

PROPOSED BAR RESTAURANT AT MANCHESTER CENTRAL, WINDMILL STREET, MANCHESTER
NOISE IMPACT ASSESSMENT

On behalf of:
Taylor Design Architects Ltd

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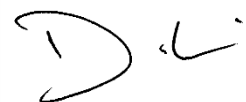
Report prepared by:
Hepworth Acoustics Ltd
21 Little Peter Street
Manchester
M15 4PS

On behalf of:
Taylor Design Architects Ltd

Report prepared by:
George Zelenovic BSc MSc MIOA – Consultant



Report checked by:
Donald Quinn BSc FIOA – Managing Director



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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Taylor Design Architects Ltd to carry out a noise impact assessment in connection with a planning application for a proposed new bar restaurant at Manchester Central, Windmill Street, Manchester M2 3GX.
- 1.2 The proposed bar restaurant is to be located within the Manchester Central building facing Windmill Street. The premises are located on the corner of the Windmill Street and Lower Mosley Street in Manchester city centre. The guest rooms at The Midland Hotel are the closest noise sensitive receptors, with the Edwardian Hotel also situated further west; both hotels are located opposite the site on Windmill Street. There is also an apartment building located further northwest along Watson Street. The location of the site is shown in **Figure 1**.
- 1.3 It is proposed to operate a bar restaurant fronting onto Windmill Street. Proposed trading hours for the internal area are proposed to be from 07:00 to 23:00 seven days a week however, for private functions, it is proposed to extend operating hours until 02:00 for up to 10 functions per year. The proposed premises layout is shown in **Figure 2**.
- 1.4 The proposals also include installation of new ventilation and cooling equipment, with new ventilation fans terminating at existing rooftop penthouse louvres. Some of the new external condensers will be located such that they are very well screened from nearby sensitive receptors.
- 1.5 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of ambient and background noise levels including a weekend period;
 - Assessment of the potential noise impact at the nearest noise sensitive receptors; and
 - Recommendation of appropriate noise mitigation measures, if necessary.
- 1.6 The various noise units and indices referred to in this report are described in **Figure 3 – Plant Layout**

- 1.7 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.

Local Policy

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

‘Entertainment noise (L_{eq}) should be controlled to 10dB below the background noise level (L_{90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location.’

‘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_{eq}) below the typical background (L_{90}) level at the nearest noise sensitive location.’

3.0 NOISE SURVEY

- 3.1 Noise levels were measured at two locations considered to be representative of the noise climate outside the Midland Hotel and the Edwardian Hotel opposite the site on Windmill Street. The noise measurement locations are shown in **Figure 1**.
- 3.2 The purpose of the noise survey was to establish the prevailing ambient/background noise climate of the area during a key period. On the basis that the proposed bar restaurant will typically have trading hours equivalent to existing bars/restaurants in the vicinity, the noise measurements were taken in consecutive 5-minute periods between approximately 22:00 and 00:00 hours on Saturday 17 June 2023.
- 3.3 The measurements were carried out using a B&K 2250 'Class 1' sound analyser that was tripod mounted with the microphone fitted with a windshield and located approximately 1.4m above local ground level in free-field conditions. Calibration checks were carried out on the sound analyser both before and after the measurement period with no variance in levels observed. Weather conditions during the survey were considered acceptable for the purposes of the survey and subsequent assessment.
- 3.4 The results of the noise survey are summarised in **Table 1** and are shown in the chart in **Appendix II**.

Table 1: Summary of Noise Levels Measured (dB)

Location	$L_{Aeq,5mins}$	$L_{A90,5mins}$
1. The Midland Hotel	54 - 67	50 - 55
2. The Edwardian Hotel	59 - 65	55 - 57

- 3.5 During the survey, the noise climate of the area was dominated by road traffic on adjacent roads and intermittent tram pass-bys along Lower Mosley Street. There was also noise from pedestrians in the vicinity.
- 3.6 As indicated in **Appendix II**, whilst there was some variation in the noise climate over the course of the noise survey period, noise levels were no lower at the end of the survey compared to the beginning and therefore indicate that the noise climate remains steady during the late evening and into the night-time.

- 3.7 On this basis, we have adopted the representative background noise levels to be the arithmetic average of each of the measured octave bands over the course of the noise survey as presented in **Table 2**.

Table 2: Adopted representative late evening and night background noise levels

Adopted background noise in dB L_{90}	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
1. The Midland Hotel	58	55	51	49	47	42	35	52
2. The Edwardian Hotel	63	58	54	53	50	45	38	55

- 3.8 Tables 1 and 2 show that the background noise levels outside the Midland Hotel were lower than those outside Edwardian Hotel.

