenorchy; Microphone at 1.2 m height
N Hobart	Beside western walkway, 31 m from North Hobart Cultural Park's skate park, overlooking skate park at 5° dip; Microphone at 1.2 m height

Position plotted on aerial photo and photographs of location are on the following pages.

Weather observations

Conditions suitable for noise measurements. High wind gusts were encountered on 20/5/2017. Details are shown alongside.

Weather observations				
Date	15/6/2017	15/6/2017	18/6/2017	20/5/2017
Location	Loc 2	Loc 2	Tolosa	N Hobart
Time	13:00	21:10	15:00	15:10
Temp °C	16	13	13	17
Relative Humidity %	76	69	45	55
Pressure hPa	1023	1024	1024	1012
Wind speed average m/s	1.9	0.5	2.1	3.7
Wind speed maximum m/s	3.7	1.4	4.7	12.8
Wind direction	N	N	NW	NW
Cloud cover x/8	2	5	7	3

[Last revised 8/7/2017]

Locations – plotted airphoto indicating monitoring positions



Monitoring locations plotted to good approximation. Base image sourced from Google 21/6/2017. Note 20 m scale bar.
Changes may have occurred since this image was captured by satellite.

Location – plotted airphoto indicating monitoring position



Monitoring location plotted to good approximation. Base image sourced from Google 21/6/2017. Note 20 m scale bar.
Changes may have occurred since this image was captured by satellite.

Location – plotted airphoto indicating monitoring position



Monitoring location plotted to good approximation. Base image sourced from Google 6/6/2017. Note 20 m scale bar.
Changes may have occurred since this image was captured by satellite.

Eastern panorama of recreation park, South Arm



View of sweeping eastern arc of park from water tank by Calverton Community Hall.
Note the 2-photo composite has minor join error and distortion

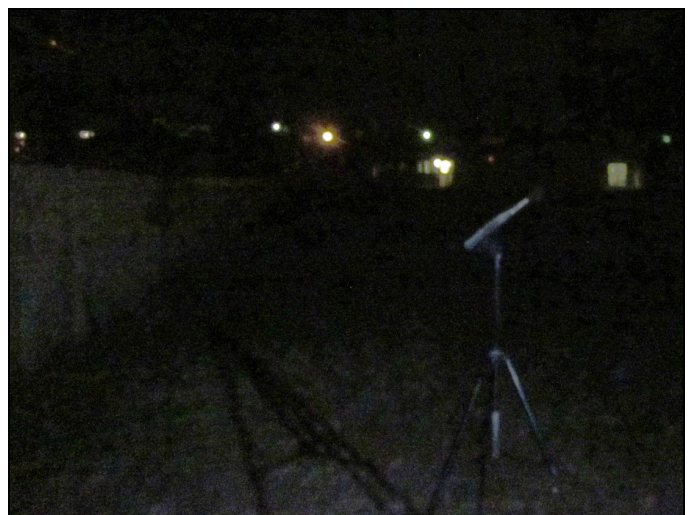
Site photographs



View of Location 1, close to southern neighbours, 15/6/2017



View northward of Location 2, 15/6/2017



Monitoring late evening noise at Location 2 (left) and Location 1 (right), 15/6/2017

Site photographs



Tolosa monitoring location, view northward towards skate park, 18/6/2017



North Hobart monitoring location, view east towards skate park, 20/6/2017

Noise descriptions

For this location, ambient noise by source noted during the site visit is listed (in descending order of significance by loudness, noticeability, duration and incidence):

Location 1 and 2, day time

- Birds including galahs, magpies, plovers, gulls, crows, kookaburras, mynas
- Mowers at times
- Children playing at school
- Traffic
- Dogs
- Hammering
- Light aircraft
- Surf

Location 1 and 2, evening

- Traffic
- Surf
- Dog
- Voices
- Distant plovers
- Wildlife

Tolosa, daytime

- Skate park 10-15 users: young children excited voices
- Traffic and parking
- Birds including crows, gulls
- Skate park plastic trikes rolling, rare skateboard bang

North Hobart, daytime

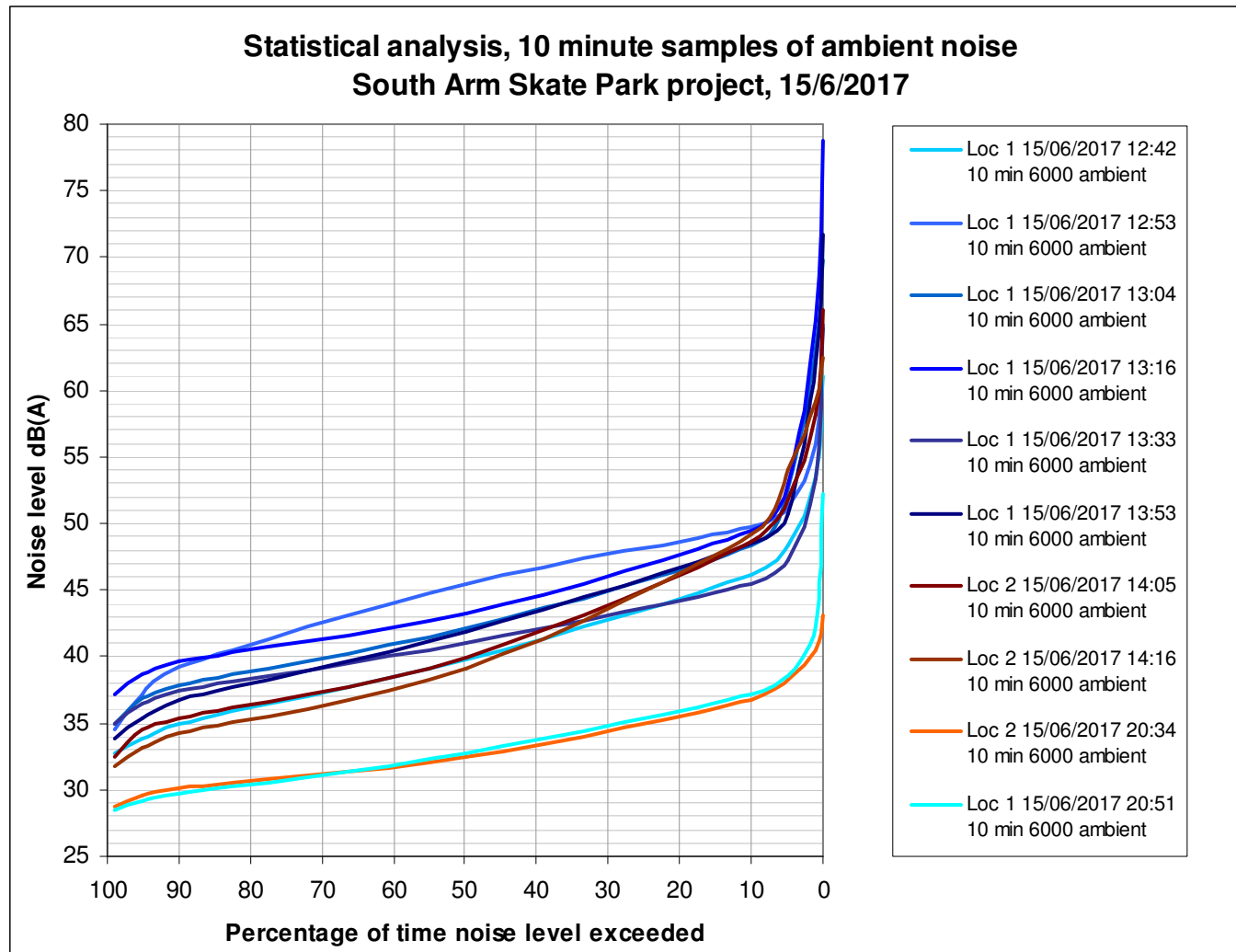
- Traffic Murray St, Tasma St
- Wind in trees and leaves rustling on ground
- Skate park 15-20 users: skateboard bangs, scrapes, teenage voices
- Voices and music in park
- Birds

