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AVIATION HOUSE
HOLBORN, LONDON

PLANT NOISE ASSESSMENT

Technical Report: R5122-1 Rev 0

Date: 31st March 2014

For: Diverse Building Solutions Ltd
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24 Acoustics Document Control Sheet

Project Title: Aviation House, Holborn, London – Noise Assessment

Report Ref: R5122-1 Rev 0

Date: 31st March 2014

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Document Status and Approval Schedule

Revision	Description	Prepared By	Approved By
0	Approved for Issue	David Coles	Stephen Gosling

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CONTENTS **PAGE**

1.0 INTRODUCTION

1.1 Diverse Building Solutions Ltd intends to apply for planning permission to install additional mechanical plant Aviation House in Holborn, London. 24 Acoustics Ltd has been instructed by Diverse Building Solutions Ltd to undertake a noise assessment to support the application.

1.2 This report presents the results of the assessment, following site visits and a background noise survey undertaken between 19th and 26th March 2014.

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

2.0 SITE DESCRIPTION

2.1 Aviation House is an eight-storey, Government-operated building located in Central London. The building is situated in a mixed retail and commercial area with ambient noise levels controlled by local road traffic, aircraft and existing plant units on surrounding buildings.

2.2 There are a number of existing plant items on the roof of Aviation House, including a large air handling unit and a number of condenser units, all enclosed within an impervious surround. Diverse Building Solutions proposes to install an additional condenser unit within the existing plant area.

2.3 It is understood that the plant may operate for 24 hours a day and this assessment has therefore considered potential noise impact during the daytime and night-time periods.

2.4 Residential properties are located to the rear of Aviation House, with the closest being 15-19 Newton Street, approximately 20 m from the proposed position of the plant unit.

2.5 Figures 1 and 2 show the site layout, proposed location of the condenser unit and the nearest residential windows.

3.0 CRITERIA

NPPF

3.1 The National Planning Policy Framework (NPPF) [Reference 1] was published by the Department for Communities and Local Government in March 2012, and is now effective. This document supersedes PPG 24 [Reference 2] which previously provided guidance on noise relating to planning and new development. For noise, the NPPF policy 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 refers to the Noise Policy Statement for England (NPSE) [Reference 3] 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;
- Where possible, contribute to the improvement of 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 As the NPPF/NPSE do not provide any technical guidance on planning noise limits, it is appropriate to refer to guidelines set out in other standards. 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 upheld of the assessment is undertaken in accordance with British Standard 4142:1997 [Reference 4].

BS 4142

3.5 BS 4142 provides a method for rating the effects of industrial noise on mixed residential and industrial areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} 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 of +5 dB is applied. The standard states that a difference between the rating noise level and the background level of +10 dB indicates that 'complaints are likely', a difference of +5 dB is of 'marginal significance' and a difference of −10 dB is a 'positive indication that complaints are unlikely'.

Local Authority Requirements

3.6 The London Borough of Camden's requirements for noise from fixed plant are as follows. For noise from plant which does not have a distinctive tonal or impulsive nature the local authority's requirement is to set a level 5 dB below the minimum external background noise level (dB $L_{A90,15min}$) 1 metre from the nearest sensitive facade. Where noise from the plant has a distinctive tonal or impulsive nature, the limits should be reduced by 5 dB.

4.0 ENVIRONMENTAL NOISE SURVEY AND RESULTS

4.1 Background noise levels were measured between 19th and 26th March 2014. A noise monitor was setup at a location representative of the acoustic conditions at the nearest residential property. The noise monitor was located on a small balcony 5 storeys below the existing plant enclosure, opposite the residential properties, and was well-screened from existing plant noise. The following equipment was used:

- Rion Type 1 sound level meter Type NL-32;
- Brüel and Kjær Class 1 acoustic calibrator Type 4231.

4.2 The instrumentation was configured to continuously measure and store overall A-weighted statistical parameters including L_{Aeq}, L_{Amax} and L_{A90} (all measured on fast response) in 5 minute intervals. Where practicable, 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].

4.3 The sound level meter was equipped with an environmental microphone and windshield. The calibration of the instrumentation was checked before and after the survey and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards.

