31-32 John Street, Clerkenwell, WC1N 2AT

8.3 Appendix 3
Noise Survey & Report

August 2011

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31-32 JOHN STREET, LONDON

NOISE IMPACT ASSESSMENT

Report 5366.NIA.01

Prepared on 12 August 2011

For:

Mr Maurice Leonard

GFZ Investments Ltd

4 Lower Addison Gardens

London

W14 8BQ

CONTENTS

List of Attachments

1.0 INTRODUCTION

Practical Acoustics has been commissioned by Mr Maurice Leonard, GFZ Investments Ltd, 4 Lower Addison Gardens, London, W14 8BQ to measure existing background noise levels at 31-32 John Street, London, WC1N 2AT. The measured noise levels will be used to determine noise emission criteria for proposed plant unit installations in agreement with the planning requirements of the London Borough of Camden.

This report presents the results of the environmental noise survey followed by noise impact calculations and outlines any necessary mitigation measures.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Procedure

Measurements were taken at the position shown in Site Plan 5366.SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receivers.

Continuous automated monitoring was undertaken for the duration of the survey between 11:30 on 5 July 2011 and 11:30 on 6 July 2011.

Weather conditions were dry with light winds, 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 use and no abnormalities were observed.

The equipment used was as follows.

- Svantek Type 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

3.0 RESULTS

The $L_{Aeq:\,5min}$, $L_{Amax:\,5min}$, $L_{A10:\,5min}$ and $L_{A90:\,5min}$ acoustic parameters were measured and are shown as a time history in Figure 5366.TH1.

Background noise levels were dominated by traffic noise from John Street.

Minimum measured background levels are shown in Table 3.1.

	Minimum Background Noise $L_{A90:\ 5min}$ dB(A)
Daytime (07:00-23:00)	50
Night-time (23:00-07:00)	46

Table 3.1: Minimum background noise levels

4.0 NOISE CRITERIA

The London Borough of Camden's criteria for noise emissions of new plant installations are as follows:

> *"Design measures should be taken to ensure that specific plant noise levels at a point 1 metre external to sensitive façades are at least 5dB(A) less than the existing background measurement (L_{A90}) when the equipment is in operation. Where it is anticipated that equipment will have a noise that has distinguishable, discrete continuous note[...], special attention should be given to reducing the noise at any sensitive façade by at least 10dB(A) below the L_{A90} level."*

In order to provide a more robust assessment, it is proposed that criteria are set at 10dB below the existing minimum background noise levels, as shown in Table 4.1.

	Daytime	**Night-time**
Noise criterion at nearest residential receiver (10dB below minimum L_{A90})	40 dB(A)	36 dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the units could be used at any time the night time hours criterion of 36dB(A) will be used in this assessment.

5.0 DISCUSSION

The proposed plant installation comprises of No.15 Daikin ERHQ014BV3 air source heat pump units, manufacturer's spectral noise data is shown in Table 5.1.

Loudest operating modes have been used, in order to provide a worst-case scenario.

	Sound Pressure Level (dB) in each Frequency Band, at 1m								
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Daikin ERHQ014B Air Source Heat Pump Type Unit	53	54	52	52	46	42	38	27	52

Table 5.1 Manufacturer's overall sound pressure levels for proposed unit.

The proposed units will be installed in the middle of the flat roof area of 31-32 John Street. The proposed plant units will be arranged in rows of three in a free field position. The closest noise sensitive receiver has been identified as the bedroom of Flat 15 at roof level of the property located at a distance of approximately 3m, as shown in indicative site plan 5366.SP1.

Due to the close proximity of the nearest residential window to the proposed plant units it has been deemed necessary to specify mitigation measures, for this we would recommend the installation of an acoustically treated barrier to cover the units within direct line of sight to the residential window. The barrier should be at least 1.8m in height, we would recommend lining the interior façade of the barrier with absorbent non-flammable material, such as rock wool or glass fibre to minimise reflections and attenuate noise emissions from the proposed plant units in order to comply with criterion set out by the London Borough of Camden.

