

**PROPOSED NEW EXTERNAL PLANT
SIX BY NICO RESTAURANT, 2 JOHN DALTON STREET, MANCHESTER**

NOISE IMPACT ASSESSMENT

On behalf of:

Six by Nico (Holdings) Limited

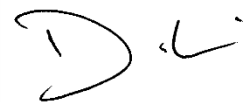
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NOISE IMPACT ASSESSMENT

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CONTENTS

1.0	INTRODUCTION	1
2.0	RELEVANT GUIDANCE & CRITERIA	2
3.0	NOISE SURVEY	3
4.0	NOISE ASSESSMENT & RECOMMENDATIONS	4
5.0	SUMMARY	7
	FIGURE 1 – SITE LOCATION & NOISE MEASUREMENT POSITION	8
	FIGURE 2 – PROPOSED GROUND FLOOR LAYOUT	9
	APPENDIX I: NOISE UNITS & INDICES	10
	APPENDIX II: NOISE SURVEY RESULTS	12
	APPENDIX III – PLANT NOISE CALCULATIONS	14

1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Six by Nico (Holdings) Limited to carry out a noise impact assessment in connection with proposed new external plant and equipment to be installed at their new Six by Nico restaurant at a ground floor demise within the Yotel building at 2 John Dalton Street in Manchester city centre.
- 1.2 The location of the proposed Six by Nico is shown in Figure 1. It will occupy a ground floor demise of the building located at the corner of John Dalton Street and Deansgate. Part of the demise, which adjoins Ridgefield to the east, occupies the single storey section of the building to the rear. The proposed new plant and equipment is to be installed on the flat roof and will comprise a kitchen supply fan, restaurant extract fan and AC/chilling outdoor condensers as indicated in Figure 2. It is important to note that the kitchen extract system is a recirculating system and is located entirely within the building.
- 1.3 The nearest noise sensitive receptors are upper floor hotel rooms with windows on the rear elevation overlooking the flat roof.
- 1.4 The noise assessment has included:
- An inspection of the site and surrounding area;
 - Measurement of noise levels outside the nearest hotel guest rooms for a 24-hour period during the week;
 - Establishing appropriate noise limits for the new equipment by reference to relevant guidance;
 - Calculating likely plant noise levels; and
 - Where necessary/feasible, advising on noise mitigation measures.
- 1.5 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 RELEVANT GUIDANCE & CRITERIA

Manchester City Council Criteria

- 2.1 Manchester City Council has well-established noise design criterion for new external fixed plant/equipment 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.’

- 2.2 The ‘rating level’ referred to in the Manchester City Council criterion is based upon the guidance set out in BS 4142 as follows:

BS4142

- 2.3 British Standard 4142: 2014 ‘Methods for rating and assessing industrial and commercial sound’ provides methods for rating and assessing sound of an industrial and/or commercial nature and requires the ‘rating’ sound level for the operation to be compared with the L_{A90} background sound level in the absence of the operational noise.
- 2.4 The ‘rating’ level is derived based on the ‘specific’ L_{Aeq} sound level attributable to the operation of the equipment with an ‘character correction’ penalty added for any sound sources which give rise to tonal, impulsive, intermittent, or other characteristics readily distinctive against the residual acoustic environment.

3.0 NOISE SURVEY

3.1 A noise survey has been carried out to quantify the baseline environmental noise climate at the site. The results have been used as a basis for determining the relevant noise design limits for the new external plant/equipment in line with Manchester City Council requirements.

3.2 The noise survey was carried out over 24-hours commencing at 12:30 on Monday 21 August 2023. The noise measurements were taken at one position as described below and shown in Figure 1:

A. In generally free-field conditions at 1.5m above the first-floor flat roof outside the hotel guest rooms overlooking the flat roof.

