MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS
MATTHEW SHIELDS
BEN WHITE

YHA, The Rocks
Proposed Extension of Hours of Use of Level 3 Roof Top Terrace

Noise Emission Assessment

SYDNEY
A: 9 Sarah St Mascot NSW 2020
T: (02) 8339 8000
F: (02) 8338 8399

SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE

www.acousticlogic.com.au
ABN: 11 068 954 343

DOCUMENT CONTROL REGISTER

Project Number	20150238.1
Project Name	YHA, The Rocks Proposed Extension of Hours of Use of Level 3 Roof Top Terrace
Document Title	Noise Emission Assessment
Document Reference	20150238.1/0320A/R1/TT
Issue Type	Email
Attention To	YHA

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	20/3/2015	20150238.1/0320A/R0/TT	TT	TT	
1	20/3/2015	20150238.1/0320A/R1/TT	TT	TT	

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to conduct an assessment of potential noise impacts associated with the proposed extension in hours of use of a roof top terrace area at the YHA Hostel at Cumberland Street, The Rocks.

In this report we will:

- Identify potential noise sources as a result of the increased hours of use of the terrace.
- Identify noise emission controls based on City of Sydney and Office of Liquor gaming and Racing standard conditions of consent and
- Determine acoustic treatments/management controls as necessary to ensure ongoing compliance with noise emission requirements.

2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site lies between Cumberland and Gloucester Streets, The Rocks.

The site is bounded to the south by residential development and to the north by the Australian Hotel.

The site is bounded to the west by Cumberland Street. Cumberland Street is a four lane road which carries light to moderate traffic flows. Further to the west of the site (across Cumberland Street) lies an indoor sports centre with an outdoor children's play area. Still further to the west lies an exit ramp for the Harbour Bridge. The ramp and the bridge carry high levels of traffic at all times of day.

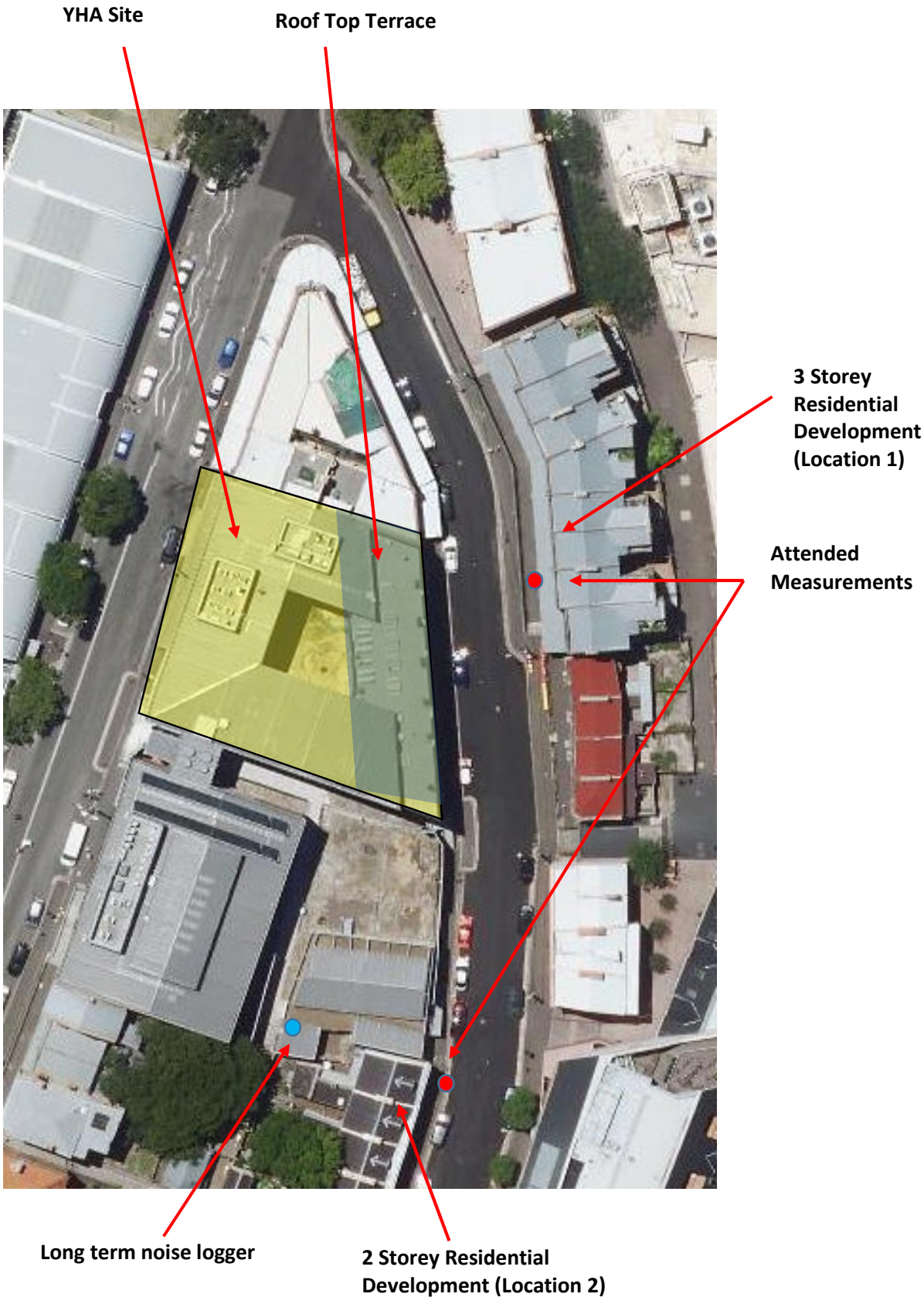
The site is bounded to the east by Gloucester Street, which carries light traffic flows. Further to the east (across Gloucester Street) lies a mixture of residential dwellings (up to 3 storeys) and commercial development.

The roof terrace in question is located on Level 3 on the Gloucester Street façade of the hostel. The terrace has a capacity of approximately 200 people and is currently required to cease use at 10pm.

It is proposed to extend the currently permitted use as follows:

- From 5am in the morning (to allow for YHA guests to view the sunrise).
- Up to 11pm at night.

See aerial photograph below.