4.0 NOISE ASSESSMENT

Potential Trading Noise Break Out

- 4.1 Hepworth Acoustics has carried out numerous noise assessments in connection with proposed bar restaurants in the past and we have a library of noise levels for a variety of establishment styles. We understand that the proposal is for a bar restaurant with music played at modest background levels only inside and no music in the outdoor seating area. We have measured the following trading noise levels during busy weekend evening trading periods in similar premises:

Table 3: Adopted trading noise levels (dB)

Description	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Busy weekend evening (L_{eq})	64	77	84	82	80	75	68	84

- 4.2 **Table 4** below shows the calculated noise level from internal trading noise break-out through the premises shopfront outside the hotel guest rooms opposite. The calculation considers the noise break-out through a standard thermal double-glazed shopfront and corrections for distance attenuation only.
- 4.3 For the purposes of this assessment, noise levels breaking out from trading activities have been calculated outside the nearest dwelling i.e. The Midland Hotel. The noise limit has been determined by subtracting 10 dB from the adopted noise levels as set out in **Table 2** based upon Manchester City Council's requirements in relation to entertainment noise.

Table 4: Calculated trading noise break-out (dB)

Description	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Outside nearest receptor (L_{eq})	17	24	35	28	16	8	4
Adopted noise limit ($L_{90} - 10$ dB)	48	45	41	39	37	32	25
Difference	-31	-21	-6	-11	-21	-24	-21

- 4.4 The noise levels calculated outside the nearest hotel guest rooms are well below the adopted noise limits. For hotel guest rooms and apartments further from the premises, noise levels will be lower still.

New External Plant/Equipment Assessment

4.5 Manufacturer's published noise emissions data for the proposed equipment have been provided to us by the project architects Taylor Design. The items of plant are listed below:

- Finishing Kitchen Extract: Systemair MUB 062 630 EC
- Prep Kitchen Extract: Systemair MUB/T_S 062 500 EC
- Pot Wash Extract: Systemair MUB/T-S 025 355EC
- Large AHU: Systemair Topvex FC25-R (4 no.)
- Small AHU: Systemair Topvex SF12 HWL (2 no.)
- Cellar Extract: Systemair Prio XP 200EC
- Refuse Extract: Systemair Prio XP 150EC (2 no.)
- Condensers: Mitsubishi PUMY-P200YKM3 (3 no.)

4.6 The atmosphere side in-duct sound power levels are set out in **Table 5**.

Table 5: Atmosphere Side In-Duct Fan Sound Power Levels

Plant Item	Component	Sound Power Level dB							
		63Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
Finishing Kitchen Extract	Outlet	83	85	84	82	80	76	72	68
Prep Kitchen Extract	Outlet	72	79	78	75	71	67	63	58
Pot Wash Extract	Outlet	72	79	78	75	71	67	63	58
Large AHU	Inlet	93	81	73	65	63	54	49	47
	Outlet	92	87	90	81	77	73	63	48
Small AHU*	Inlet	90	88	88	84	83	75	67	68
Cellar Extract	Outlet	47	51	53	56	56	48	41	39
Refuse Store Extract	Outlet	45	47	55	49	47	42	32	25

*The small AHUs only have atmospheric connections on the inlet side

- 4.7 In addition, there will be three new condensers mounted onto the external wall that will be visible from the Midland hotel guest rooms. The condensers will be one of nine selections, the precise models have not been confirmed. As a worst case we have assumed that all three will be the noisier PUMY-P200YKM3 as follows, with manufacturer's noise data available in terms of A-weighted values only:

Table 6: Condenser source noise levels in dB L_w

Plant Item	Sound Power level (dBA)
Mitsubishi PUMY-P200YKM3 (3 no.)	76

- 4.8 Taking into account the above, we have calculated the likely resulting noise levels outside the most exposed noise sensitive receptors, these being the Midland Hotel guest rooms.
- 4.9 Because all ventilation fans/AHUs are located internally, our calculations have accounted for the dynamic insertion losses from proposed attenuators and distance attenuation only. No details of proposed attenuators have been provided, but based upon the drawings, we have assumed that they will be standard un-podded '2D' attenuators. No account for duct and termination losses, screening or directivity corrections have been included. As such, the calculations, as set out in **Appendix III** are a conservative assessment of likely resulting noise levels.
- 4.10 The predicted noise combined noise level from all equipment combined is 46 dB. We would not expect any tonal characteristics from the equipment and noise will be generally steady. As such, the rating level is 46 dB which is 6 dB below the relevant background noise level and hence within Manchester City Council's standard noise control criterion.

Conclusion

- 4.11 Based upon the above, we conclude that the development would not result in any unacceptable noise impact. On the basis that there will be no adverse impact, the development would be in line with the NPPF and the aims of the Noise Policy Statement for England (NPSE) 2010.

