

BRIGHTON HOUSE, WILMSLOW ROAD, MANCHESTER

NOISE ASSESSMENT RE. PLANNING CONDITION

On behalf of:
Peakstone Commerce Limited

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NOISE ASSESSMENT RE. PLANNING CONDITION

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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Peakstone Commerce Limited to carry out a noise impact assessment in connection with an application to discharge a condition of a planning condition (Condition 4) which relates to any externally mounted plant and equipment at Brighton House 273-275 Wilmslow Road, Manchester (planning application reference 129386/FO/2021). The planning condition states:

“4 a) 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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location. Prior to the installation of any plant hereby approved the scheme shall be 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 site.”

- 1.2 The nearest dwellings are to the rear of the property on Brighton Grove, there are also dwellings to the north of the premises on Norman Road.
- 1.3 The development is an approved restaurant on the basement/ground floors with offices on the first and second floors. The kitchen extract fan unit will be located on the roof with it terminating above roof height in the centre of the building. The kitchen supply is located on ground floor on the Brighton Grove elevation of the building. An AC condensing unit is located on the Norman Road elevation of the building at ground floor level. The site location is indicated in Figure 1.
- 1.4 The proposed trading hours are 12:00 to 00:00 hours seven days a week, with the kitchen equipment only operating within these hours.
- 1.5 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of background sound levels during representative periods of the weekday;
 - Recommendation of appropriate noise 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 BRITISH STANDARD 4142

- 2.1 The planning condition refers to the noise 'rating level' of externally mounted plant. Although not referred to explicitly in the condition, this phrase is taken from British Standard 4142:2014+A1:2019, 'Methods for rating and assessing industrial and commercial sound'. This Standard is summarised below.
- 2.2 BS 4142 is the appropriate guidance for assessing the potential impact at residential locations from commercial sources of noise such as kitchen extract ventilation equipment.
- 2.3 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 ($L_{A90,T}$) 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).
- 2.4 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' at residential locations.
- 2.5 The acoustic character correction is applied to the specific sound level in order to obtain the rating level, and can take into account tonality, intermittency, impulsivity and characteristics otherwise distinctive against the prevailing noise climate in the area at the residential location.
- 2.6 An initial estimate of the potential noise impact from the operating noise source is determined by comparing the difference between the noise rating level and the background sound level.
- 2.7 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 is does not exceed the background sound level, this is an indication of the specific sound source having low impact, depending on the context.

- 2.8 BS 4142 also states in respect of background sound levels that *“it is important 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”*.
- 2.9 BS 4142 states that in addition to the initial numerical estimate of impact it is essential 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.
- 2.10 Thus, under BS 4142 the initial numerical assessment and the context are both taken into account when determining the potential noise impact. However, it is noted that the planning condition only considers the initial numerical estimate of noise impact and does not take into account the context.

3.0 NOISE SURVEY

- 3.1 A measurement survey of existing environmental noise levels in the area was carried out by Hepworth Acoustics between approximately 15:00 on Wednesday 22 and 09:00 on Thursday 23 September 2021.
- 3.2 The noise measurements were taken at a location outside the elevation of the building overlooking Norman Road and is considered representative of the noise climate prevailing at the nearest dwellings both on Norman Street and Brighton Grove.
- 3.3 The noise survey was carried out in terms of a series of 15-minute measurements. The noise measurements were taken 1 metre from the building elevation at first floor height. Calibration checks of the sound level meter were carried out both before and after the measurement periods with no variance in levels noted. Frequency analysis was also carried out.
- 3.4 The weather conditions during the noise survey were suitable for the purposes of the survey and subsequent assessment.
- 3.5 The results of the noise survey are summarised in Table 1. The full results of the survey, along with details of the equipment used and the weather conditions during the survey periods, are shown in Appendix II.