YHA Site
Roof Top Terrace
3 Storey Residential Development (Location 1)
Attended Measurements
Long term noise logger
2 Storey Residential Development (Location 2)

3 NOISE DESCRIPTORS

Noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals. The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced at the source. Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; like traffic noise.

4 BACKGROUND NOISE MONITORING

Background noise levels at the site have been determined based on long term unattended noise logging.

Long term noise logging was conducted between 25 February and 5 March 2015 using an Acoustic Research Laboratories noise logger set on A-weighted fast response mode and recording in 15 minute intervals.

A logging location on the roof of one of the YHA buildings on Gloucester Street (the Big Bid education centre) was selected because:

- Being located on Gloucester Street, the logger is as close as practicable to the residences that are potentially impacted.

- Being located on the roof of the Big Dig building (one storey high), the logger was screened from traffic noise from the Harbour Bridge and approach ramps), which would inflate the background noise level. The noise logger location has a similar level of noise screening from the Harbour Bridge approach as that received by the nearby residences.

The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Industrial Noise Policy. Exceedances of the 5m/s average wind speed limit of the EPA were noted and corrected for in determining the background noise levels. These areas are highlighted in the logging data in Appendix 2.

Table 1 - Measured Background Noise Levels

Noise Receiver Location	**Rating Background Noise Level dB(A)$L_{90(period)}$**				
	Early Morning (5am – 7am)	**Daytime (7am – 6pm)**	**Evening (6pm – 10pm)**	**Late Evening (10pm – 11pm)**	**Night (11pm – 7am)**
Noise Logger – Cumberland Street	52	55	53	52	50

A background noise spectrum measurement was also measured on site, as presented below.

Table 2 – Background Noise Spectrum

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Gloucester Street	59	59	54	49	48	49	43	36	38	**52**

5 NOISE EMISSION CRITERIA

Although not a licenced venue, it is likely that alcohol will be consumed on the terrace from time to time. As such, we anticipate that the acoustic requirements of the Office of Liquor Gaming and Racing or the Licenced Premises requirements of the City of Sydney Council will be imposed, both of which are as follows:

- The L_{10} noise emissions not exceed background noise levels by more than 5dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 7am and 12am and

- The L_{10} noise emissions not exceed background noise levels by more than 0dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 12am and 7am. .

The noise emission goals for the proposed new hours of usage (5am-7am and 10pm-11pm) are presented below.

Table 3 – Terrace Noise Emission Goals

Time of Day	Criteria	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Early Morning (5am-7am)	52BG+5	64	64	59	54	53	54	48	41	43	**57**
Late Evening (10pm-11pm)	52BG+5	64	64	59	54	53	54	48	41	43	**57**

6 ASSESSMENT OF NOISE EMISSIONS

Patron noise emissions from the terrace to each of the nearby residential properties is presented below.

The predicted noise emissions are based on the following assumptions:

- The average sound power per patron (raised voice) on the terrace is 77dB(A)L_{10}, and that one in two patrons are speaking at any one time.

- That there are up to 200 people using the terrace at any one time. Please note, at present, the terrace is never used to anywhere near this capacity other than during a New Year's Eve party. The number of 200 significantly exceeds any typically anticipated level of usage but has been adopted based on the physical capacity of the terrace.

- With respect to the patrons on the terrace, the solid balustrade around the perimeter of the terrace will provide some noise screening between the patrons and the residences on Gloucester Street, which are either 2 or 3 storeys high (and therefore below the level of the terrace). When predicting noise emissions to the nearest residences, the noise screening for patrons at the edge of the terrace is reduced, as they will overlook the balustrade. In making predictions:

    - When predicting to the residences to the east, patrons within 1.5m from the edge of the terrace have little to no noise screening. Once 1.5m back from the edge, the screening is more effective.

    - When predicting to the residences to the south, patrons within 3m from the edge of the terrace have little to no noise screening. Once 3m back from the edge, the screening is more effective.

    These distances have been determined based on observation of sight lines when standing on the terrace.

- That music in outdoor areas is limited to background music only (sound pressure of no more than 70dB(A) on the terrace.

- In all cases, noise emissions are predicted at the top floor windows of the nearest residences (as the top floor windows are most potentially impacted given that the benefits of the noise screening provided by the terrace balustrade is reduced).

Predictions are made at the following locations:

- The three storey residences to the east (across Gloucester Street, directly opposite the site) – Location 1 in the aerial photo.

- The two storey residences to the south of the site – Location 2.

Assessment against relevant acoustic criteria for all nearby residential development is shown in the following tables. A detailed calculation of noise emissions is included in appendix 2.

Table 6 – Patron noise emission to Residences at Location 1 (dBL_{10})
5am-7am, Up to 11pm Assessment - 200 patrons.

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Predicted Noise Level – Second Floor*	40	40	45	48	53	51	48	39	25	**55**
Allowable Noise Level (5am-7am or 10pm-11pm) – 52dBG+5dB	64	64	59	54	53	54	48	41	43	**57**
Complies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**

*Second Floor – ie top floor of three storey residence.

Table 6 – Patron noise emission to Residences at Location 2 (dBL_{10})
5am-7am, Up to 11pm Assessment - 200 patrons.

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Predicted Noise Level –First Floor	36	36	42	45	50	49	46	37	24	**53**
Allowable Noise Level (5am-7am or 10pm-11pm) – 52dBG+5dB	64	64	59	54	53	54	48	41	43	**57**
Complies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**

*First Floor – ie top floor of two storey residence.

Noise emissions are predicted to be compliant with permissible noise levels.

Recommendations to ensure ongoing compliance are presented in section 7.

7 RECOMMENDATIONS

Based on our analysis, noise from the site is capable of complying with noise emission requirements. The following management controls should be imposed to ensure ongoing compliance:

- Terrace not to be used before 5am or after 11pm.
- Patron numbers not to exceed 200, with management/security to keep control of patron numbers during any special event/party.
- Background music only is permitted on the terrace (not exceeding 65dB(A)L_{10} if measured in the middle of the terrace and not exceeding 60dB(A)L_{10} when measured at the eastern or southern edges of the terrace). In the event that management place a speaker on the terrace, this should be positioned away from the eastern or southern edges of the terrace.
- Hostel Management to prohibit noisy behaviour (shouting or similar), and ensure that any patron that engages in such an activity is immediately requested to leave the terrace. A sign should be placed on the terrace to this effect.

