



YMCA, 112 Great Russell Street, WC1B 3NQ

**Background Noise Survey and Plant Impact
Assessment**

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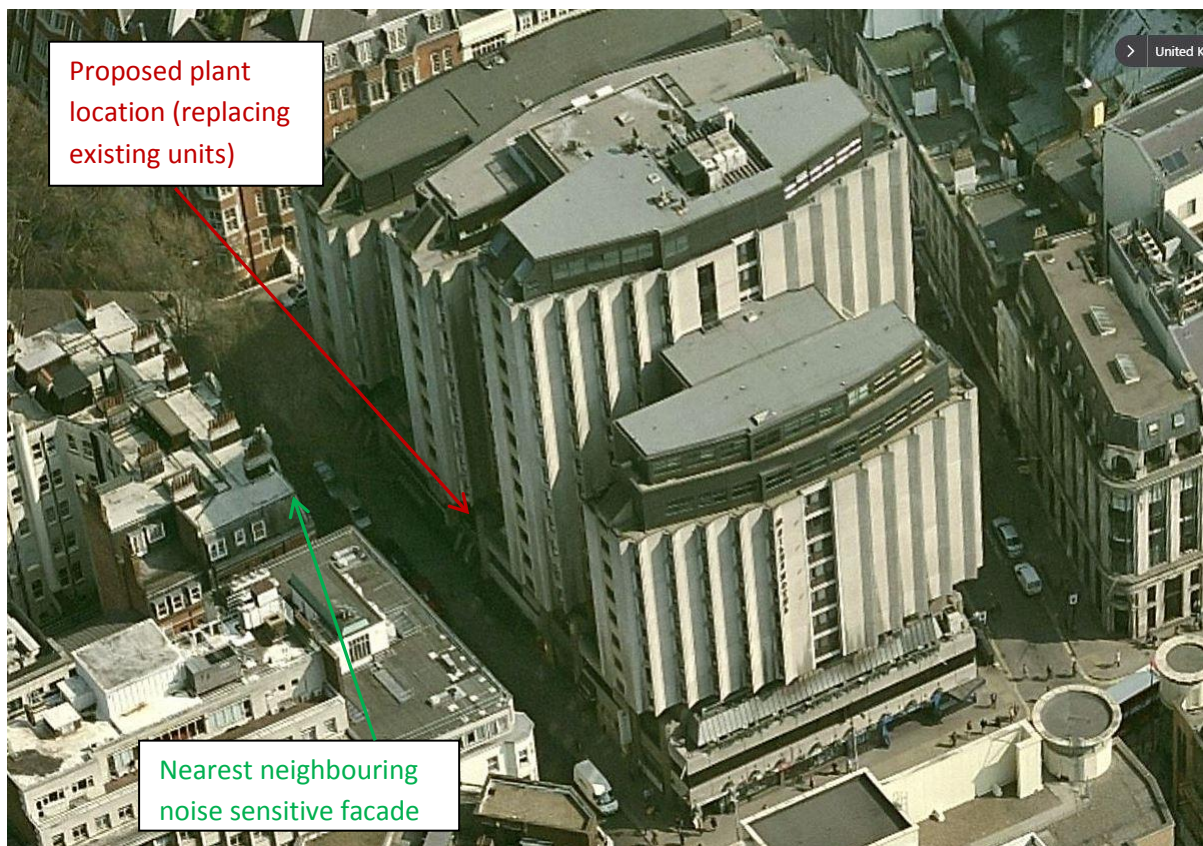
1.0 Introduction

- 1.1 Holtz Acoustics have been commissioned to undertake a background noise survey and plant impact assessment for the proposed replacement external heat pump units at the YMCA, 112 Great Russell Street WC1B 3NQ.
- 1.2 As a part of planned internal refurbishment works, an existing external heat pump unit is proposed to be replaced. The existing unit is located on a balcony area on Bedford Avenue.
- 1.3 A background noise survey has been undertaken at a location representative of the noise environment at the nearest noise sensitive windows.
- 1.4 The proposed items of plant will be assessed in accordance with Camden's noise policies.
- 1.5 The results of this background noise survey and plant impact assessment are presented in the following sections of this report together with supporting Appendices.
- 1.6 The author of this report is a member of the Institute of Acoustics, the professional body for acoustic consultants in the UK.