Table 1: Summary of measured noise levels (dB)

Location	$L_{Aeq,15\text{ min}}$	$L_{A90,15\text{ min}}$
Daytime trading hours (15:00 – 23:00 hours)	58 – 66	45 – 53
Night-time last hour of trading (23:00 – 00:00 hours)	57 – 60	46

- 3.6 These are fairly high levels of residual sound/background sound noise that reflect the busy area which is in between Rusholme and Fallowfield. During the proposed periods of plant operation, the noise climate of the area was due to traffic on the surrounding road network.
- 3.7 Condition 4 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 calculated the mode from the $L_{A90,15\text{ min}}$ values measured for the last two hours of proposed operation of the equipment. This results in a 'typical' background noise level of 46 dB.

4.0 NOISE ASSESSMENT

- 4.1 As set out in Section 3 above, the typical background sound level for the noise assessment is 46 dB $L_{A90,T}$. Therefore, to comply with planning condition 4, the noise level from the external plant must be controlled so as not to exceed a BS 4142 rating level of 41 dB $L_{A,T}$ during trading hours outside the nearest dwelling.

Plant Noise Assessment

- 4.2 SWAN Projects have provided details of the proposed equipment.
- 4.3 The externally mounted condensing unit associated with the air conditioning system is a Midea MDV-224, with a broadband noise level of 59 dBA assumed to be measured at 1.5 metre from the unit.
- 4.1 The manufacturer's (Estoc Targe) noise output data for the proposed externally mounted kitchen extract fan model number GF805607, in octave band sound power levels are as follows:

Table 2: Kitchen Extract Fan Sound Power Levels (dB L_w)

Description	Octave Band Centre Frequency (Hz)						
	125	250	500	1k	2k	4k	8k
Inlet	84	86	77	73	71	68	62
Outlet	91	85	81	78	75	70	64
Breakout	78	72	64	61	60	56	52

- 4.2 The proposals, as shown in the SWAN Projects drawings, indicate that the extract fan is to be located on the roof.
- 4.3 Manufacturer's noise output data for the proposed supply fan, model number 'ePowerBox' 67-560-1. The fan unit itself will be mounted internally. The octave noise emission levels of the fan are as follows:

Table 3: Kitchen Supply Fan Sound Power Levels (dB L_w)

Description	Octave Band Centre Frequency (Hz)						
	125	250	500	1k	2k	4k	8k
Inlet	68	67	62	58	54	50	47

- 4.4 We understand the inlet of the supply fan will be fitted with a 2D silencer with the ducting orientated towards the Brighton Grove elevation of the building.

- 4.5 The character of the noise from the new equipment is generally steady/continuous in nature when it is operating.
- 4.6 However, octave band noise emission data for the extract fan indicate that there is a tonal characteristic of the noise from the equipment and, therefore, a 4 dB acoustic character penalty has been applied in our BS 4142 assessment.
- 4.7 The calculation of the resulting noise rating level outside the nearest dwellings is shown in Table 4 below. The likely resulting plant noise level outside the upper floor windows of these dwellings has been calculated, with appropriate allowances for duct terminations, directivity, distance and any barrier attenuation. The representative background sound level is also shown and an initial assessment of noise impact in accordance with BS 4142 is presented.

Table 4: Initial BS 4142 Assessment of fixed plant noise at nearest dwellings (dB)

Description	Brighton Grove
Calculated Specific Sound Level outside Dwelling	41
Acoustic feature correction	4
Rating Level of Sound at Dwelling	45
Representative Background Sound Level	46
Difference	-1
Likely Noise Impact	'Low'

- 4.8 The results in Table 4 show that, noise from kitchen ventilation equipment will be 1 dB below the representative background sound level at the nearest dwellings. In terms of the initial BS 4142 assessment this indicates an 'low' impact. Nevertheless, it is 4 dB above the criterion set out in Condition 4 of the planning permission. Therefore, further noise mitigation measures will be necessary in order to reduce the noise impact.
- 4.9 For dwellings on Norman Road, the kitchen ventilation equipment will be well screened and further away, noise from the condensing unit will be the main source of plant noise at these dwellings. However, it is calculated that the noise level from the condensing unit outside the dwellings on Norman Road will be 37 dBA, 4 dB below the planning condition criterion.