8 CONCLUSION

This report provides the results of an assessment of potential noise emissions from the proposed extension in times of use of the Level 3 terrace at the YHA hostel at Cumberland Street, the Rocks.

Analysis indicates that noise from the use of the terrace is capable of complying with noise emission requirements typically imposed by the Office of Liquor Gaming and Racing and the City of Sydney Council.

Provided that the recommendations in section 7 of this report are adopted, ongoing compliance with noise emission requirements will be achieved.

Please contact us should you have any further queries.

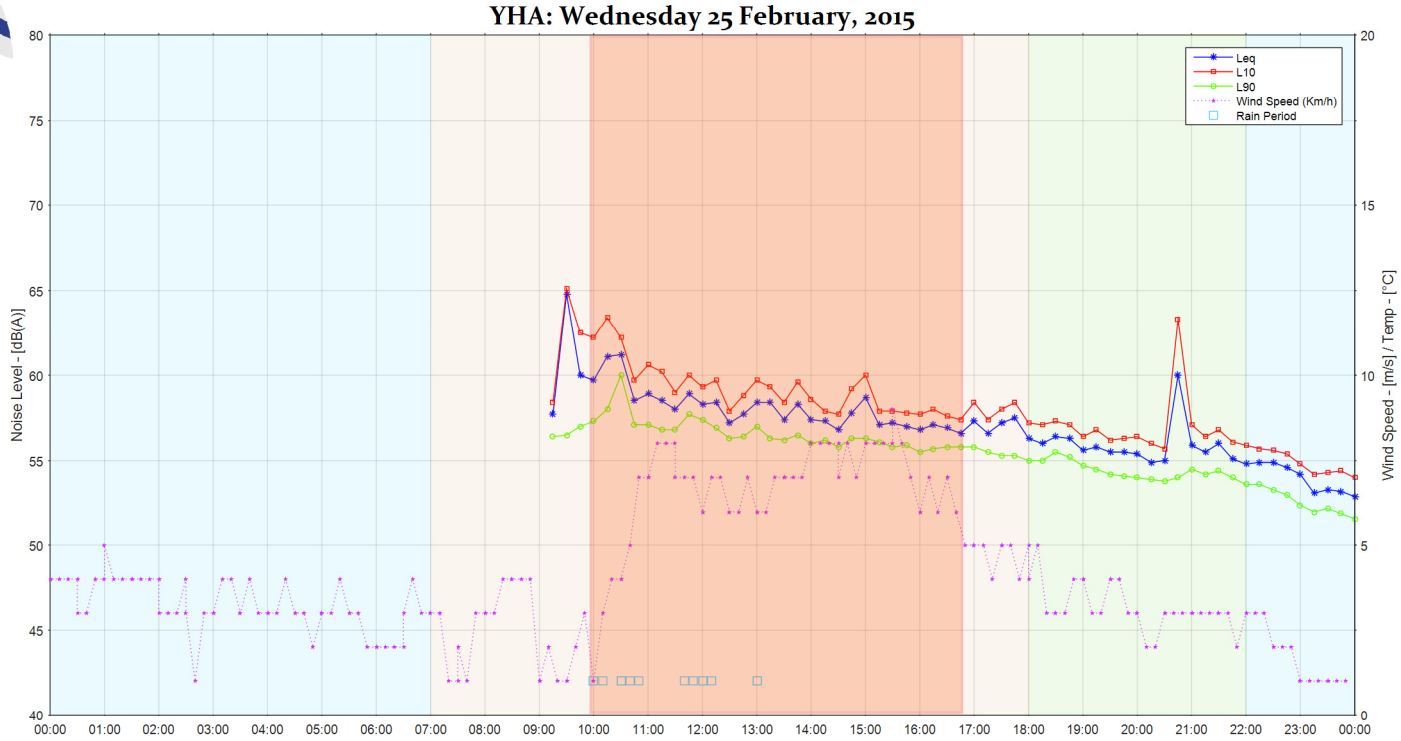
Yours faithfully,

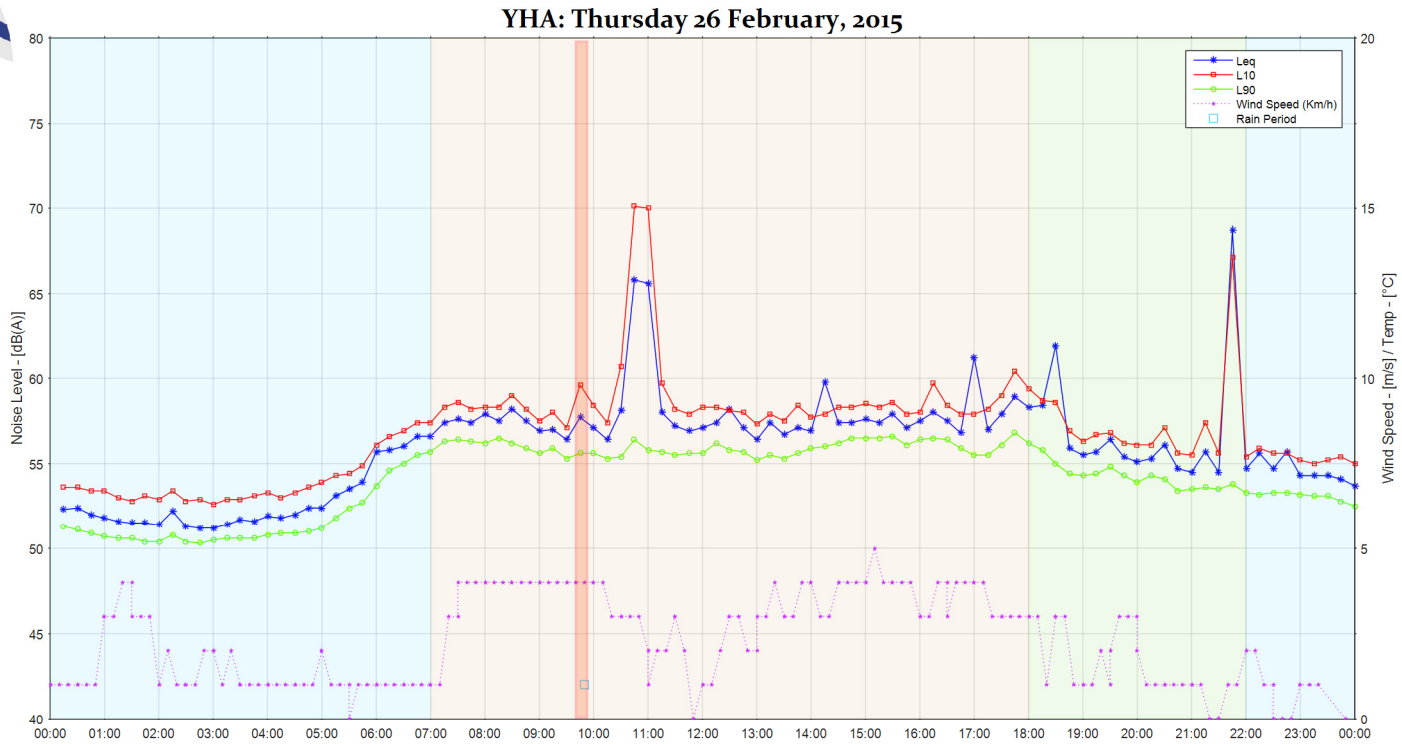
Acoustic Logic Consultancy Pty Ltd
Thomas Taylor