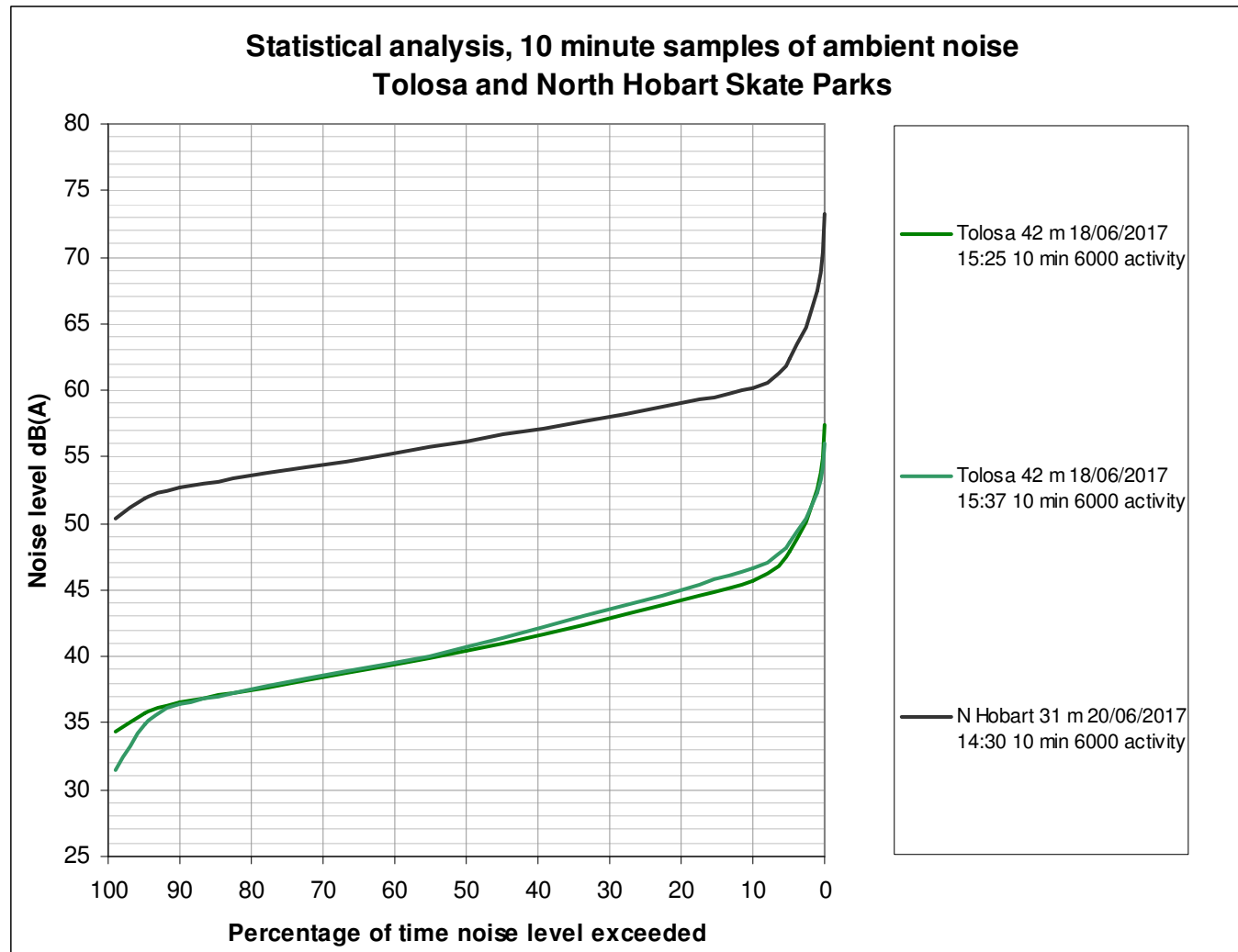
Comments

- Day and evening noise measurements were conducted under suitable conditions.
- The proposal area was dominated by bird calls during the daytime visit. No users were present at the park (for example playing football or tennis) during the visit.
- The evening visit at the proposal site encountered a tranquil soundscape.
- Tolosa park visit saw a number of younger children on the skate park, mainly using scooters or bikes, such that few bangs were generated, the noise contribution was mainly from excited voices or rolling of plastic trikes.
- The North Hobart visit encountered a mainly teenage cohort, on a mix of skateboards and scooters. Of 15-20 users there were typically 3-6 in motion at any one time. A number of skateboard bangs were measured. Considerable noise contributions from traffic and wind gusts in trees were present at this location.

Measurements and statistical analysis of noise over 10 min periods, dB(A)

