

## **25-26 RED LION STREET, LONDON**

### **NOISE IMPACT ASSESSMENT REPORT**

Report 10191.NIA.01

**For:**

**The William Pears Group**

**152 West End Lane**

**West Hampstead**

**London**

**NW6 1SD**

<b>Site Address</b>	<b>Report Date</b>	<b>Revision History</b>
25-26 Red Lion Street, London	13/08/2013	

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10191.SP1-2	Indicative Site Plans
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Appendix B	Acoustic Calculations

## 1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by The William Pears Group, 152 West End Lane, West Hampstead, London, to undertake an environmental noise survey at 25-26 Red Lion Street, London. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for the extension of the kitchen extract ducting 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 unit 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 at the position shown in Site Plan 10191.SP1. 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 15:08 on 24/07/2013 and 15:38 on 25/07/2013.

Initial inspection of the site revealed that the background noise profile at the monitoring location was wholly 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 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.

- 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 10191.TH1.

Minimum background noise levels are shown in Table 3.1.

<b>Minimum background noise level</b>	
$L_{A90: 5min}$ dB(A)	
Daytime (07:00-23:00)	49
Night-time (23:00-07:00)	43
Operating Hours (09:00-23:30)	48

**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.

	<b>Daytime (07:00 to 23:00)</b>	<b>Night-time (23:00 to 07:00)</b>	<b>Operating Hours (09:00 to 23:30)</b>
Noise criterion at nearest residential receiver (10dB below minimum $L_{A90}$ )	39	33	38

**Table 4.1: Proposed Noise Emissions Criteria**

As the kitchen extract fan will only be used during the restaurant operating hours, we would suggest adopting the criterion of 38dB in order to render the noise impact assessment more robust.

## 5.0 DISCUSSION

The location of the kitchen extract system is as shown in indicative site plan 10191.SP2.

The proposals involve extending the kitchen extract ducting to the height of the proposed fourth floor extension to the property. Therefore the closest noise sensitive receiver to this location will be the window of the rear Bedroom of Flat 2.

After a full site inspection, it was not possible to establish the exact make and model number of the kitchen extract fan, due to its original installation being some years ago. Therefore, a manual measurement was undertaken at a distance of 3m with the extraction system running at full capacity.

The sound pressure levels as measured on site for the units are shown in Table 5.1.

Unit	Sound Pressure Level (dB) in each Frequency Band (at 3m)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Unknown kitchen extract fan	65	60	58	53	49	42	32	27

Table 5.1 Measured Sound Pressure Level at 3m

## 5.1 Objective overview

Taking all acoustic corrections into consideration, including distance and screening corrections, the noise levels expected at the closest residential window would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver - Nearest Noise Sensitive Window	Criterion	Noise Level at Closest Residential Receiver
Operating hours	38 dB(A)	38 dB(A)

Table 5.2: Predicted noise levels 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.

Furthermore, the value of 38dB(A) is 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 proposed unit relocation would be expected to meet the 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 30-35dB(A) as being ‘Good-Reasonable’ internal resting/sleeping conditions.

With calculated external levels of 38dB(A), the residential window would need to provide at least 8dB attenuation, in order for ‘Good-Reasonable’ conditions to be achieved. According to BS8233:1999, even a partially open window offers 10-15dB attenuation, thus leading to an acceptable interior noise level that meets the criterion.

Receiver	‘Good’-‘Reasonable’ Conditions Design Range – <i>For resting/sleeping conditions in a bedroom, in BS8233:1999</i>	Noise Level at Closest Receiver (due to plant relocation)
Inside Nearest Residential Space	30-35 dB(A)	28 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 plant unit installation would be expected to comfortably meet the most stringent recommendations of the relevant British Standard, even with neighbouring windows partially open.