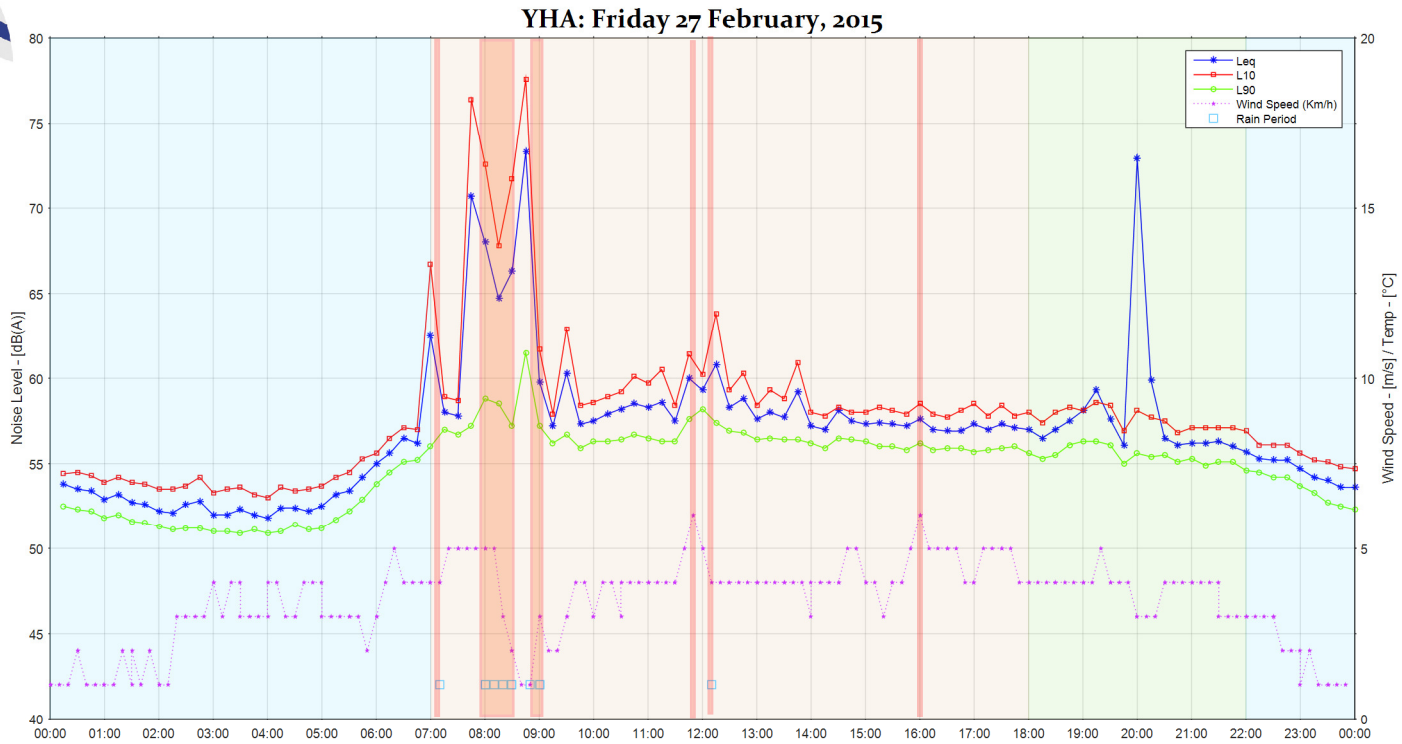
Appendix 1

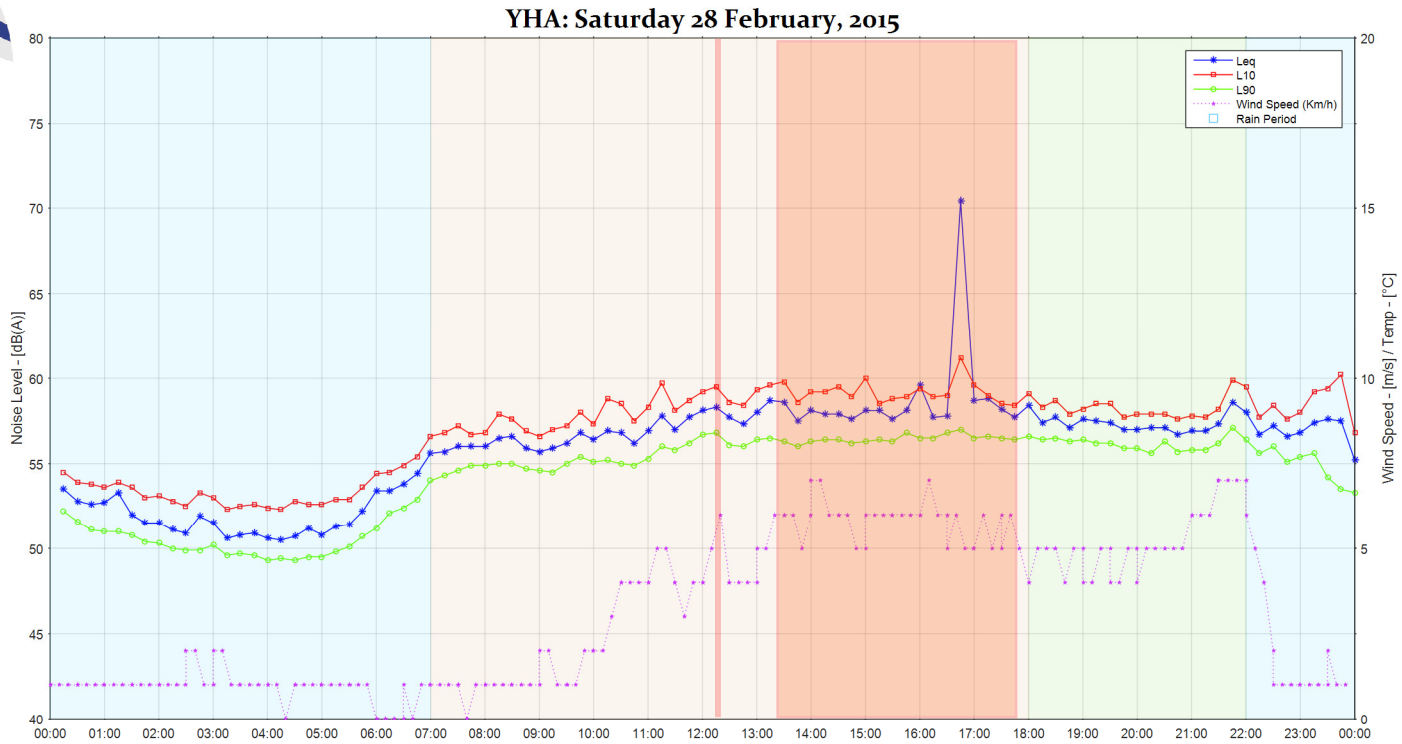
Noise Logging Results – Background Noise Logging

