

PROPOSED WOK TO WALK RESTAURANT, 61 DEANSGATE, MANCHESTER

NOISE IMPACT ASSESSMENT

On behalf of:

Wok Kitchen (Manchester) Limited

Report No: P18-416-R01v1
August 2018

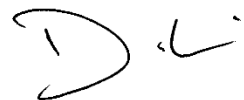
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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Wok Kitchen (Manchester) Ltd to carry out a noise impact assessment in connection with a proposed planning application for a proposed Wok to Walk restaurant at 61 Deansgate, Manchester.

1.2 The noise assessment has included:

- An inspection of the site and surrounding area;
- Measurement of noise levels from a Friday morning through until the following Monday morning in order to establish the prevailing ambient and background noise climate of the area during weekday, evening and weekend periods;
- Assessment of the potential impact of trading noise break-out through the premises shopfront and externally located plant/equipment noise outside the nearest sensitive premises; and
- Recommendation of appropriate mitigation measures.

1.3 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 SITE DESCRIPTION AND PROPOSALS

- 2.1 The proposed Wok to Walk restaurant will be located at Unit 9 of the Barton Arcade development which is located between Deansgate and Barton Square in Manchester city centre. Barton Arcade, which has a full height central atrium, with balconies around, features a mixture of shops and restaurants on the ground floor and on the first floor with offices on the upper floors.
- 2.2 The area is a mix of commercial uses including shops and many restaurants and bars. There are no residential dwellings within the Barton Arcade development. The nearest dwellings are further along Deansgate from which there is only a very oblique line of sight to the shopfront of the proposed Wok to Walk unit. Deansgate Number 1 is located approximately 110m to the north and the Manera apartments located above Bem Brasil restaurant are approximately 140m to the south.
- 2.3 Unit 9 was formerly a retail unit, with the main shopfront (which is predominantly single glazed) on Deansgate adjacent to the southern pedestrian entrance to Barton Arcade. The location of the Unit is shown in Figure 1.
- 2.4 The proposals are for the basement to be used for the main kitchen and other ancillary areas, with the ground floor featuring a kitchen serverly, and dining area with seating for approximately 36 diners. Wok to Walk will serve wok stir-fired Asian style dishes for takeaway and eating in. The proposed unit layout is shown in Figure 2.
- 2.5 The trading area of the restaurant will have a lively atmosphere, but with music played at background levels only over a small in-house PA system.
- 2.6 All external plant and equipment will be located within, or ducted to roof level via a fully enclosed lightwell within the Barton Arcade development. Only toilet and other ancillary space windows overlook the lightwell.
- 2.7 Proposed trading times are from 10:00 – 24:00 on Sundays to Thursdays, and from 10:00 – 04:00 on Fridays and Saturdays.

3.0 ADOPTED ACOUSTIC DESIGN CRITERIA

Trading Noise

3.1 Manchester City Council Planning & Noise Technical Guidance 2015 provides guidance for assessing the potential impact of noise from various sources on dwellings. Whilst there is no specific guidance for restaurants, there is guidance on entertainment noise more generally.

3.2 The guidance states:

A planning application for a new entertainment venue that is structurally detached from other building uses should demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is:

'Entertainment noise (L_{Aeq}) should be controlled to 10dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location'

3.3 On this basis, the assessment has included consideration of the potential impact of trading noise break-out (including music played at background levels only) via the shopfront.

3.4 To ensure that the development is suitable for potential use by future tenants within the context of the planning permission being sought, the guidance states that *"...applicants and consultants should predict the noise impact of a proposed entertainment venue using noise levels that are representative of those found in 'typical' venues of the kind being applied for."*

3.5 For the purposes of this assessment, we have therefore adopted typical noise levels that we have previously measured during busy periods in restaurants with a lively atmosphere but with background music only.

3.6 The Manchester City Council guidance also provides advice on noise limits for low frequency noise. However, given the proposals for background music only and the fact that the nearest dwellings are some distance from the unit, we do not consider that any specific assessment of low frequency noise is warranted in this particular case.