Taking into account all necessary acoustic corrections including distance and the screening provided by the proposed mitigation measures, the resulting noise level at the window of the nearest noise sensitive receiver would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver	Night-time Criterion	Level at Receiver (due to proposed plant)
Nearest Residential Window	36 dB(A)	36 dB(A)

Table 5.2: Noise levels and criteria at nearest noise sensitive receivers

As shown in Appendix B, the predicted plant noise emissions would be expected to meet the criterion of the London Borough of Camden provided that specific mitigation measures are put in place.

In addition to the above assessment, further calculations will aim to assess whether the noise emissions from the proposed plant units would be expected to meet recognised British Standard recommendations, in order to further ensure the amenity of nearby noise sensitive receivers.

British Standard 8233:1999 *'Sound insulation and noise reduction for buildings – Code of Practice'* gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:1999 recommends 30dB(A) as being 'Good' internal resting/sleeping conditions.

With external levels of 36dB(A), the window itself would need to provide 6dB attenuation in order to achieve 'Good' internal resting/sleeping conditions. However, according to BS8233:1999, even a partially open window offers a minimum of 10dB attenuation.

It can therefore be predicted that noise emissions from the proposed plant would be expected to comfortably meet the most stringent recommendations of the relevant British Standard, even with neighbouring windows partially open. Predicted levels are shown in Table 5.3, with detailed calculations shown in Appendix B.

Receiver	'Good' Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:1999*	Noise Level at Receiver (due to plant installation)
Inside Nearest Residential Space	30 dB(A)	26 dB(A)

Table 5.3: Noise levels and criteria inside nearest residential space

6.0 CONCLUSION

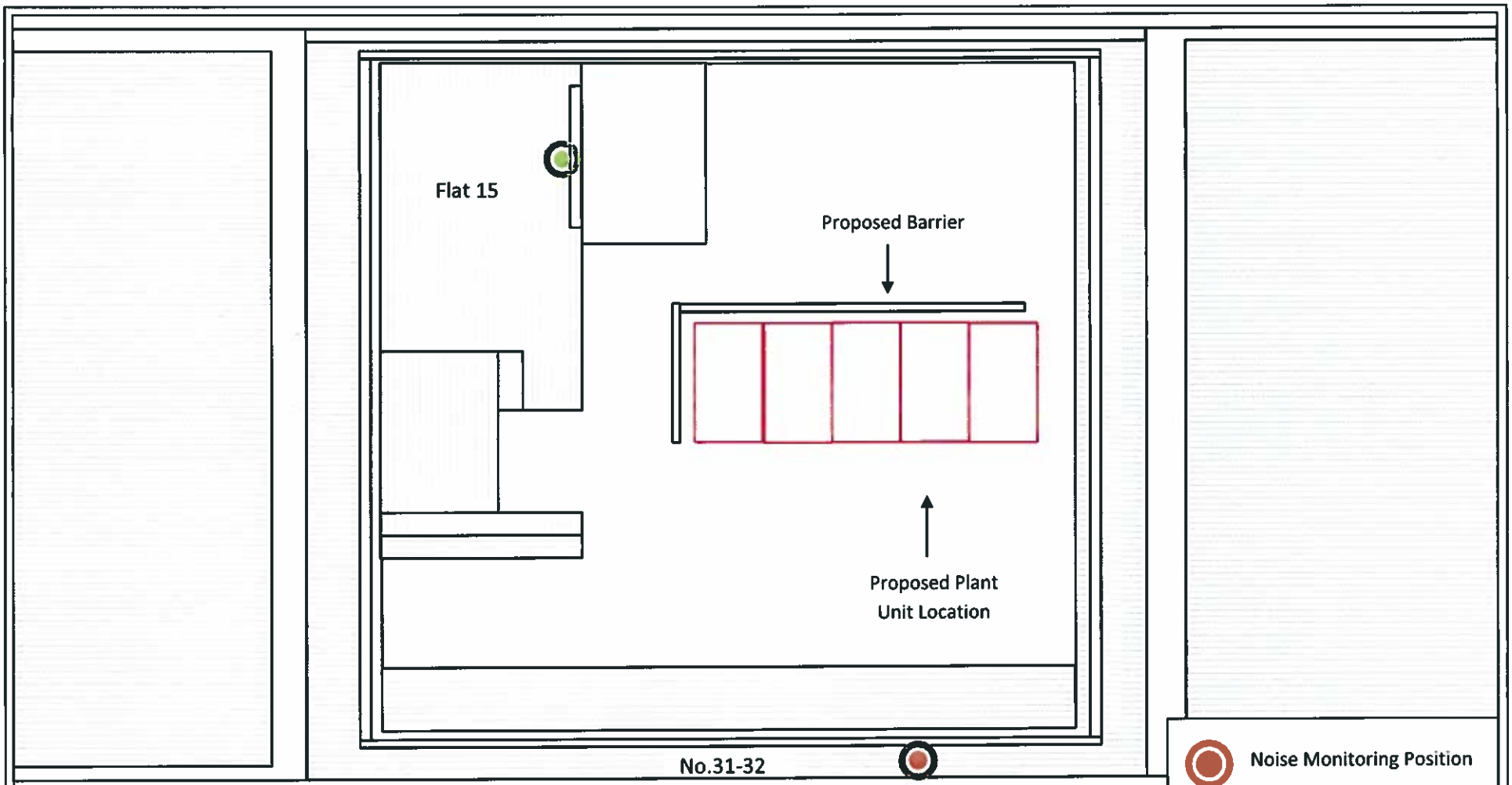
An environmental noise survey has been undertaken at 31-32 John Street, London, WC1N 2AT. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant in accordance with the London Borough of Camden's planning conditions.