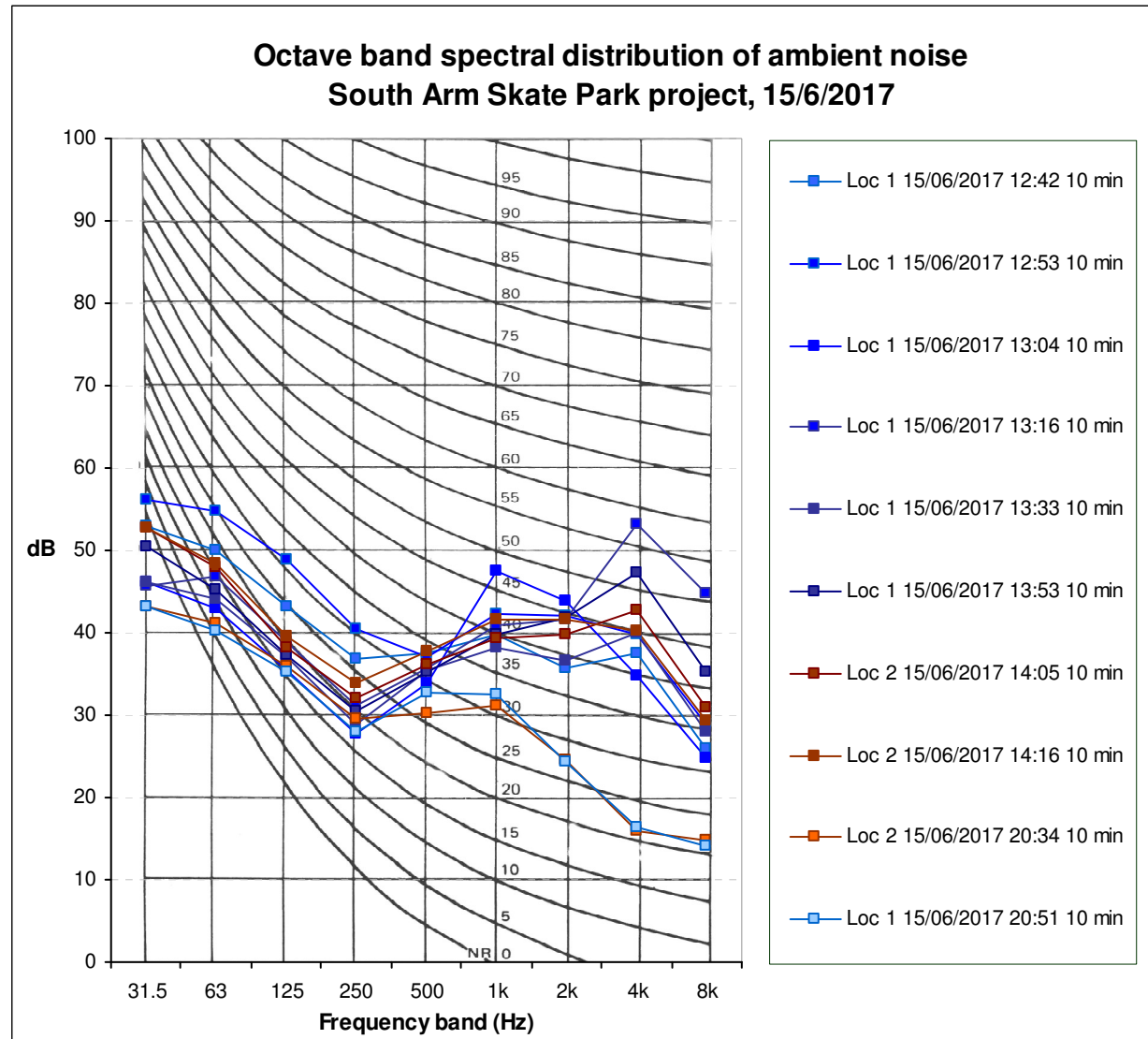
Location	Loc 1	Loc 1	Loc 1	Loc 1	Loc 1	Loc 1	Loc 2	Loc 2	Loc 2	Loc 1	Tolosa	Tolosa	N Hobart
Date	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	18/6/2017	18/6/2017	20/6/2017
Time	12:42	12:53	13:04	13:16	13:33	13:53	14:05	14:16	20:34	20:51	15:25	15:37	14:30
Duration	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min
Samples	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Test	ambient	ambient	ambient	ambient	ambient	ambient	ambient	ambient	ambient	ambient	activity	activity	activity
Lmax	68.9	70.4	72.4	83.1	68.1	73.7	69.4	65.5	44.4	58.9	59.0	59.5	76.1
L0.1	61.1	64.9	69.8	78.8	64.6	71.7	66.0	62.4	43.1	52.2	57.4	56.0	73.2
L1	53.5	56.0	63.2	65.2	53.3	62.0	58.2	59.1	40.5	42.3	52.6	52.3	67.5
L5	48.3	51.3	52.6	52.9	47.3	50.7	51.8	54.0	38.2	38.6	47.9	48.6	62.4
L10	46.1	49.8	48.3	49.5	45.4	48.5	48.6	49.2	36.8	37.2	45.7	46.6	60.2
L50	39.8	45.4	42.1	43.2	41.0	41.8	39.9	39.1	32.5	32.7	40.4	40.7	56.1
L90	34.9	39.3	37.8	39.7	37.4	36.7	35.4	34.2	30.1	29.7	36.6	36.4	52.7
L95	33.9	37.1	36.9	38.7	36.5	35.4	34.5	33.1	29.6	29.2	35.8	34.9	51.9
L99	32.8	34.6	35.0	37.1	35.0	33.9	32.5	31.8	28.7	28.4	34.4	31.5	50.4
Lmin	31.1	32.3	32.7	35.3	33.2	32.7	31.2	31.0	27.0	27.2	32.9	29.5	48.5
Leq A	44.1	47.7	50.0	55.0	44.4	50.0	46.7	46.9	34.0	35.1	43.0	43.4	58.3

