

**32-34 DALE STREET, MANCHESTER - APPROVED SUI GENERIS USE
NOISE IMPACT ASSESSMENT**

**On behalf of:
The Green Lab**

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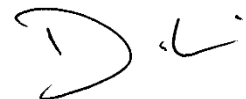
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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was previously commissioned by The Green Lab to carry out a noise impact assessment in connection with a planning application for the approved sui generis use development at 32-34 Dale Street, Manchester.

1.2 The site is located within Cheetwood House, and the building has permission to be used as a yoga studio (D2) in the basement, a cafe (A3) and barbers (A1) at ground floor level and continued use of the upper floors as offices (B1).

1.3 This report is an update of our previous report (ref P19-407-R01v1) to discharge Condition 4a of planning application ref: 125943/FO/202. Condition 4a states:

'4(a) Notwithstanding the details shown in the approved documents, before first occupation of the development the building, together with any externally mounted ancillary equipment, shall be acoustically insulated in accordance with a scheme submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment.'

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.'

1.4 The nearest dwellings are 15 Newton Street and a hotel at 33 Dale Street. The air conditioning, toilet extract and 'HRV' unit are to be located within a plant room to the rear of building on Cavell Street. The plant room is to be ventilated via a weather louvre approximately 3m above ground. The kitchen extract terminates via a weather louvre above the service access doors further along Cavell Street. First floor apartments at 15 Newton Street are approximately 5 metres from these louvres.

1.5 This updated noise assessment has included:

- A review of the findings of the noise survey previously carried out at the site;
- Calculation of the noise levels from external equipment at the nearest dwellings;
- Assessment of the noise impact by reference to the requirements of the planning condition.
- Recommendation of appropriate mitigation measures.

1.6 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 NOISE SURVEY

- 2.1 A measurement survey of existing environmental noise levels in the area was carried out by Hepworth Acoustics at a location overlooking Dale Street and is described below. This location is considered representative of dwellings on Dale Street and Newton Street. The noise measurement location is shown in Figure 1.
- 2.2 The noise measurements were carried out by installing an automatic data-logging sound level meter with a microphone mounted on a pole protruding from a first-floor window, the microphone being approximately 0.5 metre outside the window. The noise survey was carried out using a Rion NA-28 'Type 1' sound level meter (s/n: 00960036). Noise measurements were taken continuously, in consecutive 15 minute periods, between approximately 09:15 hours on Wednesday 21 August 2019 until 11:15 hours on Thursday 22 August 2019.
- 2.3 Calibration checks were carried out both before and after the measurement period with no variance in levels noted. Audio recording was undertaken during the survey to identify sources of noise.
- 2.4 Weather conditions during the survey were dry and mild to warm (14-18°C) with a light southerly breeze (<3 m/s).
- 2.5 The results of the noise survey for the proposed trading hours of the yoga studio (excluding any noise from building works) are summarised in Table 1 and the noise levels measured over the full survey period are shown in Appendix II.

Table 1: Summary of measured noise levels (dB)

Location	L _{Aeq,15 min}	L _{A90,15 min}
Representative of the nearest proposed dwelling	61 – 70	50 – 67

- 2.6 These are fairly high levels of noise that reflect the city centre location. During the proposed periods of operation, the noise climate of the area was due to traffic on the surrounding road network and occasional voices from pedestrians during the late evening from the surrounding area.
- 2.7 Condition 4a of the planning consent requires noise from external equipment to be controlled to 5 dB below the 'typical' background noise level. In order to establish a robust 'typical' noise background level, we have arithmetically averaged the measured L_{A90,15min} values for both the first hour and last hour of proposed operation of the equipment (i.e. between 06:00 – 07:00 and 20:00 – 21:00). This results in a 'typical' background noise level of 54 dB.

3.0 NOISE ASSESSMENT

- 3.1 Condition 4a require that any noise from the external plant achieves a rating noise level of 5dB (L_{Aeq}) below the existing 'typical' background (L_{A90}) at the nearest noise sensitive location.
- 3.2 Manchester City Council document, "Planning & Noise Technical Guidance" dated December 2015 specifies that noise from industrial/commercial developments and fixed plant/equipment should be assessed to British Standard 4142:2014, 'Methods for rating and assessing industrial and commercial.