Recommendations

- 4.10 We recommend that (similar to the inlet of the supply fan) the outlet of the extract fan is fitted with a 2D silencer. We recommend that both the supply fan and extract fan 2D silencers should be sourced to have the following minimum insertion loss performance values:

Table 5: Minimum silencer insertion loss values (dB)

Description	Octave Band Centre Frequency (Hz)						
	125	250	500	1k	2k	4k	8k
Minimum insertion loss	8	13	17	23	17	12	11

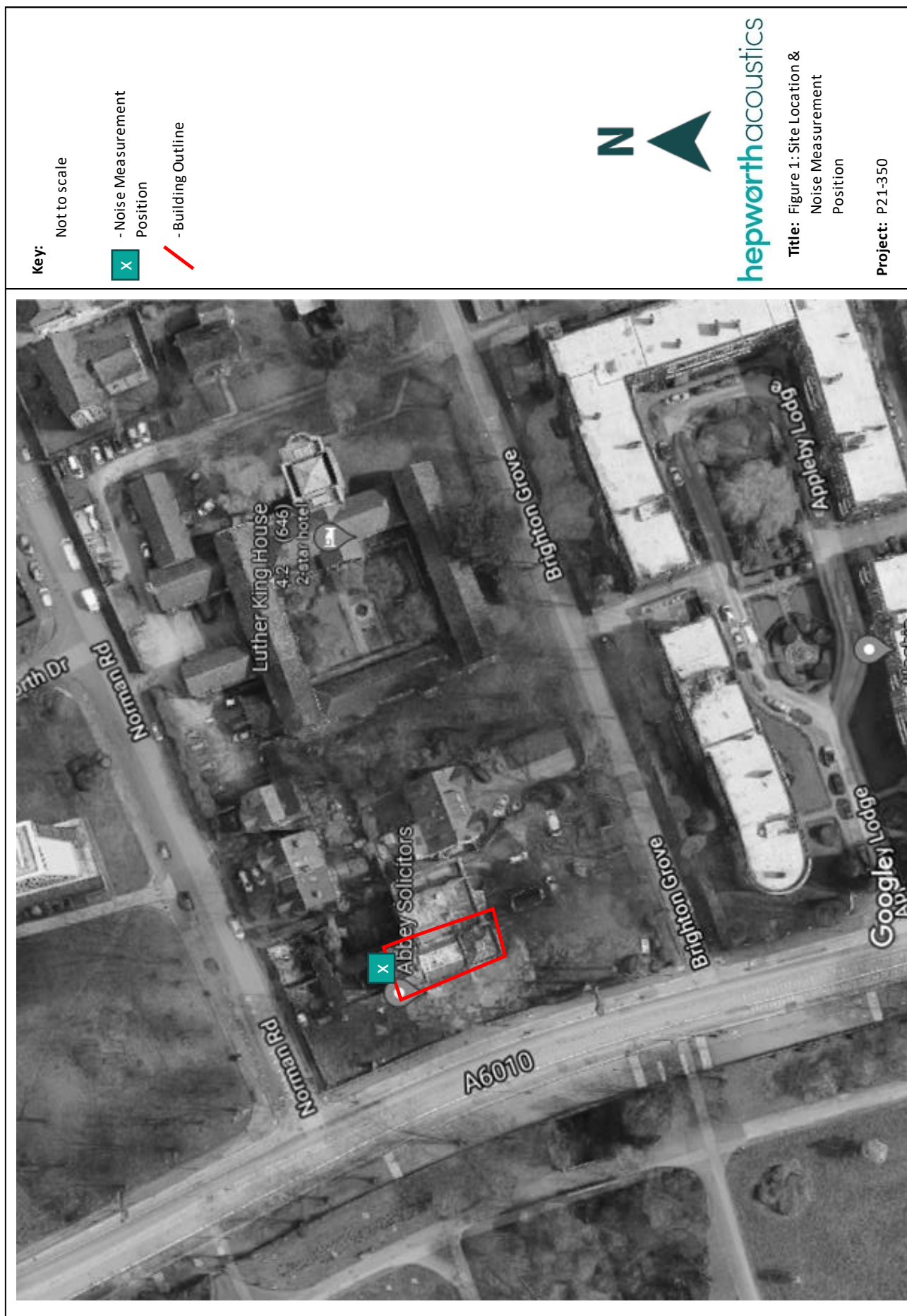
- 4.11 We recommend that the kitchen extract termination does not exhaust straight up but instead should be repositioned to face towards Wilmslow Road at a 90 degree angle. We also recommend that the ductwork and the fan casing are lagged effectively with an acoustic lagging material, e.g. CMS Danskin L10 SuperLag AcoustiSheild (10kg/m²).
- 4.12 The above recommendations have been made in order to reduce the noise impact to within the requirements of Condition 4.