2.0 Site

- 2.1 The YMCA is located on the basement floors of the building at 112 Great Russell Street.
- 2.2 112 Great Russell Street is located on the corner of Great Russell Street and the A400 Tottenham Court Road. The building is approximately 100m north of Tottenham Court Road Underground Station.
- 2.3 The surrounding area comprises predominantly commercial properties with some residential properties. The noise environment is made up of road traffic noise along the A400, including numerous buses and activity noise from cafes and busy nearby pedestrian areas.
- 2.4 It is proposed that the plant is located in a dedicated plant area on the balcony at second floor level to the north of the building. The location is indicated in Figure 1.
- 2.5 The nearest residential windows that are not a part of the same building at the YMCA are located at the properties across Bedford Avenue.
- 2.6 Figure 1 below shows an aerial view of the site and photographs of the proposed plant area, the survey location and the nearest noise sensitive windows.

Figure 1: Site views and photographs of proposed plant area



Nearest neighbouring
noise sensitive facade



3.0 Assessment Criteria

- 3.1 Camden's Local Development Framework Core Strategy states that in order to protect amenity, specific Development Policies are used to approach specific issues such as the impact of sound and vibration and references policy DP28.
- 3.2 Camden's Development Policy DP28 states the following.

Table E: Noise levels from plant and machinery at which planning permission will not be granted

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dB _{LAeq}

Taken from Camden Local Development Framework, Camden Development Policies, Adopted Version 2010

- 3.2 The Table states that items of plant should not exceed 5dB below the LA90 with relevant penalties for impulsive and tonal behaviour.
- 3.3 The LA90 referenced in the above table is taken to be the lowest measured LA90 during the proposed period of operation as this has historically been Camden's noise policy.

4.0 Background Noise Survey

- 4.1 A background noise survey has been undertaken at a location representative of the nearest noise sensitive windows. The survey was unattended and taken over a 28 hour period.
- 4.2 The sound level meter's microphone was mounted on a tripod and positioned on the balcony of the proposed plant area. Given that the noise environment is dominated by road traffic noise and activity noise this location was deemed representative of the noise levels incident on the nearest noise sensitive windows.
- 4.3 The microphone position is shown in Figure 1.
- 4.4 The survey was undertaken between 1230hrs Friday the 25th November 2016 and 1700hrs Saturday the 26th of November 2016.
- 4.5 Weather monitoring was undertaken on the balcony using an automated weather station, also shown in Figure 3. The weather was generally clear and calm throughout the survey period. Time history graphs of the temperature, wind speed and precipitation are included in Appendix A.
- 4.6 Details of measurement equipment and calibration procedure are included in Appendix B.
- 4.7 There was a small contribution from existing plant ducting to atmosphere in the vicinity of the balcony area, this existing contribution forms a part of the immediate noise environment as the residential windows and has been captured by the survey accordingly.
- 4.8 A summary of the survey results is shown below in Table 1.

Table 1. Summary of survey results

Period	Lowest measured background noise level, L _{A90,5min} (dB)
Day: 0700-2300hrs	50
Night: 2300-0700hrs	49
Proposed operation: 0800-2300hrs	54

- 4.9 The lowest measured background noise level occurred in the early hours of Saturday morning hence the only minor differences between the daytime and night-time lowest background noise levels.

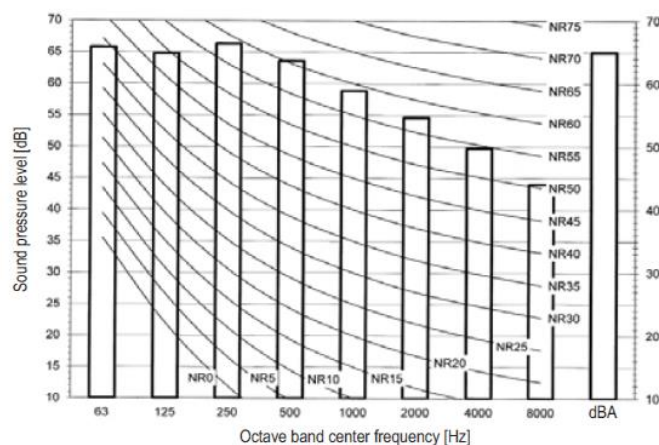
- 4.10 A noise time history is included in Appendix C.
- 4.11 A table of survey results is included in Appendix D.

