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# THE WELLS, HAMPSTEAD, LONDON

## NOISE IMPACT ASSESSMENT REPORT

Report 9085.NIA.01

**For:**

**Speed 9600 Ltd,**

**The Wells,**

**30 Well Walk**

**Hampstead,**

**NW3 1BX**



| Site Address | Report Date | Revision History |
|---|---|---|
| 10 Ashburn Gardens, Kensington | 15/05/2012 | |

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## 1.0 INTRODUCTION

KP Acoustics Ltd, Britannia House, 11 Glenthorne Road, London, W6 0LH, has been commissioned by Speed 9600 Ltd, The Wells, Well Walk, Hampstead, NW3 1BX, to undertake an environmental noise survey at The Wells, Hampstead. The background noise levels measured will be used to determine daytime and night-time noise emission criteria for the proposed extract fan installation in agreement with the planning requirements of Camden Council.

This report presents the overall methodology and results from the environmental survey followed by calculations to demonstrate the feasibility of the fan 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 9085.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 12:30 on 9/05/2012 and 12:30 on 10/05/2012.

Initial inspection of the site revealed that the background noise profile at the monitoring location was generally quiet, with noise mainly occurring from occasional road traffic from the surrounding roads.

The weather during the course of the survey was generally dry, and 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.

- 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 15 minute sample periods in Figure 9085.TH1.

Minimum background noise levels are shown in Table 3.1.

| | **Minimum background noise level $L_{A90;\ 15min}$ dB(A)** |
|---|---|
| Daytime (07:00-23:00) | 42 |
| Night-time (23:00-07:00) | 37 |
| Operating Hours (08:00-22:30) | 42 |

**Table 3.1: Minimum measured background noise levels**

## 4.0 NOISE CRITERIA

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

*"Noise emitted by all plant [...] shall not increase the lowest existing $L_{A90}$ (10mins) level measured or predicted at 1.0m from the nearest residential window or at a height of 1.2m above any adjacent residential garden [...] at any time when the plant is operating."*

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

| | **Daytime (07:00 to 23:00)** | **Night-time (07:00 to 23:00)** | **Operating Hours (08:00-22:30)** |
|---|---|---|---|
| Noise criterion at nearest residential receiver (10dB below minimum $L_{A90}$) | 32 dB(A) | 27dB(A) | 32dB(A) |

**Table 4.1: Proposed Noise Emissions Criteria**

Due to the proposed operating hours being from 08:00 to 22:30, the set criterion of 32dB(A) will be used in this assessment.

## 5.0 DISCUSSION

The location of the proposed fan installation is as shown in the indicative site plan 9085.SP1. The fan extract is positioned close to The Wells rear facade, with screening provided between the closest noise sensitive receiver and the extract fan by the building envelope.

It is understood that the extract fan installation comprises of one new extract fan unit, selected as follows:

- 1 No. Systemair KDRD 50 extract fan

The sound power levels as provided by the manufacturer for the unit are shown in Table 5.1*.

| | Sound Power Level (dB) in each Frequency Band (at 1m) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Unit** | **63Hz** | **125Hz** | **250Hz** | **500Hz** | **1kHz** | **2kHz** | **4kHz** | **8kHz** |
| SystemAir KDRD 50 extract fan * | 73 | 77 | 73 | 72 | 70 | 66 | 64 | 58 |

**Table 5.1 Manufacturer's Sound Power Level**

*** worst case operational modes have been used in order to provide a more robust assessment**

### 5.1 Objective overview

Taking all acoustic corrections into consideration, including distance 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 Receiver** |
|---|---|---|
| Operating hours | 32 dB(A) | 32 dB(A) |

**Table 5.2: Predicted noise levels and criterion at nearest noise sensitive location**

As shown in Appendix B and Table 5.1, transmission of noise to the nearest sensitive windows due to the effects of the fan unit installation satisfies the emissions criteria set by Camden Council. It is the professional opinion of KP Acoustics that this level is not going to pose any negative impact on the amenity of nearby residential receivers. Furthermore, the value of 32dB(A) does not include the attenuation levels provided by the installed silencer, which would further reduce the noise level at the closest noise sensitive receiver. A final point to note is that the value of 32dB(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 plant unit installation 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 Practise'* 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 calculated external levels of 32 dB(A), the residential window itself would need to provide at least 2dB attenuation in order for 'good' 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' 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) | 22 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 Camden Council, the emissions from the extraction fan unit would be expected to comfortably meet the most stringent recommendations of the relevant British Standard, even with neighbouring windows partially open.

