

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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55 Spring Gardens, Manchester

Noise survey and plant noise egress assessment

London, Manchester, Edinburgh, Birmingham, Leeds, Bristol

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Version	Date	Comments	Author	Reviewer
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Summary

Sandy Brown has been commissioned by Melcotton Ltd to provide acoustic advice in relation to the proposed development at 55 Spring Gardens, Manchester, M12 1EN.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was carried out between 14:30 on 30 May 2025 and 14:15 on 5 June 2025.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 56 dB during the day and $L_{A90,15min}$ 50 dB at night.

Based on the requirements of Manchester City Council and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 51 dB during the day, and $L_{Aeq,15min}$ 45 dB during the night. These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

The proposal includes relocating of the existing rooftop VRF units to the north. The existing AHUs will remain in their current locations

Attended measurements were undertaken on 5 June 2025 with the purposed of determining the noise generated by existing rooftop plant to be retained/relocated.

An assessment of noise associated with the proposed rooftop plant relocation has been carried out. The assessment indicates compliance with the noise criteria stipulated by Manchester City Council.

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1 Introduction

Sandy Brown has been commissioned by Melcotton Ltd to provide acoustic advice in relation to the proposed development at 55 Spring Gardens, Manchester, M12 1EN.

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing background sound levels in the vicinity of nearby noise sensitive premises and to set appropriate limits for noise egress from building services plant.

Attended measurements were undertaken with the purpose of determining the noise generating by the installed rooftop plant to be retained and relocated to the north.

This report presents the survey method and results, a discussion of acceptable limits for noise emissions from building services plant, and a noise egress assessment for the proposed rooftop plant relocation.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is outlined in yellow in Figure 1. The site is bounded by Fountain Street north-west to south west, Spring Gardens to the south, and W Mosley St north-east to south east.



Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The nearest noise sensitive premises are summarised below with respect to mark-ups shown in Figure 1.

- 53 Fountain Steet, Barnett House (office), highlighted in light green
- 70 Spring Gardens (commercial/offices), highlighted in red
- 58 Mosley Street (commercial/offices), highlighted in pink
- 60 Spring Gardens (commercial/offices), highlighted in orange
- 50 Fountain Street (offices), highlighted in purple
- 38- 42 W Mosley Street (commercial/offices), highlighted in light blue
- 100 King Street (Hotel Gotham), highlighted in dark blue.

3 Development proposals

The proposed development comprises the relocation of the existing VRF rooftop plant units to the north, the existing AHUs will remain in their existing locations.

4 Building services noise egress criteria

4.1 Standard guidance

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at nearby noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background sound level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

4.2 Local Authority criteria

Manchester City Council (MCC) provides guidance in relation to plant noise emissions in Planning and Noise Technical Guidance document dated October 2022 states the following in relation to plant noise egress:

'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'

Corrections for tonal or attention catching characteristics would need to be applied to the rating level in accordance with BS4142: 2014.

5 Noise survey method

The survey included unattended and attended noise measurements.

The measurements and information described in this report are provided in accordance with requirements of BS 7445, as referenced in Appendix A.

5.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 7 days.

The measurements were taken over 15 minute periods between 14:30 on 30 May 2025 and 14:15 on 5 June 2025.

The microphone for the sound level meter was installed on a tri-pod which was mounted to a pole extended approximately 1 m out a partially open window on level 6 on the Spring Garden facade to the south.

The measurement position is indicated in Figure 1 denoted by the letter 'L'. This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

A photograph showing the measurement location is provided in Figure 2.

Details of the equipment used and the noise indices measured are provided in Appendix A.



Figure 2 Photograph of the unattended monitoring position

5.2 Attended measurements

Attended sample measurements were taken at 3 positions around the proposed site, at the nearest noise sensitive premises. These are indicated in Figure 1 as positions 1 to 3. The measurements were carried out on 30 May 2024. All measurements were 5 minutes in duration.

At each position the microphone was mounted on a tripod approximately 1.5 m above the ground level and approximately 1 m from a reflective surface.

Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.

Photographs of the measurement positions are shown in Figure 3.