Recommendations

4.12 Although the noise assessment indicates that there will be no unacceptable noise impact associated with the development, we would nevertheless recommend the following outline measures in order to minimise noise impact:

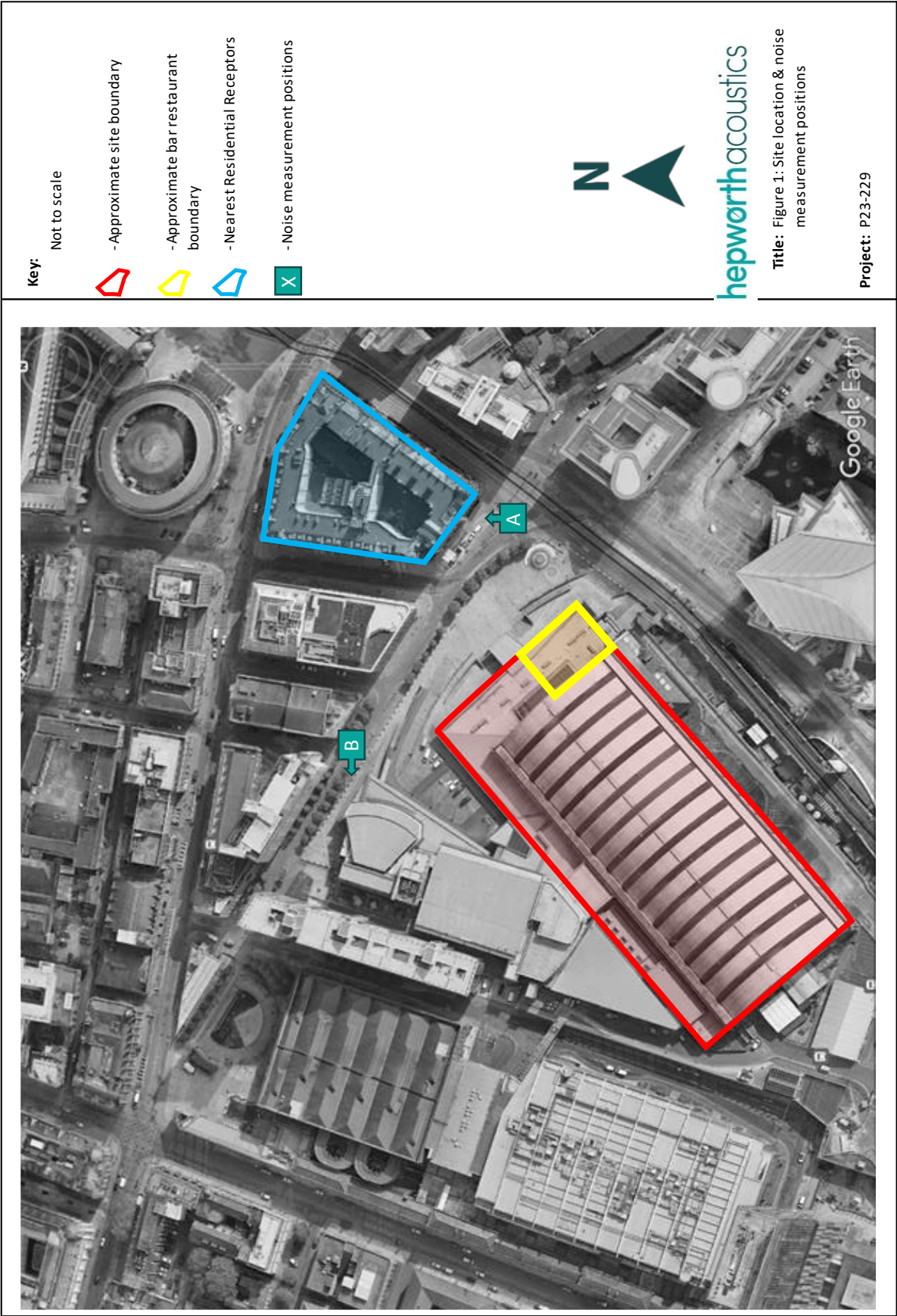
- The shopfront glazing should be specified with a minimum laboratory sound insulation performance of $25 \text{ dB } R_w + C_{tr}$. This would be provided by standard thermal double glazing.
- Entrance doors should be fitted with effective perimeter seals, self-closing devices and should not be pinned open during the late evening.
- We recommend that music noise levels in the trading areas are controlled to be no higher than the values set out in **Table 3** above.
- The PA system should be designed and installed in order to minimise noise levels in the entrance areas i.e. by orientating loudspeakers away from entrances, and by careful selection of loudspeakers etc; and
- There should be no external loudspeakers.
- For design purposes we recommend the following minimum dynamic insertion losses:

