

HOT FOOD TAKEAWAY - 220 UPPER BROOK STREET, MANCHESTER, M13 9LY

PLANT NOISE IMPACT ASSESSMENT

**On behalf of:
OO-Life Limited**

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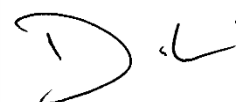
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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by OO-Life Limited to carry out a noise impact assessment in connection with a proposed planning application for a proposed change of use from a bakery to a hot food takeaway at 220 Upper Brook Street, Manchester, M13 9LY (hereby referred to as “the site”). Specifically, the noise assessment was requested in connection with new external kitchen ventilation equipment to be installed.
- 1.2 The location of the proposed development is shown in **Figure 1**. The site is adjacent to Upper Brook Street to the northeast, Grafton Street to the northwest and North Road to the southwest and southeast.
- 1.3 The proposed hot food takeaway will be located on the ground floor of the three-storey end terrace building located close to the junction of the busy Upper Brook Street (A34) and Grafton Street near to Manchester Royal Infirmary. The nearest dwellings are existing apartments on the upper floors of the building also shown in **Figure 1**.
- 1.4 The assessment has been based on the layout shown on drawing provided by the project architects DawnWinterbottom. The proposed layout of the development is shown in **Figure 2**. No specific trading hours have been confirmed at this stage.
- 1.5 The precise details of the proposed equipment have yet to be finalised, but we understand that a kitchen extract fan with associated ductwork routed up the side of the building with a termination at high level is anticipated to be installed to the rear of the site.
- 1.6 This assessment has therefore included the following:
- An inspection of the proposed equipment location and the site and environs;
 - A survey of the prevailing environmental noise levels of the area;
 - Recommending appropriate design noise limits for the new fixed plant/equipment based upon the requirements of BS 4142: 2014+A1:2019 and Manchester City Council’s usual noise control criteria; and
 - Providing outline advice on potential noise mitigation measures.

- 1.7 All recommendations in this report are given for acoustics reasons only. Compliance with other requirements (e.g. fire, structural, thermal, etc.) must be checked by others.
- 1.8 The various noise units and indices referred to in this report are described in **Appendix I**. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 GUIDANCE

NPPF:2021

- 2.1 Paragraph 185 of the National Planning Policy Framework (NPPF) 2021 states that planning policies and decisions should *“ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;”*

NPSE:2010

- 2.2 The Noise Policy Statement for England (NPSE) 2010, which is referred to the in NPPF, includes three aims:
- i. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
 - ii. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
 - iii. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

BS 4142:2014+A1:2019

- 2.3 British Standard 4142:2014+A1:2019, *Methods for rating and assessing industrial and commercial sound* (referred to hereafter as BS 4142), is the appropriate guidance for assessing and controlling the potential noise impact at residential locations from noise sources such as new mechanical services plant installations.
- 2.4 BS 4142 requires a ‘rating’ level ($L_{A,T}$) to be calculated from the operation of the noise source and compared with the background sound level ($L_{A90,T}$) which is measured in the absence of the noise

source, evaluated over a 1-hour period for daytime operations and a 15-minute period for night-time operations.

- 2.5 In respect of the representative background sound level, BS 4142 states that 'the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods'.
- 2.6 The rating level ($L_{Ar,Tr}$) is based on the 'specific' sound level ($L_s = L_{Aeq,Tr}$) attributed to the operating noise source, with 'character corrections' added for sound sources where 'certain acoustic features can increase the significance of impact' at the residential locations.
- 2.7 The character correction applied to the specific sound level in order to obtain the rating level can take into account tonality, intermittency, impulsivity and characteristics otherwise distinctive against the prevailing noise climate in the area of the residential properties.
- 2.8 An initial estimate of the potential noise impact from the operating noise source is determined by comparing the difference between the background sound level and the rating level.
- 2.9 Regarding the outcome of the initial estimate, BS 4142 states that:
- Typically, the greater this difference, the greater the magnitude of the impact
 - A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context
 - A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context
 - The lower the 'rating' level is relative to the measured background level, the less likely it is that the operation will have an adverse impact or a significant adverse impact. Where the 'rating' level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 2.10 Where the initial estimate of the impact needs to be modified due to the context, BS 4142: 2014 states that all pertinent factors should be taken into account regarding the context in which the noise occurs, including but not limited to:

- The absolute level of sound.
- The character and level of the residual sound compared to the character of the specific sound; and,
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will incorporate design measures that ensure good internal and/or outdoor acoustic conditions such as acoustic screening.