During the attended sample measurements the weather was dry, and no rain occurred.



Figure 3 Photo of attended measurement locations Pos A (left), Pos B (centre), Pos C (right)

5.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

6 Noise survey results

6.1 Observations

The dominant noise sources observed at the site during the survey were from road traffic on Spring Gardens with contributions from road traffic on fountain Street and trams passing on Mosley Street.

Less significant noise sources included pedestrians passing by talking and occasional seagulls. Noise measurement results

6.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
30 May 2025	65 ^[1]	58
31 May 2025	61	61
1 June 2025	64	57
2 June 2025	64	58
3 June 2025	63	60
4 June 2025	62	59
5 June 2025	62 ^[1]	-
Average	63	59

^[1] Measurement not made over full period due to monitoring start and end time (the measurement on 30 May 25 was over 8.5 hours, and on 5 June 25 over 7.25 hours); not included in the average.

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 49 dB during the day and $L_{A90,15min}$ 48 dB at night.

In line with BS 4142:2014+A1:2019, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Day and night statistical analysis of representative values for the site are given in Figure 4.

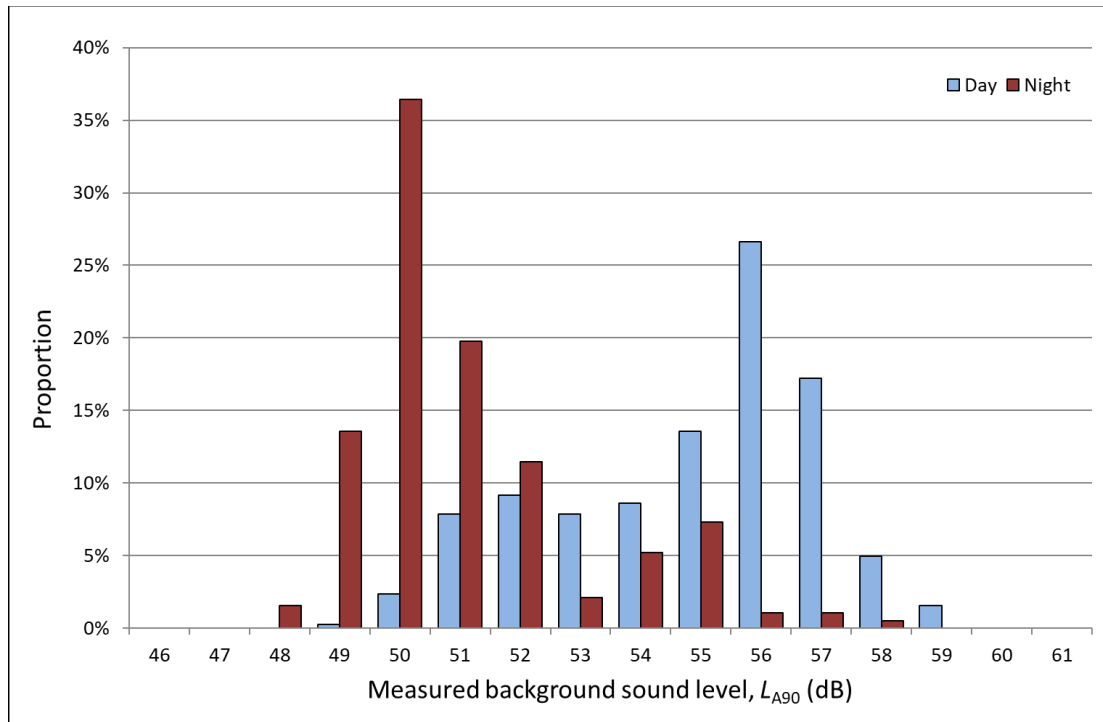


Figure 4 Statistical analysis of background sound levels

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 56 dB during the day and $L_{A90,15min}$ 50 dB at night.