3.3 Noise measurements were taken with automatic data-logging equipment as a series of consecutive 15-minute periods (in line with the guidance set out in BS 4142: 2014+A1:2019) over the full survey period and included one-third octave band analysis and audio recording. The measurements were taken with a Nti Audio XL2 sound analyser (serial no. A2A-20228-E0) with environmental enclosure, windshield and tripod. The analyser was field-calibrated before and after the measurements with no variance observed. Weather conditions during the survey were generally dry, calm and mild with daytime temperatures of around 18-20°C. There was a short period of rain in the evening, but it is clear from analysis of the results that this had no bearing on the measured noise levels.

3.4 The full results of the noise survey are shown in Appendix II and summarised below.

Table 1: Summary of Noise Levels Measured (dB)

Period	Range of $L_{Aeq,15min}$	Mode of $L_{A90,15min}$	Mean of $L_{A90,15min}$
Daytime (07:00 – 19:00)	56 - 58	55	55
Evening (19:00 – 23:00)	54 - 58	53	54
Night-time (23:00 – 07:00)	53 - 58	53	53

3.5 The noise climate was found to be very steady, with the background noise levels dictated by noise from steady building services equipment noise associated with the hotel and other nearby premises.

4.0 NOISE ASSESSMENT & RECOMMENDATIONS

Noise Limit

- 4.1 We understand that the restaurant will be open until 23:45 and whilst cooking will generally cease by 23:00, the kitchen ventilation system also serves the restaurant trading area. As such, there is the potential for all new plant/equipment to operate after 23:00. As such, the relevant noise limit, based upon Manchester City Council requirements is a 'rating' level of 48 dB L_{Aeq} (the representative night-time background noise level of 53 dB minus 5 dB).
- 4.2 The proposed plant/equipment is not anticipated to produce any tonal or impulsive noise and the ventilation fans will produce steady/continuous noise when operating. Whilst the condensers will switch on/off as required, it is not considered that this on/off state will be readily apparent in the context of the existing residual noise climate. Furthermore, the residual noise climate is principally due to existing building services equipment noise. As such, no character corrections are warranted to obtain the 'rating' level and hence we conclude that the plant/equipment noise must be controlled to 48 dB L_{Aeq} outside the hotel guest rooms.

Plant Noise Calculations

- 4.3 We have been provided with manufacturers' source noise data for the proposed equipment by the project MEP contractors, APL. The proposed first-floor flat roof layout is shown in Figure 2.
- 4.4 We understand that the equipment will be as follows:
- Kitchen/restaurant supply fan - Flakt Woods 56JM/20/4/6/21
 - Customer area extract fan – Flakt Woods 35JM/16/4/5/26
 - Customer AC condensers (x2) – Mitsubishi Electric PUZ-M200YKA
 - DX Coil condensers (x2) – Mitsubishi Electric PUZ-M250YKA
- 4.5 Taking into account the manufacturers' noise data and proposed layout, with corrections for proposed silencers, duct configuration, directivity, attenuation of sound over distance and any screening attenuation where this is appropriate (e.g. in the case of the customer area extract fan which is outside

the 'gable end' of the building and therefore not overlooked by any hotel guest rooms), we have calculated the likely resulting noise levels outside the hotel guest rooms.

- 4.6 In respect of the kitchen supply fan, because of the proposed duct layout, the calculations consider the termination, fan casing and external ductwork. For the customer area extract fan, which has only a very short external duct run, only the termination noise has been considered.
- 4.7 Some initial calculations indicated that acoustic duct lagging would be required for the kitchen/restaurant supply fan building-side ductwork (i.e. that closest to the hotel guest rooms), and the condensers will require acoustic enclosures. These measures have been incorporated into our calculations.
- 4.8 The findings of the calculations, which are shown in Appendix III indicate a combined plant/equipment noise of 46 dB L_{Aeq} outside the nearest hotel guest rooms which is within the relevant noise limit.
- 4.9 We therefore conclude that, subject to the installation of acoustic duct lagging on the building-side external ductwork for the kitchen/restaurant supply fan and acoustic enclosures for the condensers as described below, there will be no unacceptable noise impact from the proposed new external plant/equipment.