4.4 The results of the environmental noise survey are summarised below in Table 1 and shown graphically in Appendix B.

Period	**Sound Pressure Level, $L_{A90,15min}$ (dB)**			
	Daytime		**Night-time**	
	Typical	**Minimum**	**Typical**	**Minimum**
Wednesday 19/3/2014	49.5	49.0	46.0	45.7
Thursday 20/3/2014	50.7	49.7	45.4	44.8
Friday 21/3/2014	50.0	48.8	46.7	46.0
Saturday 22/3/2014	48.2	47.7	45.7	45.4
Sunday 23/3/2014	46.4	45.2	43.3	43.2
Monday 24/3/2014	48.8	48.1	44.9	44.6
Tuesday 25/3/2014	48.5	47.2	44.8	44.7
Wednesday 26/3/2014	48.8	48.1	--	--
Overall	**49**	**48**	**45**	**45**

Table 1: Summary of Environmental Noise Survey Results

4.5 Based on the results of the noise survey, background noise levels of 48 dB $L_{A90,15min}$ for daytime and 45 dB $L_{A90,15min}$ for night-time have been used in this assessment.

5.0 PLANT NOISE ASSESSMENT

5.1 The proposed plant comprises a single Daikin condenser unit (model: RZQG71LV1B) installed within the plant enclosure on the roof of Aviation House.

5.2 The manufacturer's stated plant sound pressure levels at a distance of 1 m are detailed in Table 2 below:

Model	Sound Pressure Level (dB) per Octave Band Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Cooling	46	50	48	46	44	39	35	24	48
Heating	48	53	52	48	45	38	36	27	50

Table 2: Plant Sound Pressure Levels Measured at 1m

5.3 Calculations have been undertaken to determine the noise levels in the amenity areas of the nearest residential properties. The proposed condenser unit operates in two modes, heating and cooling. The heating mode presents the highest noise level and has therefore been used in the calculations to provide a worst case scenario prediction. Calculations were completed using single octave data as shown in full in Appendix C.

5.4 The predicted noise level at the nearest residential property receptor is 14 dB L_{Aeq} which is significantly below the measured night-time background noise level of 45 dB $L_{A90,5min}$. An assessment in accordance with BS 4142 yields a difference between background noise level and predicted noise level from the proposed plant unit of -31 dB. The proposed plant unit would not be audible at the nearby residential properties and would therefore not cause any reasoned complaints. The assessment result also complies with the requirements of the Local Planning Authority described in Section 3. It is therefore considered that this application should not be refused on grounds of noise.

6.0 CONCLUSIONS

6.1 Diverse Building Solutions Ltd intends to apply for planning permission to expand the mechanical plant installed at Aviation House in Holborn, London. 24 Acoustics Ltd has been instructed by Diverse Building Solutions Ltd to undertake a noise assessment to support the application.

6.2 An environmental noise survey has been carried out to establish existing background noise levels at the nearest residential properties.

6.3 Calculations have been undertaken to predict the noise level from the proposed plant unit at the nearest residential properties.

6.4 A comparison of the predicted noise levels from the plant unit and the measured background noise levels indicates that the proposed plant unit would be inaudible at the nearest residential properties. It is therefore considered that this application should not be refused on grounds of noise.