**6.0 CONCLUSION**

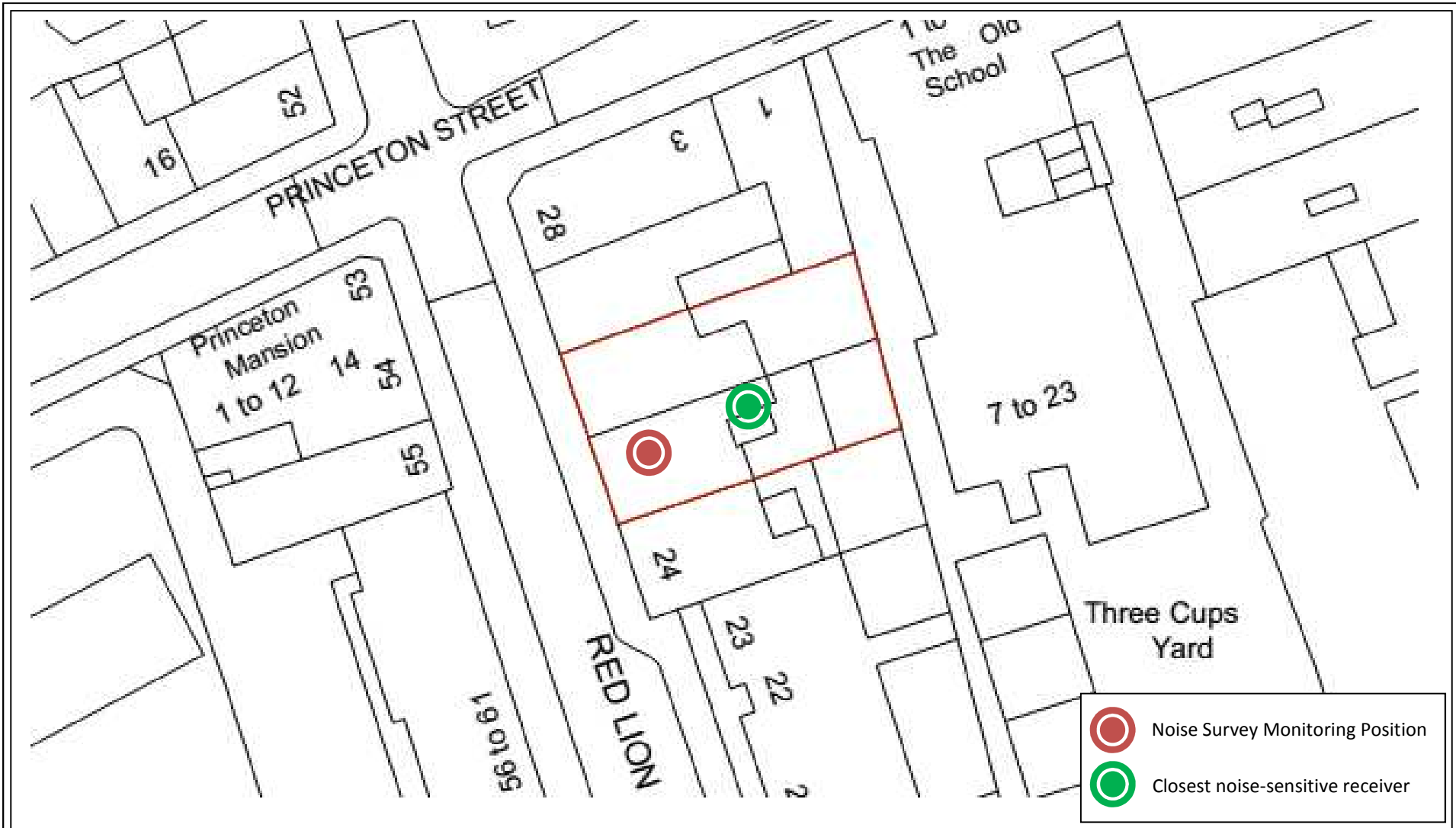
An environmental noise impact survey has been undertaken at the 25-26 Red Lion Street, London, by KP Acoustics Ltd between 24/07/2013 and 25/07/2013. The results of the survey have enabled criteria to be set for noise emissions. Using data captured from a manual measurement conducted on-site, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the proposed unit installations would meet the requirements of The London Borough of Camden.