Recommendations

- 4.10 We recommend that all building-side ductwork for the kitchen/restaurant supply fan is wrapped with proprietary acoustic duct lagging as described in Table 2:

Table 2: Minimum sound reduction performance of acoustic duct lagging

Description	Octave band Centre frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
CMS Danskin Superlag Prime 10/50 acoustic duct lagging or equivalent	1	4	4	12	24	33	40	43

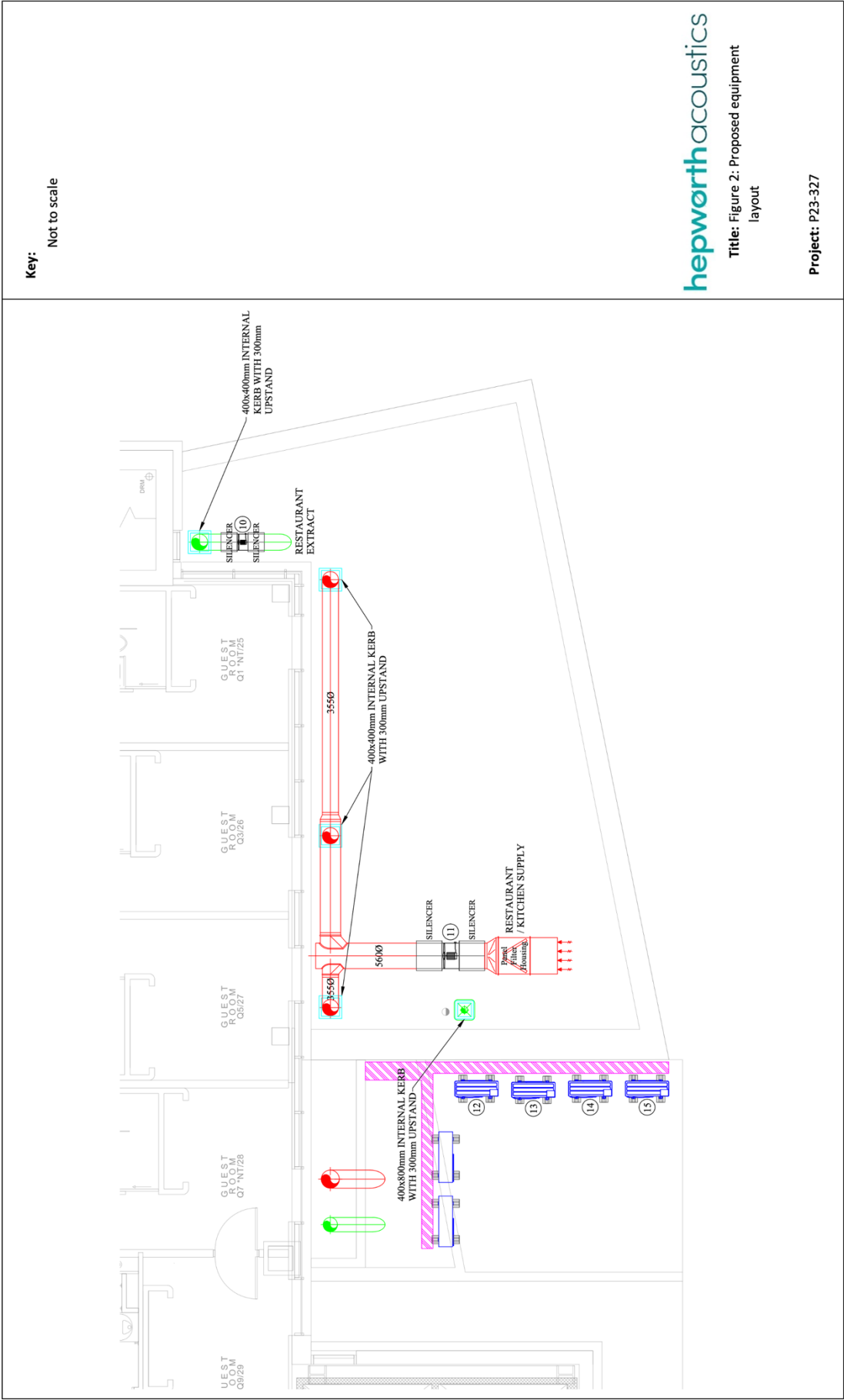
- 4.11 The acoustic enclosures for each of the outdoor condenser units must provide an overall sound reduction equivalent to at least 10 dBA.
- 4.12 For general guidance purposes, we would also recommend the following:
- Any equipment that has the potential to generate vibration should be isolated from the building with effective anti-vibration mounts; and

