# Report VA5077.240228.NIA

# 109 Pinner Road, Northwood

## Noise Impact Assessment

**13 March 2024**

**London Interiors**
**Unit 8 Bowman Trading Estate**
**Westmoreland Road**
**London**
**NW99RL**

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## Contents



## Attachments

| Report Version | Author | Approved | Changes | Date |
|---|---|---|---|---|
| NIA | Steven Liddell | Jamie Duncan | - | 04/03/24 |

# 1. Introduction

Retrospective approval is being sought for a kitchen supply and extract fan at 109 Pinner Road, Northwood.

Venta Acoustics has been commissioned by London Interiors to undertake an assessment of the potential noise impact of these proposals in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the background noise levels at the most affected noise sensitive receptors. These levels are used to undertake an assessment of the likely impact with reference to the planning requirements of London Borough of Hillingdon.

# 2. Design Criterion and Assessment Methodology

## 2.1 London Borough of Hillingdon Requirements

It is understood that the London Borough of Hillingdon require that noise from commercial uses should ideally be at least 5dB below the local background noise level as assessed at the most affected noise sensitive receivers. Where justified, sound levels up to 5dB above the background sound level may be acceptable.

The assessment is to be undertaken with reference to BS4142:2014.

## 2.2 BS4142:2014+A1:2019

British Standard BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations comprising mechanical and/or electrical plant and equipment;

The assessment methodology considers the Specific Sound Level, as measured or calculated at a potential noise sensitive receptor, due to the source under investigation. A correction factor is added to this level to account for the acoustic character of the sound as follows:

**Tonality –** A correction of up to 6dB depending on the prominence of tones;

**Impulsivity -** A correction of up to 9dB depending on the prominence of impulsivity;

**Other sound characteristics -** A 3dB correction may be applied where a distinctive acoustic character is present that is neither tonal nor impulsive;

**Intermittency -** A 3dB correction may be applied where the specific sound has identifiable on/off conditions.

An estimate of the impact of the source is obtained by subtracting the typical background noise level from the corrected Specific Sound Level.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context.

## 2.3 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to suitable internal noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.1.

| Activity | Location | 07:00 to 23:00 | 23:00 to 07:00 |
|---|---|---|---|
| Resting | Living Room | 35 dB $L_{Aeq, 16 hour}$ | - |
| Dining | Dining Room | 40 dB $L_{Aeq, 16 hour}$ | - |
| Sleeping (daytime resting) | Bedroom | 35 dB $L_{Aeq, 16 hour}$ | 30 dB $L_{Aeq, 8 hour}$ |

**Table 2.1 - Excerpt from BS8233: 2014** **[dB ref. 20µPa]**

# 3. Site Description

As illustrated on attached site plan VA5077/SP1, the site building is located at ground floor level in a terrace of shops with residential units above. To the rear is a courtyard common to the surrounding retail uses and through which the flats are access via a first floor walkway. The most affected flats are those directly above the premises at a distance of approximately 3m from the plant.

The extract fan and supply fan as well as a condenser unit are located on a small flat roof to the rear of the premises. These plant are at a lower level than the first floor walk way and so are screened from the dwellings above the premises by a wall. The fans are both located on the flat room and orientated to discharge away from the dwellings above. The fans include sound attenuators on the atmospheric side.

It was noted that there are a number of other kitchen extract fans and condenser units within the rear courtyard, servicing the surrounding restaurants.

109 Pinner Road is a takeaway restaurant which operates between 10:30 and 20:00 daily, although the nature of the business is that food is batched prepared and the kitchen is not is use continuously.

# 4. Environmental Noise Survey

## 4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Wednesday 21st and Friday 23rd February 2024 at the location shown in site plan VA5077/SP1. This location was chosen to be representative of the background noise level at the most affected noise sensitive receivers.

Continuous 5-minute samples of the $L_{Aeq}$, $L_{Amax}$, $L_{A10}$ and $L_{A90}$ sound pressure levels were undertaken at the measurement location.

