Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton on Thames
Surrey. KT12 2TP
t: 01932 230940
f: 01932 230941
e: info@eecnoisecontrol.co.uk

Project:

Radlett House

Title:

Background Noise Survey and Plant Impact Assessment

quietly moving forward

Environmental Equipment Corporation Ltd
Richmond House, Churchfield Road
Walton on Thames
Surrey. KT12 2TP
t: 01932 230940
f: 01932 230941
e: info@eecnoisecontrol.co.uk

Report Title	Radlett House Background Noise Survey and Plant Impact Assessment
Reference	EEC/EC11656-001
Version	
Issue Date	31 August 2011
Client	Edward Pearce LLP
Author	Jonathan Jones BSc(Hons) Acoustic Consultant
Checked	Tim Meed BSc(Hons) MIOA Technical Director

CONTENTS:

1 INTRODUCTION

1.01 Environmental Equipment Corporation Limited has been commissioned by Edward Pearce LLP to undertake a background noise survey at Radlett House, with a view to ascertaining prevailing background noise levels for the immediate vicinity.

1.02 Proposals are being submitted to Camden Council to install items of air conditioning equipment at the rear of the property. Noise levels from the plant need to be assessed as part of the planning application and are therefore addressed in this report.

1.03 This report is prepared solely for Edward Pearce LLP. Environmental Equipment Corporation Ltd accepts no responsibility for its use by any third party.

2 SITE

2.01 Radlett House is located in Radlett Place, situated set back from the main road. Appendix A shows a plan of the site and indicates the proposed plant location as well as the properties in the surrounding area. There are residential properties located to the east of the site and Primrose Hill lies to the west.

2.02 It is proposed that the plant equipment is to be installed at the rear of the property. The nearest noise sensitive properties are the residential buildings to the east. The nearest noise sensitive windows are the top floor windows that overlook the rear garden. These are located approximately 40m from the proposed plant location, as shown in Figure 1.

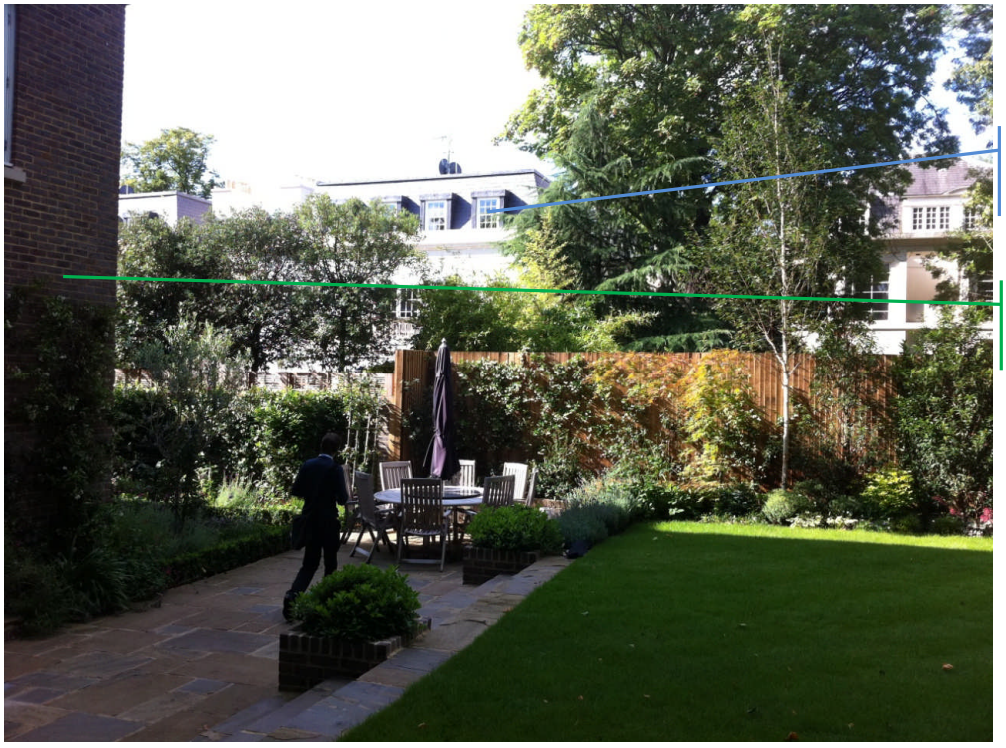


Figure 1: View from the proposed plant location

3 MEASUREMENTS

3.01 Background noise levels have been measured over an extended time period at a suitable location, representative of the immediate noise environment, as shown on the site plan in Appendix A.

