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1 RANULF ROAD
LONDON

PLANT NOISE IMPACT ASSESSMENT

Technical Report: R5519-1 Rev 1

Date: 22nd January 2015

For: MarketingHut
3 Rosemont Road
London
NW3 6NG

24 Acoustics Document Control Sheet

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Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved for Issue	Chris McConnell	Stephen Gosling
1	Updated to reflect latest drawings and plant location	Chris McConnell	Stephen Gosling

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by MarketingHut to undertake a noise impact assessment in relation to proposed outdoor air-conditioning units at 1 Ranulf Road, London.

1.2 Accordingly this noise impact assessment has included:

- Background noise monitoring
- Determination of external noise limits for new plant
- Assessment of noise levels from the proposed plant

1.3 This report presents the results of the assessment, following a site visit and background noise survey undertaken between the 8th and 11th December 2014.

1.4 All noise levels in this report are presented in dB relative to 20μPa.

2.0 SITE DESCRIPTION

2.1 Ranulf Road is located to the west of the A41 Finchley Road, within the London Borough of Camden. 1 Ranulf Road is a detached three-storey house and the surrounding properties are residential in nature.

2.2 It is proposed to extend and refurbish the property and, as part of the works, two outdoor air-conditioning units are proposed, to be located underneath the external staircase at the rear of the property. It is understood that the plant is proposed to operate according to demand, over 24 hours.

2.3 Other residential properties are located on Ranulf Road. The closest residential windows to the proposed plant are at a distance of approximately 11m, at 1A Ranulf Road to the east of the site.

3.0 CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions, while recognising that many developments will create some noise.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

3.4 The NPPF and NPSE documents do not refer to specific noise criteria. When considering the impact of noise from new plant 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 4142: 2014 are adopted.

BS 4142: 2014

3.5 BS 4142:2014 [Reference 3] has recently been published and replaced BS 4142:1997. The standard provides a method for rating the effects of industrial and commercial sound on residential areas.

3.6 The standard advocates a comparison between the typical measured L_{A90} background noise (sound) level and L_{Aeq} (sound) noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.

3.7 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background noise (sound) level, this is an indication of the specific sound source having a low impact (depending upon the context).

Local Authority Requirements

3.8 London Borough of Camden's Development Policy DP28 'Noise and Vibration' [Reference 4] provides guidance on the control of noise and vibration through planning. The policy states "Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted".

3.9 Specifically in relation to plant and machinery, Policy DP28 states "The Council will only grant permission for plant and machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds."

3.10 The London Borough of Camden's requirements for noise from fixed plant are stated in Table E of DP28 which states that, for noise from plant and machinery, at 1 metre external to a sensitive façade the noise level should be 5 dB below the minimum external background noise level (dB $L_{A90,\ 15\ min}$). Where noise from the plant has a distinctive tonal or impulsive nature, the limits should be reduced by 5 dB (i.e. 10 dB below the minimum external background noise level). The daytime period is assessed between 07:00-19:00 hours, evening period between 19:00-23:00 hours and night time period between 23:00-07:00 hours.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS AND RESULTS

4.1 A background noise survey was undertaken on site from the 8th to the 11th December 2014. The microphone was installed at ground floor level, at the location shown in Figure 1. The measurement location used is considered representative of the nearest noise sensitive properties.

4.2 Ambient noise levels were measured using the following equipment:

Rion (Type 1) precision grade sound level meter	Type NL-31;
Bruel and Kjaer acoustic calibrator	Type 4231.

4.3 The instrumentation was configured to continuously measure and store overall A-weighted statistical parameters including L_{Aeq} and L_{A90} (all measured on fast response) in 5 minute intervals. Measurements were made in accordance with BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 5].

4.4 The instrumentation at the measurement location was equipped with an environmental microphone and an extension cable. The instrument was powered by external batteries and stored in a weatherproof case. The calibration of the instrumentation was checked before and after the tests and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards. The weather at the start and end of the survey period was dry and the wind speed was less than 5 m/s. The weather during the survey period was variable, with some periods of precipitation which have been excluded from the analysis.

Results

4.5 The measured noise levels are shown graphically in Appendix B. The prevailing background noise levels on site were noted to be affected by noise from distant road traffic and occasional aircraft movements.

4.6 The measured background noise levels have been processed to obtain 15-minute values in order to derive plant noise emission limits in accordance with Camden Council's requirements.