- Carrying out regular maintenance of equipment to minimise noise emissions.

5.0 SUMMARY

- 5.1 Hepworth Acoustics Ltd was commissioned by Six by Nico (Holdings) Limited to carry out a noise impact assessment in connection with new external plant/equipment to be installed on the first-floor flat roof above their new restaurant at Yotel, 2 John Dalton Street in Manchester city centre.
- 5.2 The assessment has included a baseline environmental noise survey to establish the existing noise climate of the area.
- 5.3 Based upon the findings of the noise survey, and taking into account the usual noise control requirements of Manchester City Council and other relevant guidance, we have assessed the potential impact of noise from the proposed plant/equipment.
- 5.4 Initial calculations have indicated that some noise control measures will be necessary.
- 5.5 Subject to our recommendations for noise control measures, we conclude that the noise from the new external plant/equipment will be controlled to within Manchester City Council's usual requirements and hence no unacceptable noise impact will result.





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.

The frequency spectrum can be divided up into octave bands or third octave bands.

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.

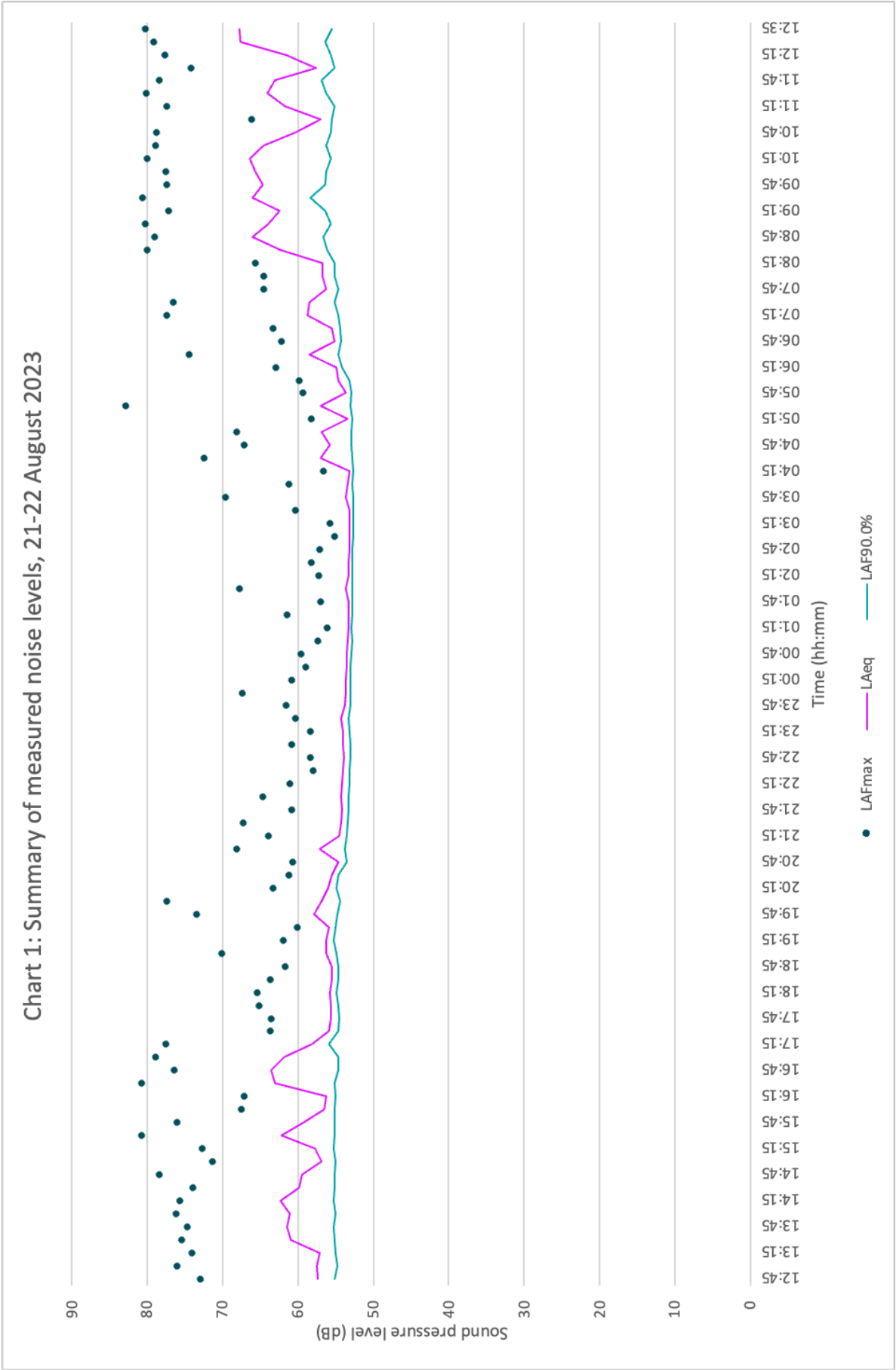
$L_{Aeq,T}$ This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, $L_{Aeq,T}$ is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