The weather during the survey period was generally dry with light winds. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

| Manufacturer | Model Type | Serial No | Calibration | |
|---|---|---|---|---|
| | | | Certificate No. | Date |
| NTi Class 1 Integrating SLM | XL2 | A2A-11586-E0 | 1502936-2 | 25/7/22 |
| Larson Davis calibrator | CAL200 | 19816 | 1506037-1 | 28/7/23 |

**Table 4.1 – Equipment used for the survey**

The calibration of the sound level meter was verified before and after use with no significant calibration drift observed.

## 4.2 Automated Survey Results

The measured sound levels are shown as time-history plots on the attached charts VA5077/TH1-2.

It can be seen from the time histories that the background noise level is determined by numerous plant servicing the surrounding premises. These continue beyond the operational hours of 109 Pinner Road and the operation of the equipment associated with the premises does not control the acoustic environment.

The typical background noise levels measured were:

| Monitoring Period | Typical[1] $L_{A90,5min}$ |
|---|---|
| 07:00 – 23:00 hours | 49 dB |
| 23:00 – 07:00 hours | 51 dB |
| Operational Hours 10:30 – 20:00 | 55 dB |

**Table 4.2 – Typical background noise levels** **[dB ref. 20 µPa]**

[1] The typical $L_{A90}$ value is taken as the 10th percentile of all $L_{A90}$ values measured during the relevant period.

## 4.3 Attended Measurements

During the site visits on 21 February 2024, attended measurements were undertaken with the fans set to their normal operating speed, their maximum operating speed and with the equipment turned off. The equipment listed in Table 4.1 was used for the measurements.

| Measurement | Ambient Sound level $L_{Aeq}$ | Notes |
|---|---|---|
| 1m in front of Extract, Max | 70 dB | |
| 1m in front of Extract, Normal Operation Speed | 64 dB | |
| MaxKold Condenser Unit | 68dB | 1m from unit |
| 1m in front of Supply Air Fan – Max Speed | 65 dB | |
| AM1 – Behind Fans, 1m from window – Max speed | 55 dB | Application Fan just identifiable against other fans in the area |
| AM1 – Behind Fans, 1m from window – Normal Speed | 55 dB | Application fan not identifiable relative to existing sound levels |
| AM1 – Behind Fans, 1m from window - Off | 54 dB | Residual Sound Level |
| AM2 – 8m to the side - Max Speed | 59 dB | Fans just identifiable against other fans in the area |
| AM2 – 8m to the side - Normal Speed | 58 dB | |
| AM2 – 8m to the side - Off | 57 dB | Residual Sound Level |

**Table 4.3 – Results of attended measurements**

## 4.4 BS4142 Noise Impact Assessment

Correcting the measured sound levels for the residual sound, the specific sound levels are derived.

As the area contains existing extract plant and condenser units, the sound from this equipment is not considered to be out of place or of a character that attracts attention. The equipment is not intermittent or impulsive in its use. No character correction is therefore considered appropriate for the sound.

Comparing the resulting rating level to the background sound level results in the indication of the likely impact:

| Measurement | Specific Sound Level $L_{Aeq}$ | Feature Correction | Rating Level | Background Sound Level | Result |
|---|---|---|---|---|---|
| AM1 – Behind Fans, 1m from window – Max speed | 47 dB | 0 | 47 dB | 55 dB | -8 |
| AM1 – Behind Fans, 1m from window – Normal Speed | 45 dB | 0 | 45 dB | 55 dB | -10 |
| AM2 – 8m to the side - Max Speed | 55 dB | 0 | 55 dB | 55 dB | -0 |
| AM2 – 8m to the side – Normal Speed | 53 dB | 0 | 53 dB | 55 dB | -2 |

**Table 4.4 – BS4142 Assessment of plant noise**

At maximum speed the rating level is at most equal to the existing background sound level. At the normal operating duty the rating level is between 2 and 10 dB below the background sound level.