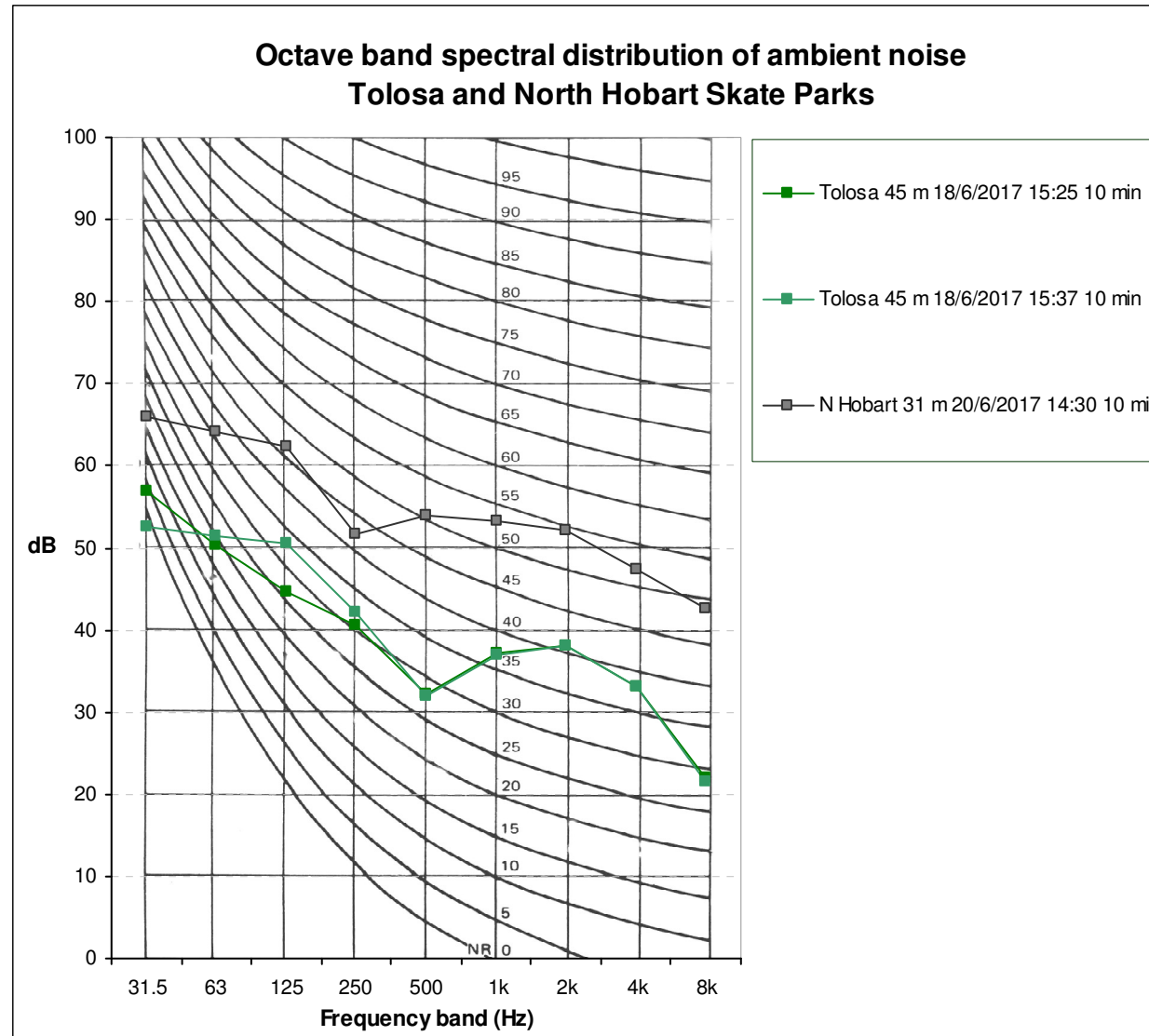




Spectral analysis of measured noise

Location	Loc 1	Loc 1	Loc 1	Loc 1	Loc 1	Loc 1	Loc 2	Loc 2	Loc 2	Loc 1	Tolosa	Tolosa	N Hobart
Date	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	15/6/2017	18/6/2017	18/6/2017	20/6/2017
Time	12:42	12:53	13:04	13:16	13:33	13:53	14:05	14:16	20:34	20:51	15:25	15:37	14:30
Duration	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min
Test	ambient	ambient	ambient	ambient	ambient	ambient	ambient	ambient	ambient	ambient	activity	activity	activity
Measure	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq
Overall A	44.1	47.7	50.0	55.0	44.4	50.0	46.7	46.9	34.0	35.1	43.0	43.4	58.3
C	55.0	57.9	52.1	54.7	49.0	52.6	54.9	55.6	46.7	45.8	58.8	55.4	70.0
Octave band Hz 31.5	53.0	56.0	46.1	45.7	46.2	50.4	52.6	52.7	43.3	43.1	56.9	52.6	66.0
63	49.9	54.7	43.0	46.9	44.1	45.3	48.0	48.4	41.2	40.3	50.2	51.5	64.3
125	43.3	48.8	35.4	38.8	37.0	37.2	38.1	39.5	35.9	35.1	44.7	50.6	62.3
250	36.8	40.5	27.7	31.1	28.8	30.5	31.9	34.0	29.6	27.9	40.6	42.2	51.8
500	37.4	37.1	33.8	35.7	35.4	35.3	36.1	37.8	30.2	32.7	32.2	32.0	53.9
1k	39.8	42.4	47.5	41.0	38.3	39.8	39.4	41.7	31.2	32.5	37.2	37.0	53.2
2k	35.7	42.1	43.9	41.6	36.6	41.7	39.8	41.5	24.5	24.3	38.1	38.1	52.1
4k	37.6	39.7	34.7	53.2	40.0	47.3	42.7	40.2	16.0	16.3	33.0	33.0	47.4
8k	26.0	28.9	24.7	44.8	27.8	35.2	30.8	29.3	14.8	14.0	22.0	21.6	42.5