Plant & Equipment Noise

- 3.7 In respect of plant and equipment to be installed in connection with new commercial premises, the Manchester City Council guidance refers to British Standard 4142: 2014 'Methods for rating and assessing industrial and commercial sound'.
- 3.8 BS 4142: 2014 describes methods for rating and assessing sound of an industrial and/or commercial nature, including sound from fixed installations which comprise mechanical and electrical plant and equipment. This requires the sound from a specific source (in L_{Aeq}) to be compared with the existing background sound level (L_{A90}) outside residential locations. The standard also puts weight on the importance of the context in which the sound will occur.
- 3.9 A 'character correction' is added to the specific sound level where '*certain acoustic features can increase the significance of impact*' at the residential locations. Penalties ranging from 2 – 9 dB are added where the sound sources are considered tonal or impulsive or '*otherwise are readily distinctive against the residual acoustic environment*'.
- 3.10 BS 4142 states that if the rated sound level exceeds the L_{A90} background sound level by around 10 dB or more it '*is likely to be an indication of significant adverse impact*'. An excess of around 5 dB over the background sound level is '*likely to be an indication of an adverse impact*'.
- 3.11 The lower the rating level is relative to the measured background sound level, the less likely it '*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'.
- 3.12 The Manchester City Council guidance states:

The Council consider that new developments should contribute and enhance the area in which they are located and where possible, contribute to the improvement of people's health and quality of life as per the NPSE. With this in mind, the design objective should be:

'The development should be 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'.

4.0 NOISE SURVEY

- 4.1 A noise survey was carried out in order to establish the prevailing ambient and background noise climate in the vicinity of the site.
- 4.2 Noise measurements were taken in terms of consecutive 15-minute periods at two locations between 11:30 on Friday 17 August 2018 through until 11:30 on Monday 20 August 2018 in order to cover weekday, night-time and weekend periods.
- 4.3 Measurements were undertaken at two locations as described below and shown in Figure 1:
- A. With the sound level meter microphone protruding on a pole 1m from a second floor office window on the Deansgate elevation of the Barton Arcade building, to be representative of dwellings nearby on Deansgate; and
 - B. With the sound level meter microphone protruding on a pole into the lightwell of the Barton Arcade building at ground floor level where the plant/equipment for the development will be installed.
- 4.4 The weather conditions during the survey were warm (up to around 21°C), overcast and generally dry and calm with some periods of rain during the daytime on Sunday 19 August. The noise measurements were carried out using a B&K 2250 'Type 1' sound analyser (serial no. 3011706) and a Rion NL31 'Type 1' sound level meter (s/n: 01120844). Calibration checks were carried out both before and after the survey with no variance in levels noted.
- 4.5 Noise levels measured at Location A on Deansgate were, as one would expect, high and due principally to road traffic and pedestrian noise on Deansgate, with some noise from other commercial premises also present in the evening and night-time. The results are shown in Chart 1 in Appendix II.
- 4.6 At Location B, noise levels within the lightwell were also high and dominated by steady noise from existing plant and equipment located in the lightwell. Chart 2, in Appendix II, shows that background noise levels are very steady around 67 dB L_{A90} during the daytime and early night-time, reducing to no less than 62 dB L_{A90} overnight, before increasing again to around 67 dB L_{A90} at 07:30 the following morning.