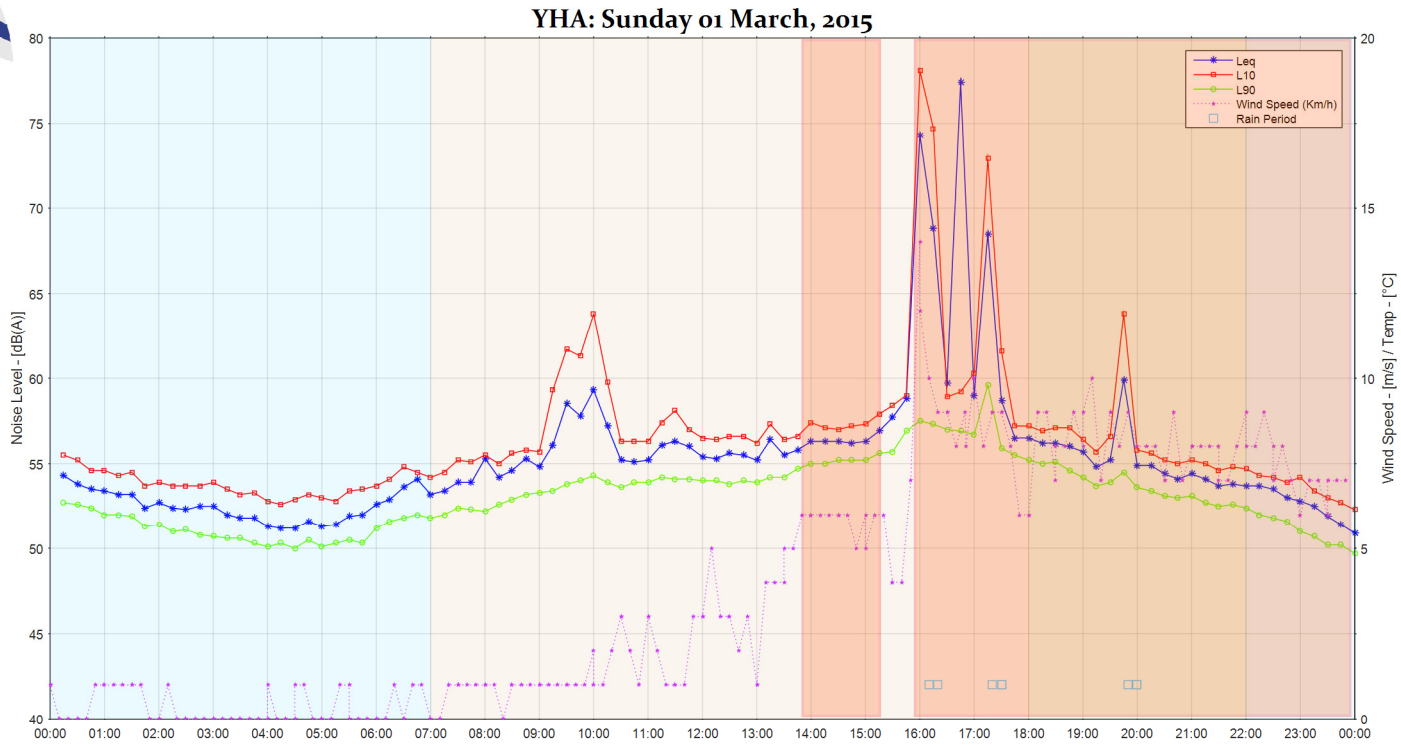
Weather effected data

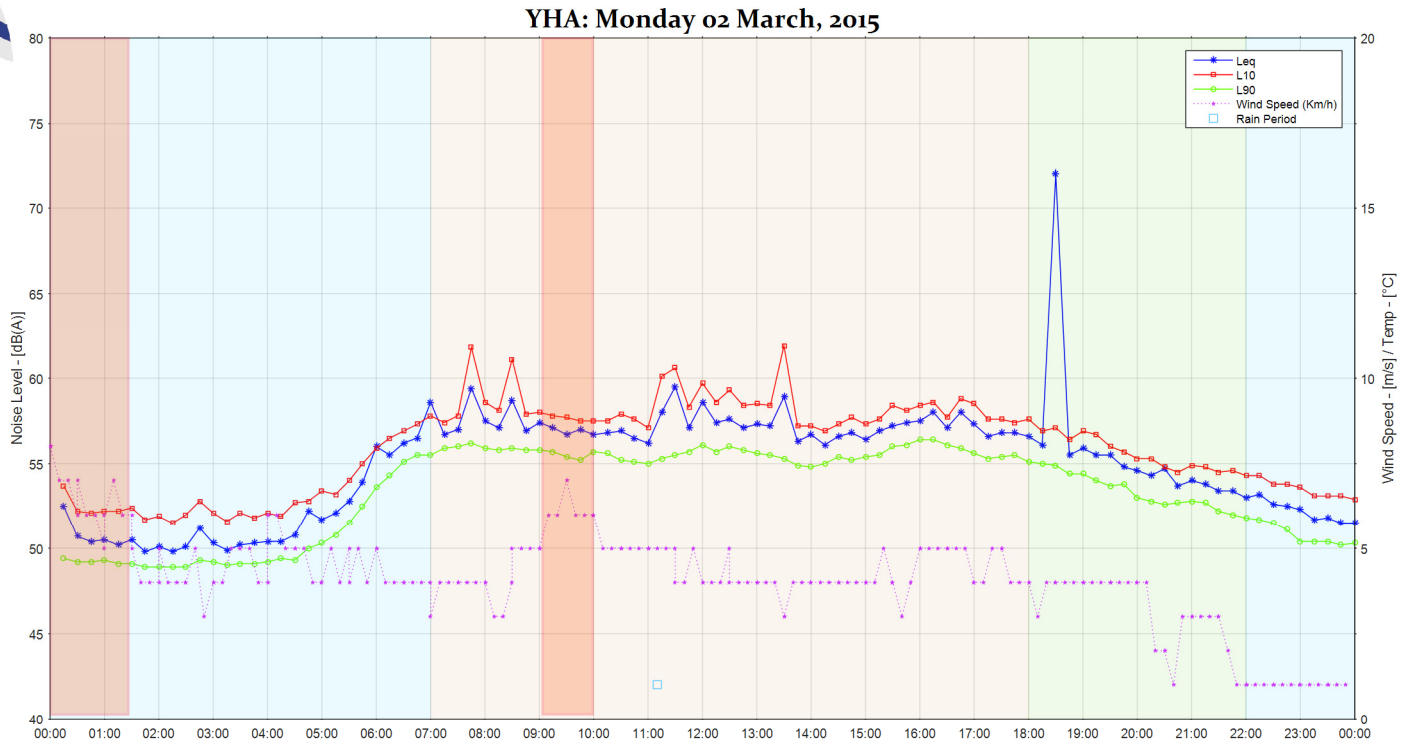