4.7 For the purposes of this assessment, the background noise level for design purposes is 38 dB $L_{A90,\ 15\ minute}$.

Assessment

4.8 The London Borough of Camden requires that the noise level of the plant should be at least 5 dB below the existing background noise level ($L_{A90\ 15\ minute}$) at the nearest noise sensitive premises. Therefore the external plant noise limit for 24-hour operation, to be achieved at 1m from the nearest noise sensitive façade, is 33 dB $L_{Aeq\ 15\ minute}$.

4.9 The above limit should be reduced by 5 dB if noise from the plant has a distinctive tonal or impulsive nature.

5.0 PLANT NOISE ASSESSMENT

5.1 The proposed plant will comprise two Daikin external air-conditioning units, model numbers as follows:

- 1 x Daikin EVLQ08CV3
- 1 x Daikin RXYSQ6P8V1

5.2 It is understood that the plant units will be located underneath the external staircase at the rear of the property, at basement level. The nearest noise-sensitive windows are at 1A Ranulf Road to the east, at a distance of approximately 11m from the proposed plant. The plant location and nearest windows are shown in Figure 2.

5.3 The manufacturer's data states that the Daikin RXYSQ6P8V1 outdoor unit has an overall sound pressure level of 53 dBA at 1m in cooling mode and 55 dBA at 1m in heating mode. The octave-band sound pressure levels for heating mode have therefore been used, as a worst-case assessment and these are presented in Table 1 below.

Sound Pressure Level (dB) at 1m, at Octave Band Centre Frequency (Hz)								**SPL**
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
65	57	57	53	50	45	38	33	**55**

Table 1 - Daikin RXYSQ6P8V1 Unit - Octave band Sound Pressure Levels (Heating Mode)

5.4 The manufacturer's stated sound pressure levels for the Daikin EVLQ08CV3 outdoor unit (heating mode) are presented in Table 2 below.

Sound Pressure Level (dB) at 1m, at Octave Band Centre Frequency (Hz)								**SPL**
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
52	51	48	46	45	39	35	35	**49**

Table 2 - Daikin EVLQ08CV3 Unit - Octave band Sound Pressure Levels (Heating Mode)

5.5 Based on the manufacturer's stated plant noise levels, calculations have been undertaken to determine the plant noise level at the nearest noise sensitive windows. The calculations have taken into account geometric spreading and the acoustic screening effects from the intervening building. Appendix C presents a summary of the calculations to the nearest windows of the adjacent properties at 1A Ranulf Road.

5.6 BS 4142: 2014 states that certain acoustic features can increase the significance of impact, and where such features are present at the assessment location a character correction should be applied to determine the rating level. The rating correction is determined based upon the impulsivity, tonality and intermittency of the sound source. Based on the octave-band data values in Tables 1 and 2, and from experience of similar units on site, the proposed plant units are not expected to exhibit tonal, impulsive, intermittent or other distinctive characteristics; therefore no character correction has been applied to the calculations.

5.7 Calculations indicate that, with the plant in operation, the total plant noise level at the nearest noise sensitive property would be 32 dB $L_{Aeq,\ 15\ minute}$. This noise level does not exceed the established 24-hour limit of 33 dB $L_{Aeq,\ 15\ minute}$ and would therefore be acceptable and in line with the requirements of London Borough of Camden.

5.8 BS 4142: 2014 requires uncertainty to be considered as part of the assessment. At this site an extended background noise survey has been undertaken over several days and the data has been analysed to ensure that any influences from meteorological conditions have been removed from the assessment. The calibration of the sound level meter was verified before and after the survey and no significant drift in calibration was recorded. Standard acoustic theory has been used in the noise propagation calculations, using geometric divergence and acoustic screening only. It is therefore considered that the uncertainty associated with the assessment is minimal and the results, as stated, are valid.

6.0 CONCLUSIONS

6.1 An assessment of plant noise levels has been carried out at 1 Ranulf Road, London. An environmental noise survey has been undertaken to determine the existing background noise levels at the nearest noise sensitive premises.

6.2 Based upon the survey results and Local Authority requirements, limiting criteria applicable to noise from the installation of external plant have been established.

6.3 Calculations have been undertaken to determine the plant noise levels at the nearest noise sensitive property. The assessment has demonstrated that noise from the plant will not exceed the established noise limit at the nearest noise sensitive property, and will therefore comply with the requirements of London Borough of Camden.

