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59 MILL LANE, WEST HAMPSTEAD, LONDON

PLANNING COMPLIANCE REPORT

Report 11257.PCR.01

For:

Naspram Ltd

Sanjay Patel c/o Mayank Patel

102 Mill Lane

West Hampstead

London

NW6 1NF

Site Address	Report Date	Revision History
59 Mill Lane, West Hampstead, London	31/07/2014	

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KP Acoustics is the Trading Name of KP Acoustics Limited

CONTENTS

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Naspram Ltd, Sanjay Patel c/o Mayank Patel, 102 Mill Lane, West Hampstead, London, NW6 1NF, to undertake an environmental noise survey at 59 Mill Lane, West Hampstead, London. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for the installation of 3 No. air conditioning units in agreement with the planning requirements of The London Borough of Camden.

This report presents the overall methodology and results from the environmental survey followed by calculations to demonstrate the feasibility of the plant installation to satisfy the emissions criterion at the closest noise-sensitive receiver and outline mitigation measures as appropriate.

2.0 ENVIRONMENTAL NOISE SURVEY AND EQUIPMENT

2.1 Procedure

Automated noise monitoring was undertaken on the proposed site as shown in Site Plan 11257.SP1 and 11257.SP2. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver relative to the proposed plant installation. The duration of the survey was between 15:30 on 09/06/2014 and 15:30 on 10/06/2014.

Initial inspection of the site revealed that the background noise profile at the monitoring location was dominated by road traffic noise from the surrounding roads.

The weather during the course of the survey was generally dry with wind speeds within acceptable tolerances and therefore suitable for the measurement of environmental noise. The measurement procedure generally complied with BS7445:1991 "*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*".

2.2 Equipment

The equipment calibration was verified before and after the survey and no calibration irregularities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 957 Class 1 Sound Level Meter
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

The results from the continuous noise monitoring are shown as a time history of L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} averaged over 5 minute sample periods in Figure 11257.TH1.

Minimum background noise levels are shown in Table 3.1.

	Minimum background noise level $L_{A90: 5min}$ dB(A)
Daytime (07:00-23:00)	35
Night-time (23:00-07:00)	34
Operating hours (9:00- 19:00)	39

Table 3.1: Minimum measured background noise levels

4.0 NOISE CRITERIA

The criterion of The London Borough of Camden for noise emissions of new plant in this instance is as follows:

"The Council considers that for new developments involving noisy plant/equipment or other uses, design measures should be taken to ensure that levels predicted at a point 1 metre external to sensitive facades are at least 5dB(A) less than the existing background measurement (LA90) when the equipment is in operation. Where it is anticipated that equipment will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses in the noise (bangs, clicks, clatters, thumps), special attention should be given to reducing the noise levels at any sensitive facade by at least 10dB(A) below the LA90 level."

We therefore propose to set the noise criteria as shown in Table 4.1 in order to comply with the above requirement.

	Operating hours (9:00 to 19:00)
Noise criterion at nearest receiver	29 dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the proposed air condenser units are used only during operating hours and could present some low frequency hum noise, the criteria of 29 dB(A) will be used to ensure the amenity of the closest residential receiver will be protected.

5.0 DISCUSSION

It is understood that the plant installation is comprised of the following units:

- 1 No. Daikin RXS60L
- 1 No. Daikin RXS42L
- 1 No. Daikin RXS35L

All units are proposed to be installed on the roof of the commercial space of 59 Mill Lane, West Hampstead, London as shown in 11257.SP2 and 11257.SP3.

The closest noise sensitive receivers are three residential windows, at an approximate distance of 3m from the proposed plant unit locations on the roof of the commercial space at 59 Mill Lane, as shown in 11257.SP2.

The sound pressure level at 1m from the operating unit as provided by the manufacturer are shown in Table 5.1.

Unit	Manufacturer's Sound Pressure Level (dBA)
Unit 1. Daikin RXS60L	49
Unit 2. Daikin RXS42L	48
Unit 3. Daikin RXS35L	48

Table 5.1 Manufacturer's Sound Pressure Levels

5.1 Objective overview

Taking all acoustic corrections into consideration, the noise level expected at the closest residential windows would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver - Nearest Noise Sensitive Window	**Criterion**	**Noise Level at Receiver (Residential Window)**
Window A (see 11257.SP2)	29 dB(A)	26 dB(A)
Window B (see 11257.SP2)		24 dB(A)
Window C (see 11257.SP2)		25 dB(A)

Table 5.2: Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the plant installation fully satisfies the emissions criteria set by The London Borough of Camden provided that acoustic enclosures for the units are utilised as shown in Appendix B. These are shown in site plans 11257.SP2 and 11257.SP3.