3.02 The equipment was set up to integrate sound levels over 5 minute intervals between 0915hrs, Tuesday 10 August and 1100hrs, Wednesday 11 August 2011.

3.03 Levels were recorded as A weighted L_{eq}, L_{10} and L_{90}.

3.04 Weather conditions during the survey were clear and calm throughout.

4 EQUIPMENT

4.01 Equipment for the survey was as follows:-

- Brüel & Kjær type 2238 Integrating Sound Level Meter conforming to type 1 BS EN 60804 & BS EN 60651: 1994.
- Brüel & Kjær Condenser Microphone and Connecting Leads.
- Brüel & Kjær Outdoor Microphone Kit, type UA1404.
- Tripod.

4.02 The equipment holds current UKAS or equivalent accreditation and serial numbers as follows:

Sound Level Meter B&K2238	Serial No.	2736836
	Calibration Date	14th June 2010
	Cal Certificate No.	C1104528
½" Condenser Mic. B&K4188	Serial No.	2760436
	Calibration Date	14th June 2010
	Cal Certificate No.	C1104528
Calibrator B&K4231	Serial No.	1761563
	Calibration Date	23rd March 2010
	Cal. Certificate No.	AC/10/46/01

N.B. Copies of calibration certificates are available upon request.

4.03 The equipment was calibrated both before and after the survey with no difference noted in the levels.

5 RESULTS

5.01 A list of the levels measured is included in Appendix B and represented graphically in Appendix C.

5.02 A summary of the time averaged ambient level and lowest measured background levels are shown in Table 5.1, below.

Period	$L_{Aeq,T}$ – dB	L_{A90} – dB
Day time (0700-1900 hrs)	49.7	37.5
Evening (1900-2300 hrs)	43.5	35.0
Night-time (2300-0700 hrs)	43.2	28.0

Table 5.1: Measured Ambient and Lowest Background Noise Levels

6 DISCUSSION

6.01 Camden Council require that noise levels generated by mechanical services plant should be designed to a level of 5 dB below the lowest measured background level during the proposed period of operation and as measured at the nearest noise sensitive facade.

6.02 Based on the measured noise levels, as summarised in Table 5.1, the applicable criteria for this application will be 5 dB below the lowest background noise levels of 38, 35 and 28 dB(A) for the respective day, evening and night-time periods.

6.03 It is assumed that plant will have the facility to operate 24 hours a day, therefore, noise emitted from the proposed plant should not exceed 23 dB(A) at 1m external of the nearest residential window.

7 PLANT ASSESSMENT

7.01 The proposed plant consists of a Daikin RXYHQ12P8W1B condenser unit. The manufacturer's published noise level for this unit is 60 dB(A) at 1m free-field. It is proposed to install the unit in an acoustic enclosure.

7.02 Allowing for distance attenuation over 40m and the acoustic enclosure, the cumulative plant noise level outside the windows of the properties to the west has been calculated to be 23 dB(A), as indicated below.

