Practical Acoustics
www.practicalacoustics.com

Practical Acoustics Ltd
London House
271-273 King Street
London W6 9LZ

Tel: +44(0)208 233 2850
Fax: +44(0)208 233 2960
info@practicalacoustics.com

12 ENGLAND'S LANE, LONDON

NOISE IMPACT ASSESSMENT

Report 2227.NIA.04.RevA

Prepared on 12 August 2010

For:

Mandarina Investments

c/o Michael Evans & Co Ltd

10 Queen's Way

Hemel Hempstead

HP1 1LR

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CONTENTS

List of Attachments

1.0 INTRODUCTION

Practical Acoustics has been commissioned by Mandarina Investments to measure existing background noise levels at 12 England's Lane, London. The measured noise levels will be used to determine noise emission criteria for the proposed plant units in agreement with the planning requirements of the London Borough of Camden.

This report presents the results of the environmental 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 2227.SP4. 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 12:30 on 16 March 2010 and 12:30 on 17 March 2010.

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 $L_{Aeq:\ 15min}$, $L_{Amax:\ 15min}$, $L_{A10:\ 15min}$ and $L_{A90:\ 15min}$ acoustic parameters were measured and are shown as a time history in Figure 2227.TH4.

Background noise levels were dominated by traffic noise from England's Lane.

Minimum measured background levels are shown in Table 3.1.

	Minimum Background Noise $L_{A90:\ 15min}$ dB(A)
Daytime (07:00-23:00)	38
Night-time (23:00-07:00)	32

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 exiting minimum background noise levels, as shown in Table 4.1.

	Daytime	**Night-time**
Noise criterion at nearest residential receiver (10dB below minimum L_{A90})	28 dB(A)	22 dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the units are only expected to be used during normal office opening hours, the daytime criterion of 28dB(A) will be used in this assessment.

5.0 DISCUSSION

The proposed plant installation comprises two VES Andover units, a size 2 Airline unit and a RS 200 Round Fan unit. The two units have been selected as shown in Table 5.1, where the manufacturer's sound power levels are also shown.

	Sound Power Level (dB) in each Frequency Band								
Unit	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**dB(A)**
VES Andover Airline Unit Size 2	72	65	59	63	70	68	67	66	75
VES Andover Round Fan Unit type RS 200	75	78	76	73	70	66	61	54	75

Table 5.1 Manufacturer spectral sound power levels for proposed unit

The proposed unit will be installed on a first floor roof area, to the rear of 12 England's Lane, as shown in indicative site plan 2227.SP4. The closest residential window is approximately 2m from the proposed Airline unit inlet and 3m from the Round Fan outlet.

Both units will be placed within proposed enclosures in order to attenuate noise emissions. The Airline unit will be placed in a timber, brick clad enclosure, with ventilation provided by louvred panels. The Round Fan Unit will be placed in an enclosure formed entirely of louvred panels.

For each enclosure, the main transmission path for noise will be the louvred panels themselves, which are required to provide ventilation to the units. We would therefore recommend selecting acoustically treated louvred panels, in order to minimise this transmission path.

In order to provide a good level of attenuation, we would propose using louvred panels that meet the spectral noise reduction levels shown in Table 5.2.

	Attenuation (dB) in each Frequency Band							
Mitigation Type	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
Proposed Louvred Panels	-11	-10	-11	-12	-15	-19	-20	-19

Table 5.2: Spectral attenuation from proposed louvred panels

For Indication Purposes Only:

IAC Slimshield SL-100 louvred panels are specified as having noise reduction levels meeting those shown in Table 5.2. These acoustically treated louvres are 100mm deep panels.

In addition to the enclosures, we would recommend using insulation on surrounding hard surfaces, such that the effects of reflections are minimised. We would recommend treating the hard surfaces of the roof and solid walls within the timber enclosure with a layer of 30-50mm layer of non-flammable absorbent layer, such as rock wool or glass fibre, held in place by a strong, permeable (minimum 20% open area) facing.

Due to the low measured background noise levels and the proximity of the plant location to noise sensitive receivers, it will also be necessary to use silencers in the ductwork as well as the proposed enclosures and absorptive treatment.