Within the context of the site, this indicates a low impact.

Sound from the MaxKold refrigeration unit is included in the above assessment as a cumulative level (the plant was operational during the surveys). The refrigeration unit is well screened from the residential elements by the backing walls and so has a lower contribution to the sound levels that the extraction fan.

The rating level of the equipment, being at most 2dB below the background sound level, is considered to meet the requirements of Hillingdon Council with the justification of not meeting 5dB below the background sound being that there is existing extract and cooling plant in the area that is already louder than the assessed plant which operates for longer periods. The assessment has been undertaken to the most affected windows which are understood to the kitchens (non-noise sensitive), with living rooms on the opposite facades. The top floor windows are likely to be bedrooms but the premises in question closes relatively early and so would not affect bedrooms at night.

Overall, a low impact is expected from the installed equipment.

# 5. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the background noise climate in the locality of 109 Pinner Road, Northwood in support of a retrospective planning application for installed building services plant.

A survey of noise levels in the area has been undertaken, leading to a BS4142 assessment of the noise impact of the installed equipment.

Given that there is a significant number of existing extract and cooling plant in the immediate area that generates higher sound levels than the application plant, and that sound from the installed plant is lower than the local background sound level, the assessment indicates a low impact.

The proposed scheme is not expected to have a significant adverse noise impact and the relevant planning requirements are considered to have been met.

**Steven Liddell MIOA**


Most Affected Receiver
Noise monitoring location
AM2
AM1
Installed New Plant Location
Neighbouring Plant