$L_{A90,T}$ 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.

Appendix II: Noise Survey Results

Date(s):	Monday 21 August 2023 – Tuesday 22 August 2023
Equipment	NTi XL2 'Class 1' sound analysers (s/n: A2A-20228-E0) with associated calibrator and environmental outdoor monitoring kit
Weather	Generally dry and calm, but with some rain during the evening. Daytime temperatures around 18-20°C.

Chart overleaf



Appendix III – Plant Noise Calculations

P23-327-C01 - Six by Nico, John Dalton Street, Manchester
August 2023

hepworthacoustics

External plant/equipment noise calculations

KITCHEN SUPPLY - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Flakt Woods 56JM/20/4/6/21 (Item 11)	75	78	75	73	72	67	65	60	76	Manufacturer's data - Lw inlet
Attenuator	-2	-5	-7	-15	-13	-8	-9	-8		Flakt Woods 1D silencer at 560mm internal diameter
Resulting in-duct after attenuator	73	73	68	58	59	59	56	52	66	
Duct losses - no bends	0	0	0	0	0	0	0	0		Trox manual
Duct losses - 0m duct length	0	0	0	0	0	0	0	0		Trox manual
Termination area correction (600mm square)	-8	-4	-1	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 off-axis	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		Distance to hotel rear elevation is approx. 5m
Screening	0	0	0	0	0	0	0	0		No screening
Resulting at receiver location	44	47	44	32	25	17	14	10	37	