5.1 Silencer Requirements

In this case, we would recommend using a silencer as the most effective way of controlling noise emissions. In order to further reduce noise emissions, we would recommend using silencers meeting the spectral attenuation levels shown in Table 5.3.

	Attenuation (dB) in each Frequency Band							
Noise Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
VES Andover Airline Unit Size 2	-4	-5	-6	-14	-24	-27	-21	-18
VES Andover Round Fan Unit type RS 200	-5	-8	-15	-33	-39	-40	-36	-20

Table 5.3: Spectral attenuation from proposed silencer schedule

For Indication Purposes Only:

For the Airline unit, the corresponding VES Andover ALS 2 silencer would achieve the attenuation levels shown in Table 5.3.

For the Round Fan Unit, the VES Andover LD 100 silencer would achieve the attenuation levels shown in Table 5.3.

Taking into account all necessary acoustic corrections including specified mitigation measures, the resulting noise level at the window of the nearest noise sensitive receiver would be as shown in Table 5.3. Detailed calculations are shown in Appendix B4.

Receiver	Daytime Criterion	Level at Receiver (due to proposed plant)
Nearest Residential Window	28 dB(A)	27 dB(A)

Table 5.3: Noise levels and criteria at nearest noise sensitive receivers

As shown in Appendix B4, the predicted plant noise emissions would be expected to meet the requirements set out by the London Borough of Camden with proposed mitigation measures in place.

In order to further ensure the amenity of nearby residential receivers, an additional calculation has been undertaken in order to assess whether the noise emissions from the proposed plant unit would be expected to meet the recommendations of recognised British Standard BS8233:1999.

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

With external levels of 27dB(A) at the closest window, noise emissions from the proposed plant would be expected to meet 'good' conditions without taking attention from the window itself into consideration. According to BS8233:1999, a partially open window offers between 10-15dB attenuation.

It can therefore be predicted that, as well as meeting the requirements of the London Borough of Camden, the emissions from the proposed plant would be expected to be within the most stringent recommendations of the relevant British Standard. Predicted levels are shown in Table 5.4, with detailed calculations shown in Appendix B.

Receiver	**'Good' Conditions Design Range – *For resting/sleeping conditions in a bedroom, in BS8233:1999***	**Maximum Noise Level at Receiver (due to proposed plant)**
Inside Nearest Residence	30 dB(A)	17dB(A)