Local Authority Requirements

2.11 Manchester City Council have well-established noise design criteria that are relevant to this development as follows:

‘Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.’

3.0 BASELINE NOISE SURVEY

- 3.1 A baseline noise survey was carried out over a 24-hour period during the week in order to establish the existing background noise climate of the area.
- 3.2 The noise survey took place between approximately 11:00 on Wednesday 19 July 2023 until 11:00 on Thursday 20 July 2023 using a NTi Audio XL2 'Class 1' sound level meter (serial no. A2A-20361-E0) with environmental case and microphone environmental windshield. The calibration level of the meter was checked before and after the survey with no calibration deviation observed.
- 3.3 The noise measurements were taken as a series of consecutive 15-minute periods at a location at the rear of the site outdoors on the ground floor below the nearest dwellings. The sound level meter microphone was mounted via a pole at approximately 3m above local ground level and around 1m from the side elevation of the building towards the rear. The microphone was above the height of the wall to the back yard area and representative of the upper floor apartment windows. The measurement location is shown in **Figure 1**.
- 3.4 The weather conditions throughout the noise survey were mild (approx. 18°C in the daytime), dry and clear with low wind speeds. These were considered appropriate conditions for the survey.
- 3.5 The prevailing noise climate at the measurement location was found to be dictated by noise from road traffic on Upper Brook Street and nearby construction noise. The construction noise was found to be during the daytime only and was intermittent such that it has minimal effect on daytime L_{90} levels. Full results of the noise survey are shown in **Appendix II**, with representative sound levels summarised below. Since trading hours have not yet been confirmed, we have analysed the results to establish representative background sound levels for trading periods up to 23:00, 00:00 and 02:00. The adopted representative sound levels for each terminal hour are also shown, these being the lowest of either of the mean or mode of the measured background sound levels during the relevant period:

Table 1: Summary of representative sound levels (dB)

Description	Summary of Measured noise levels			Adopted representative background sound level $L_{A90,15min}$
	Range of $L_{Aeq,T}$	Mean $L_{A90,15min}$	Mode $L_{A90,15min}$	
Daytime period (07:00 – 23:00)	57 - 70	54	53	53
Evening period (19:00 – 23:00)	60 - 70	53	53	53
Early night-time (23:00 – 00:00)	71 - 85	51	51	51
Early hours (00:00 – 02:00)	69 - 85	49	49	49

4.0 ASSESSMENT & RECOMMENDATIONS

- 4.1 As noted above, there are no confirmed details of the noise emissions from the equipment at this stage. As such, we have derived appropriate noise design limits from the adopted representative background sound levels which will need to be taken into account in the selection, specification and installation of the equipment.
- 4.2 On this basis, the recommended cumulative fixed plant/equipment rating sound levels (i.e. rated according to BS 4142) are shown in **Table 2** which presents three different noise limits that are applicable, depending on whether trading hours cease at 23:00 or if they continue until 00:00 or even 02:00.