Furthermore, the values of 26dB(A), 24dB(A) and 25dB(A) for each receiver are to be considered outside of the building. Windows may be closed or partially closed leading to further attenuation, as follows.

Further calculations have been undertaken to assess whether the noise emissions from the air conditioning units would be expected to meet the recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

Internal noise requirements are normally based on BS8233:2014 '*Guidance on sound insulation and noise reduction for buildings'*. This standard recommends internal noise levels for resting conditions during daytime (07:00-23:00 hours) and night-time (23:00-07:00). These levels are shown in Table 5.3.

Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living Rooms	35 dB(A)	-
Dining	Dining Room/area	40 dB(A)	-
Sleeping (daytime resting)	Bedrooms	35 dB(A)	30 dB(A)

Table 5.3 BS8233:2014 recommended internal background noise levels

According to BS8233:2014, even a partially open window offers 10-15dB attenuation, thus leading to a further reduced interior noise level.

Inside Receiver Window	Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:2014*	Noise Level at Receiver (due to plant installation)
Window A	30-35 dB(A)	16 dB(A)
Window B	30-35 dB(A)	14 dB(A)
Window C	30-35 dB(A)	15 dB(A)

Table 5.3: Noise levels and criteria inside nearest residential space

Predicted levels are shown in Table 5.3, with detailed calculations shown in Appendix B. It can therefore be stated that, as well as complying with the requirements of The London Borough of Camden, the emissions from the air conditioning units would be expected to comfortably meet the most stringent recommendations of the relevant British Standard.

6.0 CONCLUSION

An environmental noise survey has been undertaken at 59 Mill Lane, West Hampstead, London, by KP Acoustics Ltd between 09/06/2014 and 10/06/2014. The results of the survey have enabled criteria to be set for noise emissions. Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the proposed plant unit installation would meet the requirements of The London Borough of Camden, providing the specified acoustic enclosures.

Further calculations have been undertaken with regards to the relevant British Standard and it has been ensured that the amenity of nearby residential receivers will be protected.

Report by
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KP Acoustics Ltd

Noise Survey Monitoring Position

Closest noise-sensitive receiver

Title:

Indicative site plan showing plant unit location, noise monitoring position and closest noise sensitive receiver

Date: 31 July 2014

FIGURE 11257.SP1

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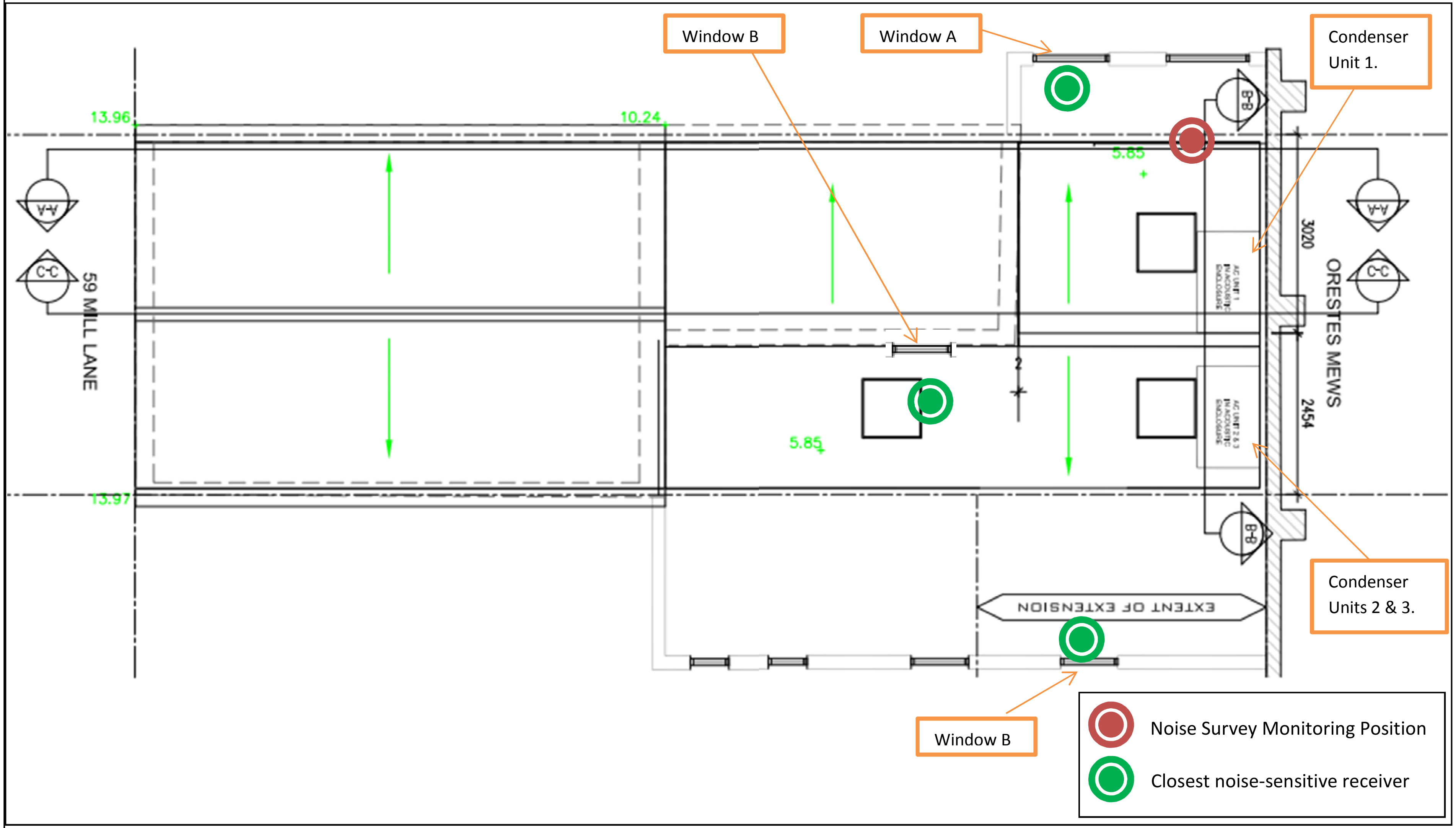