REFERENCES

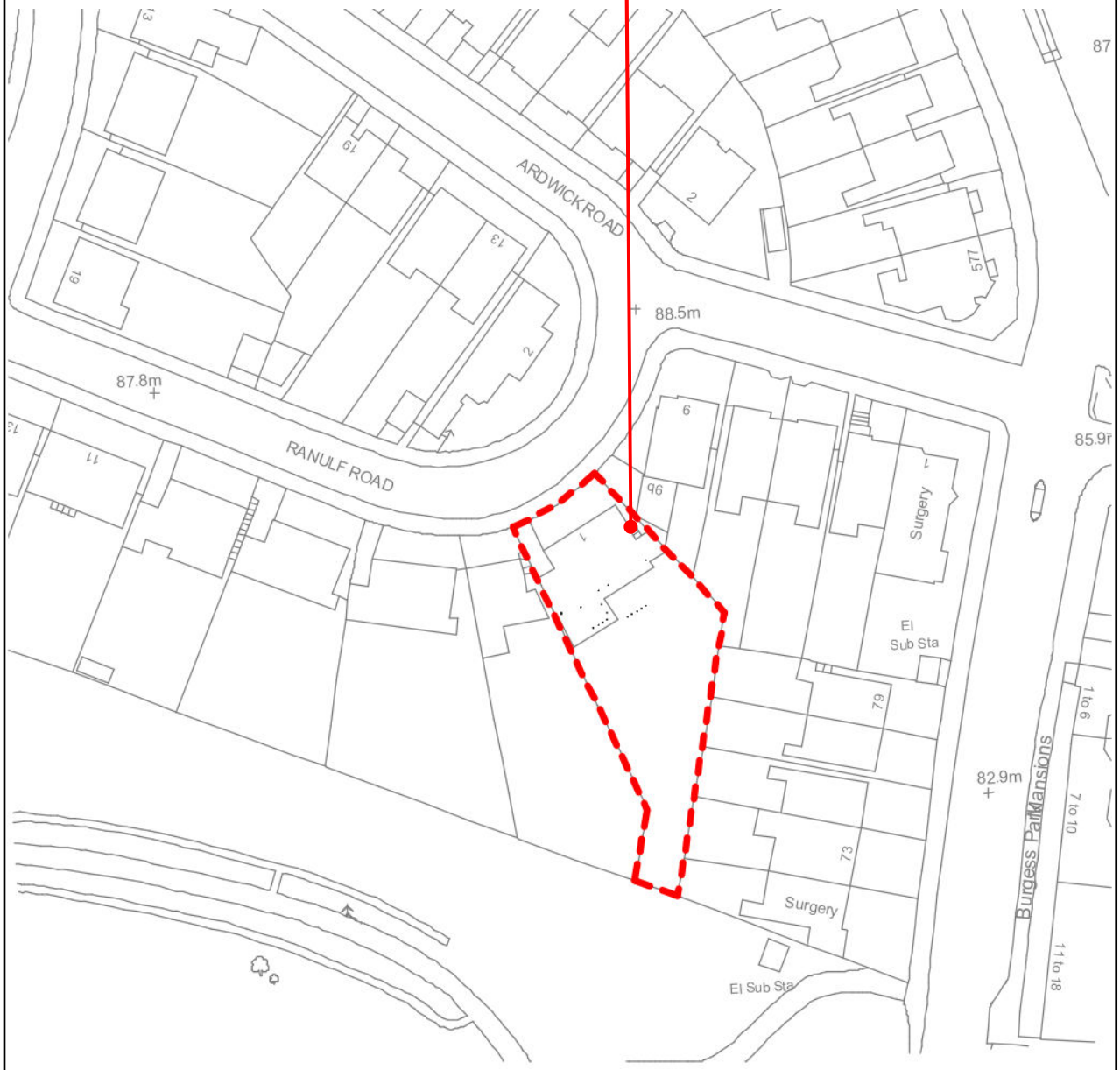
1. Department for Communities and Local Government. National Planning Policy Framework, March 2012.