5.0 Plant Impact Assessment

- 5.1 The plant noise level is required to be at least 5dB below the lowest background level during the proposed period of operation.
- 5.2 The proposed heat pump will only operate during the daytime (0800-2300hrs) and should therefore not exceed 49 dB(A) at the nearest noise sensitive window.
- 5.3 The proposed plant consists of 1 No Daikin RYYQ18T external heat pump unit. The manufacturer's stated sound pressure level for this unit is 65dB(A) at 1m. The unit dimensions are 1685mm x 2540mm x 765mm. Figure 2 shows the manufacturer's measured noise levels taken from the unit technical databook.
- 5.4 The external heat pump runs on a soft start with the fans slowly building up to speed. Therefore no impulsivity penalty has been applied. Well maintained heat pump units are not typically distinctly tonal in nature therefore no tonality correction has been applied.

Figure 2. Manufacturer's noise data

RYYQ18T
RYMQ18T



3D079906

NOTES

1. Data is valid at free field condition
2. Data is valid at nominal operation condition
3. dBA = A-weighted sound pressure level (A-scale according to IEC)
4. Reference acoustic pressures 0dB = 20μPa
5. Measuring position.



- 5.5 The nearest noise sensitive windows are those located on the façade of the building on the corner of Morwell Street and Bedford Avenue. The windows are approximately 18m away with a clear line of sight to the proposed units.
- 5.6 Table 2 below summarises the calculation of plant noise at these windows.