Element	Level	Comments
Cumulative Source Noise	60 dB(A)	1 No. Unit – SPL at 1m
Distance Attenuation	- 27 dB	Conformal area losses over 40m
Directivity	+ 3 dB	1 additional reflective surfaces
Acoustic enclosure	-13 dB	Including exhaust silencers
Propagated Noise	23 **dB(A)**	1m outside residential windows

Table 7.1: Plant Noise Calculation

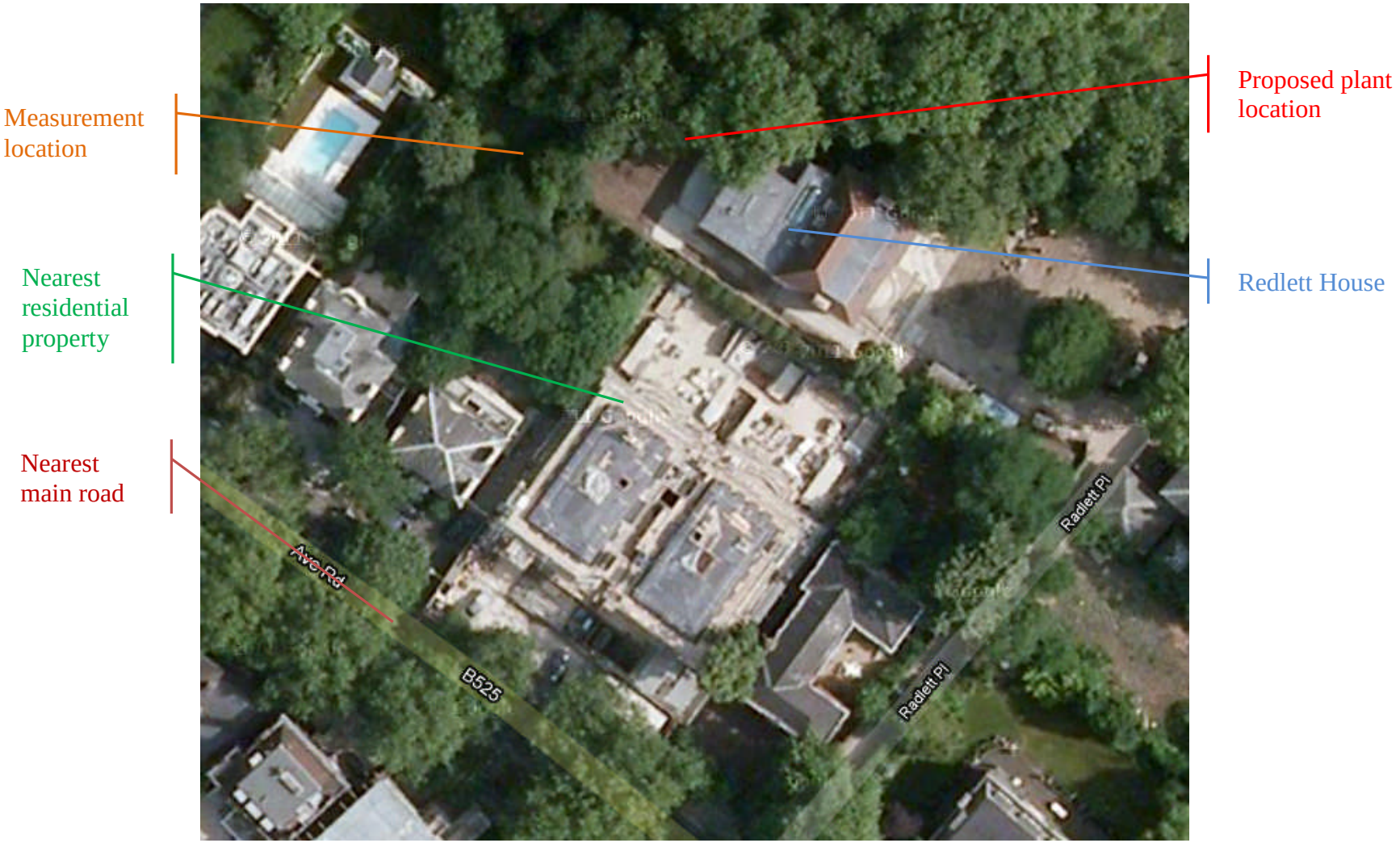
7.03 As discussed in section 6 of this report, the applicable noise level design criterion for the proposed new plant has been set at 23 dB(A) outside the nearest noise sensitive windows.

7.04 The calculated plant noise levels do not exceed the design criterion and therefore satisfy the planning requirements of Camden Council.