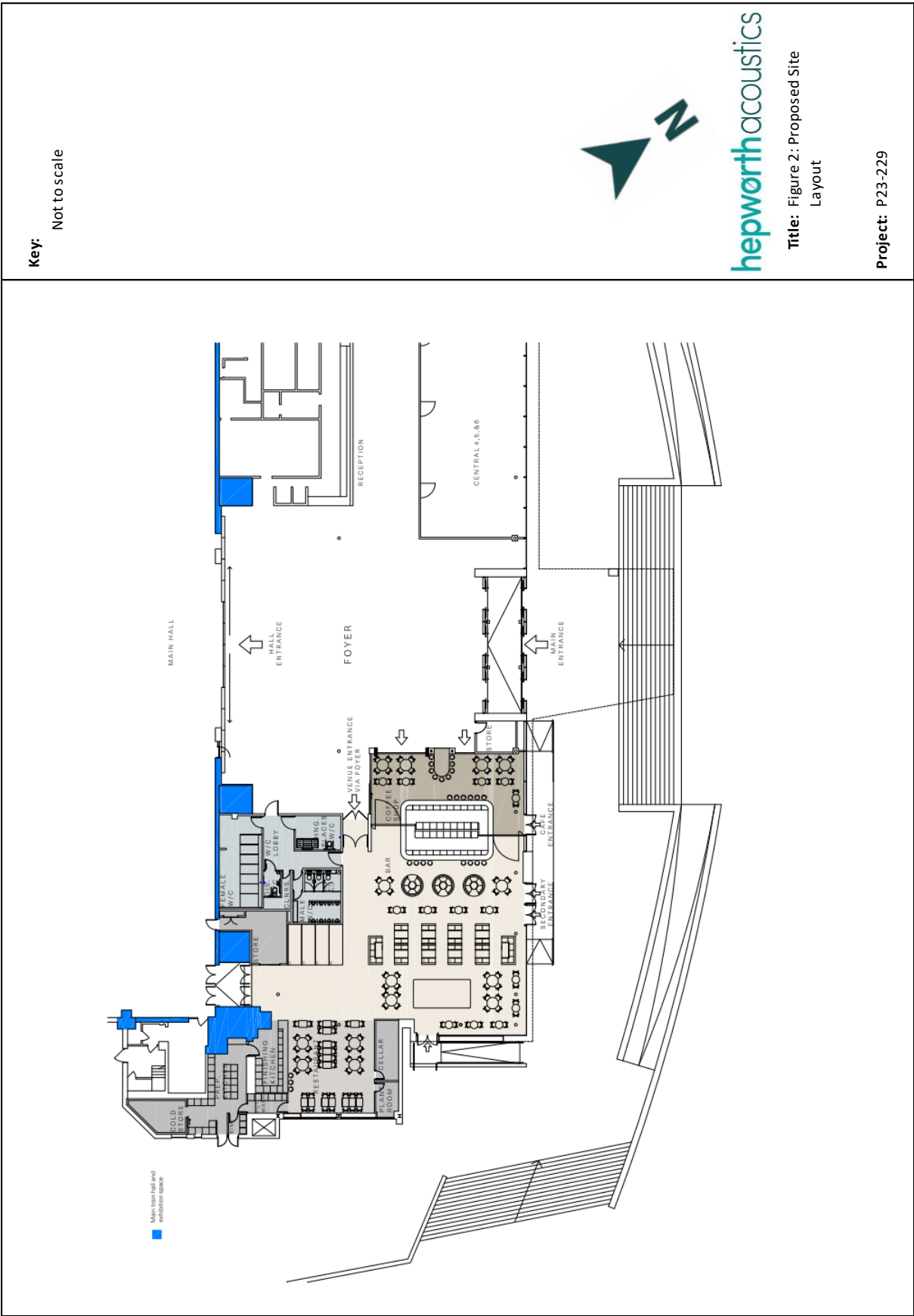
Table 7: Atmosphere side attenuator minimum dynamic insertion loss (dB)