BS 4142:2014+A1:2019

- 3.3 British Standard 4142:2014+A1:2019, 'Methods for rating and assessing industrial and commercial sound' is the appropriate guidance for assessing the potential noise impact at residential locations from any new plant and equipment.
- 3.4 BS 4142 requires a 'rating' level ($L_{Ar,Tr}$) calculated from the operation of the noise source to be compared with the background sound level (L_{A90}) which is measured in the absence of the noise source. The noise is evaluated over a 1-hour period for daytime operations (i.e. 07:00 - 23:00 hours) and 15-minute period for night-time operations (i.e. 23:00 - 07:00 hours).
- 3.5 The rating level ($L_{Ar,Tr}$) is based on the 'specific' sound level ($L_{Aeq,Tr}$) attributed to the operating noise source, with 'character corrections' added for sound sources where 'certain acoustic features can increase the significance of impact'.
- 3.6 The acoustic 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.
- 3.7 An initial estimate of the potential noise impact from the operating noise source is determined by comparing the difference between the background level and the rating level.
- 3.8 Regarding the outcome of the initial estimate, BS 4142 states that:
- Typically, the greater this difference, the greater the magnitude of 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; and,

- 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 low impact, depending on the context.

3.9 BS 4142 also states in respect of background sound levels that *“that values are reliable and suitably represent the particular circumstances and periods of interest... the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods”*.

3.10 BS 4142 states that all pertinent factors must 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.

3.11 The initial numerical assessment and the context are then both taken into account when determining the potential noise impact.

Plant Noise Assessment

3.12 As set out in Section 2 above the typical background sound level during trading hours is considered to be 54 dB $L_{A90,T}$. Therefore, the noise level from the external plant should not exceed 49 dB $L_{Ar,1hr}$ during trading hours outside the apartments.

3.13 SWAN Projects have provided details of the proposed equipment.

3.14 From an initial review of the plant noise data, it is considered that noise from the air conditioning units and the kitchen extract fan will be the dominant noise sources. The other equipment (i.e. toilet extract fan and ‘HRV’ unit) are much quieter and located within the building and ducted to the louvre via 2D silencers such that the combined noise level from these items will be at least 10 dB below the other equipment.

- 3.15 Because the kitchen extract fan and the air conditioning equipment are not installed at the same location and the kitchen extract fan louvre is set back, recessed into the building, it is considered that no one apartment will be exposed to the worst-case noise from both sources. As such, the noise impact has been calculated separately for the closest apartment to each source.
- 3.16 It is proposed to install 2 no. Midea air conditioning units (model number MOU-36FN8QD0), which each produce a noise level of 56 dBA at 3 metres (under maximum load).
- 3.17 The manufacturer's (FlaktWoods) noise output data for the proposed kitchen extract fan (Estoc Targe), indicates a potential tonal component and therefore, a 6 dB penalty has been applied.
- 3.18 Some initial calculations of the likely resulting air conditioning equipment noise levels outside the nearest apartment (i.e. the first floor of 15 Newton Street), with appropriate allowances for breakout from the weather louvre and distance attenuation, indicate a resulting noise level of 51 dBA. The character of the noise from the air conditioning equipment is broadband and generally steady/continuous in nature. Therefore, an acoustic character penalty is not warranted and so the rating level is also 51 dB. This is 2 dB above the condition criterion and so noise control measures are warranted.
- 3.19 Therefore, we recommend a 150mm acoustic louvre is installed (e.g. Allaway AL1515) instead of or in addition to the weather louvre, with following minimum sound reduction performance values shown in Table 2:

Table 2: Acoustic Louvre octave band sound reduction values (dB)

Description	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Minimum sound reduction	4	4	5	8	12	16	15

- 3.20 The calculated resulting noise levels outside the nearest apartment to air conditioning units including the recommended acoustic louvre are shown in Table 3 below. Table 3 also shows the calculated resulting noise levels outside the nearest apartment to kitchen extract. The likely resulting plant noise levels has been calculated, with appropriate allowances for duct/louvre breakout, duct terminations, directivity, distance and barrier attenuation. The adopted noise limits are also shown.