## 6.0 CONCLUSION

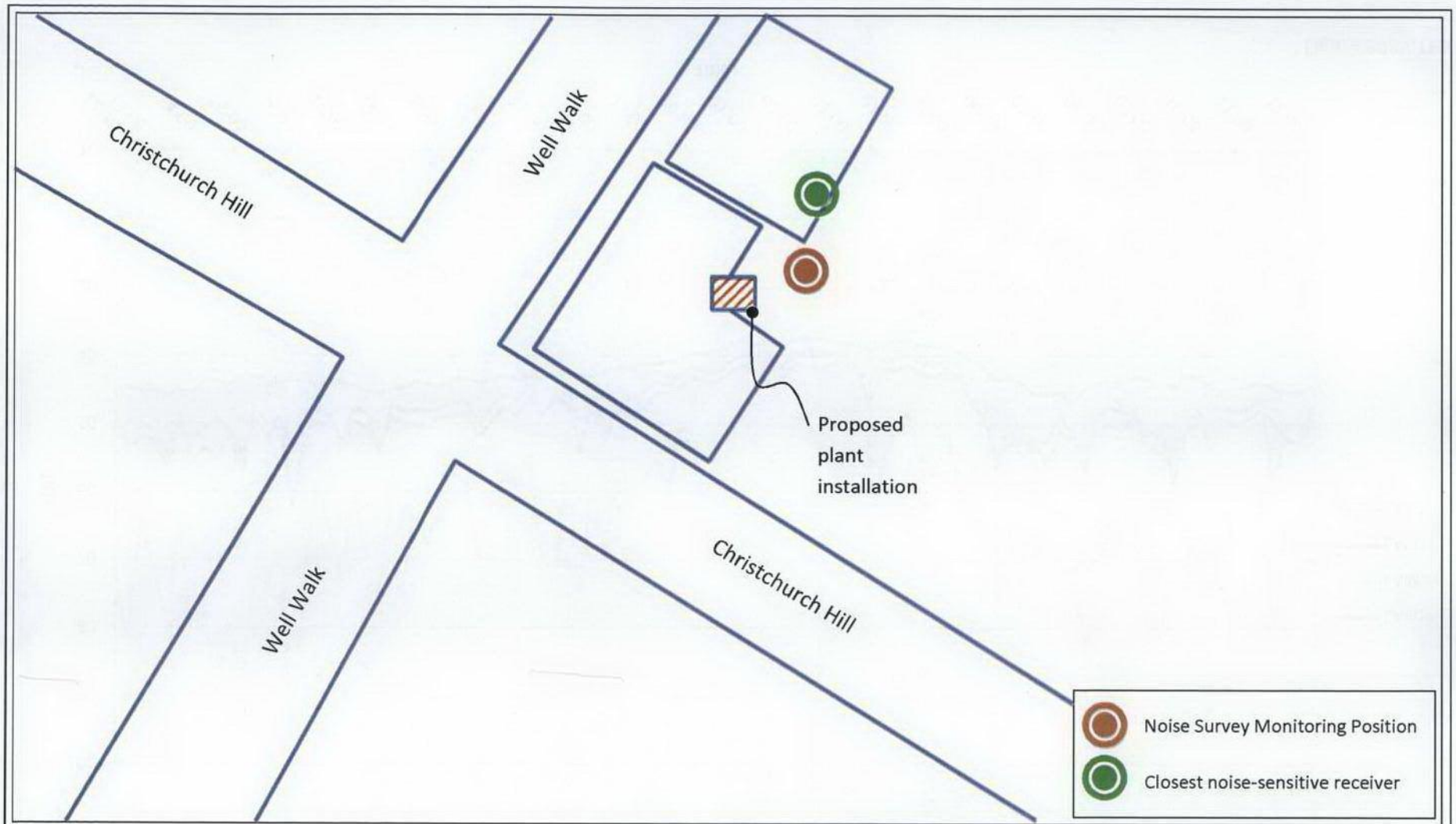
An environmental noise impact survey has been undertaken at The Wells, Hampstead, by KP Acoustics Ltd between 9/05/2012 and 10/05/2012. The results of the survey have enabled criteria to be set for noise emissions. Using manufacturer noise data, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the proposed unit installation would meet the requirements of Camden Council.