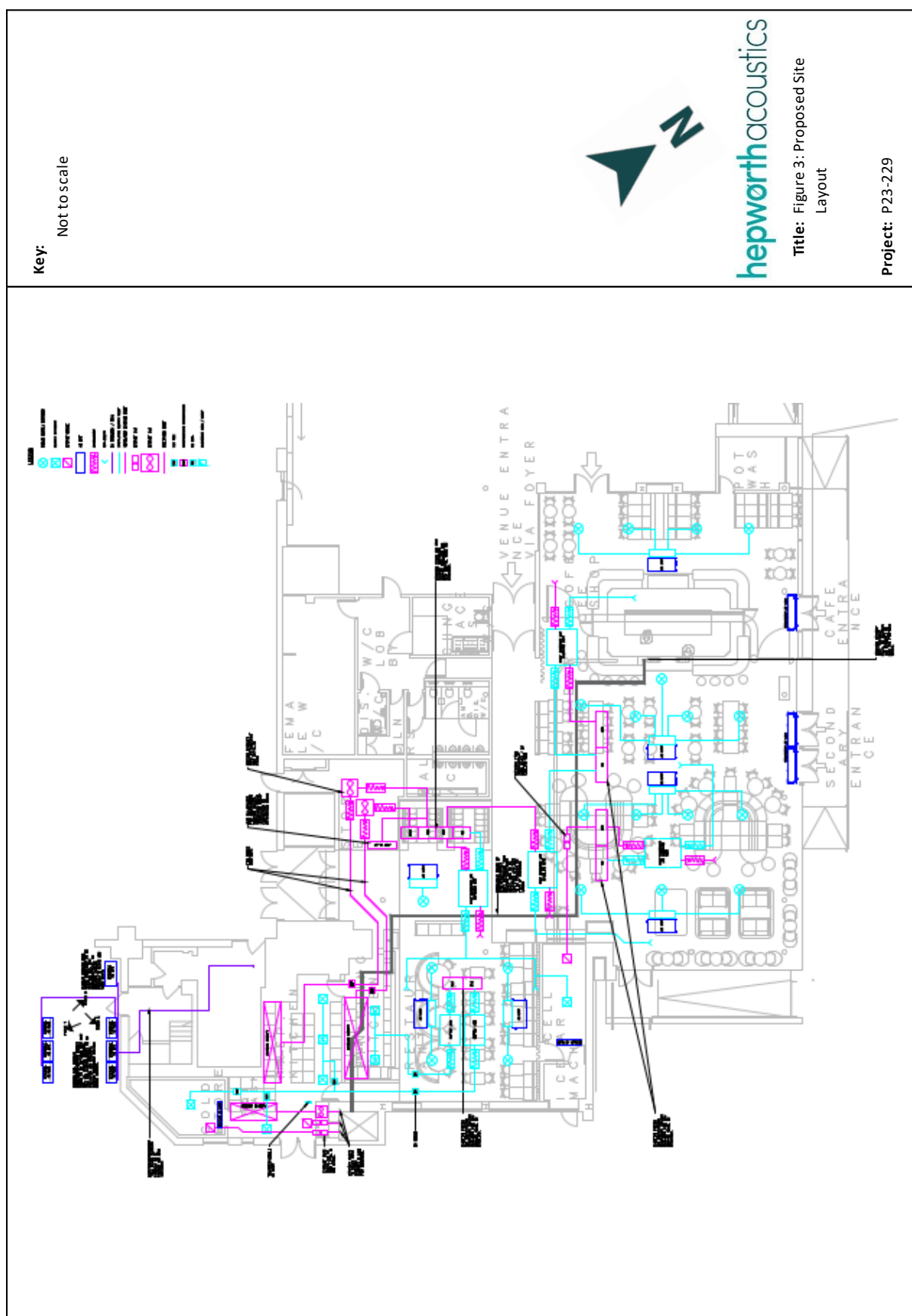
Description	Octave band centre frequency (Hz)						
	125	250	500	1k	2k	4k	8k
Finishing Kitchen Extract	-5	-10	-16	-15	-15	-11	-8
Prep Kitchen Extract	-6	-8	-14	-16	-13	-13	-9
Pot Wash Extract	-6	-7	-13	-22	-14	-12	-8
Large AHU	-5	-10	-16	-15	-15	-11	-8
Small AHU	-6	-10	-19	-19	-16	-13	-10
Cellar Extract	-4	-10	-17	-27	-25	-17	-14

5.0 SUMMARY

- 5.1 Hepworth Acoustics Ltd was commissioned to carry out a noise impact assessment in connection with a proposed new bar restaurant at Manchester Central, Windmill Street in Manchester city centre.
- 5.2 A noise survey has been carried out at locations representative of the nearest noise sensitive receptors to the premises to include a typical worst-case weekend late evening/early night-time period.
- 5.3 Taking into account the results of the noise survey and the likely noise levels generated inside the premises, along with details of proposed new plant and equipment, we have assessed the potential noise impact of the proposals.
- 5.4 Our assessment has shown that trading noise will be controlled to comfortably within the relevant noise criteria and no unacceptable impact will result. Nevertheless, we have made some outline recommendations to minimise noise as far as is practicable.
- 5.5 The assessment has also concluded that there will be no significant noise impact from the new plant and equipment associated with the proposed development and so there will be no harm to the amenity of the nearby hotel guest rooms.