6.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 2. All measurement results are considered facade measurements. Table 2 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
A	14:30	64	75	55	Dominated by car passing by with contributions from road traffic on Spring Gardens, seagulls, and pedestrians passing by talking

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
A	14:35	62	72	55	As above with distant tram passing+ horn
	14:40	67	86	55	As above, maximum level from siren passing
	15:30	60	73	60	Dominated by car passing by with contributions from road traffic on Spring Gardens, seagulls, and pedestrians passing by talking
	15:35	63	78	63	As above
	15:40	65	78	58	As above
B	14:46	67	77	61	Dominated by road traffic on Spring Gardens with contributions from distant trams passing + horn, pedestrians passing by and talking
	14:51	63	75	57	As above with contributions car slamming doors
	14:56	71	91	58	As above, maximum level motorcycle passing by
	15:41	65	78	58	Dominated by road traffic on Spring Gardens with contributions from distant trams passing + horn, pedestrian talking
	15:46	63	79	58	As above, maximum level due to car horn
	15:52	62	73	58	As above

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
C	15:02	72	95	58	Dominated by truck unloading some 4 m away with contributions from cars passing and distant tram passing + horn
	15:08	71	94	58	As above
	15:14	69	90	58	As above
	15:58	63	85	57	Dominated by road traffic on Spring Garden and cars passing by, contributions from distant plant, distant tram passing + horn, and pedestrians passing
	16:03	63	76	57	As above
	16:08	64	76	58	As above

6.3 Basic limits

Based on the above criteria and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 3.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels.

Table 3 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Day (07:00-23:00)	51
Night (23:00-07:00)	45

[1] The limits set out in Table 3 do not include any attention catching features. Penalty corrections for attention catching features may be significant and will need to be considered as the building services design progresses. This is discussed in Appendix C.

Compliance with limits shall be determined with reference to BS 7445: Part 3: 1991 *Description and measurement of environmental noise, Part 3. Guide to application to noise limits*.

7 Plant information

7.1 Installed plant

The MEP layout showing the existing rooftop plant items is shown in Figure 5. The installed items comprise two groups of plant spaces servicing each floor level and comprises 8 x outdoor VRF units and 1 x AHU to both sides of an existing glazed skylight and internal plant area as shown in Figure 5.