7.05 EEC Ltd will work alongside the Messrs Edward Pearce to ensure that an acoustic enclosure is designed to meet the design criteria.

APPENDIX A

SITE PLAN
&
MEASUREMENT LOCATION


Measurement location
Nearest residential property
Nearest main road
Proposed plant location
Redlett House
Ayot Rd
B525
Radlett Pl
Radlett Pl

APPENDIX B

SURVEY RESULTS
(TABULAR)

EC 11656 - Redlett House

Edward Pearce

24 Hour Noise data

Time	$L_A$eq	L_A10	L_A90
09:15	53	53	44
09:20	49	51	46
09:25	49	52	44
09:30	47	49	45
09:35	47	49	45
09:40	47	49	45
09:45	46	49	43
09:50	52	55	45
09:55	51	55	46
10:00	49	50	47
10:05	49	51	46
10:10	47	51	42
10:15	48	51	44
10:20	52	56	44
10:25	45	47	43
10:30	49	52	45
10:35	47	49	45
10:40	48	49	45
10:45	48	50	45
10:50	46	47	44
10:55	46	48	42
11:00	45	48	43
11:05	45	47	43
11:10	53	57	45
11:15	53	58	44
11:20	48	51	44
11:25	53	56	48
11:30	53	58	46
11:35	55	58	47
11:40	53	56	46
11:45	52	55	46
11:50	49	53	45
11:55	48	49	44
12:00	55	59	47
12:05	51	55	46
12:10	52	57	44
12:15	47	49	43
12:20	45	46	42
12:25	50	52	42
12:30	47	50	43
12:35	48	51	43
12:40	51	56	42
12:45	44	46	43
12:50	54	57	45
12:55	51	56	42
13:00	49	50	44
13:05	51	54	44
13:10	46	49	43

Time	$L_A$eq	L_A10	L_A90
13:15	46	48	44
13:20	49	52	43
13:25	47	50	43
13:30	53	57	45
13:35	50	55	45
13:40	48	51	41
13:45	50	54	44
13:50	58	61	47
13:55	52	56	46
14:00	50	52	48
14:05	51	53	48
14:10	47	49	43
14:15	46	49	43
14:20	47	50	44
14:25	47	50	44
14:30	46	49	41
14:35	47	50	43
14:40	47	50	43
14:45	48	51	43
14:50	45	47	42
14:55	44	47	42
15:00	43	45	41
15:05	50	52	43
15:10	52	55	47
15:15	58	62	47
15:20	52	56	44
15:25	46	48	43
15:30	55	59	43
15:35	53	58	45
15:40	55	60	49
15:45	56	61	46
15:50	54	56	50
15:55	57	61	45
16:00	58	62	52
16:05	50	48	43
16:10	49	51	45
16:15	48	50	47
16:20	47	48	46
16:25	45	48	42
16:30	44	45	42
16:35	46	48	43
16:40	44	46	41
16:45	45	46	43
16:50	44	46	43
16:55	45	47	44
17:00	46	48	43
17:05	43	44	41
17:10	45	47	42

EC 11656 - Redlett House

Edward Pearce

24 Hour Noise data

Time	$L_A$eq	L_A10	L_A90
17:15	45	47	42
17:20	44	45	41
17:25	45	47	42
17:30	44	47	41
17:35	47	51	41
17:40	43	45	41
17:45	45	46	43
17:50	47	49	42
17:55	45	47	43
18:00	44	45	42
18:05	46	48	41
18:10	43	45	40
18:15	44	45	41
18:20	49	52	43
18:25	43	44	42
18:30	44	46	42
18:35	43	45	41
18:40	54	55	42
18:45	43	44	41
18:50	43	45	42
18:55	54	53	40
19:00	42	44	40
19:05	43	45	41
19:10	43	45	40
19:15	41	43	39
19:20	43	44	40
19:25	42	44	39
19:30	43	45	39
19:35	41	43	38
19:40	45	48	41
19:45	42	44	39
19:50	41	43	38
19:55	42	44	39
20:00	42	44	38
20:05	43	46	38
20:10	42	44	39
20:15	41	43	39
20:20	43	46	40
20:25	41	44	37
20:30	40	42	38
20:35	39	41	35
20:40	42	45	37
20:45	47	48	37
20:50	48	52	37
20:55	44	47	36
21:00	40	42	37
21:05	47	51	39
21:10	49	53	37