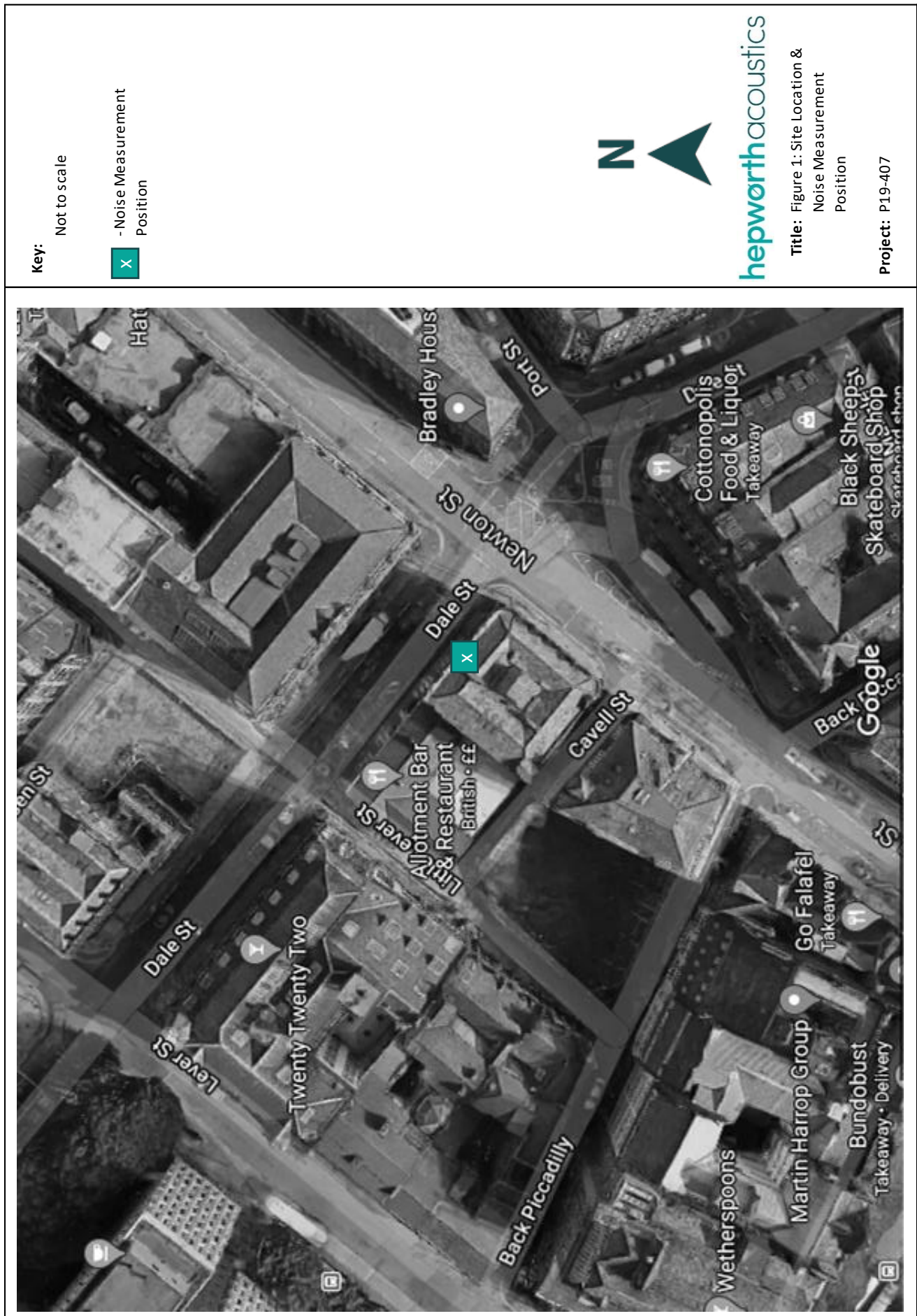
Table 3: Initial BS 4142 Assessment of fixed plant noise at nearest dwelling (dB)

Description	Air Conditioning	Kitchen Extract
Calculated Specific Sound Level	49	41
Acoustic feature correction	0	6
Rating Level of Sound	49	47
Adopted Noise Limit	49	49
Difference	0	-2

- 3.21 The results in Table 3 show that, noise from equipment will be equal to or 2 dB below the adopted noise limit and will therefore meet the requirements of planning condition 4a.
- 3.22 We therefore conclude that there will be no unacceptable noise impact from operation of the equipment subject to the installation of the proposed acoustic louvre.

4.0 SUMMARY AND CONCLUSION

- 4.1 Hepworth Acoustics Ltd has carried out a noise impact assessment in connection with proposed external equipment for the approved sui generis use development at 32-34 Dale Street, Manchester.
- 4.2 Noise calculations have been carried out for the proposed equipment which demonstrates that, subject to the installation of an acoustic louvre to reduce air conditioning unit noise, the noise impact will be within the noise control requirements of the planning condition.
- 4.3 We conclude therefore that noise from the operation of external equipment installed at the approved development would not result in any unacceptable impact to residential amenity.