Title:

Indicative site plan showing plant unit location, noise monitoring position and closest noise sensitive receiver

Date: 31 July 2014

FIGURE 11257.SP2

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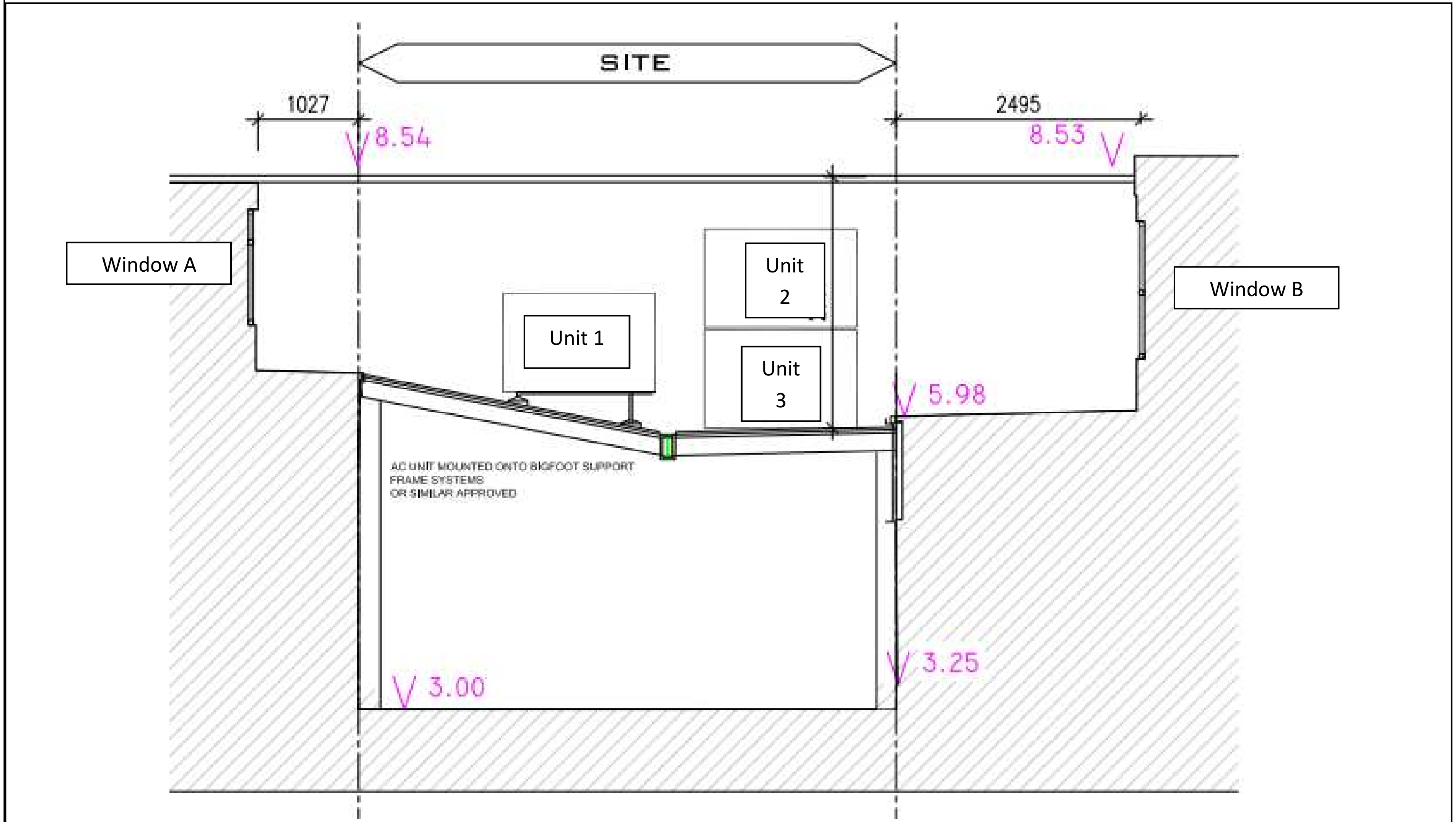