REFERENCES

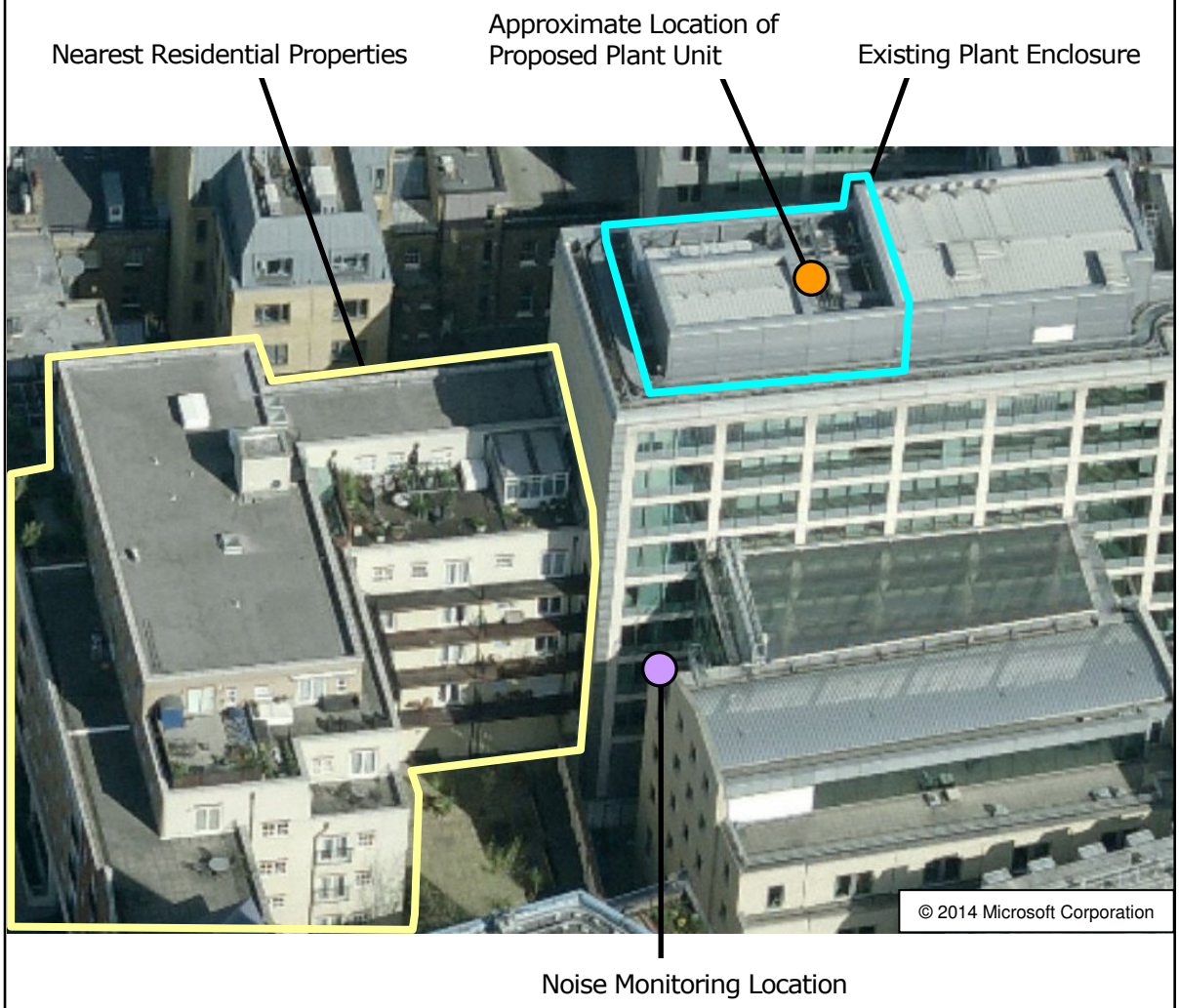
1. Department for Communities and Local Government, National Planning Policy Framework (NPPF), 2012.