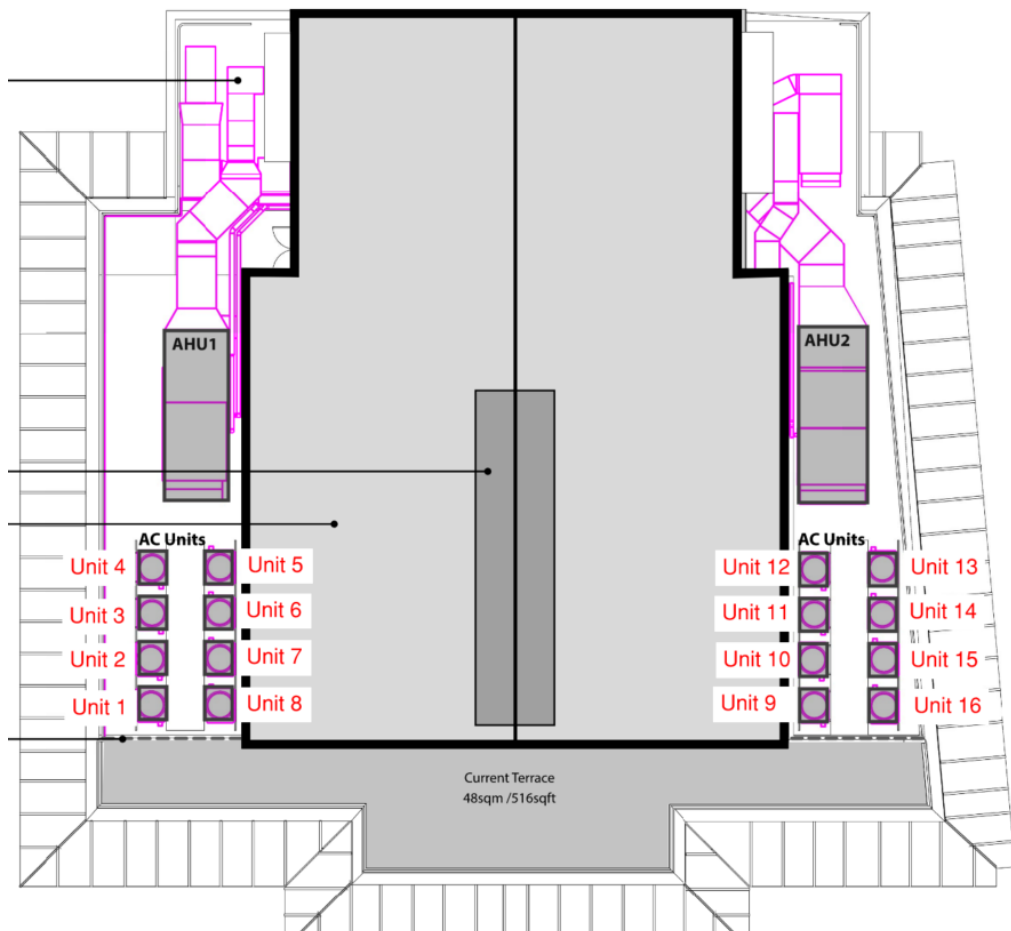


Figure 5 Existing rooftop layouts and plant location

The installed plant comprises the following

- 12 x Mitsubishi PURY-P300 Y JM-A
- 4 x Mitsubishi PURY-P250 Y JM-A
- 2 x Air Handling Units (AHUs).

AHU 1 was faulty and not in operation during the site visit on 5 June 2025.

7.2 Plant noise measurements

7.2.1 Attended measurements

Attended sample measurements were carried out at 1m from the installed rooftop plant items.

The rooftop plant items were set to operate under normal duty conditions by the MEP team. Sample measurements of the installed units were carried out at 1 m above each unit VRFs, and at 1 m from the AHU supply and extract atmosphere side connections.

Attended sample measurements were carried out of the installed plant items in operation, these comprised Mitsubishi condenser units and 2 x AHU units of which one was faulty and not in operation (AHU 1).

The measurement time intervals ranged between 30 seconds and 1 minute in each case. In all cases, measurements were carried out such that plant in operation was the dominant source.

During the attended rooftop plant sample measurements, the weather was dry, and no rain occurred.

7.2.2 Measurement results

The measurement results from plant in operation are summarised in Table 4 with respect to references indicated in Figure 5.

Table 4 Plant measurement results at 1m from each unit

Plant reference	Sound pressure levels measured, L_{eq} at 1m (dB)								
	L_{Aeq} (dB)	Octave-band centre frequency (Hz)							
		63	125	250	500	1000	2000	4000	8000
Unit 1	70	78	70	67	66	68	60	52	45
Unit 2	73	83	76	68	68	70	61	56	57
Unit 3	70	71	68	65	66	67	60	49	44
Unit 4	66	77	70	65	62	62	55	50	48
Unit 5	73	88	81	72	69	67	61	56	49
Unit 6	65	77	69	64	63	61	55	50	44
Unit 7	75	86	80	71	72	70	67	58	51
Unit 8	73	85	79	71	69	66	68	57	51
Unit 9	68	79	69	64	62	66	55	50	44
Unit 10	74	79	73	68	67	72	66	56	48

Plant reference	Sound pressure levels measured, L_{eq} at 1m (dB)								
	Octave-band centre frequency (Hz)								
	L_{Aeq} (dB)	63	125	250	500	1000	2000	4000	8000
Unit 11	69	76	67	63	62	67	54	49	44
Unit 12	61	60	61	59	62	51	49	52	51
Unit 13	69	84	74	68	66	64	60	54	50
Unit 14	70	82	73	67	64	68	58	52	48
Unit 15	66	81	71	66	63	62	56	51	48
Unit 16	67	77	69	63	61	64	60	52	50
AHU 2 Intake	71	67	76	76	63	64	57	57	45
AHU 2 Exhaust+ break out	67	63	65	60	55	57	54	53	66

Subjectively, no attention catching features were observed during the measurements (with reference to BS4142)

8 Plant noise egress assessment

8.1 Relocated plant

The proposed rooftop plant includes the relocation of the existing VRF units to the north, the AHUs are proposed to be retained at their present locations. Figure 6 shows the proposed rooftop plant arrangements.