- 4.7 For the purposes of this assessment, the lowest measured background noise levels during proposed Wok to Walk trading periods were as follows:

Location A 52 dB $L_{A90,15min}$

Location B 63 dB $L_{A90,15min}$

- 4.8 In addition, the octave band noise levels that correspond with the lowest measured L_{A90} during trading periods at Location A (at 03:30 hours on Saturday morning) were as follows:

Table 1: Lowest octave band L_{90} background noise levels measured at Location A (dB)

Lowest measured background noise levels	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Measured at 03:30 on Saturday 18 August 2018	55	52	50	49	48	43	35	52

5.0 NOISE IMPACT ASSESSMENT

Trading Noise Breakout

- 5.1 Wok to Walk, will have a lively restaurant atmosphere during busy periods, but with music played at background noise levels only over a modest in-house PA system.
- 5.2 Hepworth Acoustics has previously measured typical busy trading period noise levels in premises with a similar trading style as follows:

Table 2: Adopted Wok to Walk evening trading period noise levels (dB)

Measured short-term L_{eq} in trading area	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
During busy trading period	66	72	75	81	80	76	69	84

- 5.3 Calculations have been carried out to determine the likely levels of noise break-out from the premises trading area. Taking into account the typical busy evening period trading noise levels set out above, along with the sound reduction indices for the shopfront and noise propagation corrections, we have calculated the likely resulting noise levels outside the nearest dwellings.

Table 3: Calculation of likely Wok to Walk trading noise break-out outside nearest apartments (dB)

Measured short-term L_{eq} in trading area	Octave Band Centre Frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
A - During busy evening trading period	66	72	75	81	80	76	69	84
B - SRI of shopfront glazing (assumed 6mm glass)	-14	-20	-24	-31	-35	-29	-36	
C - Area correction (10 log S)	+14	+14	+14	+14	+14	+14	+14	
D - Effective sound power level of shopfront (A + B + C)	66	66	65	64	59	61	47	
E - Distance correction (-20 log R - 14)	-55	-55	-55	-55	-55	-55	-55	
F - Angle of view correction	-5	-5	-5	-5	-5	-5	-5	
Calculated resulting transmitted noise levels (D + E + F)	6	6	5	4	<0	1	<0	6
Adopted criteria (lowest background - 10 dB)	45	42	40	39	38	33	25	42
Difference	-39	-36	-35	-35	-38	-32	-25	-36

- 5.4 Table 3 shows that resulting noise levels outside the nearest dwellings due to Wok to Walk trading noise break-out will be very low and substantially within the adopted criteria. Indeed, even if there were dwellings immediately above the unit and/or immediately opposite the unit on Deansgate, the criteria would still be achieved without the need for any specific noise mitigation measures.
- 5.5 As such we conclude that trading noise break-out will not result in any noise impact.

Plant & Equipment Noise

- 5.6 We have assessed the potential plant and equipment noise impact at the nearest dwellings. Also, since there appears to be a roof terrace towards the rear of the Barton Arcade building, near to the lightwell, we have calculated likely resulting noise levels at this location too.
- 5.7 Based upon the results of the noise survey and the requirements of Manchester City Council, plant and equipment noise levels will need to be controlled to be no more than a rating level of 47 dB outside the nearest apartments on Deansgate. There are no sensitive rooms overlooking the lightwell, but we have nevertheless used the measured noise levels at Location B as the basis for determining an appropriate noise limit for the roof terrace. As such, plant and equipment noise should be controlled to a rating level of no more than 58 dB at this location.
- 5.8 We have been provided with details of the plant and equipment that is to be installed at the Wok to Walk. The externally located or ducted equipment will include a kitchen supply fan; a kitchen extract fan; and a single air conditioning condenser as follows:
- | | |
|----------------------|---------------------------------|
| Kitchen supply fan: | Systemair MUB/T-S 062 500D4 IE2 |
| Kitchen extract fan: | Systemair MUB/T-S 062 500D4 IE2 |
| AC condenser: | Mitsubishi PUHZ-P125 |
- 5.9 The Systemair MUB/T-S 062 500D4 IE2 has an induct inlet sound power level of 77 dBA and an induct outlet sound power level of 79 dBA. The Mitsubishi PUHZ-P125 produces a sound pressure level of 58 dBA at a distance of 1m.
- 5.10 There is to be a dedicated plant room towards the rear of the unit adjacent to the disabled toilets. The kitchen supply and extract fans will be located within the plant room and ducted via the lightwell to vertical terminations above roof level.
- 5.11 The AC condenser will be located at lower ground floor level within the lightwell alongside other existing plant items and as such it is inconceivable that noise from this source will result in any noise impact. We have however carried out calculations to determine the likely resulting kitchen ventilation fan noise levels outside the nearest dwellings and on the Barton Arcade roof terrace.
- 5.12 The calculations have taken into account the induct sound power levels for the inlet/outlet of the ventilation fans, along with corrections for duct losses, end reflections, directivity and distance attenuation.