Title:

Indicative site plan showing plant unit location, noise monitoring position and closest noise sensitive receiver

Date: 31 July 2014

FIGURE 11257.SP3

KP acoustics

59 Mil Lane, West Hampsted, London
Environmental Noise Time History
9th to 10th June 2014

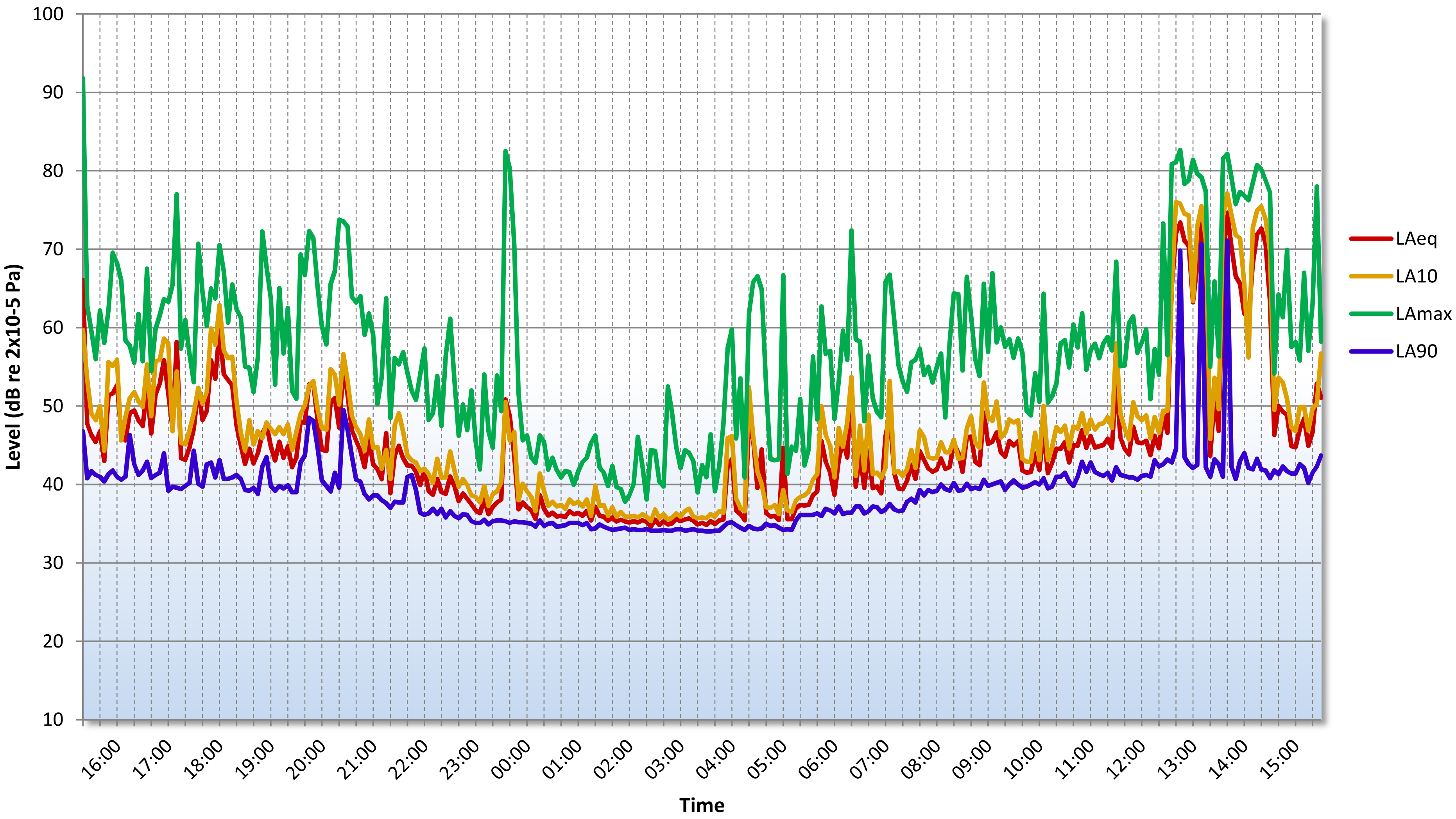

Figure 11257.TH1

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

59 MILL LANE,WEST HAMPSTEAD, LONDON

PLANT UNIT EMISSIONS CALCULATIONS

Source: Plant Unit Installation	Frequency, Hz								
Receiver: WINDOW A (see 11257.SP2)	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound Pressure Level (SPL) at 1m from nearest noise sensitive receiver window									
UNIT 1									
Daikin RXS60LVMA Sound Pressure Level at 1m									49
Correction from reflections									3
Minimum attenuation due to distance (2.5m)									-8
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 1									**24**
UNIT 2 (on top of Unit 3)									
Daikin RXS42LVMA Sound Pressure Level at 1m									48
Correction from reflections									3
Minimum attenuation due to distance (4.1m)									-12
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 2									**19**
UNIT 3 (under Unit 2)									
Daikin RXS32LVMA Sound Pressure Level at 1m									48
Correction from reflections									3
Minimum attenuation due to distance (4.1m)									-12
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 3									**19**
Sound pressure level 1m from nearest residential receiver									**26**
					Design Criterion				**29**

Source: Plant Unit Installation	Frequency, Hz								
Receiver: WINDOW B (see 11257.SP2)	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound Pressure Level (SPL) at 1m from nearest noise sensitive receiver window									
UNIT 1									
Daikin RXS60LVMA Sound Pressure Level at 1m									49
Correction from reflections									3
Minimum attenuation due to distance (5.5m)									-15
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 1									**17**
UNIT 2 (on top of Unit 3)									
Daikin RXS42LVMA Sound Pressure Level at 1m									48
Correction from reflections									3
Minimum attenuation due to distance (3.5m)									-11
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 2									**20**
UNIT 3 (under Unit 2)									
Daikin RXS32LVMA Sound Pressure Level at 1m									48