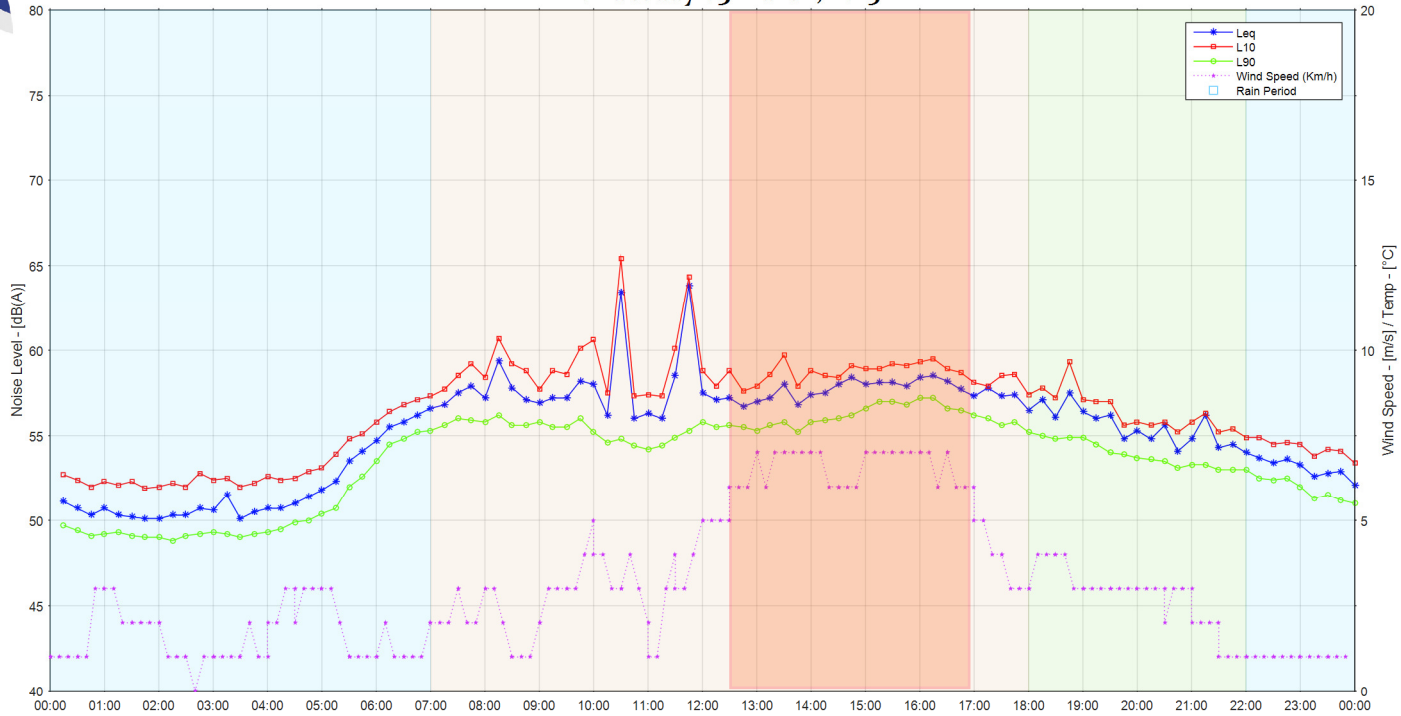

YHA: Thursday 26 February, 2015
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00