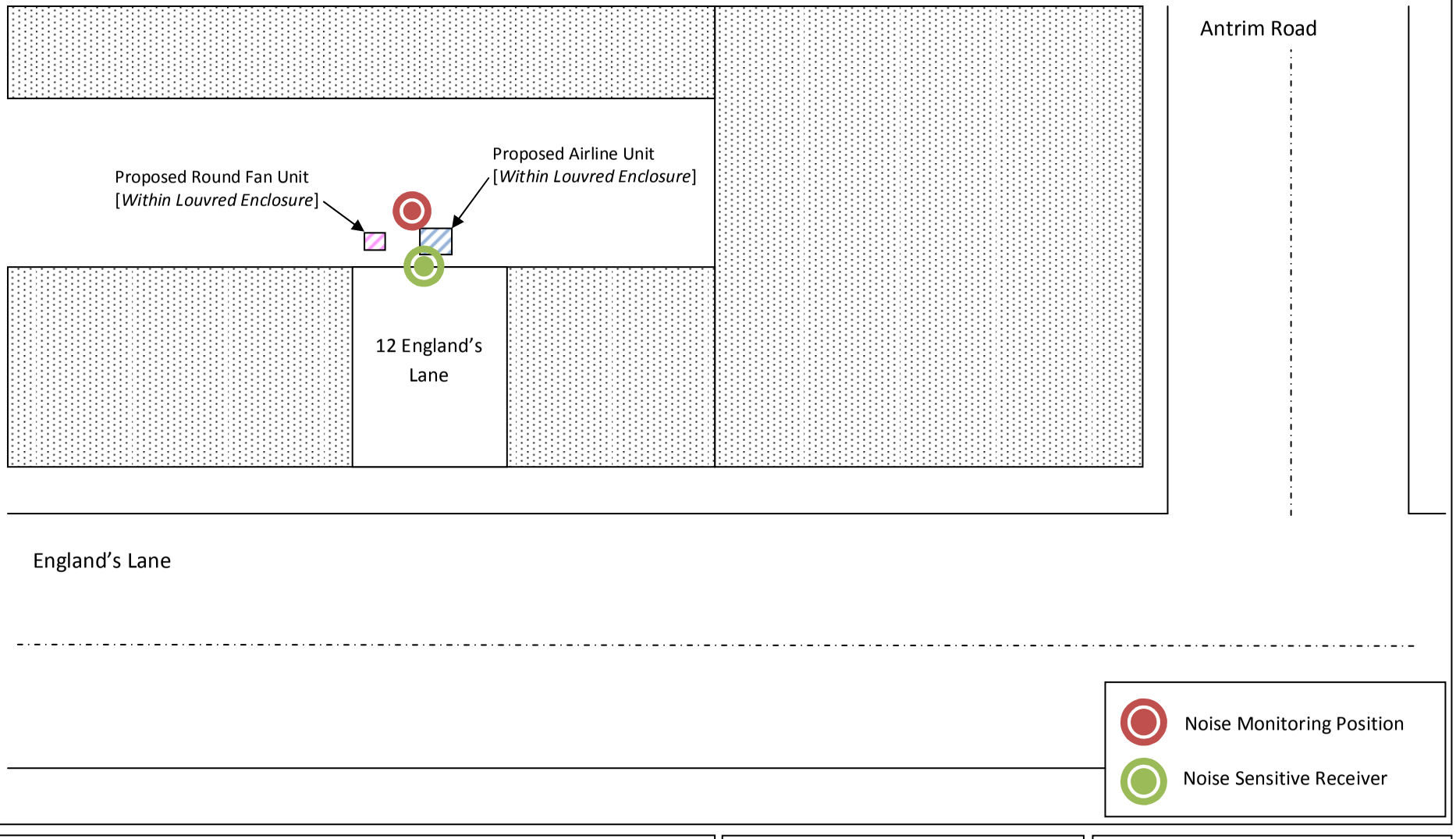
Table 5.4: Noise levels and criteria inside nearest residential space

6.0 CONCLUSION

An environmental noise survey has been undertaken at 12 England's Lane, London. 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 have shown that with proposed mitigation measures, the noise emissions of the proposed installation will be within the requirements of the London Borough of Camden for the nearest noise sensitive receiver and the recommendations of the relevant standard would be met, even when considering partially open windows and modelling stairwells as bedrooms.



Title:

Indicative site plan showing noise monitoring position and nearest noise sensitive receivers