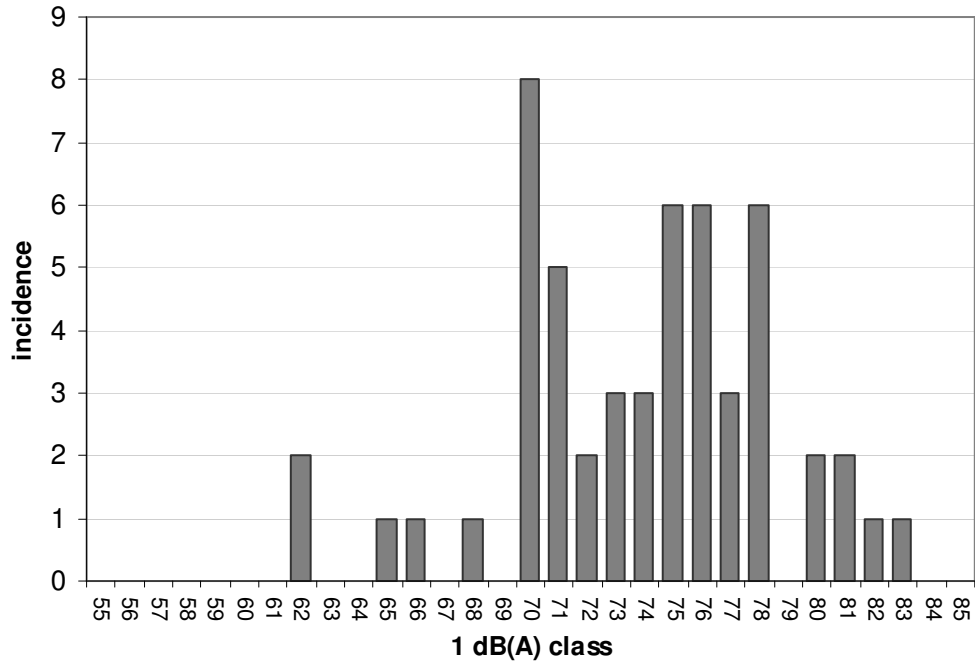




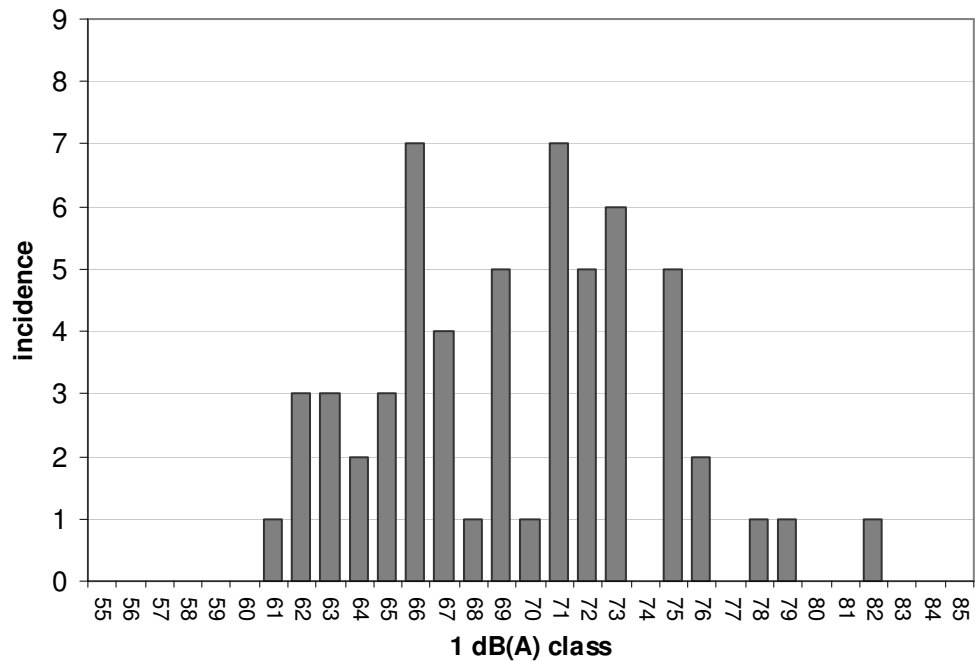
Analysis of skateboard bangs over 20 minutes, North Hobart

Date	20/06/2017	
Location	North Hobart	
Time	14:30	
Test	Skate park bangs	
Distance	31 m	
Measure	dB(A) Imp	Lmax(A)
N	53	58
Mean	73.9	69.4
Max	83.0	80.6
Min	62.0	60.8
Median	75.0	69.4
Log average	76.0	71.8
Std deviation	4.6	4.7

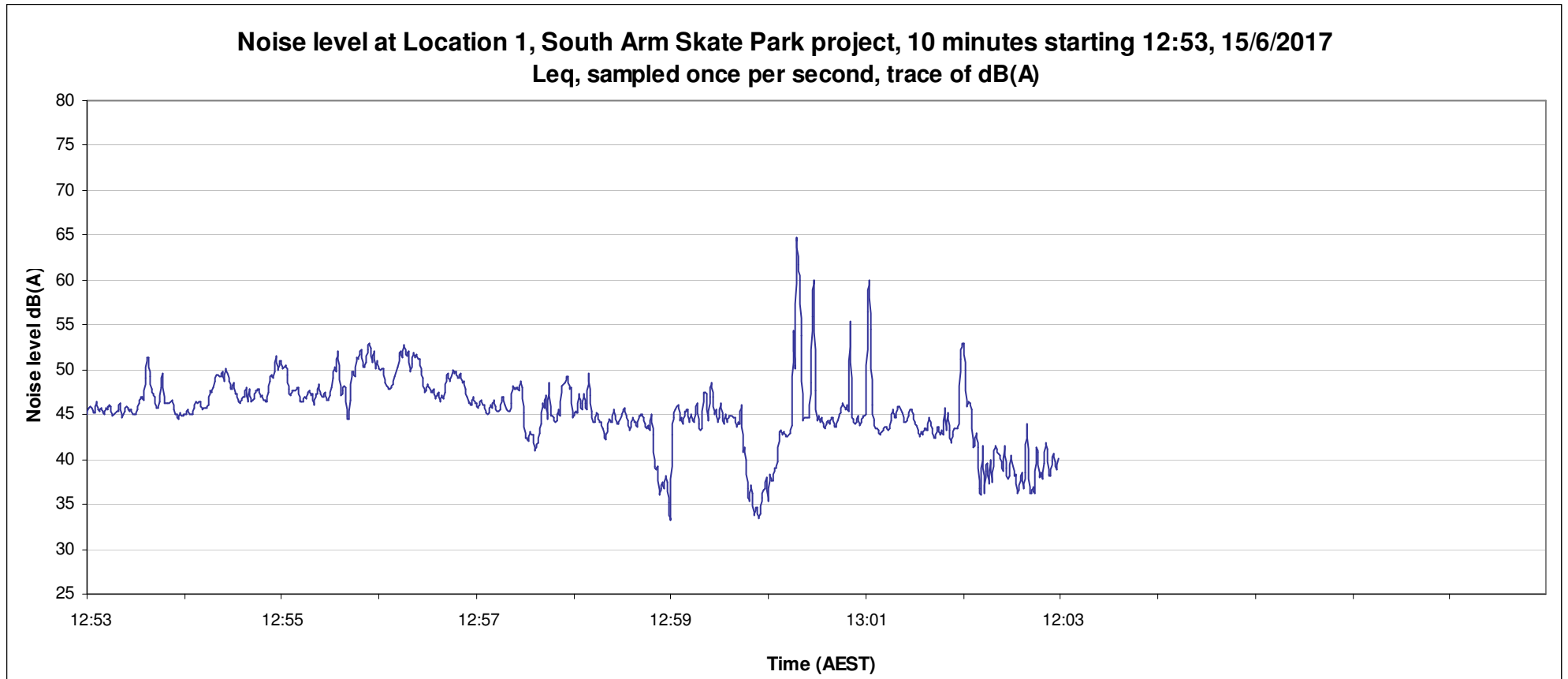
dB(A) Imp distribution of skateboard bangs
53 impulses measured above ambient level
31 m from North Hobart Skate Park, 20/6/2017



Lmax dB(A) distribution of skateboard bangs
58 impulses measured above ambient level
31 m from North Hobart Skate Park, 20/6/2017