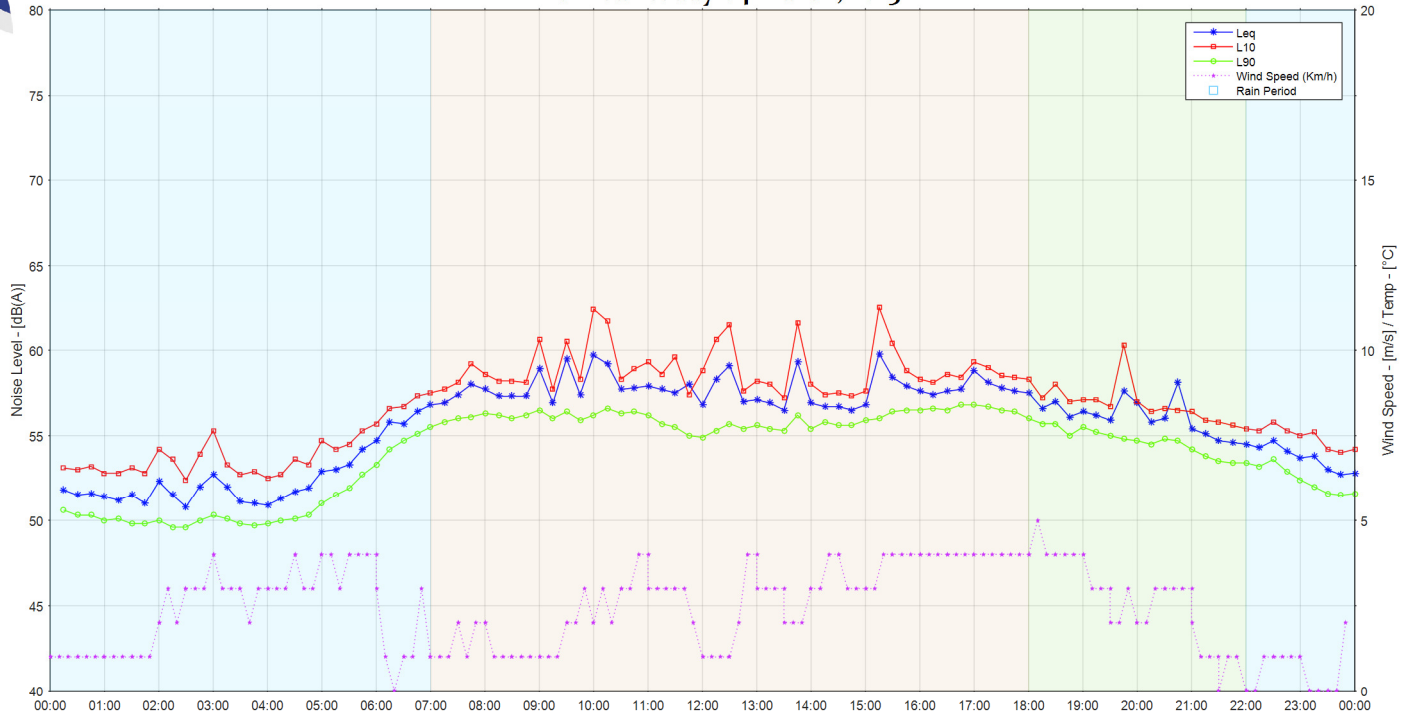

YHA: Friday 27 February, 2015
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00

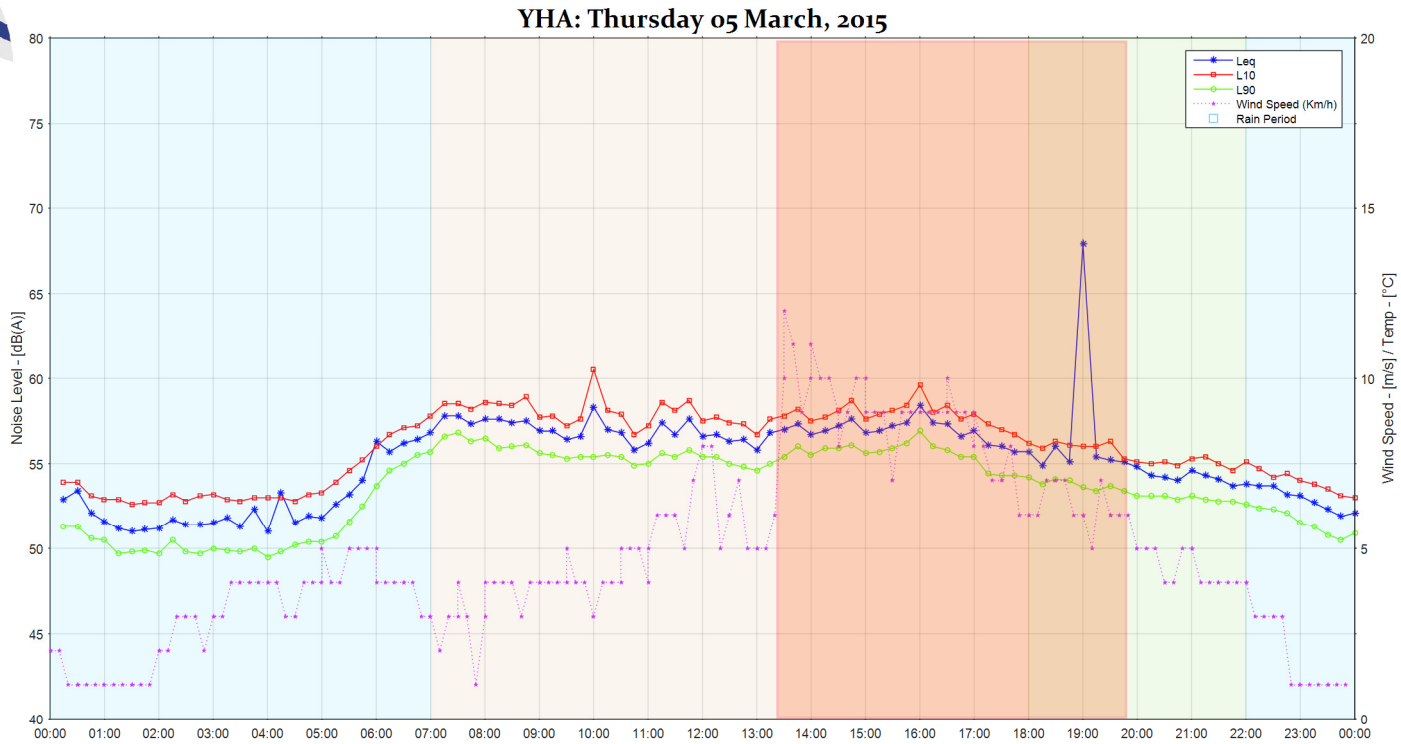

YHA: Saturday 28 February, 2015
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00