Date: 21 July 2010

FIGURE 2227.SP4

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12 ENGLAND'S LANE, LONDON

Environmental Noise Time History
16 March 2010 to 17 March 2010

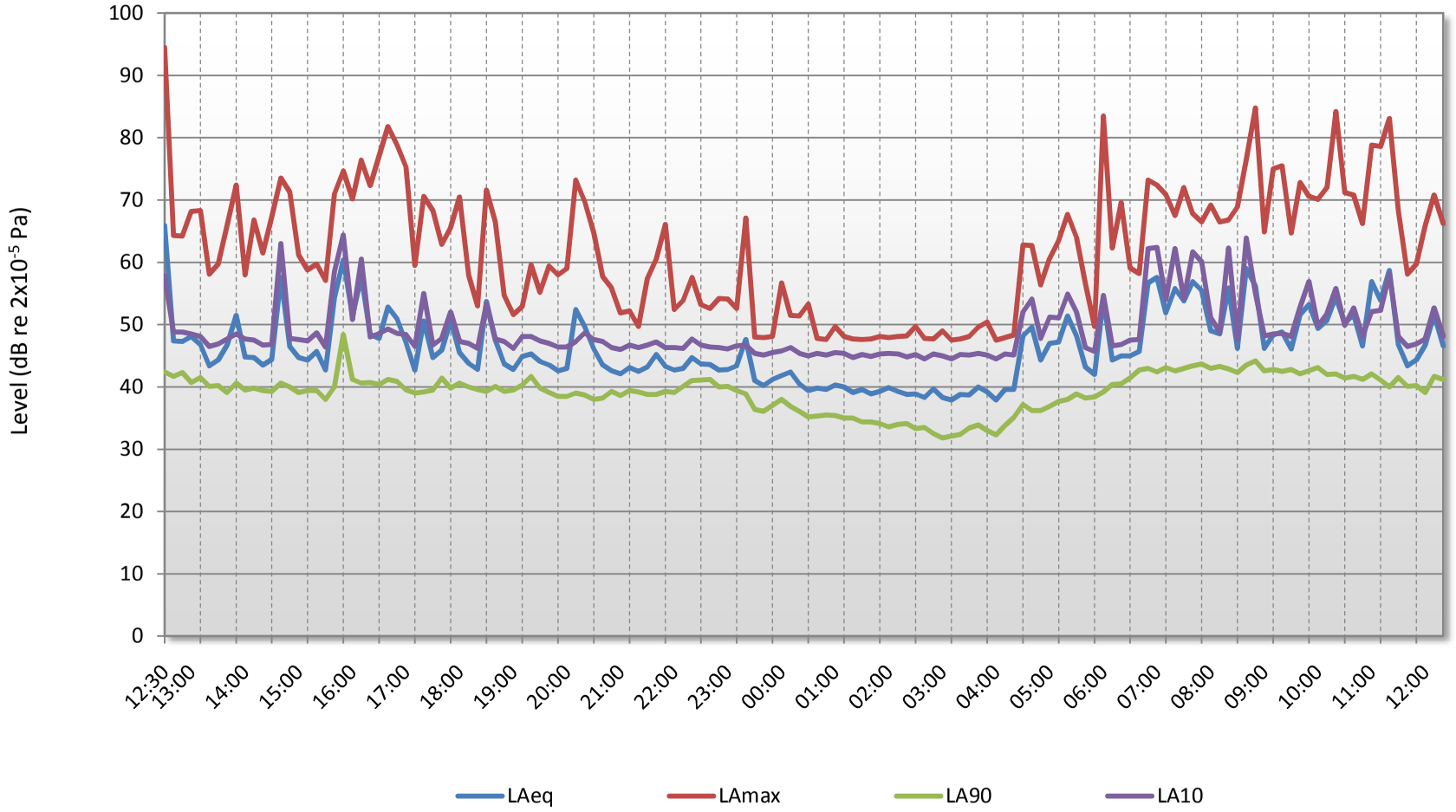

Figure 2227.TH4

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 B4

12 ENGLAND'S LANE, LONDON

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Window
Source: Proposed VES Andover Plant Installation

	Frequency, Hz								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Manufacturer's inlet sound power level									
VES Andover Airline Unit Size 2	72	65	59	63	70	68	67	66	75
Conversion to sound pressure level at 1m	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation from proposed inlet silencer	-4	-5	-6	-14	-24	-27	-21	-18	
Attenuation from proposed 100mm deep acoutic louvres	-11	-10	-11	-12	-15	-19	-20	-19	
Distance correction, dB (2m)	-6	-6	-6	-6	-6	-6	-6	-6	
Sound pressure level at receiver due to air handling unit	40	33	25	20	14	5	9	12	23
Manufacturer's outlet sound power level									
VES Andover Round Fan type RS 200	75	78	76	73	70	66	61	54	75
Conversion to sound pressure level at 1m	-11	-11	-11	-11	-11	-11	-11	-11	
Attenuation from proposed outlet silencer	-5	-8	-15	-33	-39	-40	-36	-20	
Attenuation from proposed 100mm deep acoutic louvres	-11	-10	-11	-12	-15	-19	-20	-19	
Distance correction, dB (3m)	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level at receiver due to extract unit	38	39	29	7	0	0	0	0	25
Cumulative sound pressure level at noise sensitive receiver	**42**	**40**	**31**	**20**	**14**	**6**	**10**	**12**	**27**

Design Criterion	**28**

Receiver: Inside Nearest Residential Window
Source: VES Andover Units

	Frequency, Hz								
	63	***125***	***250***	***500***	***1k***	***2k***	***4k***	***8k***	***dB(A)***
Sound pressure level outside window	42	40	31	20	14	6	10	12	27
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	
Sound pressure level inside nearest noise sensitive window	**32**	**30**	**21**	**10**	**4**	**0**	**0**	**2**	**17**

Design Range	**30-35**