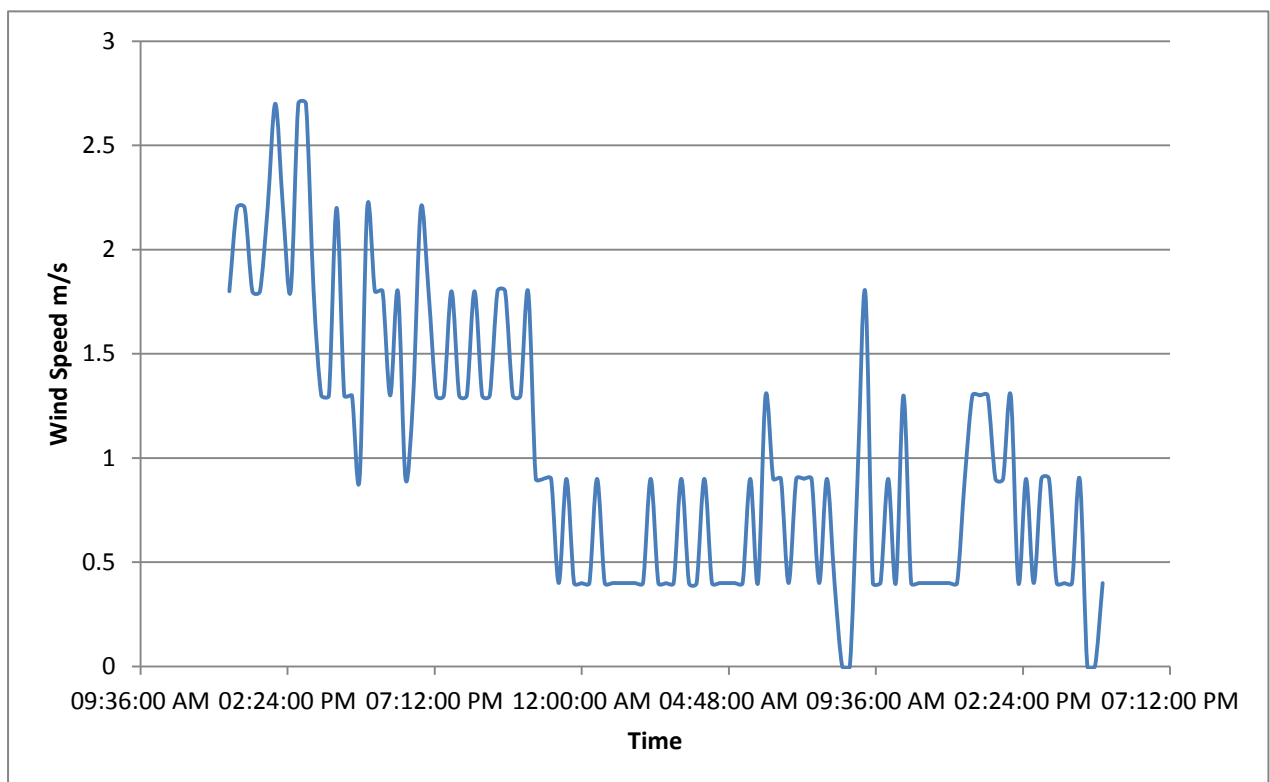
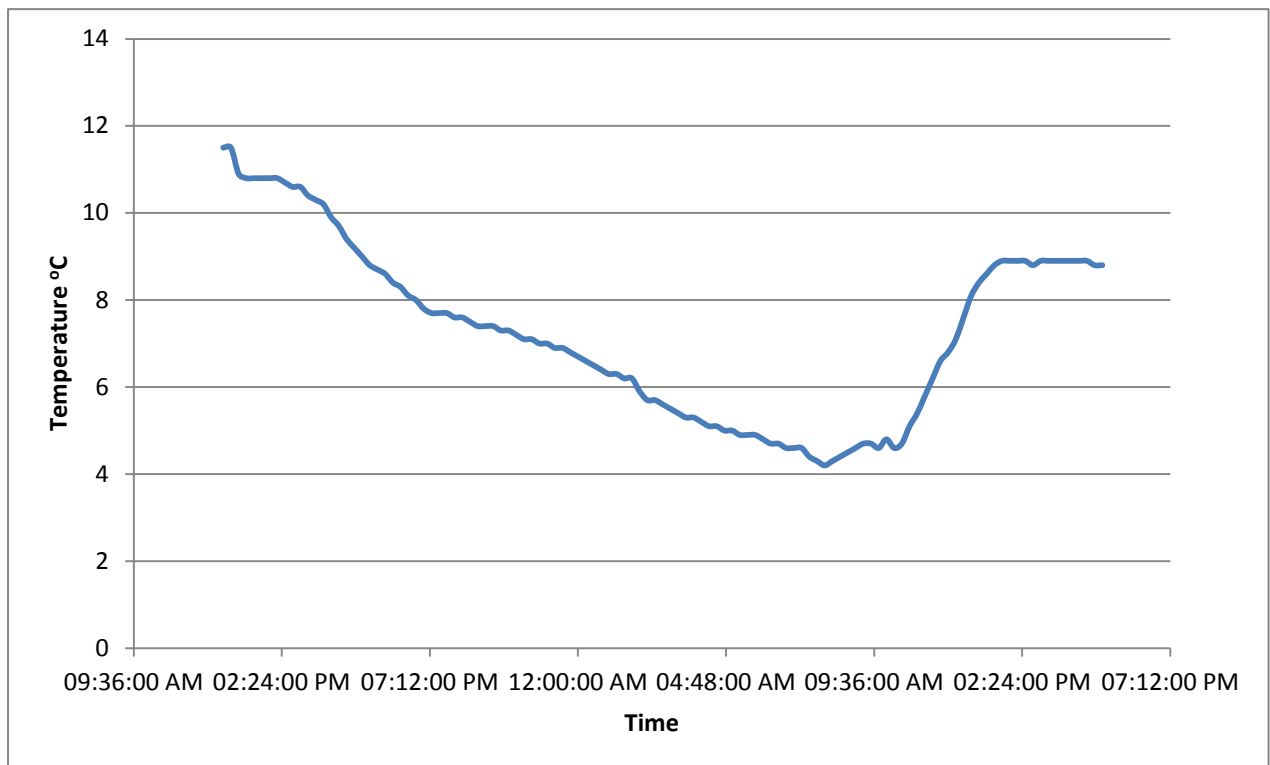
Table 2. Summary of plant noise calculations

