SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Condensers, Freetrade Exchange Building

Noise survey and plant noise egress assessment

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Version	Date	Comments	Author	Reviewer
A	10 Dec 25		GM	MH

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Summary

Sandy Brown has been commissioned by CST Limited Partnership to provide acoustic advice in relation to the proposed development at Freetrade Exchange, 37 Peter Street, Manchester, M2 5GB.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was carried out between 12:00 on 27 November 2025 and 15:15 on 2 December 2025.

The representative background sound levels from the noise survey were $L_{A90,15min}$ 57 dB during the day, and $L_{A90,15min}$ 56 dB during the night.

Based on the requirements of the Local Authority, the relevant plant noise limits at the facade of the worst affected existing noise sensitive premises are L_{Aeq} 55 dB during the day, and L_{Aeq} 54 dB during the night. These have been corrected relative to the measured free-field sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

These limits are cumulative and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be more stringent than those set out above.

An assessment of the proposed plant items associated with the development has been carried out. Results indicate that the proposed plant is expected to comply with the plant noise egress limits at all noise sensitive receptors.

Contents

1 Introduction 5
2 Site description 5
3 Development proposals 6
4 Building services noise egress criteria 7
5 Noise survey method 7
6 Noise survey results 10
7 Plant noise egress assessment 12
8 Conclusion 14
Appendix A 15
Survey details 15
Appendix B 18
Results of unattended measurements at Position A 18
Appendix C 20
BS 4142 corrections for attention catching features 20
Appendix D 22
Plant noise egress calculations 22

1 Introduction

Sandy Brown has been commissioned CST Limited Partnership to provide acoustic advice in relation to the proposed development at Freetrade Exchange, 37 Peter Street, Manchester, M2 5GB.

As part of this, an environmental noise survey has been conducted, 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.

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

A plant noise egress assessment has been undertaken.

2 Site description

2.1 The site and its surrounding

The site is located in central Manchester on Peter Street. It is bounded to the north by Bootle Street, to the east by Southmill Street, to the south by Peter Street, and to the west by commercial premises on Marron Place. The site location in relation to its surroundings is shown in Figure 1, outlined in red.



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

2.2 Adjacent premises

The adjacent premises are as follows:

- Forty-Seven Hotel to the east shown in purple in Figure 1
- Radisson Hotel to the south shown in green
- Commercial premises to the west shown in orange
- Commercial premises to the north shown in blue.

3 Development proposals

The proposals include for the installation of a new condenser unit to the rooftop plant area. The condenser unit is proposed to serve the comms rooms and therefore may be required to operate throughout the day and the night. It is understood that the condenser unit will only operate in cooling mode.

The proposed unit is shown in red in Figure 2.

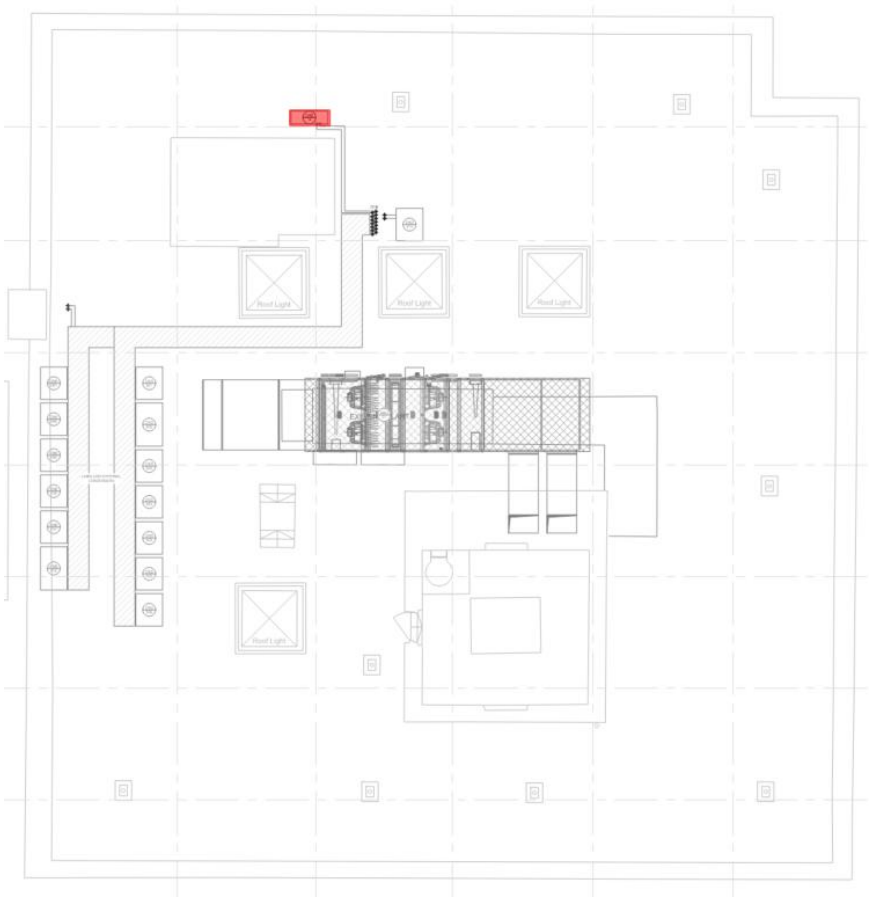


Figure 2 Proposed condenser unit location

4 Building services noise egress criteria

4.1 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 (L_{Aeq}) below the typical background (L_{A90}) 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.