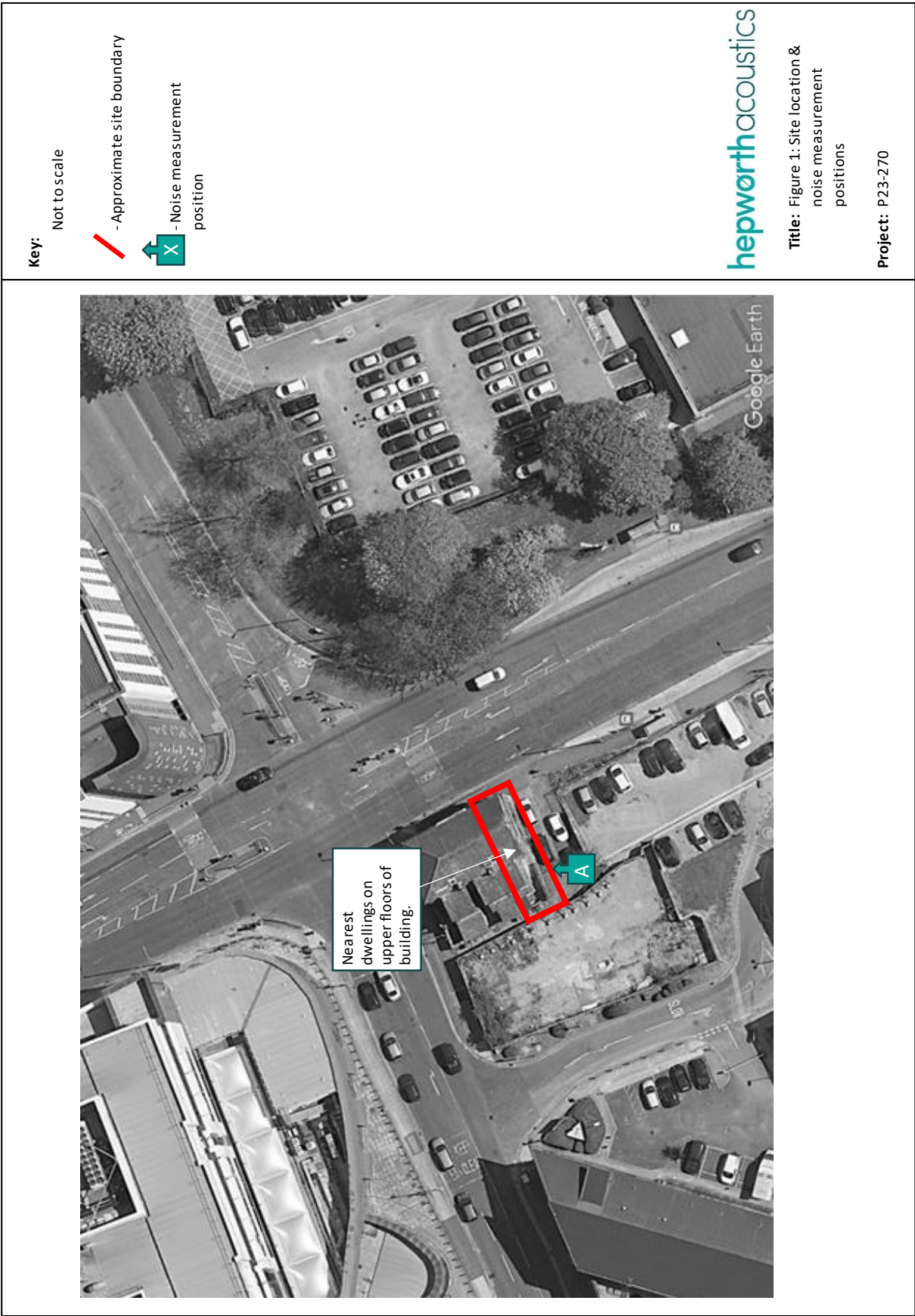
Table 2: Cumulative Buildings Services Plant Noise Rating Level Design Limits (dB $L_{A,T,r}$)