Calculation Step	Level (dB)	Comments
Manufacturer's plant noise level	65 dB(A) at 1m	1 No Daikin RYYQ18T
Distance Losses over 18m	-25 dB	Spherical spreading over 18m (directivity factors shown in steps below)
Directivity	+6 dB	2 additional locally reflective surfaces
Level at 1m from nearest noise sensitive windows	46 dB(A)	Façade reflection excluded as survey results included a façade reflection
Design Criterion (0800-2300hrs)	49 dB(A)	Meets criterion by 3dB

6.0 Summary

- 6.1 It is proposed that the existing heat pump unit on the balcony of 112 Great Russell Street is replaced with a similar unit.
- 6.2 It is proposed that the unit is only in operation between 0800-2300hrs.
- 6.3 The plant assessment in Section 5 shows that the proposed unit meets Camden's plant noise limits by 3dB during the proposed period of operation and therefore demonstrates compliance.

Appendix A: Weather Measurements



No precipitation was recorded throughout the survey period

Appendix B: Equipment

The following equipment was used for the survey

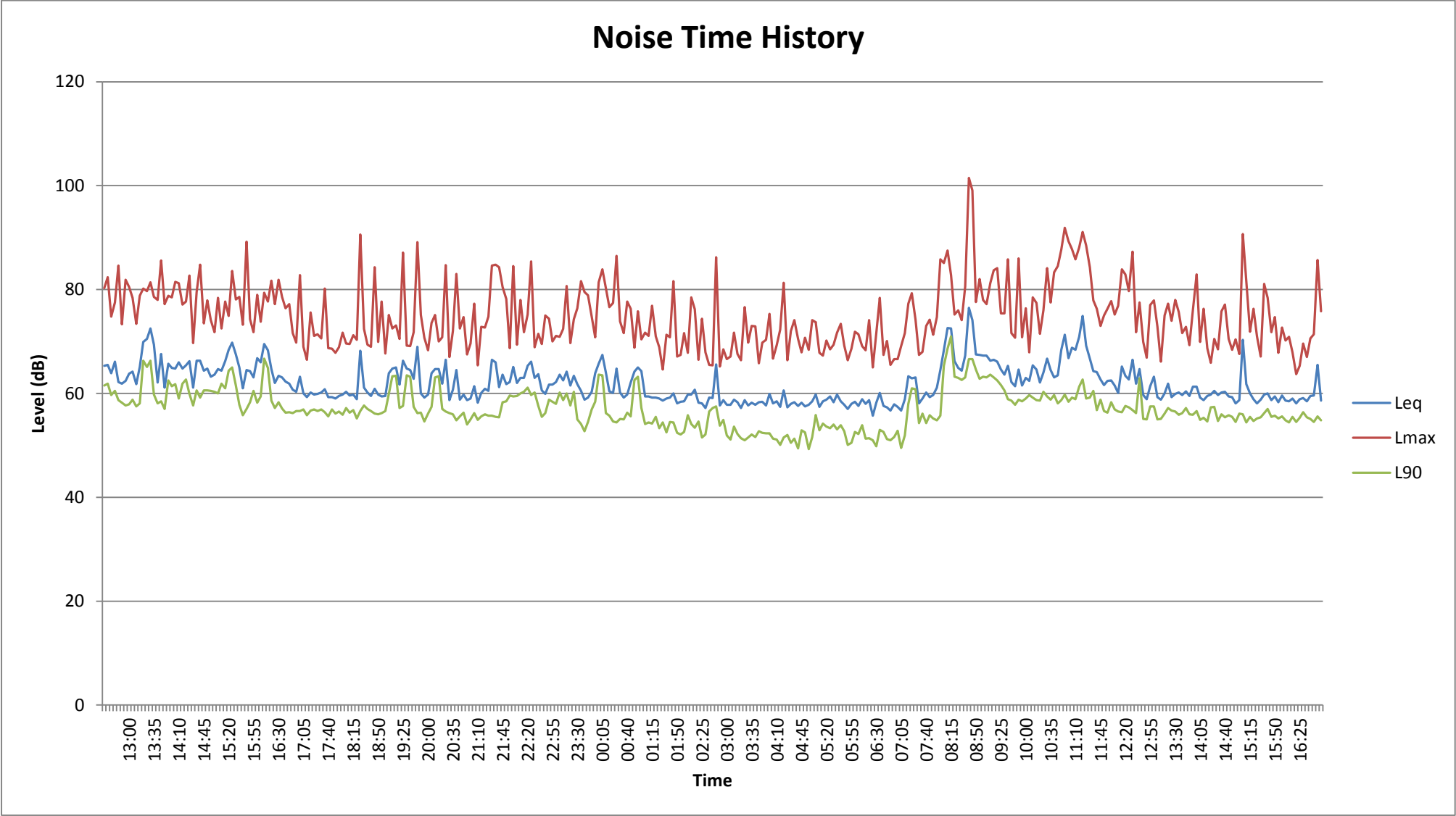
Item	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-52	00643058
Preamplifier	Rion	NH-25	43086
Microphone	Rion	UC-59	06838
Calibrator	Rion	NC-74	34546657
Windshield	Rion	WS-15	na
Weather Station	Davis	Vantage Vue	na