4.2 British Standard 4142

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.

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 6 days.

The measurements were taken over consecutive 15-minute periods between 12:00 on 27 November 2025 and 15:15 on 2 December 2025.

The microphone for the sound level meter was installed on a tri-pod which was installed approximately 1.5 m above roof level in free-field conditions. The measurement position is indicated in Figure 1, denoted by the letter 'A', and a photograph showing the measurement

position is provided in Figure 3. This location was chosen to minimise the influence of existing rooftop plant on the Freetrade building (screened by rooftop access) and to be reasonably representative of noise levels outside the nearest noise sensitive premises.

The measurement position is completely screened from road noise and as such it is likely that noise levels at the facades of noise sensitive receptors are greater than that measured at this position. Therefore, this location provides a worst case representation of noise levels outside the nearest noise sensitive premises.

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

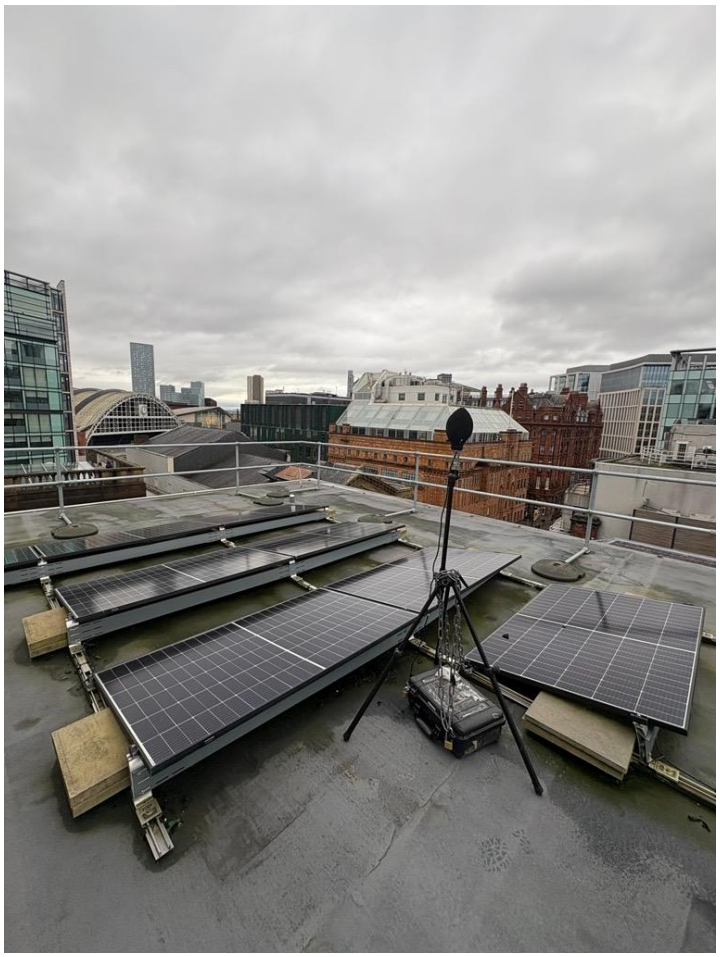


Figure 3 Logger position A

5.2 Attended measurements

Attended noise monitoring was undertaken at one position, denoted '1' in Figure 1. The measurements were taken over consecutive 5-minute periods between 14:00 and 15:15 on 2 December 2025.

The microphone for the sound level meter was installed on a tripod at approximately 1.2 m above roof level in free-field conditions.

The position was chosen to be more representative of the commercial premises to the north. A photograph showing the measurement position is provided in



Figure 4 Measurement position 1

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 rooftop plant at 49 Peter Street.

Less significant noise sources included noise from existing plant on the Freetrade building, and distant construction noise and road traffic.

6.2 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)
Thursday 27 November 2025	60 [1]	57
Friday 28 November 2025	61	60
Saturday 29 November 2025	60	61
Sunday 30 November 2025	60	59
Monday 1 December 2025	60	59
Tuesday 2 December 2025	61 [1]	-
Average	60	59

[1] Measurement not made over full period due to monitoring start and end time (the measurement on 27 November 2025 was over 11 hours, and on 2 December 2025 over 8 hours); not included in the average.

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 5 and Figure 6.