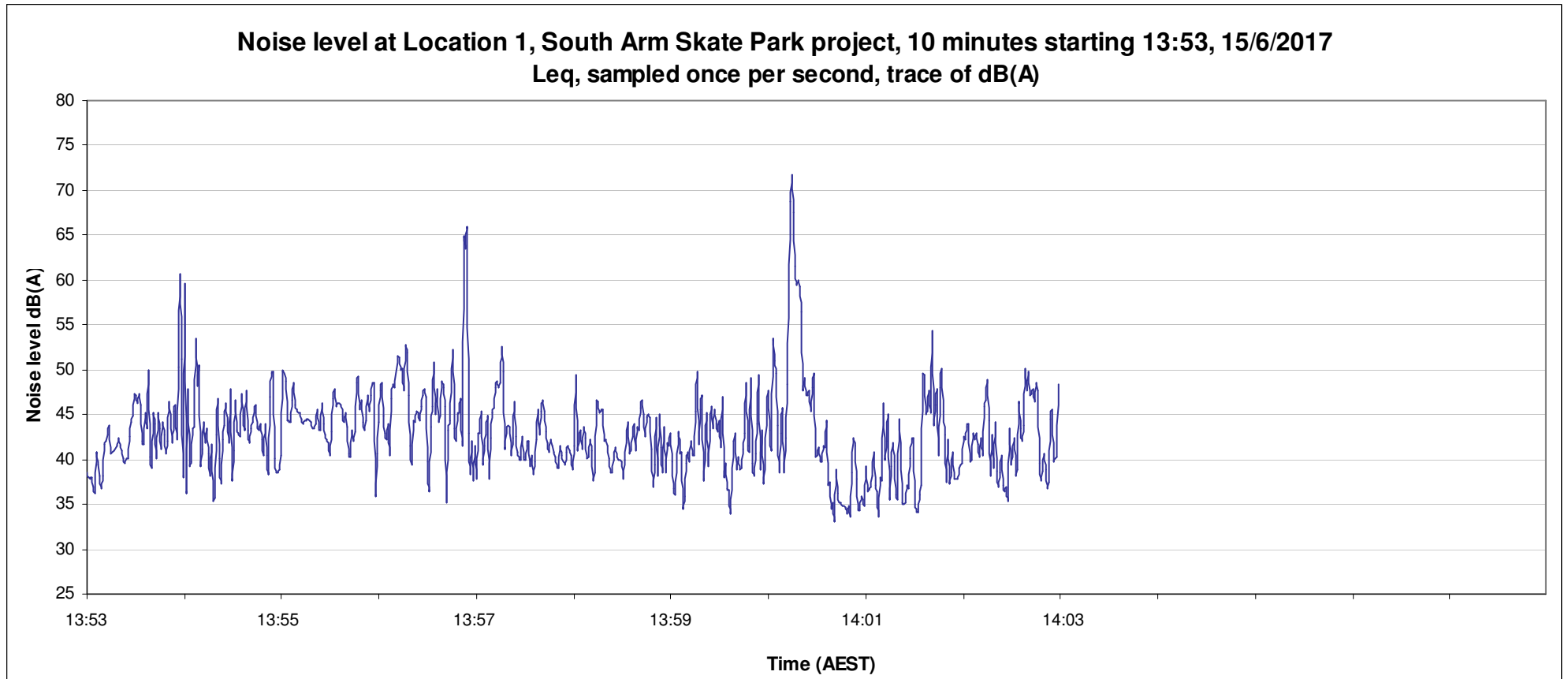


Example monitoring trace of daytime noise at Location 1



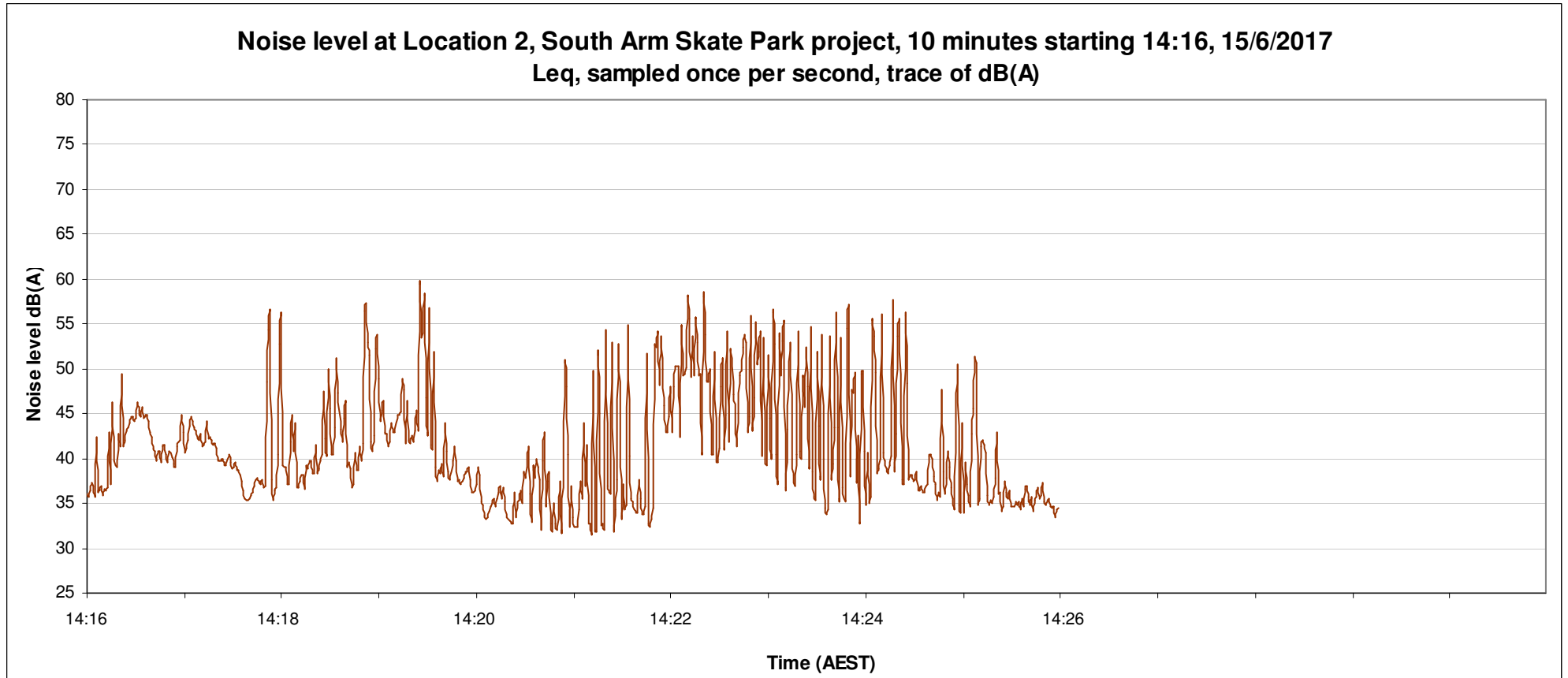
Neighbour mowing occurred for much of this period.