Conclusion

- 4.13 We therefore conclude that, subject to implementation of the noise mitigation recommendations, there will be no unacceptable noise impact from the equipment and the plant noise will be controlled to be within the planning condition noise limit.

5.0 SUMMARY

- 5.1 Hepworth Acoustics Ltd has carried out a noise impact assessment in connection with proposed kitchen ventilation equipment for the approved development at Brighton House, Manchester.
- 5.2 Noise calculations have been carried out for the proposed kitchen ventilation equipment which demonstrates that, subject to the recommended mitigation measures, the noise impact will be within the noise control requirements of the planning condition.



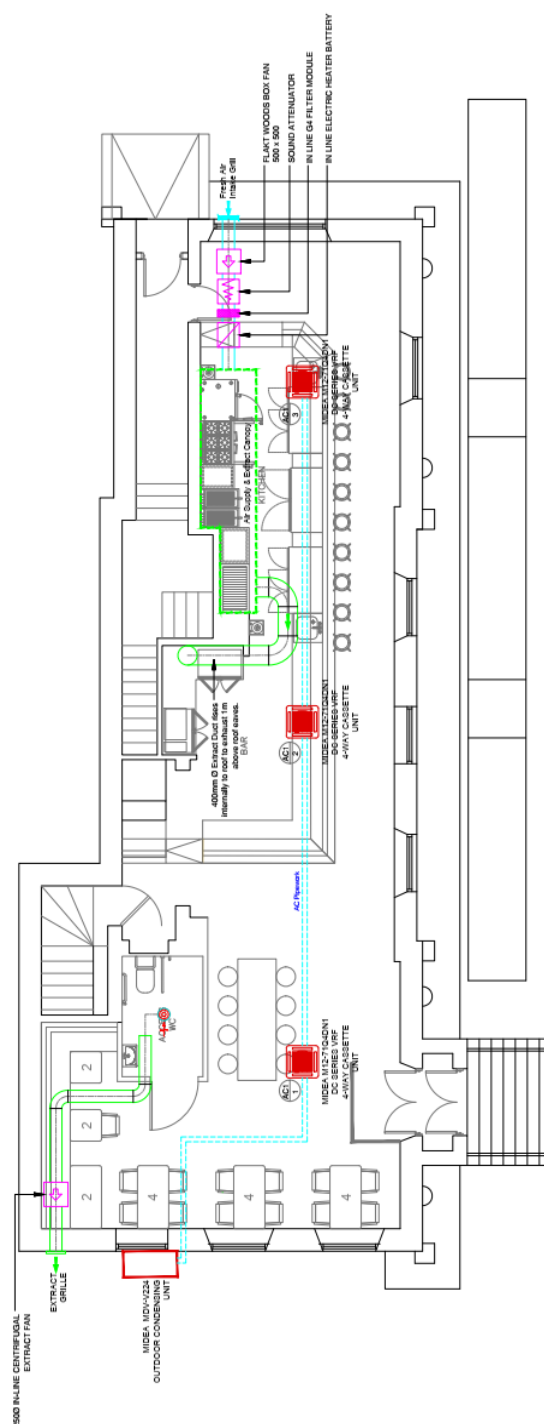
Key:
Not to scale



hepworth acoustics

Title: Figure 1: Ground Floor Layout

Project: P21-350



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} 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.

$L_{A90,T}$ 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 22/23 September 2021

Equipment: Rion NL-52 'Class 1' sound level meter (serial no. 00242747) with pole
calibrator and environmental kit, pole and windshield

Weather: Dry, mild (~13°C), overcast and calm (<2 m/s)

All levels in dB(A)

Location :