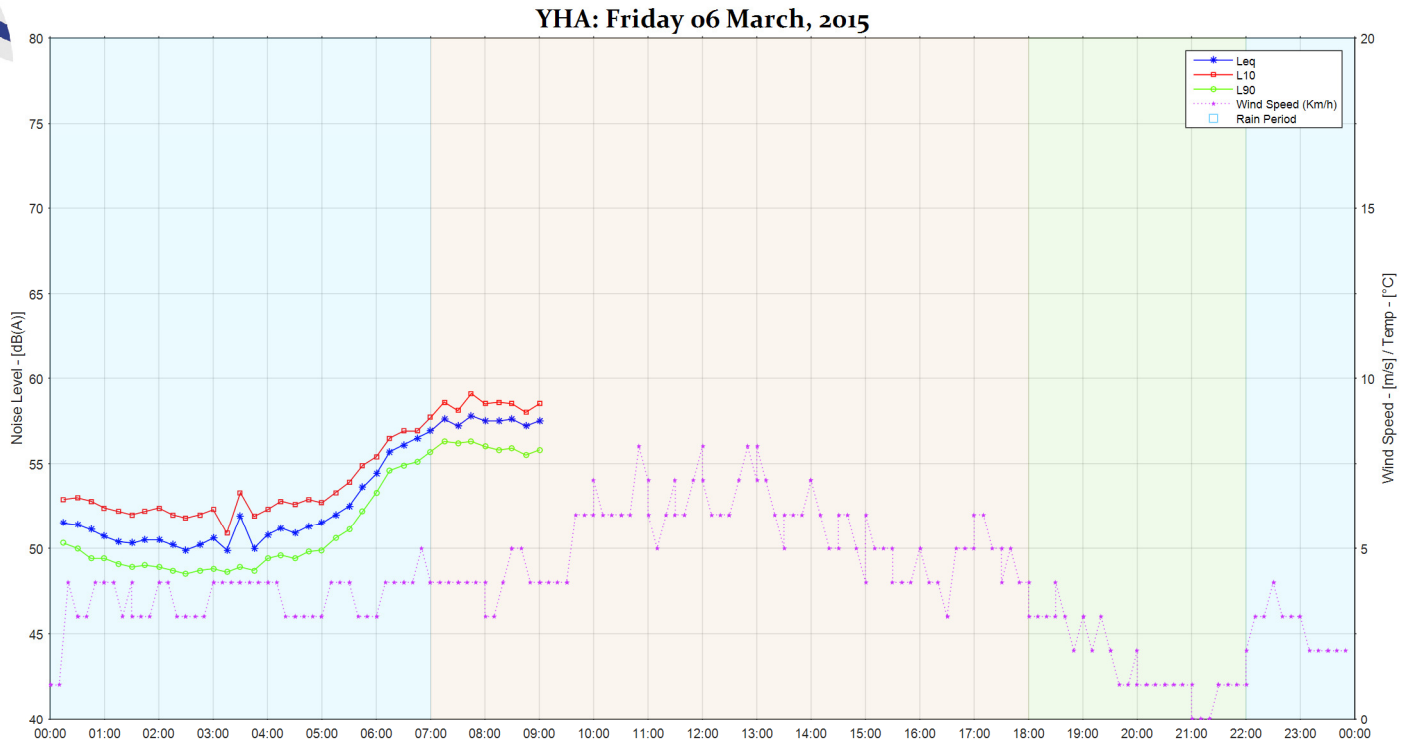

YHA: Sunday 01 March, 2015
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00


YHA: Monday 02 March, 2015
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00


YHA: Tuesday 03 March, 2015
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00


YHA: Wednesday 04 March, 2015
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00


YHA: Thursday 05 March, 2015
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00


YHA: Friday 06 March, 2015
Leq
L10
L90
Wind Speed (Km/h)
Rain Period
Noise Level - [dB(A)]
Wind Speed - [m/s] / Temp - [°C]
80
75
70
65
60
55
50
45
40
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00

Appendix 2

Noise Emission to Gloucester Street Residences – Location 1

Contribution – Patrons at Terrace Edge (Overlooking Balustrade)

Noise Source/Correction	Noise level $dBL_{eq(10)}$ – Frequency (Hz)									
	31.5	63	125	250	500	1k	2k	4k	8k	**A-wt**
Sound Power – Patron Speech - dBL_{10}	62	62	67	70	74	73	70	61	48	**77**
Correction – 33 people, 1 in 2 speaking	+12	+12	+12	+12	+12	+12	+12	+12	+12	
Correction for Distance (20m from terrace to residence)	-35	-35	-35	-35	-35	-35	-35	-35	-35	
Noise Screening	-3	-3	-2	-1	0	0	0	0	0	
Predicted Noise Level at Residences – dBL_{10}	**36**	**36**	**42**	**46**	**51**	**50**	**47**	**38**	**25**	**54**

Contribution – Patrons Back from Terrace Edge (Overlooking Balustrade)

Noise Source/Correction	Noise level $dBL_{eq(10)}$ – Frequency (Hz)									
	31.5	63	125	250	500	1k	2k	4k	8k	**A-wt**
Sound Power – Patron Speech - dBL_{10}	62	62	67	70	74	73	70	61	48	**77**
Correction – 167 people, 1 in 2 speaking	+19	+19	+19	+19	+19	+19	+19	+19	+19	
Correction for Distance (24m from terrace to residence)	-36	-36	-36	-36	-36	-36	-36	-36	-36	
Noise Screening	-7	-7	-8	-9	-10	-11	-13	-15	-16	
Predicted Noise Level at Residences – dBL_{10}	**38**	**38**	**43**	**45**	**48**	**46**	**40**	**30**	**15**	**49**

Combined Noise Level (Logarithmic Addition)

Noise Source	Noise level $dBL_{eq(10)}$ – Frequency (Hz)									
	31.5	63	125	250	500	1k	2k	4k	8k	**A-wt**
Contribution – Patrons at Terrace Edge	36	36	42	46	51	50	47	38	25	**54**
Contribution – Patrons Back from Terrace Edge	38	38	43	45	48	46	40	30	15	**49**
Combined Noise Level at Residences – dBL_{10}	**40**	**40**	**45**	**48**	**53**	**51**	**48**	**39**	**25**	**55**
Criteria (55dB BG+5)	**64**	**64**	**59**	**54**	**53**	**54**	**48**	**41**	**43**	**57**
Complies	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**