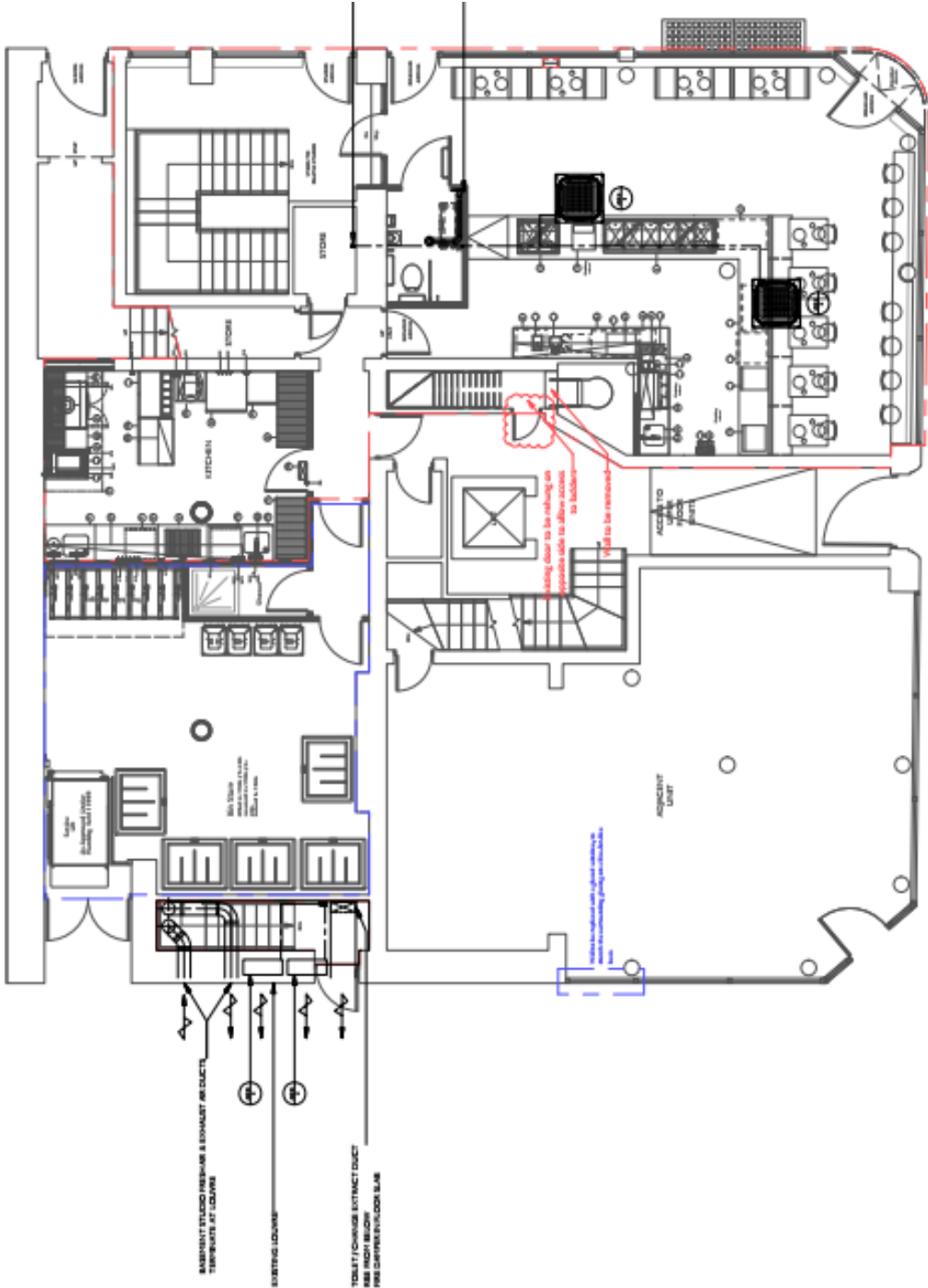


Key: Not to scale


hepworthacoustics

Title: Figure 2: Site Layout

Project: P19-407



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}** 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} 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_{Amax}** This is the maximum A-weighted noise level that was recorded during the monitoring period.
- L_{A90}** This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} 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_{WA}** This is the A-weighted 'Sound Power Level' and is a Logarithmic measure of the sound power as a relation to the threshold of hearing.

Appendix II: Noise Survey Results

Date(s): Wednesday/Thursday 20/21 August 2019

Equipment: Rion NA-28 'Type 1' sound level meter (serial no. 00960036) with
calibrator and environmental kit, pole and windshield

Weather: Dry and warm (14-18°C) with a light southerly breeze (<3 m/s)

All levels in dB(A)

Location : Overlooking Dale Street