Time	$L_A$eq	L_A10	L_A90
21:15	40	42	37
21:20	42	43	38
21:25	42	45	37
21:30	48	52	38
21:35	44	49	37
21:40	44	47	39
21:45	44	46	37
21:50	42	45	36
21:55	39	42	36
22:00	42	45	38
22:05	39	41	36
22:10	41	44	36
22:15	40	43	37
22:20	52	57	37
22:25	39	42	36
22:30	40	42	36
22:35	39	41	37
22:40	40	42	37
22:45	39	42	36
22:50	39	41	36
22:55	42	46	37
23:00	39	41	37
23:05	39	42	36
23:10	39	42	36
23:15	38	39	36
23:20	39	41	36
23:25	39	41	38
23:30	38	40	36
23:35	39	41	37
23:40	41	44	35
23:45	36	38	34
23:50	37	39	34
23:55	46	48	36
00:00	49	49	47
00:05	47	48	47
00:10	47	48	47
00:15	43	48	34
00:20	40	44	36
00:25	36	38	34
00:30	52	53	34
00:35	36	39	34
00:40	35	37	33
00:45	36	40	32
00:50	56	53	32
00:55	36	37	33
01:00	36	38	34
01:05	36	39	33
01:10	34	38	31

EC 11656 - Redlett House

Edward Pearce

24 Hour Noise data

Time	$L_A$eq	L_A10	L_A90
01:15	34	38	31
01:20	33	36	31
01:25	40	41	31
01:30	35	38	31
01:35	32	34	30
01:40	32	33	30
01:45	32	35	29
01:50	33	36	29
01:55	42	44	29
02:00	44	44	43
02:05	43	45	31
02:10	34	37	30
02:15	34	36	31
02:20	37	40	30
02:25	36	39	30
02:30	32	35	29
02:35	32	35	29
02:40	36	40	30
02:45	33	35	30
02:50	32	34	28
02:55	44	48	28
03:00	46	49	43
03:05	45	49	30
03:10	32	34	30
03:15	33	35	30
03:20	32	35	29
03:25	33	36	30
03:30	33	36	30
03:35	30	32	29
03:40	30	32	28
03:45	31	32	29
03:50	32	35	30
03:55	34	37	30
04:00	34	38	29
04:05	33	35	30
04:10	33	37	30
04:15	32	35	29
04:20	35	40	29
04:25	33	35	30
04:30	39	43	29
04:35	35	38	30
04:40	35	38	30
04:45	34	37	30
04:50	36	39	30
04:55	36	39	30
05:00	38	42	31
05:05	46	51	32
05:10	45	48	32

Time	$L_A$eq	L_A10	L_A90
05:15	44	41	32
05:20	44	44	32
05:25	41	43	33
05:30	37	41	32
05:35	37	40	32
05:40	37	40	32
05:45	43	46	32
05:50	49	51	36
05:55	40	43	34
06:00	44	47	36
06:05	44	47	36
06:10	44	48	36
06:15	38	42	34
06:20	47	52	36
06:25	44	43	35
06:30	52	52	39
06:35	42	44	36
06:40	48	49	38
06:45	51	55	39
06:50	47	50	39
06:55	41	44	37
07:00	44	46	39
07:05	45	47	38
07:10	43	45	39
07:15	44	46	40
07:20	44	46	41
07:25	44	46	40
07:30	45	49	40
07:35	48	51	40
07:40	49	53	40
07:45	43	45	40
07:50	44	46	41
07:55	43	46	39
08:00	42	44	39
08:05	51	47	41
08:10	42	44	39
08:15	43	45	42
08:20	44	46	42
08:25	44	46	41
08:30	51	54	43
08:35	44	46	41
08:40	51	53	42
08:45	48	50	44
08:50	48	50	43
08:55	49	51	43
09:00	50	54	43
09:05	46	47	43
09:10	49	53	44