Calibration certificates are available on request.

The sound level meter and associated cabling was calibrated before and after the survey and no significant drift from calibration was noted.

The sound level meter was setup up to integrate measurements over a 5 minute time period and recorded L_{eq} , L_{max} , L_{min} and $L_{90,50,10,1}$ statistics.

Appendix C: Noise Time History at Survey Location



Appendix D: Table of Survey Results

Time	L _{Aeq}	L _{Amax}	L _{A90}	L90							
				63	125	250	500	1k	2k	4k	8k
25/11/2016 12:30:03	65	80	62	65	60	58	58	57	55	48	36
25/11/2016 12:35:03	66	82	62	64	59	57	58	57	56	49	37
25/11/2016 12:40:03	64	75	60	65	59	57	58	55	51	44	34
25/11/2016 12:45:03	66	78	61	67	62	59	58	55	51	45	36
25/11/2016 12:50:03	62	85	59	65	58	56	56	54	50	43	33
25/11/2016 12:55:03	62	73	58	65	59	56	56	53	49	42	32
25/11/2016 13:00:03	62	82	58	64	58	56	55	53	48	41	30
25/11/2016 13:05:03	64	81	58	64	60	57	56	52	48	41	31
25/11/2016 13:10:03	64	78	59	65	61	57	56	54	50	44	34
25/11/2016 13:15:03	62	73	58	62	58	55	55	53	48	42	31
25/11/2016 13:20:03	65	79	58	63	60	57	56	53	49	42	31
25/11/2016 13:25:03	70	80	66	68	68	68	61	59	58	51	39
25/11/2016 13:30:03	71	80	65	67	68	66	60	59	57	51	38
25/11/2016 13:35:03	73	81	66	70	70	70	61	60	58	52	39
25/11/2016 13:40:03	69	79	60	66	63	58	56	54	52	45	34
25/11/2016 13:45:03	62	78	58	63	58	56	56	53	49	43	33
25/11/2016 13:50:03	68	86	59	67	62	57	56	54	50	45	36
25/11/2016 13:55:03	61	77	57	62	58	55	55	52	48	42	32
25/11/2016 14:00:03	66	79	63	70	66	60	58	57	53	51	39
25/11/2016 14:05:03	65	79	61	69	65	58	57	57	54	47	35
25/11/2016 14:10:03	65	82	62	72	65	60	57	56	54	49	40
25/11/2016 14:15:03	66	81	59	64	58	57	57	54	50	43	33
25/11/2016 14:20:03	65	77	62	73	67	61	57	56	54	49	40
25/11/2016 14:25:03	65	78	63	73	67	61	58	57	55	49	40
25/11/2016 14:30:03	66	83	60	66	62	58	57	54	50	45	38
25/11/2016 14:35:03	61	70	58	63	58	56	55	52	49	42	31
25/11/2016 14:40:03	66	80	61	66	60	58	58	56	52	46	38
25/11/2016 14:45:03	66	85	59	66	59	57	56	54	51	44	35
25/11/2016 14:50:03	64	74	61	69	67	60	57	55	51	46	36
25/11/2016 14:55:03	65	78	61	68	65	59	57	55	52	46	37
25/11/2016 15:00:03	63	74	61	68	62	59	57	56	51	46	36
25/11/2016 15:05:03	64	72	60	69	66	59	57	55	51	45	36
25/11/2016 15:10:03	65	78	60	67	61	58	57	55	51	46	37
25/11/2016 15:15:03	64	73	62	74	64	59	57	56	55	50	41
25/11/2016 15:20:03	66	78	61	72	65	58	57	55	53	47	38
25/11/2016 15:25:03	68	75	64	71	68	66	61	58	55	49	41
25/11/2016 15:30:03	70	84	65	72	69	65	62	59	55	51	43
25/11/2016 15:35:03	68	78	62	69	62	59	58	56	53	47	38
25/11/2016 15:40:03	65	79	58	64	58	55	55	53	49	43	30
25/11/2016 15:45:03	61	73	56	62	58	55	54	51	46	39	29
25/11/2016 15:50:03	65	89	57	62	57	55	55	52	48	41	30
25/11/2016 15:55:03	64	74	58	65	60	57	56	53	49	43	33
25/11/2016 16:00:03	63	72	61	64	61	58	57	55	53	47	37
25/11/2016 16:05:03	67	79	58	65	59	56	56	53	50	43	33
25/11/2016 16:10:03	66	74	59	68	63	57	56	54	51	45	37
25/11/2016 16:15:03	70	79	67	69	65	63	60	60	61	57	49
25/11/2016 16:20:03	68	78	65	71	65	62	60	58	58	54	45
25/11/2016 16:25:03	65	82	59	66	62	57	56	54	50	43	34
25/11/2016 16:30:03	62	77	57	64	59	55	55	53	47	40	30
25/11/2016 16:35:03	63	82	58	63	59	56	56	53	49	42	32