5.13 The calculations, as shown in Appendix II indicate the following resulting noise levels:

Barton Arcade roof terrace: 43 dB L_{Aeq}

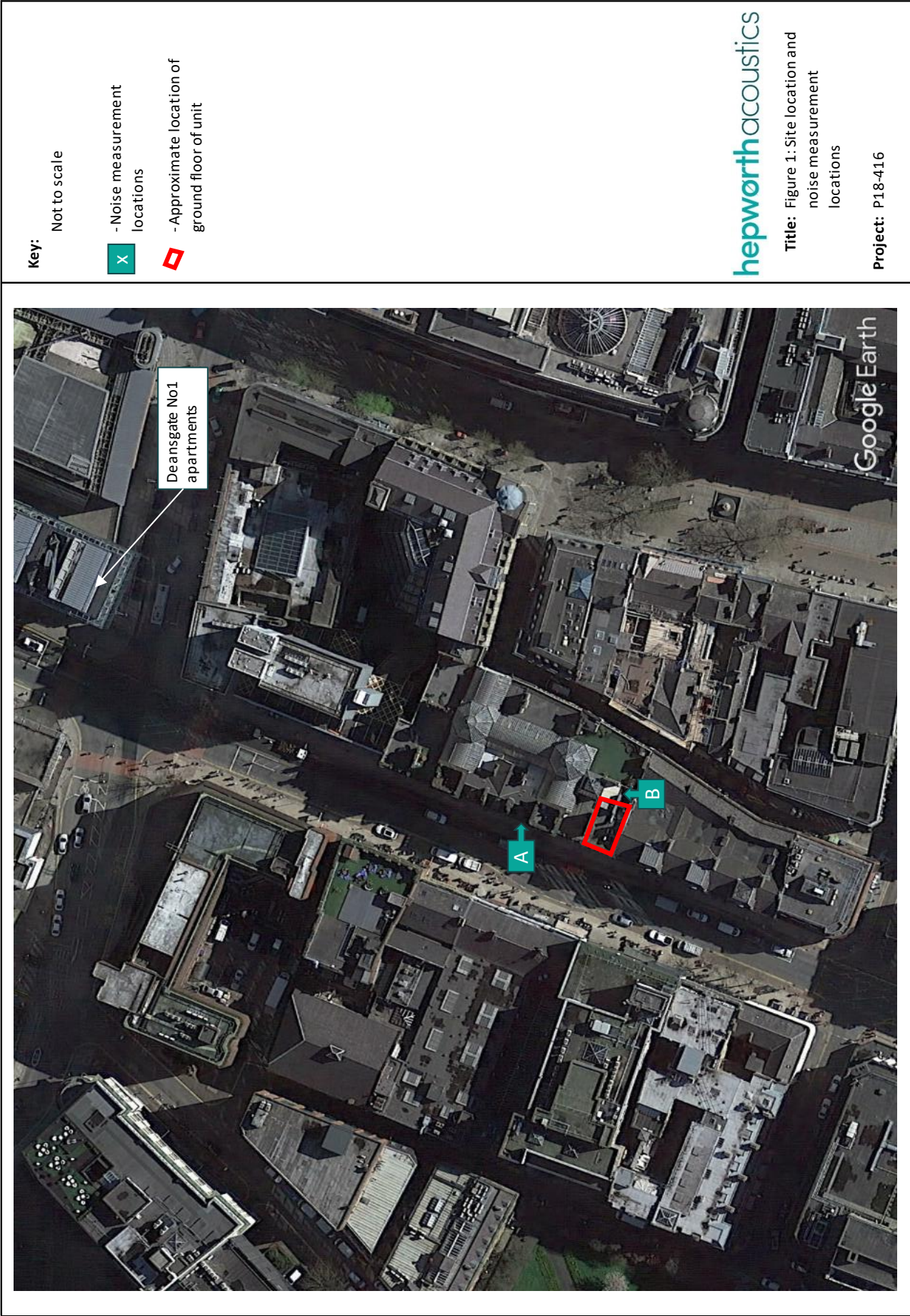
Nearest dwellings (Deansgate No 1): 21 dB L_{Aeq}