2. Department of the Environment, Planning Policy Guidance (PPG) 24, Planning and Noise, 1994.

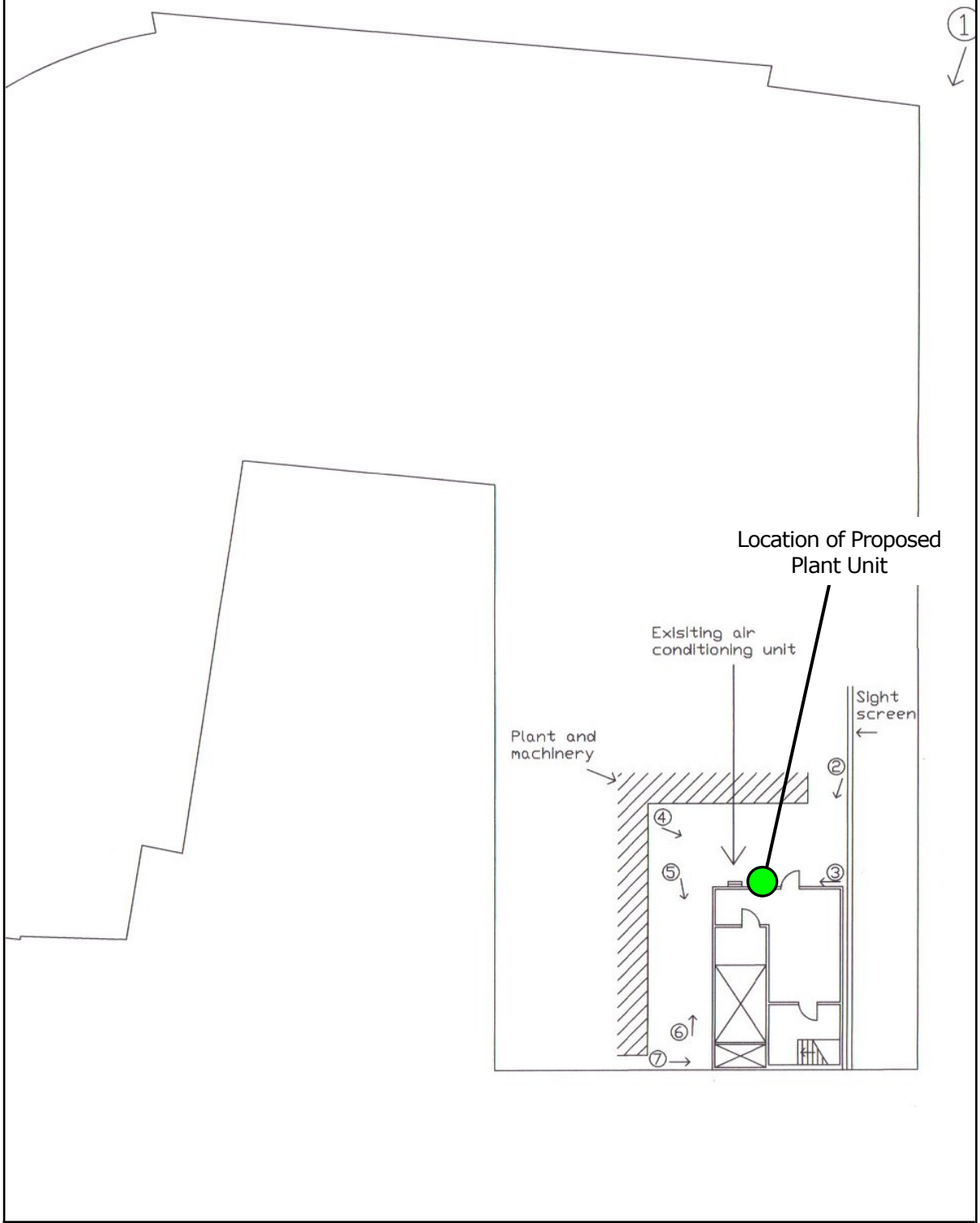
3. Department for Environment, Food and Rural Affairs, Noise Policy Statement for England (NPSE), 2010.

4. British Standards Institution, BS 4142: 'Method for Rating Industrial noise affecting mixed residential and industrial areas', 1997.

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



Project: Aviation House, Holborn, London	**Title:** Image of Site and Nearest Residential Properties		
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A	
Date: March 2014	**Drawn By:** DC	**Job No:** 5122-1	



Project: Aviation House, Holborn, London	**Title:** Site Layout and Position of Proposed Plant Unit	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** A
Date: March 2014	**Drawn By:** DC	**Job No:** 5122-1

APPENDIX A: ACOUSTIC TERMINOLOGY

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 [1] 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.