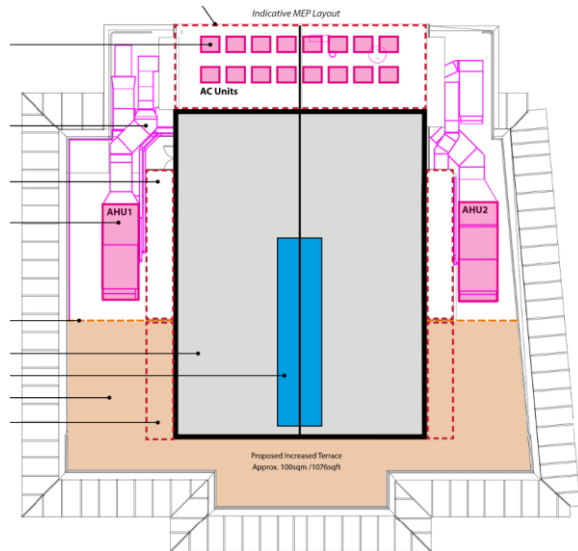


Figure 6 Proposed rooftop plant relocation

The proposed rooftop plant includes the relocation of the existing VRF units to the north, the AHUs are proposed to be retained at their present locations. Figure 6 shows the proposed rooftop plant arrangements.

The units have been relocated as shown in Figure 7 for the purposes of the assessment. This is considered a worst-case approach as the majority of the VRFs are Mitsubishi PURY-P300 Y JM. The items of plant are labelled with reference to Figure 5.

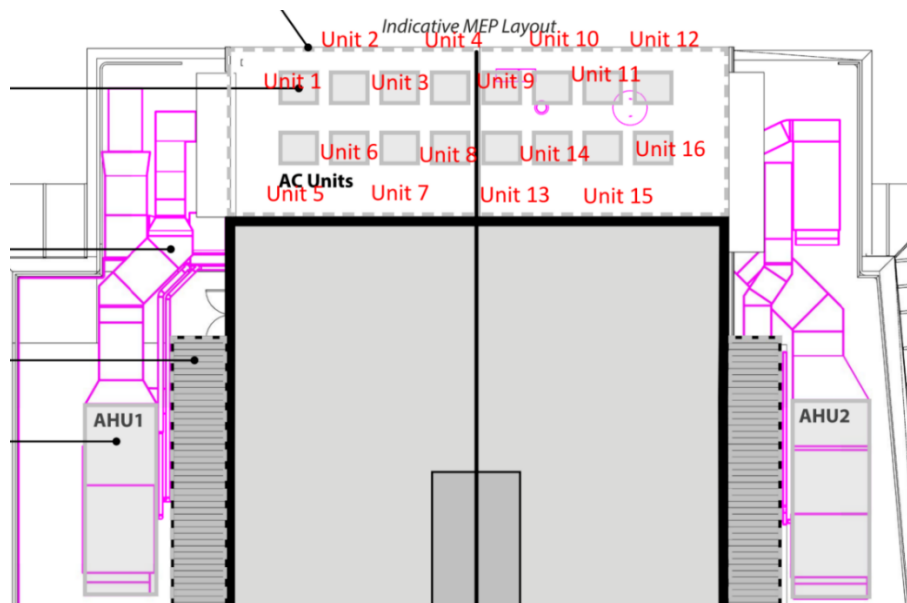


Figure 7 Rooftop plant unit location used in the noise egress assessment

9 Plant noise assessment

The worst affected windows of the nearest noise sensitive premises (NSPs) have been deemed to be as follows:

- 50 Fountain Street top floor windows (office) approximately 29 m to the west
- 38-42 W Mosley St top floor window (office) approximately 26 m to the east
- 100 Kings Street (Hotel Gotham) approximately 76 m to the west

The windows at 50 Fountain Street and 38-42 Mosley Street are located at a lower height when compared to the 55 Spring Garden rooftop.