5.14 The noise produced by the kitchen ventilation fans will be steady and generally broadband in nature and so no acoustic feature corrections are warranted. Therefore, the resulting rating levels of noise will be as above. These are substantially within the adopted noise limits.

5.15 As such, we conclude that there will be no significant noise impact from the proposed plant and equipment.

6.0 SUMMARY & CONCLUSION

- 6.1 Hepworth Acoustics has carried out a noise impact assessment in connection with a proposed Wok to Walk restaurant at Unit 9, Barton Arcade, 61 Deansgate in Manchester city centre. The assessment has included consideration of the potential impact of trading noise break-out through the premises shopfront and the impact of externally located plant and equipment.
- 6.2 Noise measurements have been carried out to establish the existing noise climate in the vicinity of the site during weekday, night-time and weekend periods. As one would expect, given the city centre location, the prevailing noise climate of the area is high.
- 6.3 Based upon the results of the noise survey, we have adopted appropriate noise criteria taking into account the requirements of Manchester City Council.
- 6.4 Due to the high ambient noise climate of the area and the modest levels of trading and plant noise that will be generated, we have concluded that there will be no unacceptable noise impact from the development and no specific noise mitigation measures are warranted.



Key: Not to scale

hepworthacoustics

Title: Figure 2: Proposed
basement and ground
floor layouts

Project: P18-416

Project: Wok to Walk, Unit 9 Barton Arcade, 61 Deansgate, Manchester

Client: Wok Kitchen Manchester Ltd

Proposed Ground and Basement Floor Plan

Drig No: 3227 (SK) 05 rev A

Scale: 1:100

Date: May 18

Proposed Ground Floor Plan 1:100

Proposed Basement Plan 1:100

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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