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

**Kyriakos Papanagiotou**
**Director**
**KP Acoustics**




**Title:**
Indicative site plan showing noise monitoring position

**Date:** 15 May 2012

**FIGURE 9085.SP1**

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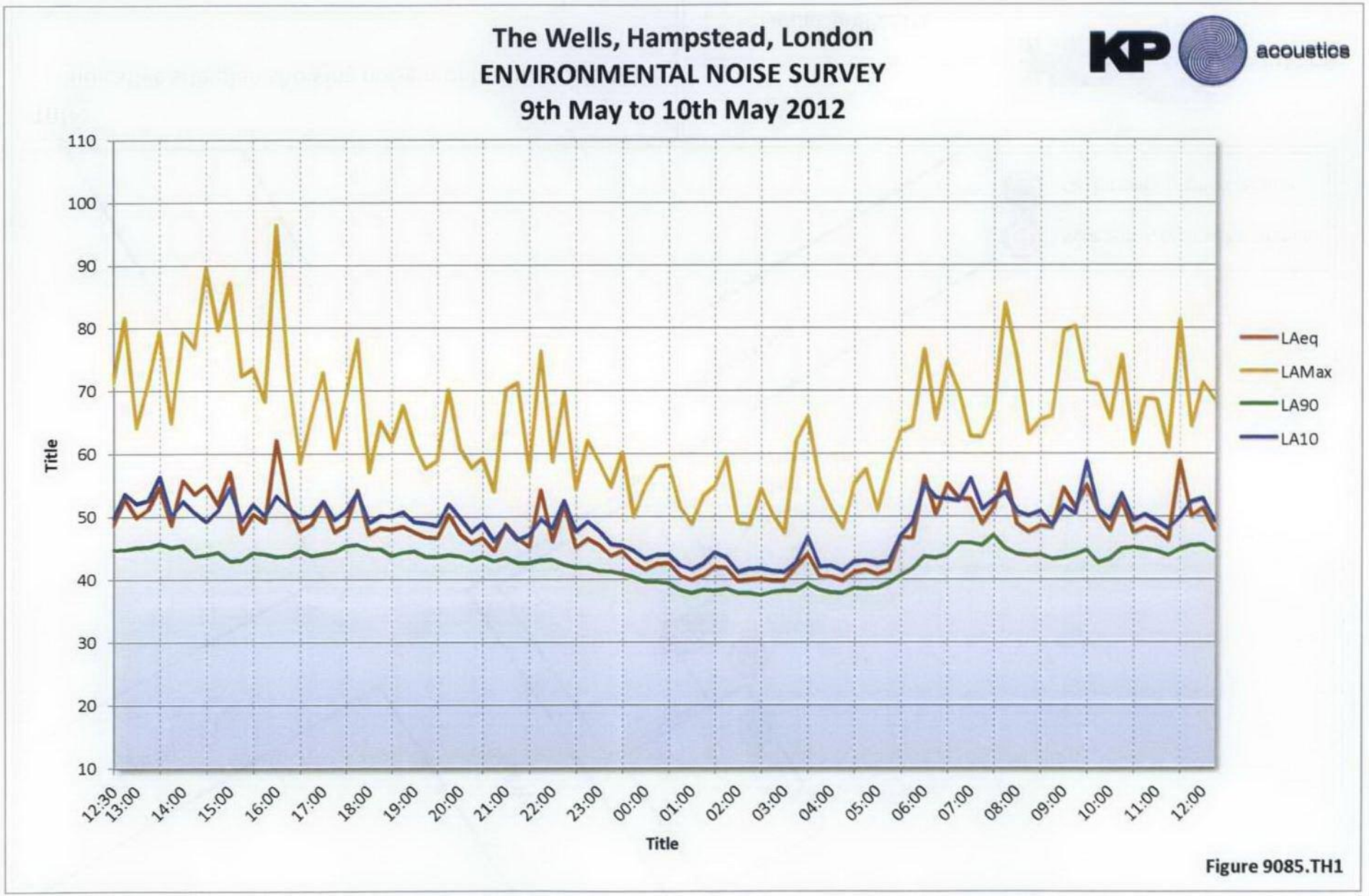


Figure 9085.TH1

# 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

## The Wells, Hampstead

### FAN EMISSIONS CALCULATION

| **Source: System Air Fan Unit** | *Frequency, Hz* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Receiver: Nearest Residential Window | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | ***dB(A)*** |
| SystemAir KDRD 50 extract fan unit | 73 | 77 | 73 | 72 | 70 | 66 | 64 | 58 | 75 |
| Correction for conversion to sound pressure level | -5 | -5 | -5 | -5 | -5 | -5 | -5 | -5 | |
| Attenuation provided by building envelope, dB | -7 | -9 | -13 | -16 | -17 | -17 | -17 | -17 | |
| Distance correction (13m) , dB | -22 | -22 | -22 | -22 | -22 | -22 | -22 | -22 | |
| **Sound pressure level 1m from nearest residential receiver** | **39** | **41** | **33** | **29** | **26** | **22** | **20** | **14** | **32** |

| **Design Criterion** | **32** |
|---|---|

| **Source: System Air Fan Unit** | *Frequency, Hz* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Receiver: Inside Nearest Residential Window | ***63*** | ***125*** | ***250*** | ***500*** | ***1k*** | ***2k*** | ***4k*** | ***8k*** | ***dB(A)*** |
| Sound pressure level outside window | 39 | 41 | 33 | 29 | 26 | 22 | 20 | 14 | 32 |
| Minimum attenuation from partially open window, dB | -10 | -10 | -10 | -10 | -10 | -10 | -10 | -10 | |
| **Sound pressure level inside nearest noise sensitive window** | **29** | **31** | **23** | **19** | **16** | **12** | **10** | **4** | **22** |

| **Design Range** | **34** |
|---|---|