Correction from reflections									3
Minimum attenuation due to distance (3.5m)									-11
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 3									**20**
Sound pressure level 1m from nearest residential receiver									**24**
					Design Criterion				**29**

Source: Plant Unit Installation	Frequency, Hz								
Receiver: WINDOW C (see 11257.SP2)	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound Pressure Level (SPL) at 1m from nearest noise sensitive receiver window									
UNIT 1									
Daikin RXS60LVMA Sound Pressure Level at 1m									49
Correction from reflections									3
Minimum attenuation due to distance (4.5m)									-13
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 1									**19**
UNIT 2 (on top of Unit 3)									
Daikin RXS42LVMA Sound Pressure Level at 1m									48
Correction from reflections									3
Attenuation due to distance (3.5m)									-11
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 2									**20**
UNIT 3 (under Unit 2)									
Daikin RXS32LVMA Sound Pressure Level at 1m									48
Correction from reflections									3
Attenuation due to distance (3.5m)									-11
Minimum attenuattion provided by acoustic enclosure									-20
TOTAL SPL at 1m for Unit 3									**20**
Sound pressure level 1m from nearest residential receiver									**25**
								Design Criterion	**29**

Source: Plant Unit Installation	Frequency, Hz								
Receiver: Window A	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window A									26
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	-10
Sound pressure level inside nearest residential window A									**16**
								Design Criterion	**30-35**

Source: Plant Unit Installation	Frequency, Hz								
Receiver: Window B	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window B									24
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	-10
Sound pressure level inside nearest residential window B									**14**
								Design Criterion	**30-35**

Source: Plant Unit Installation	Frequency, Hz								
Receiver: Window C	*63*	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Sound pressure level outside window C									25
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	-10
Sound pressure level inside nearest residential window C									**15**
								Design Criterion	**30-35**