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

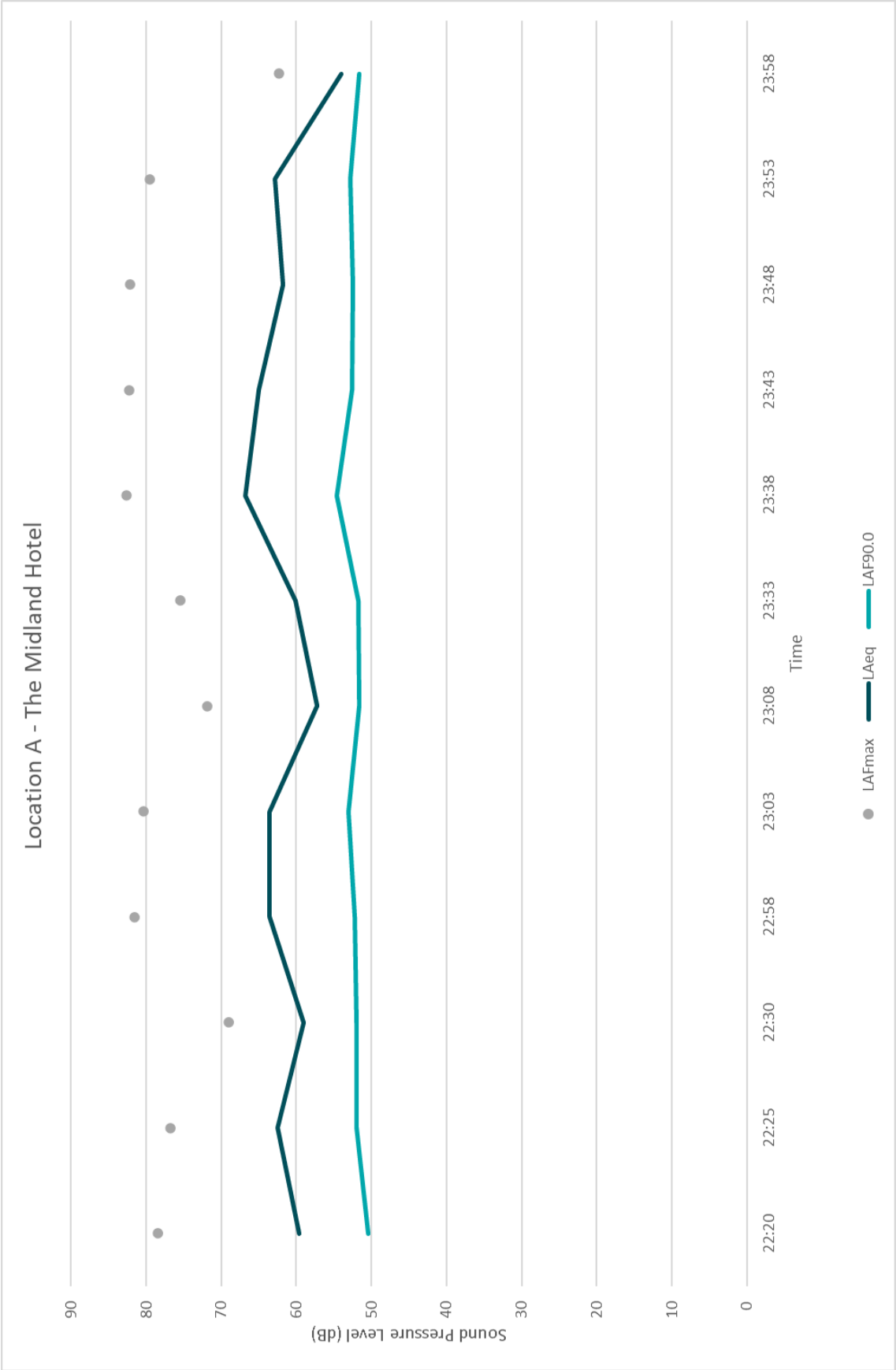
When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) 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.