EC 11656 - Redlett House

Edward Pearce

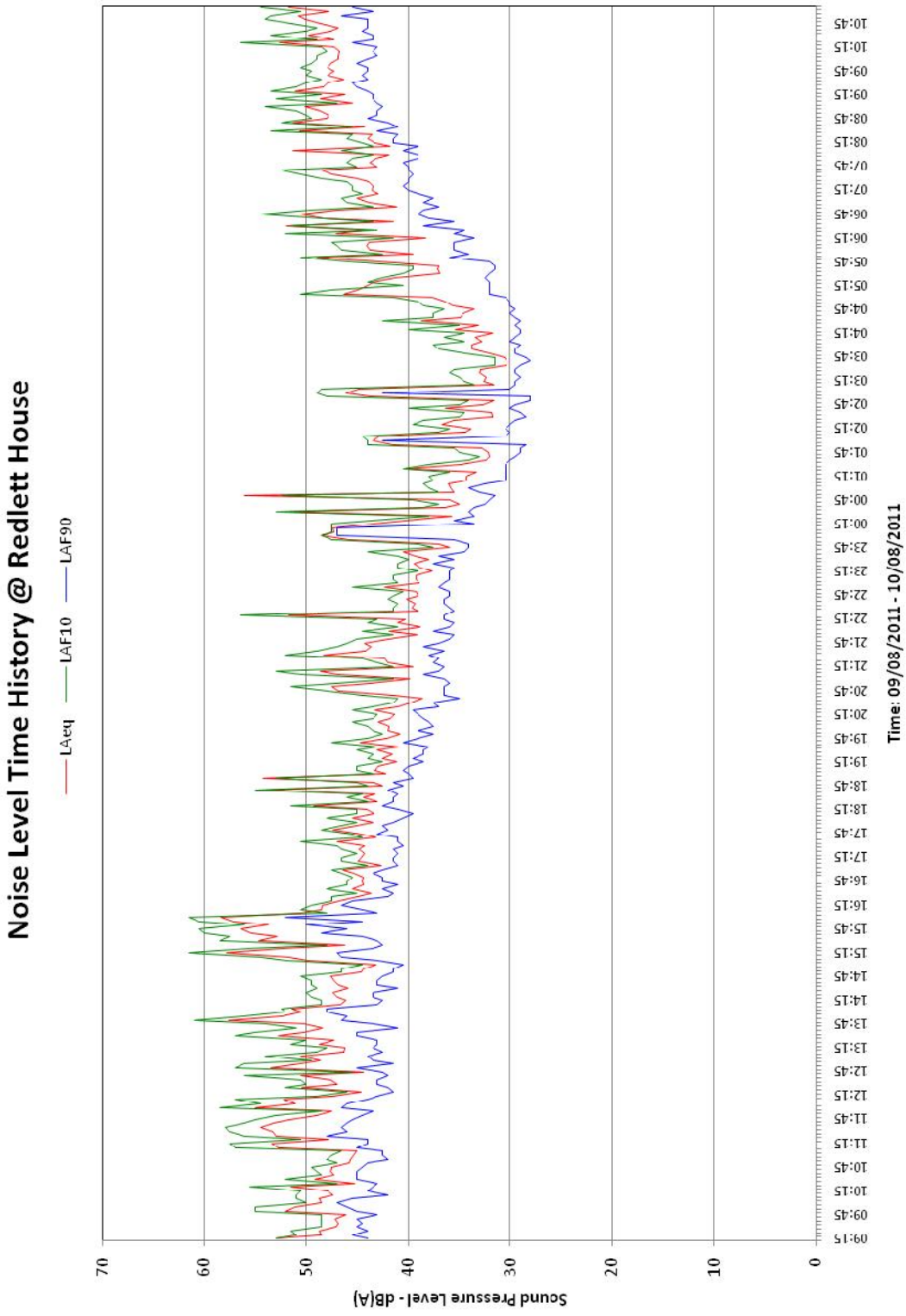
24 Hour Noise data

Time	$L_A$eq	L_A10	L_A90
09:15	*46*	*49*	*44*
09:20	*51*	*54*	*44*
09:25	*48*	*51*	*45*
09:30	*48*	*50*	*46*
09:35	*46*	*49*	*44*
09:40	*48*	*50*	*45*
09:45	*47*	*50*	*44*
09:50	*48*	*51*	*44*
09:55	*48*	*50*	*45*
10:00	*47*	*49*	*44*
10:05	*47*	*49*	*43*
10:10	*47*	*48*	*44*
10:15	*47*	*49*	*43*
10:20	*53*	*57*	*46*
10:25	*47*	*49*	*44*
10:30	*50*	*54*	*44*
10:35	*48*	*50*	*45*
10:40	*47*	*49*	*44*
10:45	*49*	*52*	*44*
10:50	*50*	*54*	*44*
10:55	*51*	*54*	*47*
11:00	*48*	*51*	*44*
11:05	*52*	*55*	*46*

Time	$L_A$eq	L_A10	L_A90

APPENDIX C

SURVEY RESULTS
(GRAPHICAL)



APPENDIX D

GLOSSARY OF TECHNICAL TERMS

TECHNICAL TERMS AND UNITS

Decibel (dB) - This is the unit used to measure sound. The human ear has an approximately logarithmic response to sound over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). We therefore use a logarithmic scale to describe sound pressure levels, intensities and power levels. The logarithms used are to base 10; hence, an increase of 10 dB in sound pressure level corresponds to a doubling in perceived loudness of the sound.

Sound Power Level (PWL) - This is a function of the noise source alone and is independent of its surroundings. It is a measure of the amount of sound power output measured in decibels.

Sound Pressure Level (SPL) - This is a function of the source and its surroundings and is a measure of the sound pressure at a point in space. For example, a sound pressure level measured at 1 metre from a sound source of certain sound power in reverberant room will not be the same as the sound pressure level a 1 metre from the sound source measured in open space.

Octave and One-Third Octave Bands - The human ear is sensitive to sound over a range of approximately 20 Hz to 20 KHz and is generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum is divided into frequency bands and the sound pressure level is measured in each band. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it. For finer analysis, each octave band may be split into one-third octave bands.