2. DEFRA, Noise Policy Statement for England, March 2010.

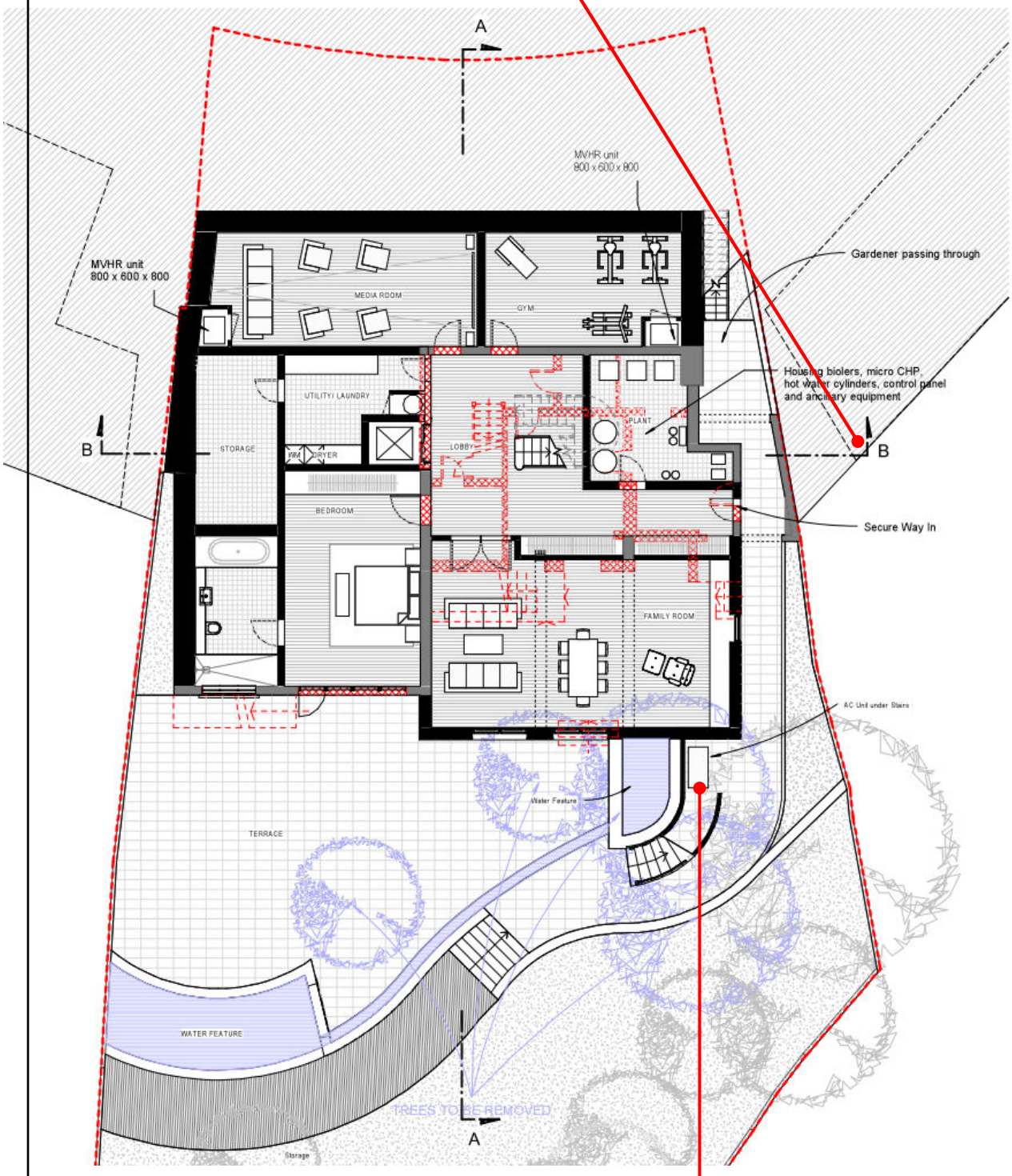
3. British Standards Institution. British Standard 4142. Methods for Rating Industrial and Commercial Sound, 2014.

4. Camden Development Policies 2010-2025, Development Policy DP28 'Noise and Vibration'

5. British Standards Institution. British Standard 7445: 1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use'



Project: 1 Ranulf Road, London	**Description:** Site Location Plan and Noise Measurement Location		
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A	
Date: January 2015	**Drawn By:** CM	**Job No:** 5519-1	



Project: 1 Ranulf Road, London	**Description:** Proposed Plant Location and Nearest Noise Sensitive Windows	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** B
Date: January 2015	**Drawn By:** CM	**Job No:** 5519-1

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise Levels

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 [2] as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