109 Pinner Road, Northwood

Environmental Noise Time History: 1

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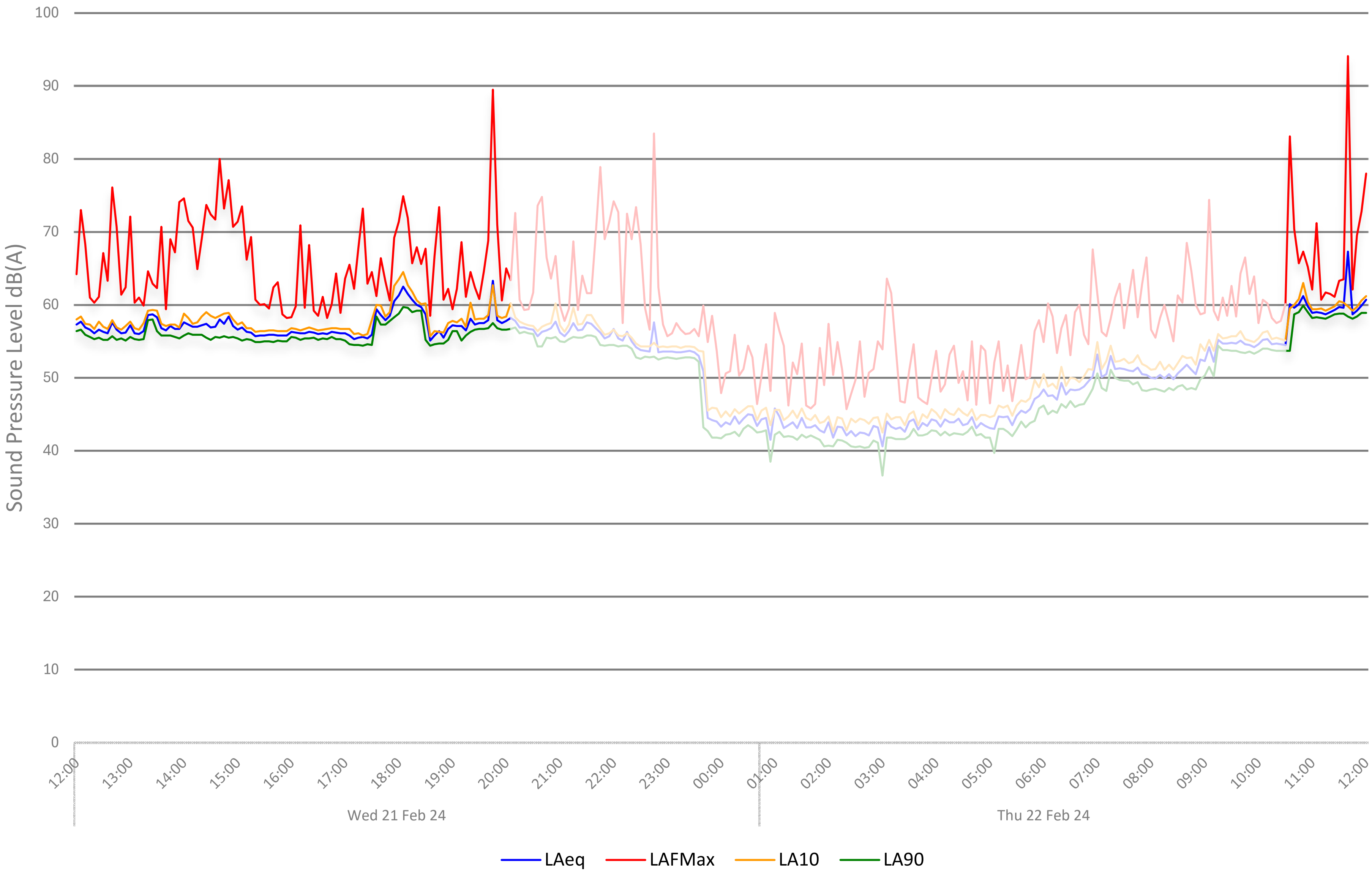
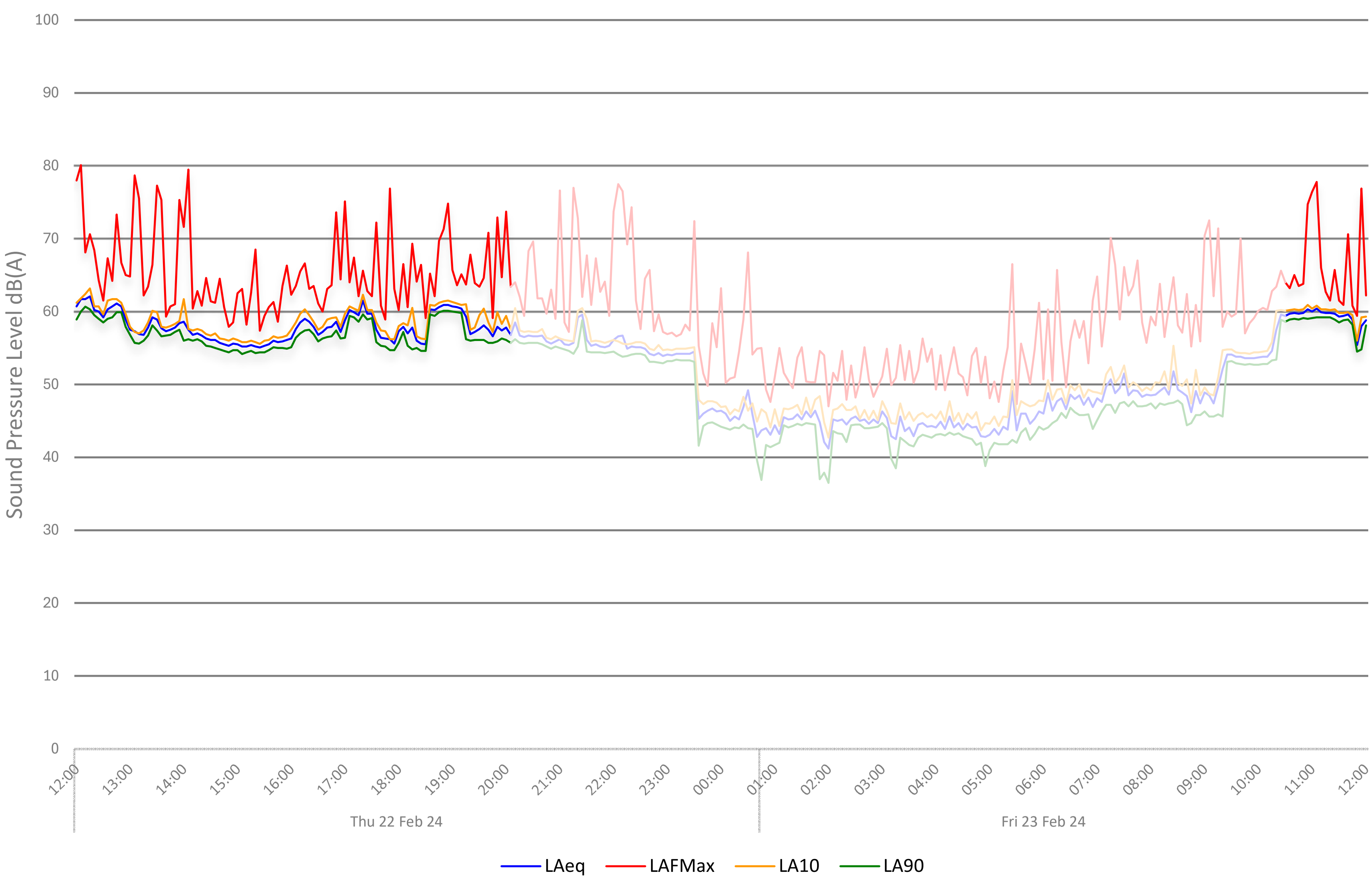
Figure VA5077/TH1