A noise impact assessment has then been undertaken using manufacturer noise data to predict noise levels at the nearby noise sensitive receivers due to the current proposals.

Calculations show that noise emissions from the proposed units would meet the criterion set by the London Borough of Camden and the recommendations of the relevant British Standards provided that proposed mitigation measures suggested in this report are put in place.

Report by
Nicholas Dobbs

Checked by
Kyriakos Papanagiotou MIOA



Title:

Indicative site plan showing noise monitoring position, proposed plant location and nearest noise sensitive receiver

Date: 12 August 2011

FIGURE 5366.SP1

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Environmental Noise Time History

05 July to 06 July 2011

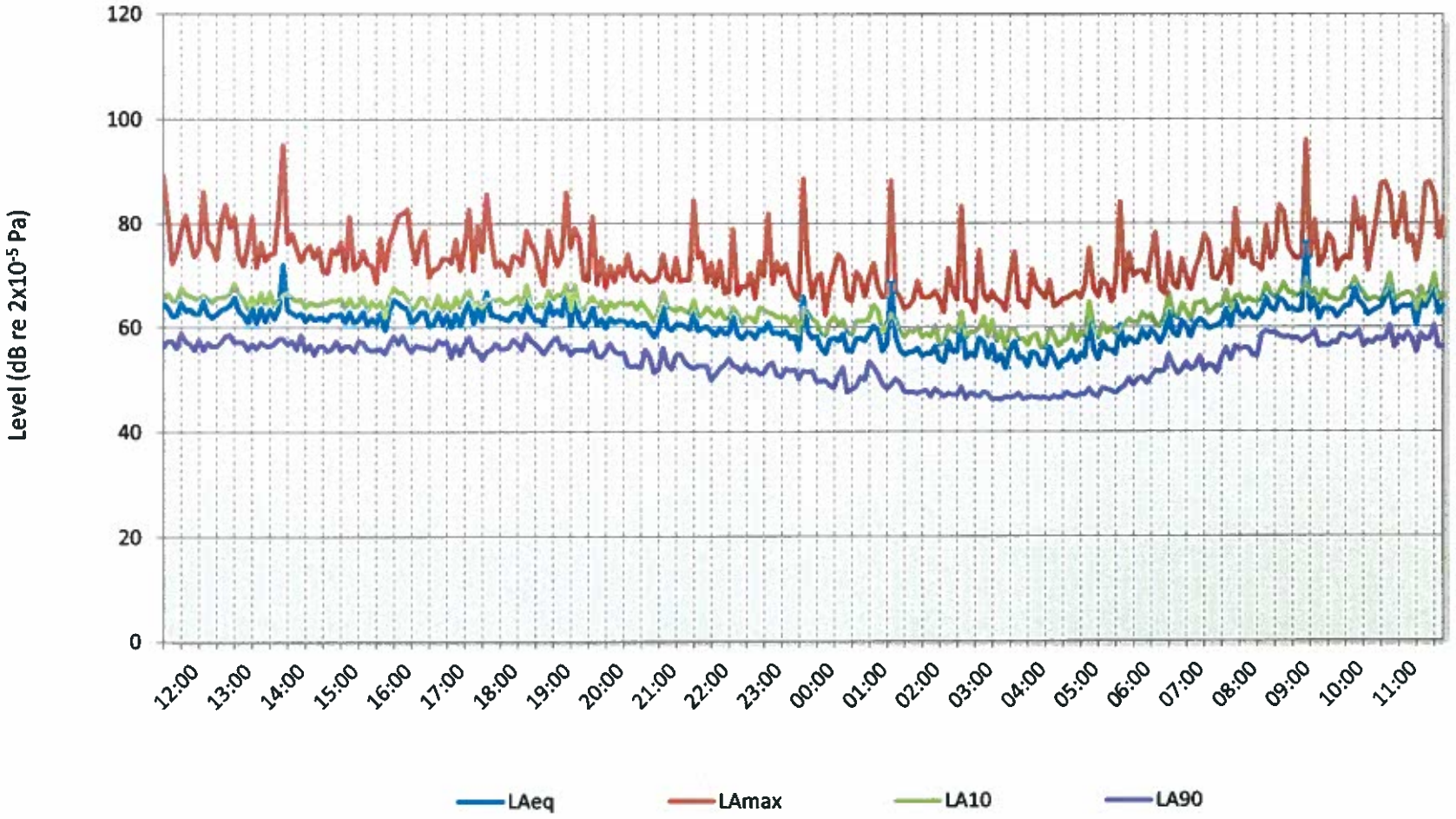

Figure 5366.TH1

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and 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 not 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 not 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 10 such octave bands whose centre frequencies are defined in accordance with international standards.

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 one alone and 10 sources produce a 10dB 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

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception 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 reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B
31-32 JOHN STREET, LONDON

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Source: Daikin Air Source Heat Pump Unit Receiver: Nearest Residential Window	*Frequency, Hz*								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturer's sound pressure level at 1m Daikin ERHQ014B Air Source Heat Pump Unit	53	54	52	52	46	42	38	27	52
Correction for number of units, (15)	12	12	12	12	12	12	12	12	
Minimum distance correction (3m), dB	-10	-10	-10	-10	-10	-10	-10	-10	
Attenuation prodivded by proposed barrier, dB	-10	-14	-15	-18	-20	-22	-23	-24	
Sound pressure level 1m from nearest residential receiver	**45**	**42**	**39**	**36**	**28**	**22**	**17**	**0**	**36**

Design Criterion	**36**

Receiver: Inside Nearest Residential Window Source: Daikin Air Source Heat Pump Unit	*Frequency, Hz*								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window	45	42	39	36	28	22	17	0	36
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level inside nearest noise sensitive window	**35**	**32**	**29**	**26**	**18**	**12**	**7**	**0**	**26**

Design Range	**30**