Other NSPs indicated in Figure 1 are located at a greater distance, partially or fully screened from plant location, or do not have windows overlooking the proposed rooftop plant. On the basis that plant noise egress are suitably controlled to the worst affected locations detailed above, noise levels at other nearby sensitive premises are expected to comply with the limits.

The assessment takes into account the following:

- Measured noise levels at 1m above each unit and set out in Table 4
- Rooftop plant relocation as shown in Figure 7.
- Plant units operating simultaneously (worst case scenario)
- The noise egress level outside the nearest noise sensitive receptors does not contain any perceivable tonal or impulsive characteristics. None of these were noted during the measurements.
- Directivity due to reflections from nearby surfaces and facade reflections
- VRF units height as per existing height (approximately 2m above the roof level including existing mounting)
- Plant assumed to be in continuous operation 24 hours a day (worst-case).

The relocation of the VRFs is not expected to impact noise egress levels from the existing AHUs, therefore noise egress levels associated with the AHUs have not been considered any further within the assessment.

9.1 Results

The predicted cumulative noise levels from the proposed rooftop plant re-location at the worst affected windows of the nearest noise sensitive premises are set out in Table 5

Table 5 Predicted sound pressure levels at 1 m from the windows of the nearest noise sensitive receptors

Noise sensitive receptor	Predicted plant noise egress level, L_{Aeq} (dB)
50 Fountain Street (office)	47
38-42 Mosley St (Office)	42
Hotel Gotham	42

The predicted noise egress levels at the nearest noise sensitive premises comply with the relevant noise limits.

Based on the above additional mitigation measures are not required to control noise egress from the proposed rooftop plant relocation.

If units are proposed in a different arrangement and additional or new plant proposed, an assessment will be required to ensure noise egress limits are met at all times.

10 Conclusion

An environmental noise survey has been carried out to determine the existing sound levels in the area.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 56 dB during the day and $L_{A90,15min}$ 50 dB at night.

Based on the requirements of Manchester City Council and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,15min}$ 51 dB during the day, and $L_{Aeq,15min}$ 45 dB during the night.

The proposal includes relocating of the existing rooftop VRF units to the north, the existing AHUs will remain in their locations. Attended measurements were undertaken on 5 June 2025 with the purpose of determining the noise generating by existing rooftop plant to be retained.

An assessment of the rooftop plant relocation has been carried out. The assessment indicates compliance with the relevant planning noise limits.

Appendix A

Survey details

Reference standards

- BS 7445 Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*
- BS 7445: Part 2: 1991 *Description and measurement of environmental noise, Part 2. Guide to the acquisition of data pertinent to land use.*

Equipment

The unattended and attended environmental noise measurements were taken using a Rion NL-52 sound level meter and a NTi XL3 sound level meter, respectively. The attended rooftop plant sample measurements

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/01143564	Rion	12 Dec 26	TCRT24/1898
Microphone	UC-59/10153	Rion	12 Dec 26	TCRT24/1898
Pre-amp	NH-25/43581	Rion	12 Dec 26	TCRT24/1898
Calibrator	NC-74/34257023	Rion	12 Dec 26	TCRT24/1895
Sound level meter	NL-52/00932326	Rion	24 Apr 26	TCRT23/1806
Microphone	UC-59/09251	Rion	24 Apr 26	TCRT23/1806
Pre-amp	NH-25/32354	Rion	24 Apr 26	TCRT23/1806
Calibrator	NC-74/34536129	Rion	24 Apr 26	TCRT23/1576
Sound level meter	XL3/ A3A-01221-F0	NTi	2 Dec 26	UCRT24/2613ATR
UCRT24/2615				
Microphone	MC230A/A28047	NTi	2 Dec 26	UCRT24/2613ATR
Pre-amp	MA220-230/14610	NTi	2 Dec 26	UCRT24/2613ATR

[1] Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg, L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS 7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Weather conditions

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 7°C at night and 22°C during the day, and the wind speed was typically less than 5 m/s with occasional wind gusts speed up to 7 m/s on 1 and 4 June 2025.