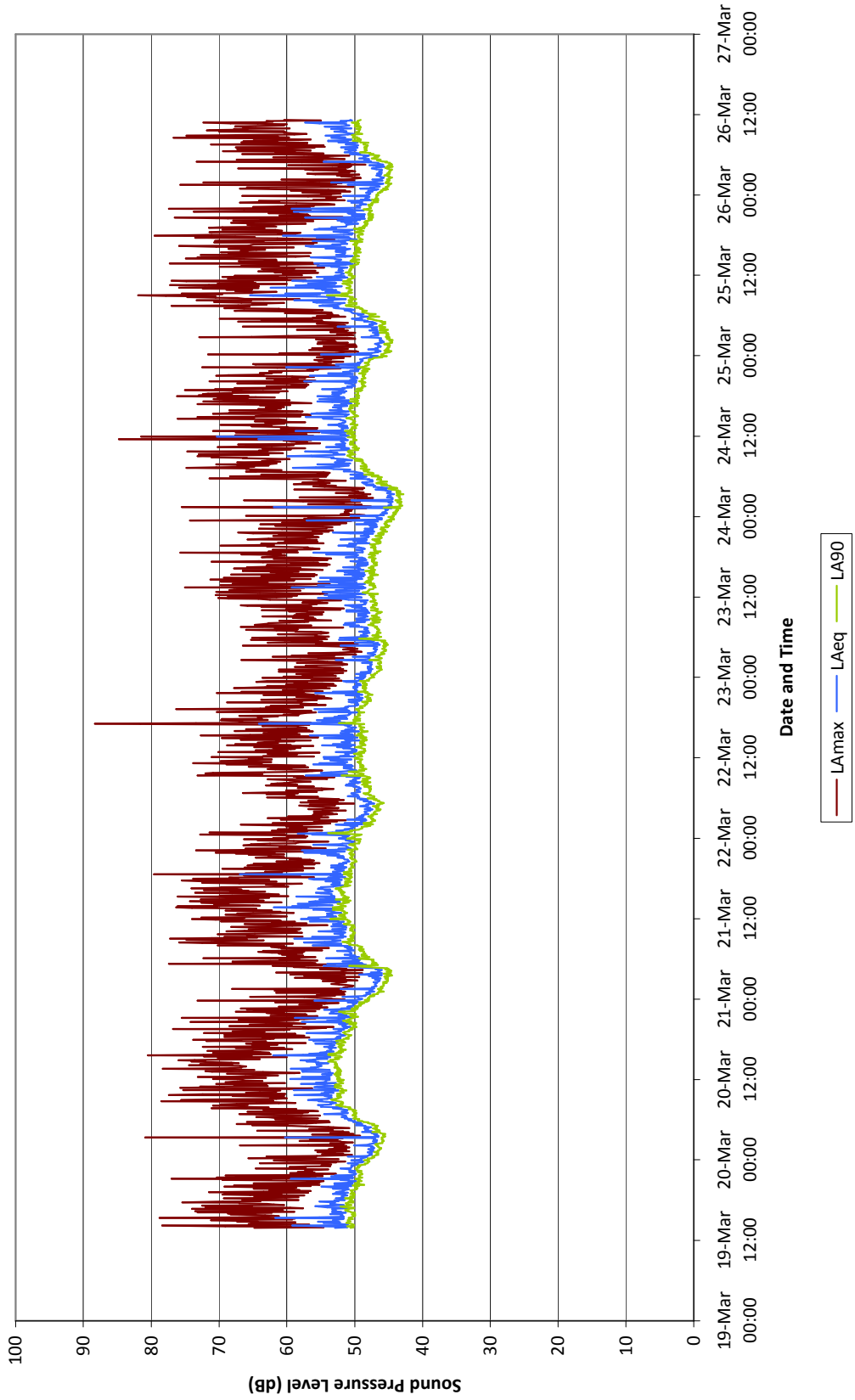
iii) The L_{A10} noise level

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: ENVIRONMENTAL NOISE SURVEY RESULTS



APPENDIX C: DETAILED NOISE CALCULATIONS

Unit	63	125	250	500	1K	2K	4K	8K	dB(A)	Comments
Specified Lp										
Daikin RZQG71LV1B	48.0	53.0	52.0	48.0	45.0	38.0	36.0	27.0	**50.1**	Max heating condition (at 1m)
Unit Sound Power Level										
Daikin RZQG71LV1B	56.0	61.0	60.0	56.0	53.0	46.0	44.0	35.0	**58.1**	Assumed hemispherical propagation
Distance Loss										
Daikin RZQG71LV1B	-32.1	-32.1	-32.1	-32.1	-32.1	-32.1	-32.1	-32.1		Plant to nearest resi = 16 m
Screening & other losses										
Daikin RZQG71LV1B	-8.0	-9.0	-10.0	-11.0	-14.0	-16.0	-22.0	-22.0		No direct line of sight
Levels at nearest residential property										
Daikin RZQG71LV1B	15.9	19.9	17.9	12.9	6.9	-2.1	-10.1	-19.1	**14.2**	Level from condenser unit
Total									**14.2**	