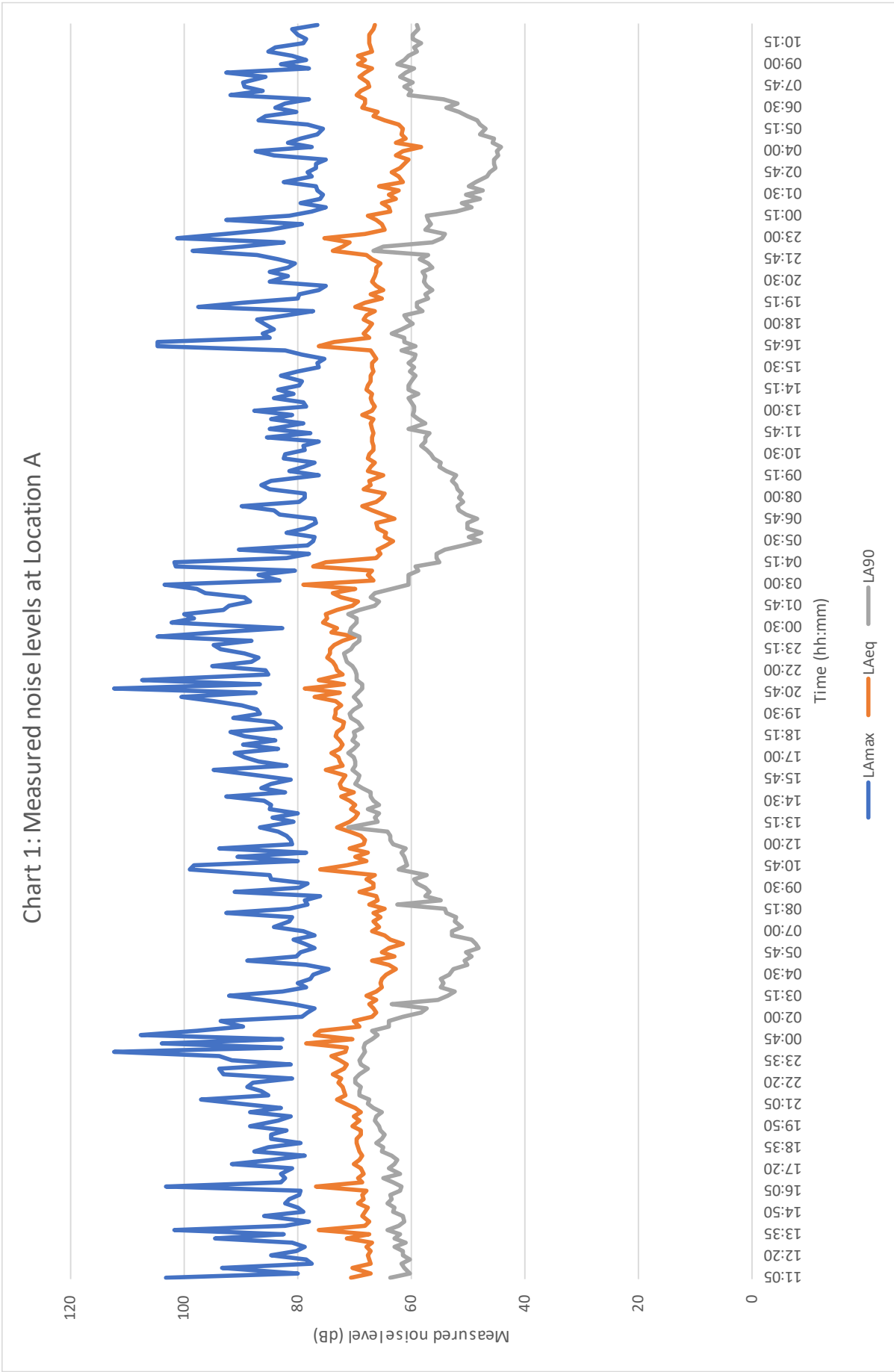
When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A)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