Intermittent rain showers were reported on 1, 2 and 5 June 2025. however, the survey duration was sufficiently long to include periods unaffected by adverse weather and no variation in noise levels was seen to correlate with the weather.

The analysed measurement results do not show a correlation between occasional high wind speeds/ rain showers and increased noise levels at the measurement position.

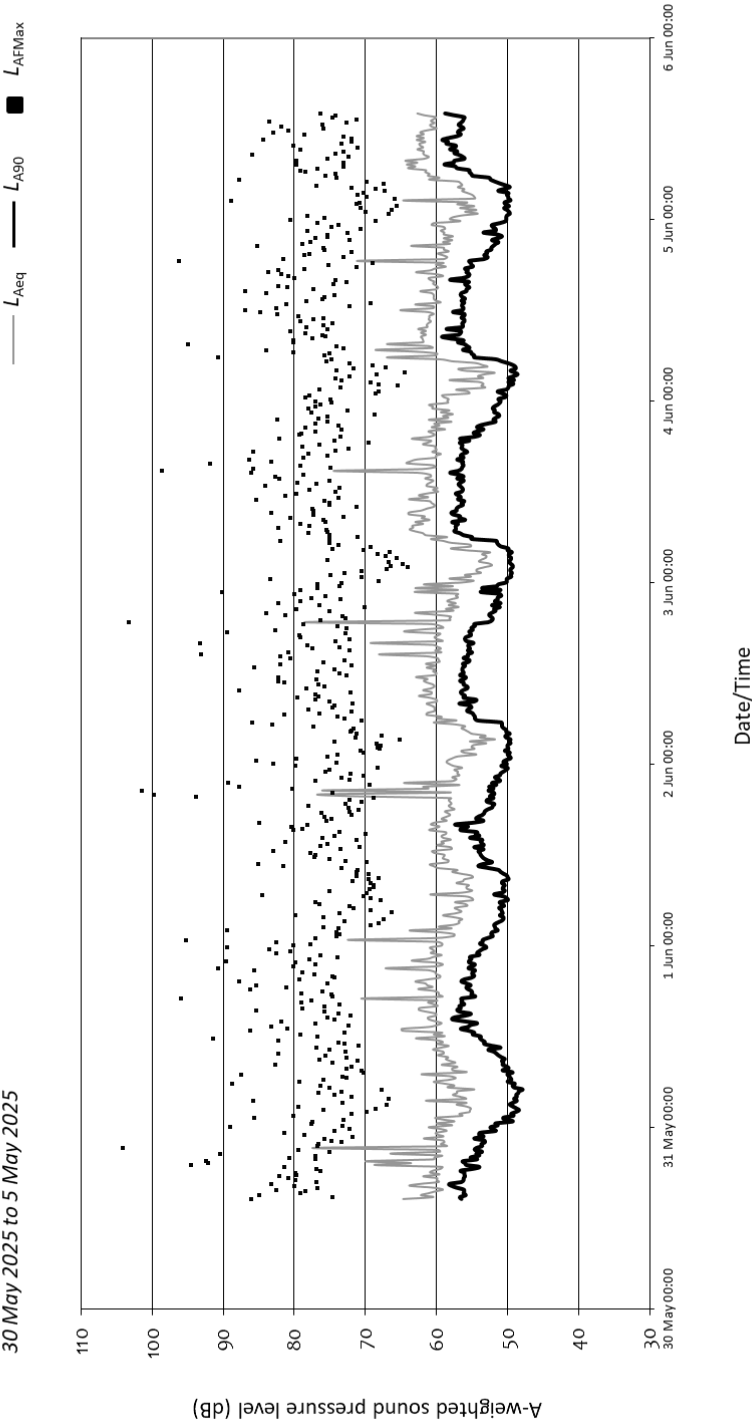
During the attended noise measurements, the weather was generally clear and dry no rain occurred. Wind speeds were measured at each position and varied between 0 m/s and 3 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Position L

55 Spring Gardens, Manchester
Results of noise logging survey at location L
30 May 2025 to 5 May 2025



Appendix C

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.