25/11/2016 16:40:03	63	79	57	63	59	56	55	52	48	42	32
25/11/2016 16:45:03	62	76	56	62	58	55	54	52	47	40	31
25/11/2016 16:50:03	62	77	56	62	58	54	54	51	47	41	31
25/11/2016 16:55:03	61	72	56	62	58	55	54	51	46	39	29
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25/11/2016 17:10:03	60	69	57	66	59	56	55	51	46	40	29
25/11/2016 17:15:03	59	67	56	62	59	54	54	51	45	39	29
25/11/2016 17:20:03	60	76	57	63	59	55	54	52	47	41	30
25/11/2016 17:25:03	60	71	57	65	60	56	55	51	47	40	30
25/11/2016 17:30:03	60	71	57	63	59	55	54	52	47	40	30
25/11/2016 17:35:03	60	71	57	63	60	55	54	52	47	39	28
25/11/2016 17:40:03	61	80	56	63	59	55	54	51	46	39	28
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25/11/2016 17:55:03	59	68	56	61	58	54	54	51	46	39	29
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25/11/2016 22:30:03	66	85	60	64	59	56	56	55	51	42	32
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25/11/2016 23:20:03	64	81	60	66	65	60	57	53	49	43	33
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26/11/2016 00:05:03	66	81	64	67	62	55	53	51	61	50	30
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26/11/2016 00:15:03	64	80	56	62	56	54	52	51	49	43	32
26/11/2016 00:20:03	60	77	56	59	55	53	53	51	47	39	28
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26/11/2016 00:35:03	60	74	55	61	56	53	52	51	45	39	28
26/11/2016 00:40:03	59	72	55	63	56	53	52	50	44	38	28
26/11/2016 00:45:03	60	78	56	64	57	54	53	52	47	40	30
26/11/2016 00:50:03	62	76	56	59	55	52	52	50	45	38	25
26/11/2016 00:55:03	64	69	63	60	56	52	50	46	60	49	26
26/11/2016 01:00:03	65	76	63	60	55	52	52	49	61	50	26
26/11/2016 01:05:03	64	70	57	61	56	54	54	52	48	39	28
26/11/2016 01:10:03	59	72	54	63	57	54	52	49	43	34	24
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