"A" Weighting - A number of frequency weightings have been developed to imitate the ear's varying sensitivity to sound of different frequencies. The most commonly used weighting is the "A" weighting. The "A" weighted SPL can be measured directly or derived from octave or one-third octave band SPLs. The result is a single figure index which gives some idea of the subjective loudness of the sound, but which contains no information as to its frequency content.

Noise Rating (NR) Curves - The "A" weighted sound pressure level cannot be used to define a spectrum or to compare sounds of different frequencies. NR curves convey frequency information in a single-figure index. This is done by defining the maximum permissible sound pressure level at each frequency for each curve. To measure the noise rating of a given environment, the SPL is measured in octave or one-third octave bands and the noise rating is then the highest NR curve touched by the measured levels.

Intermittency and Time-Weighting - The degree of annoyance caused by a noise also depends on its duration and intermittency of a noise. Intermittent, impulsive or repetitive noises tend to be more annoying than continuous noises. Various time-weightings have been derived to measure sounds of differing intermittences and these can be measured directly on modern equipment. The most common time-weightings in use are as follows:-

L_{90} This is the sound pressure level exceeded for 90% of the measurement period. It is widely used to measure background noise levels.

L_{10} This is the sound pressure level exceeded for 10% of the measurement period. It is widely used to measure traffic noise. For a given measurement period, the L_{10} level is by definition greater than or equal to the L_{90} level.

L_{eq} The equivalent continuous noise level is often used to measure intermittent noise. It is defined as the notional steady noise level that would contain the same acoustic energy as the varying noise. Because the averaging process used is logarithmic, the L_{eq} level tends to be dominated by the higher noise levels measured.