Example monitoring trace of daytime noise at Location 1



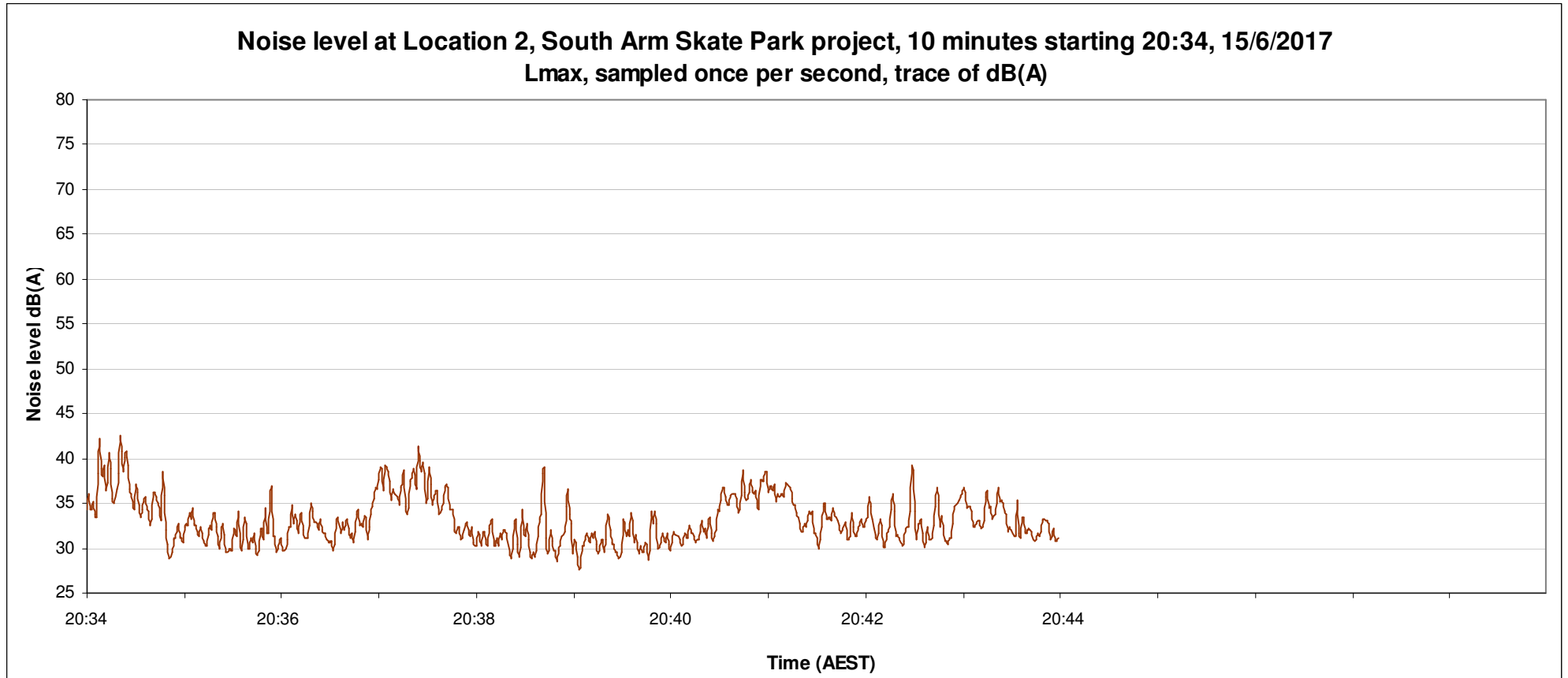
This was a more typical period without mowing, dominated by bird calls. Magpies and galahs created loud events at times.

Example monitoring trace of daytime noise at Location 2



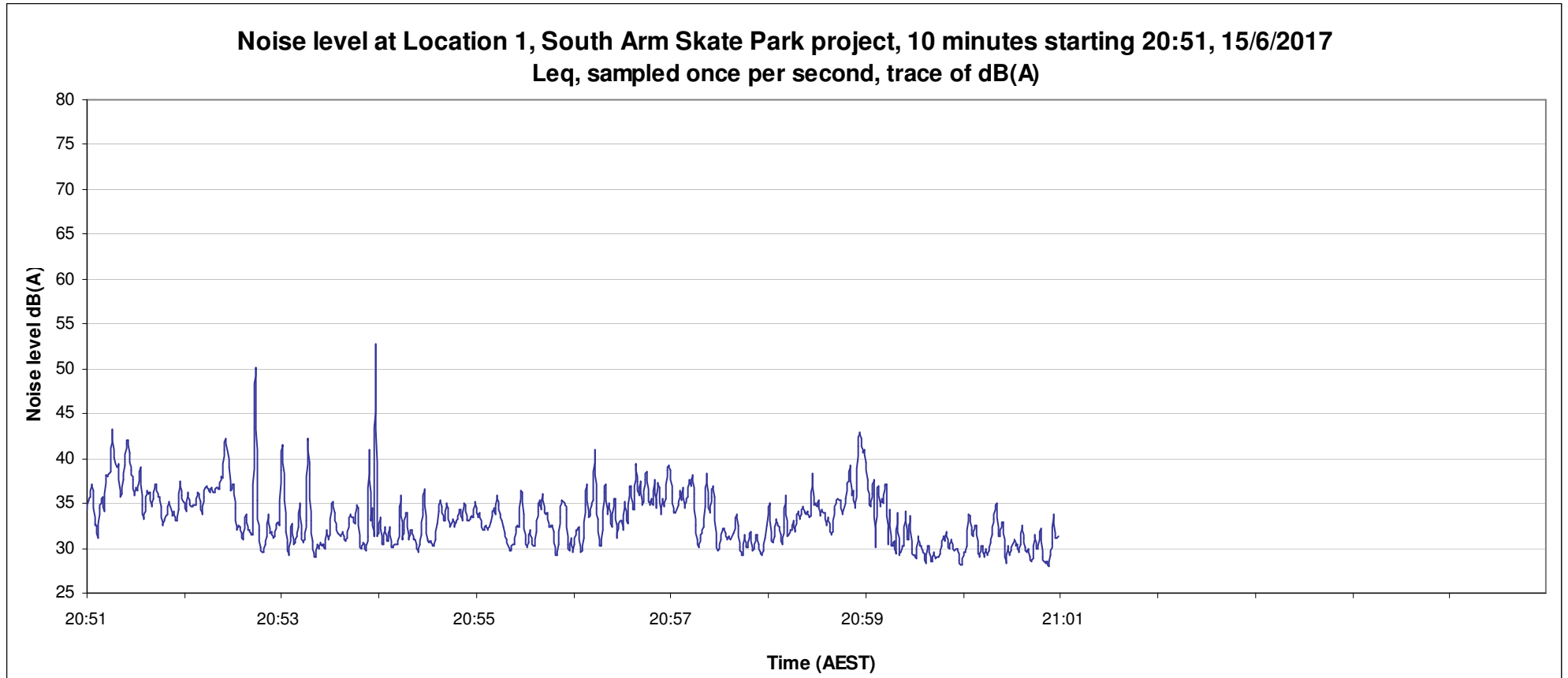
This was a typical period, dominated by bird calls. Magpies and galahs created loud events at times.