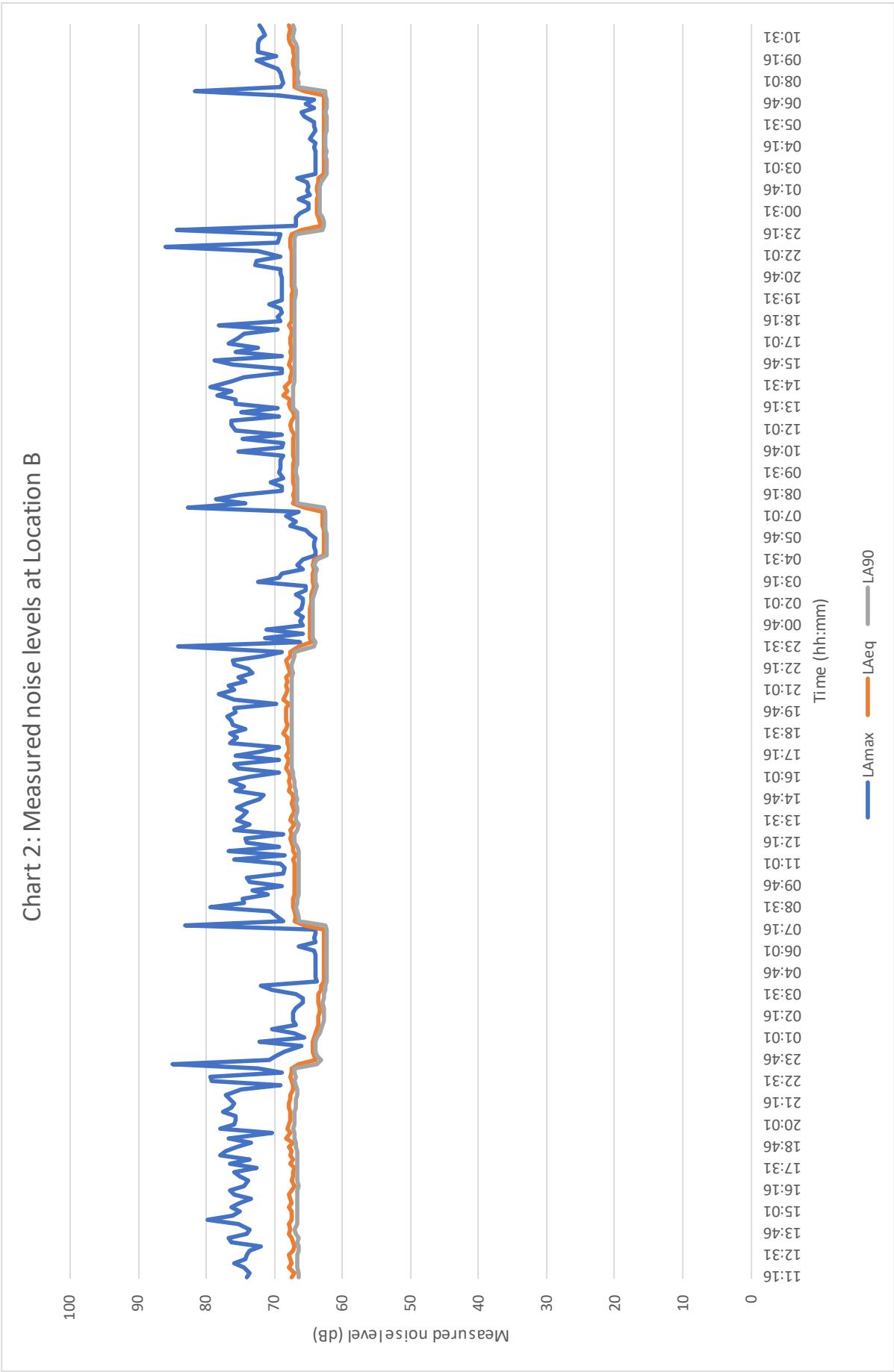
L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{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.

Appendix II: Noise Survey Results





Appendix III: Plant Noise Calculations

P18-416 Wok to Walk, Manchester
Roof top plant noise calculations - roof terrace


KITCHEN EXTRACT - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Systemair MUB/T-S 062 500D4 IE2	92	84	81	77	73	69	64	59	79	Manufacturer's data - Lw outlet
Attenuator	0	0	0	0	0	0	0	0		No attenuator
Resulting in-duct after attenuator	92	84	81	77	73	69	64	59	79	
1 x duct bend	0	0	-6	-8	-4	-3	-3	-3		Trox manual
Duct run (assume 15m)	-9	-9	-5	-2	-2	-2	-2	-2		Trox manual
Termination area correction (0.56m dia)	-10	-6	-2	0	0	0	0	0		Woods Practical Guide to Noise Control fig 5.7
Termination directivity on-axis	2	2.5	3	3.5	4	4.5	4.5	4.5		SRL - Noise Control in Industry - Fig 11.2 (top table)
Termination directivity at 120deg	0.5	0	-1.5	-4.5	-12	-20	-20	-20		SRL - Noise Control in Industry - Fig 11.2 (bottom table)
Distance attenuation	-22	-22	-22	-22	-22	-22	-22	-22		Assume 5m distance to roof terrace
Screening	0	0	0	0	0	0	0	0		No screening
Resulting	52	47	45	40	33	22	17	12	41	