KITCHEN SUPPLY - external ductwork building-side

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Flakt Woods 56JM/20/4/6/21 (Item 11)	77	80	75	73	72	68	65	61	77	Manufacturer's data - Lw inlet
Attenuator - as proposed	-2	-5	-7	-15	-13	-8	-9	-8		Flakt Woods 1D silencer at 560mm internal diameter
Resulting in-duct after attenuator	75	75	68	58	59	60	56	53	67	
SRI of duct	3	8	14	20	23	26	27	35		22g steel sheet - adopted from Woods Practical Guide to Noise Control - Appendix B
Duct surface area (m ²)	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9		1.9m of 560mm dia, 2.7m of 440mm dia, and 5.3m of 355mm dia
Cross sectional area of duct (m ²)	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14		Weighted-average cross-sectional area
L _w of duct break-out	72	72	65	55	56	54	49	38		Woods Practical Guide to Noise Control eqn. 5.11, subject to upper limit of in-duct L _w - 3dB
Duct lagging	-1	-4	-4	-12	-24	-33	-40	-43		SuperLag Prime 10/50
Distance attenuation	-13	-13	-13	-13	-13	-13	-13	-13		Average distance to hotel rear elevation assumed to be 1.8m
Screening	0	0	0	0	0	0	0	0		No screening
Resulting at receiver location	58	55	48	30	19	8	-4	-18	43	

KITCHEN SUPPLY - casing

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Flakt Woods 56JM/20/4/6/21 (Item 11)	67	59	49	48	47	41	46	37	53	Manufacturer's data - Lw casing
Lagging	0	0	0	0	0	0	0	0		SuperLag Prime 10/50
Resulting after lagging	67	59	49	48	47	41	46	37	53	
Distance attenuation	-18	-18	-18	-18	-18	-18	-18	-18		Distance to nearest hotel façade approx 3.3m
Screening/enclosure	0	0	0	0	0	0	0	0		No screening
Resulting at receiver location	49	41	31	30	29	23	28	19	35	

RESTAURANT EXTRACT - termination

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Flakt Woods 35JM/16/4/5/26 (Item 10)	70	71	65	64	62	59	56	51	67	Manufacturer's data - SPL
Attenuator	-1	-2	-4	-10	-12	-10	-9	-7		Flakt Woods 1D silencer at 355mm internal diameter
Resulting in-duct after attenuator	69	69	61	54	50	49	47	44	59	
1 x duct bend	0	0	0	-6	-8	-4	-3	-3		Trox manual
Duct run (0m)	0	0	0	0	0	0	0	0		Trox manual
Termination area correction (355mm dia)	-8	-4	-1	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 20deg	2	2.5	3	3	3.5	4	4	4		SRL - Noise Control in Industry - Fig 11.2
Distance attenuation	-18	-18	-18	-18	-18	-18	-18	-18		As crow flies distance is approx. 3m, but through the building
Screening	-10	-10	-10	-10	-10	-10	-10	-10		No line of sight of fan from any hotel guest rooms
Resulting	35	40	35	23	18	21	20	17	31	

Condensers

Description	63	125	250	500	1k	2k	4k	8k	A	Notes
Mitsubishi Electric PUZ-M200YKA (Item 12)	65	59	58	59	54	51	46	41	60	Manufacturer's data - Lp at 1m - distance to nearest hotel guest room is 4.0m
Mitsubishi Electric PUZ-M200YKA (Item 13)	65	59	58	59	54	51	46	41	60	Manufacturer's data - Lp at 1m - distance to nearest hotel guest room is 5.4m
Mitsubishi Electric PUZ-M250YKA (Item 14)	72	62	61	60	56	53	49	43	62	Manufacturer's data - Lp at 1m - distance to nearest hotel guest room is 6.6m
Mitsubishi Electric PUZ-M250YKA (Item 15)	72	62	61	60	56	53	49	43	62	Manufacturer's data - Lwp at 1m - distance to nearest hotel guest room is 7.7m
Acoustic enclosure	-10	-10	-10	-10	-10	-10	-10	-10	-10	Acoustic enclosures proposed outline acoustic performance as advised by APL
Resulting at receiver location inc. acoustic enclosures	50	42	41	41	36	33	29	23	42	Combined for all four units, including distance attenuation for each unit

Overall - all plant operating	59	56	50	42	37	34	32	26	46	
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