Monitoring trace of evening noise at Location 2



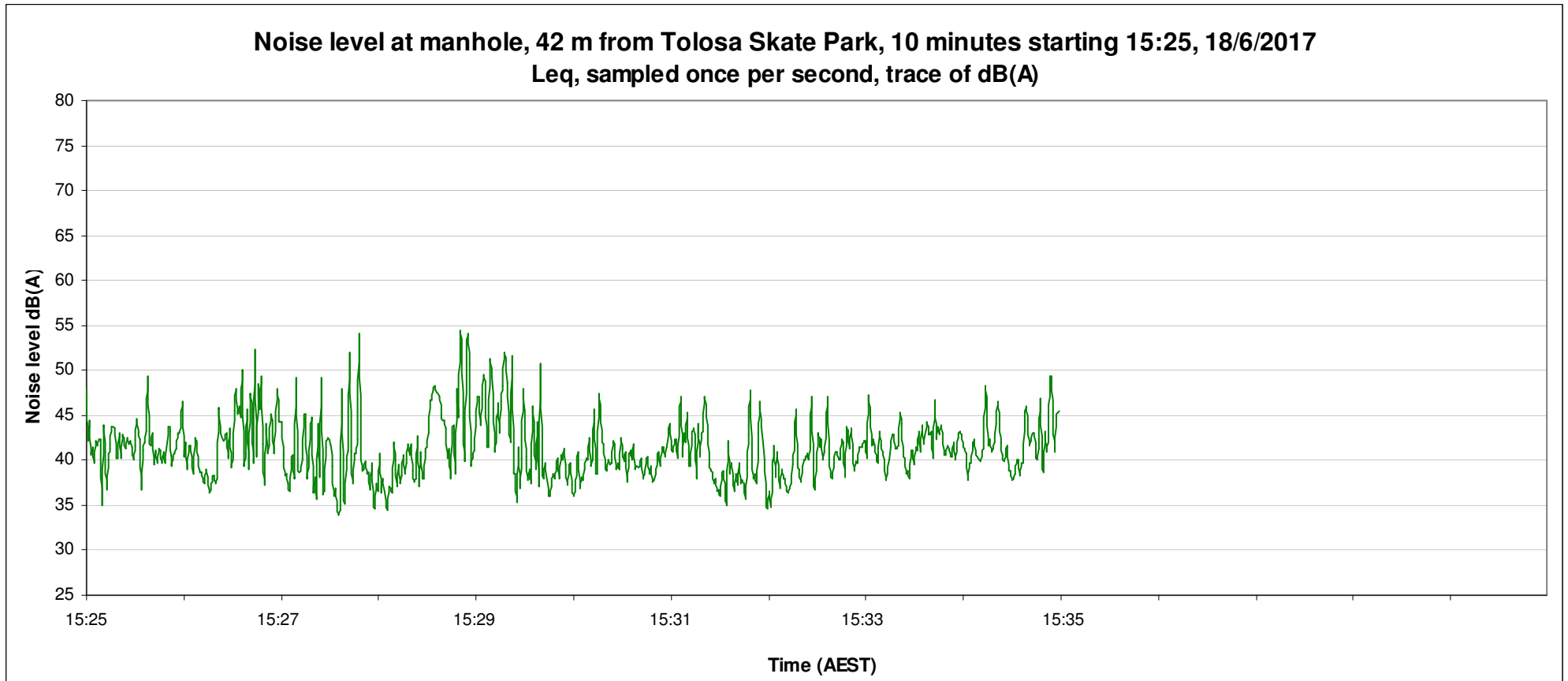
This was a typical tranquil period.

Monitoring trace of evening noise at Location 1



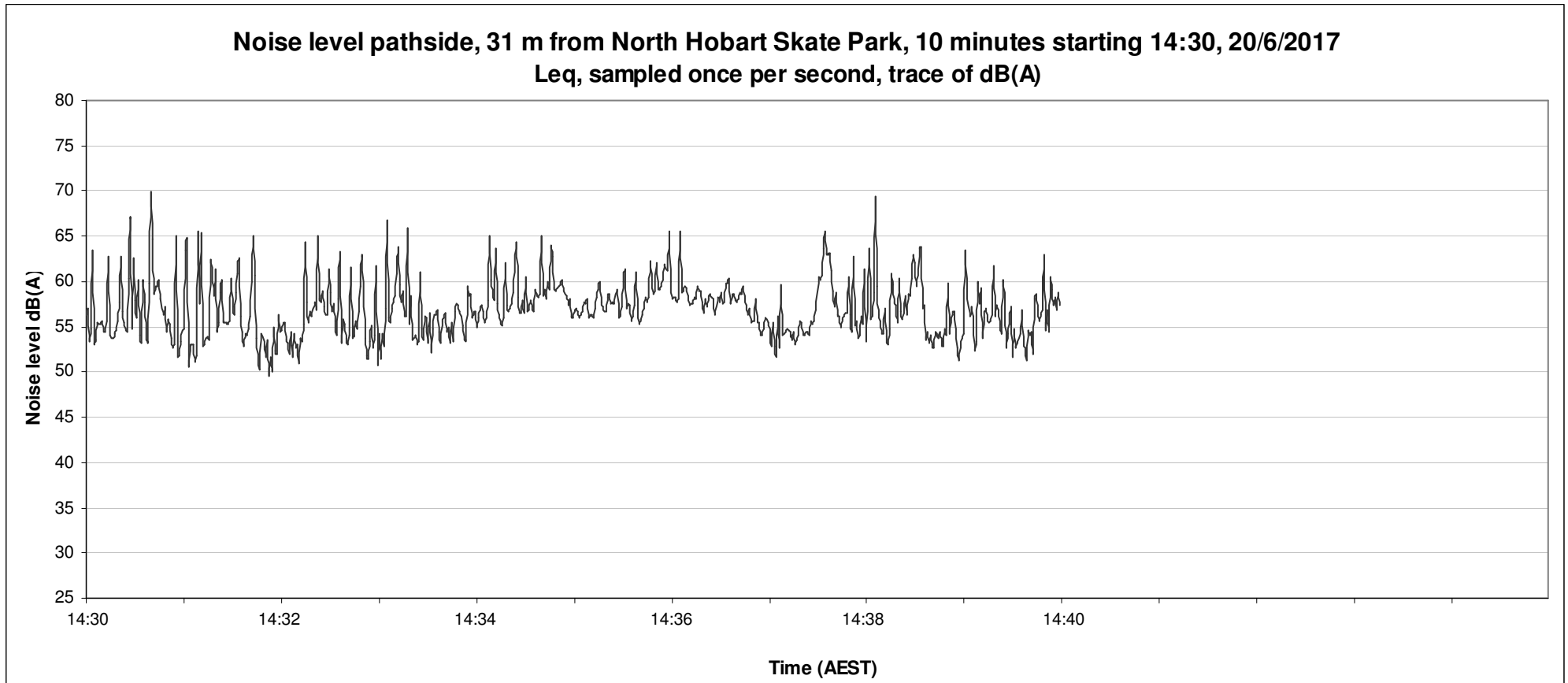
This was a typical tranquil period with rare dog barks.

Monitoring trace of afternoon noise at Tolosa



The main skate park noise contribution here was excited voices of young children.

Monitoring trace of afternoon noise at North Hobart



The main skate park noise contribution here was skateboard bangs from teenagers. Ambient noise was raised by traffic and wind gusting in trees.