KITCHEN SUPPLY - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Systemair MUB/T-S 062 500D4 IE2	90	82	79	75	71	67	62	57	77	Manufacturer's data - Lw outlet
Attenuator	0	0	0	0	0	0	0	0		No attenuator
Resulting in-duct after attenuator	90	82	79	75	71	67	62	57	77	
1 x duct bend	0	0	-6	-8	-4	-3	-3	-3		Trox manual
Duct run (assume 15m)	-9	-9	-5	-2	-2	-2	-2	-2		Trox manual
Termination area correction (0.56m dia)	-10	-6	-2	0	0	0	0	0		Woods Practical Guide to Noise Control fig 5.7
Termination directivity on-axis	2	2.5	3	3.5	4	4.5	4.5	4.5		SRL - Noise Control in Industry - Fig 11.2 (top table)
Termination directivity at 120deg	0.5	0	-1.5	-4.5	-12	-20	-20	-20		SRL - Noise Control in Industry - Fig 11.2 (bottom table)
Distance attenuation	-22	-22	-22	-22	-22	-22	-22	-22		Assume 5m distance to roof terrace
Screening	0	0	0	0	0	0	0	0		No screening
Resulting	50	45	43	38	31	20	15	10	39	

Overall combined noise from extract and supply	54	49	47	42	35	24	19	14	43	
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P18-416 Wok to Walk, Manchester
Roof top plant noise calculations - nearest dwellings


KITCHEN EXTRACT - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Systemair MUB/T-S 062 500D4 IE2	92	84	81	77	73	69	64	59	79	Manufacturer's data - Lw outlet
Attenuator	0	0	0	0	0	0	0	0		No attenuator
Resulting in-duct after attenuator	92	84	81	77	73	69	64	59	79	
1 x duct bend	0	0	-6	-8	-4	-3	-3	-3		Trox manual
Duct run (assume 15m)	-9	-9	-5	-2	-2	-2	-2	-2		Trox manual
Termination area correction (0.56m dia)	-10	-6	-2	0	0	0	0	0		Woods Practical Guide to Noise Control fig 5.7
Termination directivity on-axis	2	2.5	3	3.5	4	4.5	4.5	4.5		SRL - Noise Control in Industry - Fig 11.2 (top table)
Termination directivity at 80deg	1	1	0.5	-0.5	-2	-15	-15	-15		SRL - Noise Control in Industry - Fig 11.2 (bottom table)
Distance attenuation	-49	-49	-49	-49	-49	-49	-49	-49		110m distance to Deansgate No1
Screening	0	0	0	0	0	0	0	0		No screening
Resulting	25	21	20	17	16	0	-5	-10	19	

KITCHEN SUPPLY - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Systemair MUB/T-S 062 500D4 IE2	90	82	79	75	71	67	62	57	77	Manufacturer's data - Lw outlet
Attenuator	0	0	0	0	0	0	0	0		No attenuator
Resulting in-duct after attenuator	90	82	79	75	71	67	62	57	77	
1 x duct bend	0	0	-6	-8	-4	-3	-3	-3		Trox manual
Duct run (assume 15m)	-9	-9	-5	-2	-2	-2	-2	-2		Trox manual
Termination area correction (0.56m dia)	-10	-6	-2	0	0	0	0	0		Woods Practical Guide to Noise Control fig 5.7
Termination directivity on-axis	2	2.5	3	3.5	4	4.5	4.5	4.5		SRL - Noise Control in Industry - Fig 11.2 (top table)
Termination directivity at 80deg	1	1	0.5	-0.5	-2	-15	-15	-15		SRL - Noise Control in Industry - Fig 11.2 (bottom table)
Distance attenuation	-49	-49	-49	-49	-49	-49	-49	-49		110m distance to Deansgate No1
Screening	0	0	0	0	0	0	0	0		No screening
Resulting	23	19	18	15	14	-2	-7	-12	17	

Overall combined noise from extract and supply	27	23	22	20	18	2	-3	-8	21	
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