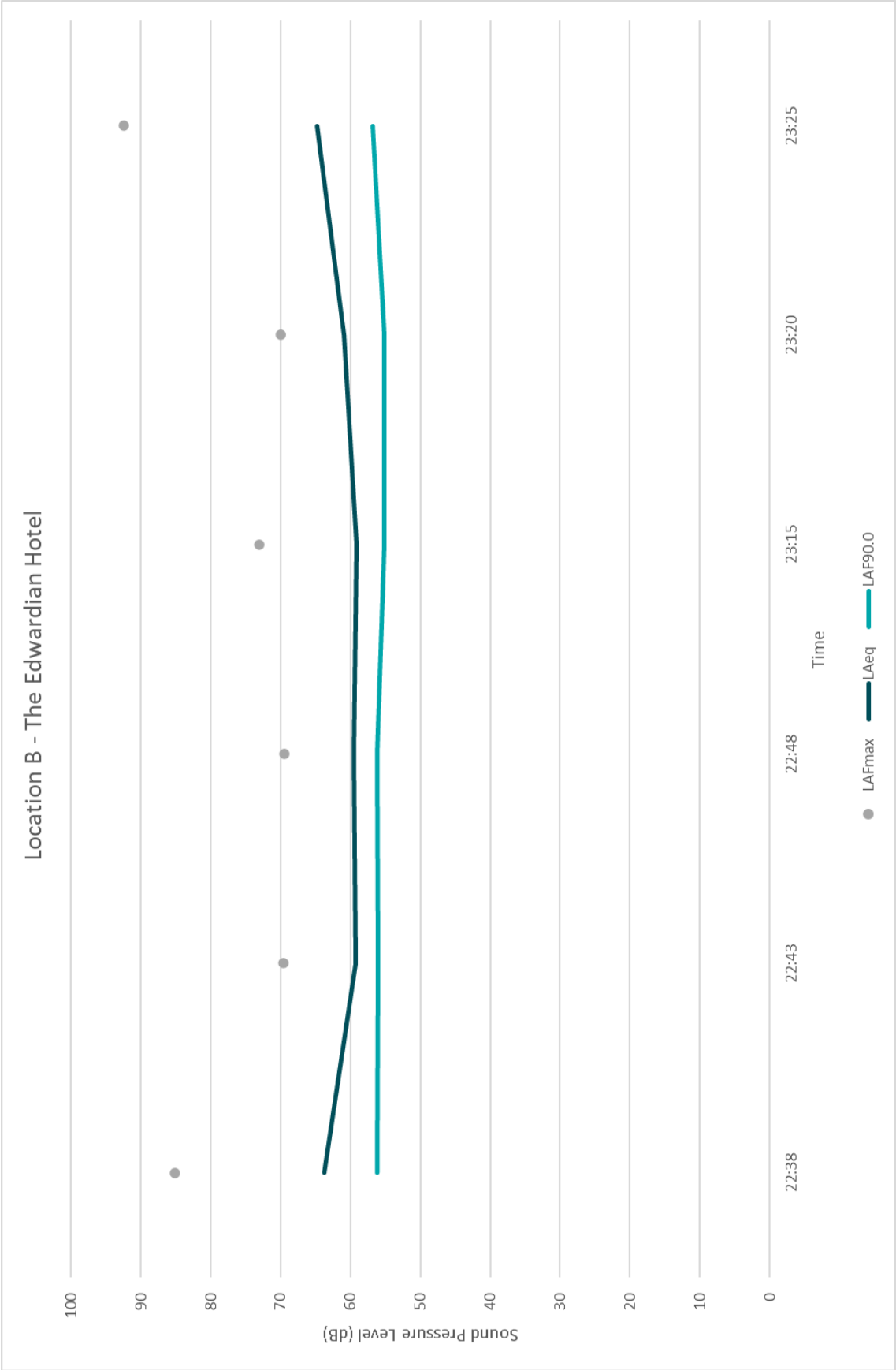
- C_{tr} This is an A-weighted urban traffic noise spectrum, which can be added to $D_{nT,w}$ or R_w in some standards to take into account different source spectra such as low frequency sound.
- R_w This is the 'Weighted Sound Reduction Index', and is a single figure quantity of R , the laboratory measured Sound Reduction Index.
- $L_{Aeq,T}$ 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.
- $L_{A90,T}$ 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.

Appendix II: Noise Survey Results

Date(s):	Late Evening - Night-time – Friday 19 June 2023
Equipment	B&K 2250 'Class 1' sound analyser (serial no. 3011706) with tripod and associated calibrator
Weather	Night-time – Dry, ~20°C, clear skies and calm <3 m/s

Please see chart overleaf:





Appendix III: Plant Noise Calculations

P23-229-C01 - Proposed bar/restaurant, Manchester Central
Plant/equipment noise calculations

October 2023

hepworthacoustics

Finishing KITCHEN EXTRACT - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Systemair MUB 062 630EC	83	85	84	82	80	76	72	68	85	Manufacturer's data - Lw outlet MUB 062 630EC
Attenuator 630mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	83	80	74	66	65	61	61	60	72	
Distance attenuation	-46	-46	-46	-46	-46	-46	-46	-46		Distance to hotel is 80m
Resulting	37	34	28	20	19	15	15	14	26	

Prep KITCHEN EXTRACT - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
MUB/T-S 062 500EC	72	79	78	75	71	67	63	58	77	Manufacturer's data - Lw outlet MUB/T 062 500EC
Attenuator 500mm	0	-6	-8	-14	-16	-13	-13	-9		500mm 2D 900mm long
Resulting in-duct after attenuator	72	73	70	61	55	54	50	49	65	
Distance attenuation	-46	-46	-46	-46	-46	-46	-46	-46		Distance to hotel is 80m
Resulting	26	27	24	15	9	8	4	3	19	

Pot Wash EXTRACT - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
MUB/T-S 025 355EC	51	59	66	63	60	57	54	50	66	Manufacturer's data - Lw outlet MUB/T-S 025 355EC
Attenuator 355mm	0	-6	-7	-13	-22	-14	-12	-8		355mm 2D 800mm long
Resulting in-duct after attenuator	51	53	59	50	38	43	42	42	53	
Distance attenuation	-46	-46	-46	-46	-46	-46	-46	-46		Distance to hotel is 80m
Resulting	5	7	13	4	-8	-3	-4	-4	7	

Big AHU #1 Extract - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	92	87	90	81	77	73	63	48	85	Manufacturer's data - Lw outlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	92	82	80	65	62	58	52	40	74	
Distance attenuation	-46	-46	-46	-46	-46	-46	-46	-46		Distance to hotel is 80m
Resulting	46	36	34	19	16	12	6	-6	28	