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:**  
**Dan Green TechIOA**

**Checked by:**  
**Kyriakos Papanagiotou MIOA**



**Title:**

Indicative site plan showing noise monitoring position

Date: 31 July 2013

FIGURE 10191.SP1





**Title:**

Indicative site plan showing kitchen extract ducting

Date: 31 July 2013

**FIGURE 10191.SP2**





25 Red Lion Street, London  
Environmental Noise Time History  
24th July to 25th July 2013

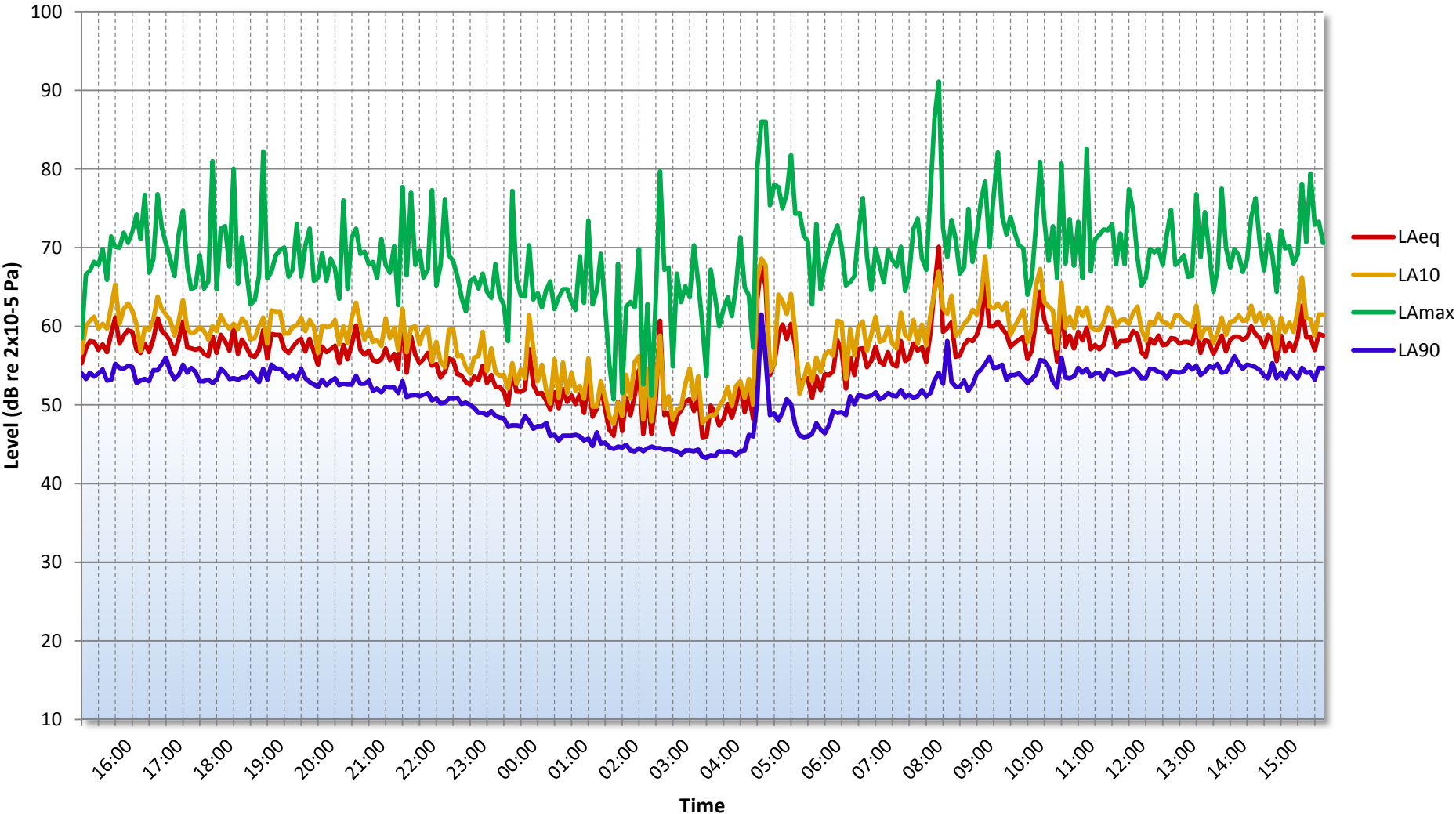


Figure 10191.TH1

## 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*.

## 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**  
**25-26 RED LION STREET, LONDON**  
**PLANT UNIT EMISSIONS CALCULATION**

Source: Plant Unit Installation	Frequency, Hz								
Receiver: Rear residential bedroom window of Flat 2	63	125	250	500	1k	2k	4k	8k	dB(A)
Manual measurement of unknown kitchen extract fan at 3m	65	60	58	53	49	42	32	27	
Directivity correction, dB	-3	-4	-8	-11	-11	-11	-11	-11	
Attenuation provided by duct bends (2)	-2	-10	-16	-8	-6	-6	-6	-6	
<b>Sound pressure level 1m from nearest residential receiver</b>	<b>60</b>	<b>46</b>	<b>34</b>	<b>34</b>	<b>32</b>	<b>25</b>	<b>15</b>	<b>10</b>	<b>38</b>

<b>Design Criterion</b>	<b>38</b>
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**Receiver: Inside Nearest Residential Window**

Source: Plant Unit Installation	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Sound pressure level outside window	60	46	34	34	32	25	15	10	38
Minimum attenuation from partially open window, dB	-10	-10	-10	-10	-10	-10	-10	-10	-10
<b>Sound pressure level inside nearest office window</b>	<b>50</b>	<b>36</b>	<b>24</b>	<b>24</b>	<b>22</b>	<b>15</b>	<b>5</b>	<b>0</b>	<b>28</b>