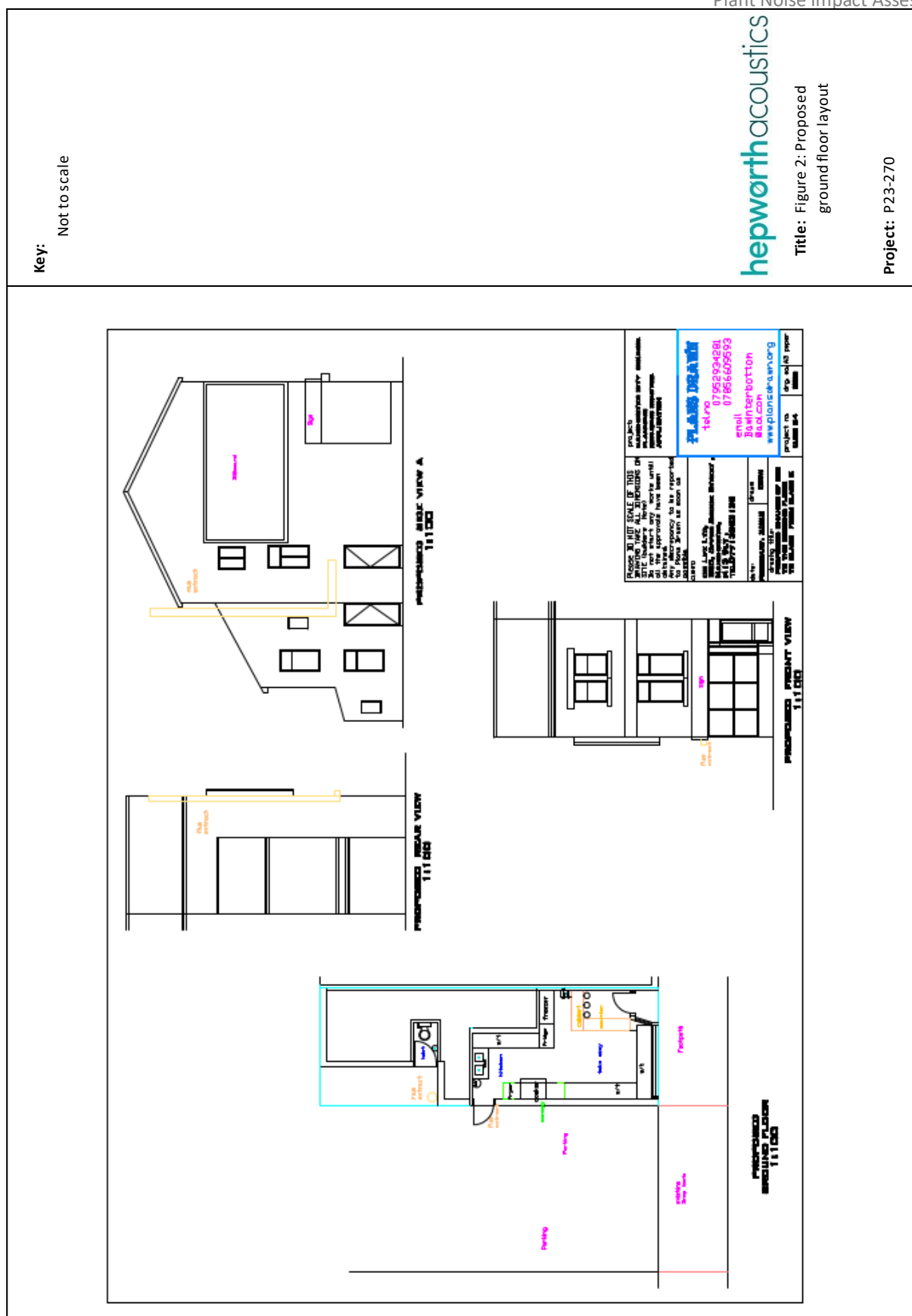
Location	Terminal trading hour		
	23:00	00:00 (midnight)	02:00
Outside upper floor apartment windows	48	46	44

- 4.3 Noise control measures may include specifying low noise equipment, attenuators and potentially acoustic duct lagging for the fan casing and unsilenced ductwork.
- 4.4 We also recommend that the equipment and all associated ductwork is mounted via appropriate anti-vibration brackets to ensure that there is no undue structure borne noise transfer to the apartments. The equipment should also be regularly maintained to ensure that noise emissions are minimised.

5.0 CONCLUSIONS

- 5.1 Hepworth Acoustics Ltd was commissioned by OO-Life Limited to carry out a noise impact assessment in connection with a proposed planning application for a proposed change of use from a bakery to a Hot Food Takeaway at 220 Upper Brook Street, Manchester. Specifically, the assessment addresses the potential impact of noise from proposed kitchen ventilation equipment to be installed as part of the proposals. No details of the proposed equipment have been finalised at this stage.
- 5.2 The assessment has included a site visit and inspection of the premises and the surrounding area; and a noise survey over a 24-hour period in order to quantify the representative background noise climate of the area.
- 5.3 The results of the noise survey have been used as a basis for recommending appropriate noise limits for the equipment. The noise limits could be used in the design and specification of the installation. Noise control measures may include specifying low noise equipment, attenuators and potentially acoustic duct lagging for the fan casing and unsilenced ductwork.





Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

- $L_{Aeq,T}$ This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, $L_{Aeq,T}$ is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.
- L_{AFmax} This is the maximum A-weighted noise level that was recorded during the measurement period in terms of 'Fast' time weighting.
- $L_{A90,T}$ This is the A-weighted noise level exceeded for 90% of the time period. $L_{A90,T}$ is used as a measure of background noise.
- L_W This is the Sound Power Level and is a Logarithmic measure of the sound power as a relation to the threshold of hearing.
- $L_{Ar,Tr}$ This is the specific sound level plus any adjustment for the characteristic feature of the sound, BS 4142 refers.

Appendix II: Noise Survey Results

Date(s):	Daytime – Friday 19 July 2023 Night-time – Friday 19 July 2023
Equipment	NTi XL2 'Class 1' sound level meters (s/n: A2A-20361-E0) with associated calibrator and environmental outdoor monitoring kit
Weather	Daytime – Dry, ~17°C, clear skies and calm <3 m/s Night-time – Dry, ~13°C, clear skies and calm <3 m/s

Please see chart overleaf.