109 Pinner Road, Northwood

Environmental Noise Time History: 2

Figure VA5077/TH2



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Environmental Noise Time History: 3

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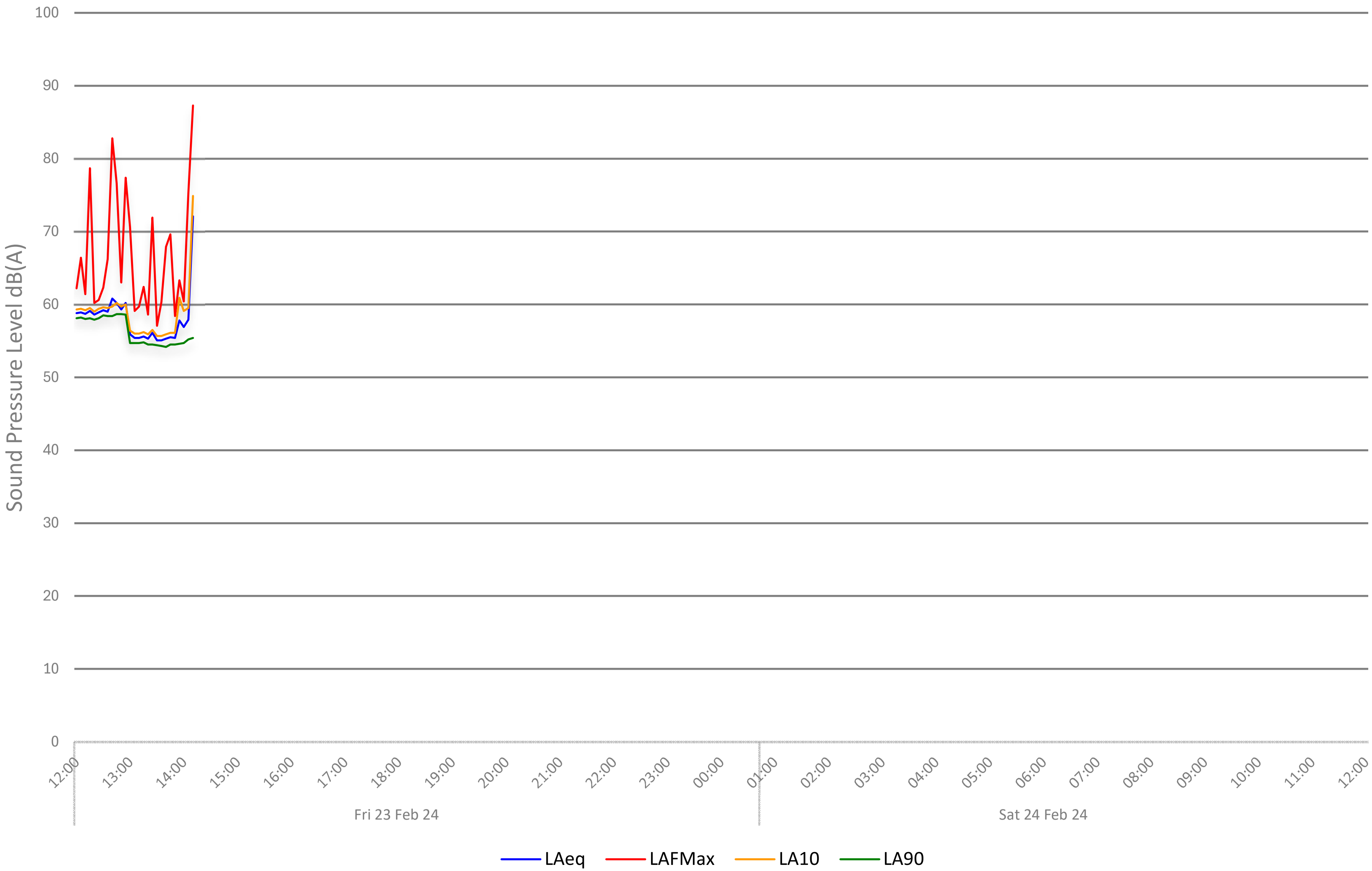
Figure VA5077/TH3



# APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

## 1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

| | |
|---|---|
| **Sound** | Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system. |
| **Noise** | Sound that is unwanted by or disturbing to the perceiver. |
| **Frequency** | The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'. |
| **dB(A):** | Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or $L_A$. |
| **$L_{eq}$ :** | A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of $L_{eq}$ (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because $L_{eq}$ is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit. |
| **$L_{10}$ & $L_{90}$ :** | Statistical $L_n$ indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, $L_{10}$ is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, $L_{90}$ is the typical minimum level and is often used to describe background noise. It is common practice to use the $L_{10}$ index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow. |
| **$L_{max}$ :** | The maximum sound pressure level recorded over a given period. $L_{max}$ is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged $L_{eq}$ value. |
| **$D_{nT}$** | *Weighted Standardised Level Difference.* As defined in BS EN ISO 717-1, representing the *Weighted Level Difference*, when standardised for reference receiving room reverberant characteristics. |
| **$D_{n,e}$** | Normalised sound insulation of small building elements of fixed dimensions, such as vents, measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010. |
| **$D_{n,f}$** | Flanking sound insulation of lightweight elements, such as curtain wall mullions, measured in an accredited laboratory test suite in accordance with the procedures laid down in ISO 10848-2:2006 |

## 1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

| Octave Band Centre Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|---|---|---|---|---|---|---|---|---|

## 1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

| Change in Sound Level dB | Subjective Impression | Human Response |
|---|---|---|
| 0 to 2 | Imperceptible change in loudness | Marginal |
| 3 to 5 | Perceptible change in loudness | Noticeable |
| 6 to 10 | Up to a doubling or halving of loudness | Significant |
| 11 to 15 | More than a doubling or halving of loudness | Substantial |
| 16 to 20 | Up to a quadrupling or quartering of loudness | Substantial |
| 21 or more | More than a quadrupling or quartering of loudness | Very Substantial |

## 1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.