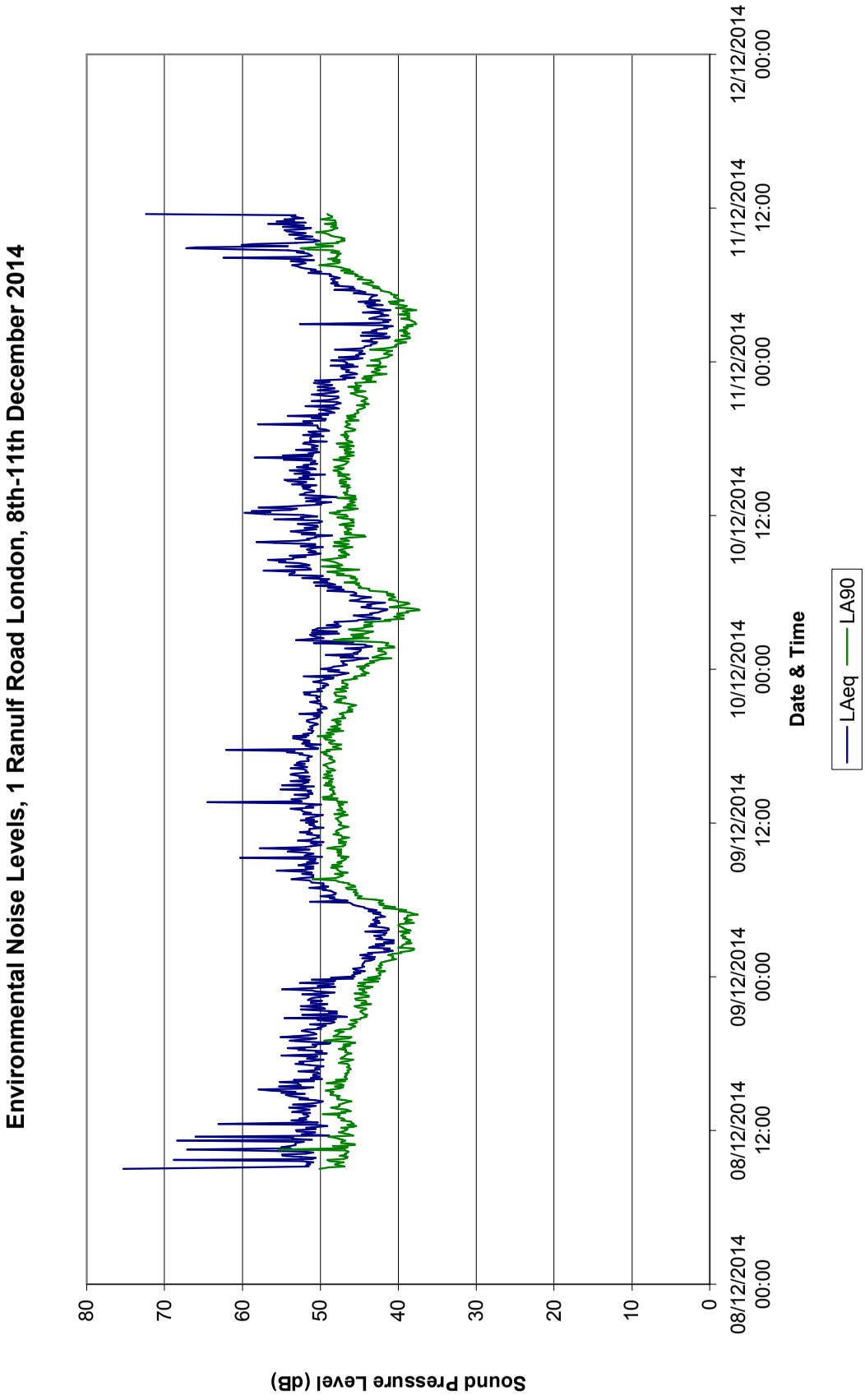
iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: MEASURED NOISE LEVELS



APPENDIX C: PLANT NOISE CALCULATIONS

Calculations of external plant noise to nearest residential windows at 1A Ranulf Road:

Daikin RXYSQ6P8V1	63	125	250	500	1k	2k	4k	8k	dBA
Lp at 1m	65	57	57	53	50	45	38	33	**55**
Correction Lp to Lw	15	15	15	15	15	15	15	15	
distance loss (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
hemispherical	-8	-8	-8	-8	-8	-8	-8	-8	
Screening from building	-7	-8	-9	-10	-11	-14	-16	-16	
Lp at residential window	44	35	34	29	25	17	8	3	**31**

Daikin EVLQ08CV3	63	125	250	500	1k	2k	4k	8k	dBA
Lp at 1m	52	51	48	46	45	39	35	35	**49**
Correction Lp to Lw	14	14	14	14	14	14	14	14	
distance loss (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
hemispherical	-8	-8	-8	-8	-8	-8	-8	-8	
Screening from building	-7	-8	-9	-10	-11	-14	-16	-16	
Lp at residential window	30	28	24	21	19	10	4	4	**23**

TOTAL Lp at window	44	36	35	30	26	18	10	7	**32**