Big AHU #2 Extract - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	92	87	90	81	77	73	63	48	85	Manufacturer's data - Lw outlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	92	82	80	65	62	58	52	40	74	
Distance attenuation	-46	-46	-46	-46	-46	-46	-46	-46		Distance to hotel is 80m
Resulting	46	36	34	19	16	12	6	-6	28	

Big AHU #3 Extract - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	92	87	90	81	77	73	63	48	85	Manufacturer's data - Lw outlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	92	82	80	65	62	58	52	40	74	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	47	37	35	20	17	13	7	-5	29	

Big AHU #4 Extract - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	92	87	90	81	77	73	63	48	85	Manufacturer's data - Lw outlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	92	82	80	65	62	58	52	40	74	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	47	37	35	20	17	13	7	-5	29	

Big AHU #1 Supply - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	93	81	73	65	63	54	49	47	72	Manufacturer's data - Lw inlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	93	76	63	49	48	39	38	39	68	
Distance attenuation	-46	-46	-46	-46	-46	-46	-46	-46		Distance to hotel is 73m
Resulting	47	30	17	3	2	-7	-8	-7	22	

Big AHU #2 Supply - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	93	81	73	65	63	54	49	47	72	Manufacturer's data - Lw inlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	93	76	63	49	48	39	38	39	68	
Distance attenuation	-46	-46	-46	-46	-46	-46	-46	-46		Distance to hotel is 80m
Resulting	47	30	17	3	2	-7	-8	-7	22	

Big AHU #3 Supply - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	93	81	73	65	63	54	49	47	72	Manufacturer's data - Lw inlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	93	76	63	49	48	39	38	39	68	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	48	31	18	4	3	-6	-7	-6	23	

Big AHU #4 Supply - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	93	81	73	65	63	54	49	47	72	Manufacturer's data - Lw inlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	93	76	63	49	48	39	38	39	68	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	48	31	18	4	3	-6	-7	-6	23	

Big AHU #4 Supply - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Topvex FC25-R	93	81	73	65	63	54	49	47	72	Manufacturer's data - Lw inlet Topvex FC25-R
Attenuator 600mm	0	-5	-10	-16	-15	-15	-11	-8		630mm 2D 1200mm long
Resulting in-duct after attenuator	93	76	63	49	48	39	38	39	68	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	48	31	18	4	3	-6	-7	-6	23	

Small AHU #1 Supply - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Prio XP 150EC	90	88	88	84	83	75	67	68	87	Manufacturer's data - Lw inlet Prio XP 150EC
Attenuator 545mm	0	-6	-10	-19	-19	-16	-13	-10		545 2D 1200L
Resulting in-duct after attenuator	90	82	78	65	64	59	54	58	73	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	45	37	33	20	19	14	9	13	28	

Small AHU #2 Supply - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Prio XP 150EC	90	88	88	84	83	75	67	68	87	Manufacturer's data - Lw inlet Prio XP 150EC
Attenuator 545mm	0	-6	-10	-19	-19	-16	-13	-10		545 2D 1200L
Resulting in-duct after attenuator	90	82	78	65	64	59	54	58	73	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	45	37	33	20	19	14	9	13	28	

Cellar Extract - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Prio Silent XP 200EC	47	51	53	56	56	48	41	39	59	Manufacturer's data - Lw outlet Prio Silent XP 200EC
Attenuator 200mm	0	-4	-10	-17	-27	-25	-17	-14		200 2D 600L
Resulting in-duct after attenuator	47	47	43	39	29	23	24	25	40	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	2	2	-3	-6	-16	-22	-21	-20	-6	

Refuse Store Extract - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Prio Silent XP 150EC	45	47	55	49	47	42	32	25	52	Manufacturer's data - Lw outlet Prio Silent XP 150EC
Attenuator 150mm	0	0	0	0	0	0	0	0		200 2D 600L
Resulting in-duct after attenuator	45	47	55	49	47	42	32	25	52	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	0	2	9	4	2	-3	-13	-20	7	

Refuse Store Extract - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Prio Silent XP 150EC	45	47	55	49	47	42	32	25	52	Manufacturer's data - Lw outlet Prio Silent XP 150EC
Attenuator 150mm	0	0	0	0	0	0	0	0		200 2D 600L
Resulting in-duct after attenuator	45	47	55	49	47	42	32	25	52	
Distance attenuation	-45	-45	-45	-45	-45	-45	-45	-45		Distance to hotel is 73m
Resulting	0	2	9	4	2	-3	-13	-20	7	

Condensers/compressors

No. units	1	2	3	4	5	6	7	8	Total (A)	Notes
LG ZUJW48GA1	76	76	76						81	Manufacturer's LpA at 1m
Distance attenuation	-36	-36	-36						-36	Distance to hotel is 60m
Resulting	40	40	40						45	

Overall	46								
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