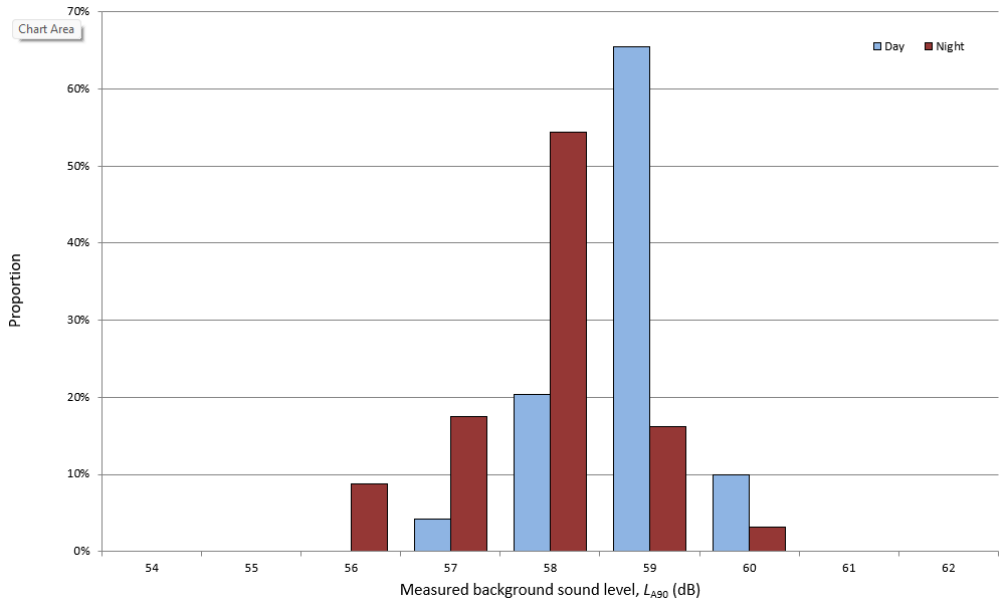


Figure 5 Measured background sound levels – Histogram

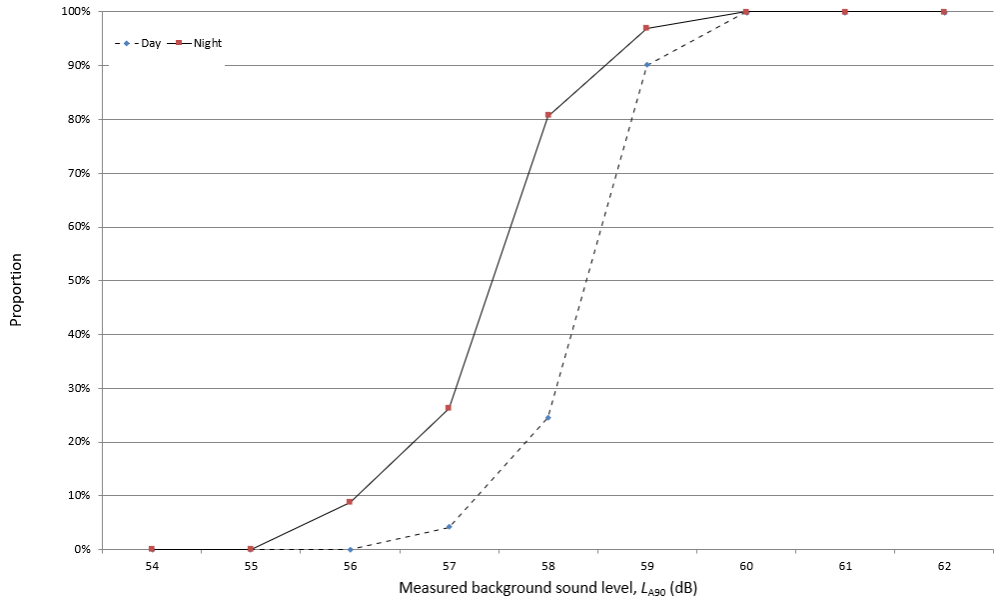


Figure 6 Measured background sound levels – Cumulative

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 57 dB during the day and $L_{A90,15min}$ 56 dB at night.

6.2.2 Attended measurement results

The results of the attended measurements are presented in Table 2

Table 2 Measured noise levels at position 1

Measurement start time	Ambient noise level, L_{Aeq} (dB)	Maximum noise level, L_{AFmax} (dB)	Background noise level, L_{A90} (dB)
14:15	61	80	58
14:20	59	68	58
14:25	59	67	58
14:30	61	71	59
14:35	60	68	58
14:40	60	70	58
14:45	59	68	58
14:50	59	68	58
14:55	59	62	58
15:00	59	65	58
15:05	59	66	58
15:10	63	68	60

The measured noise levels at Position 1 are typically 1-2 dB higher when compared with those measured at logger location A. On this basis, measurements taken at Logger Location A are considered a worst case representation of the noise climate at the commercial premises to the north.

7 Plant noise egress assessment

7.1 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. These have been corrected relative to the measured free-field sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1). In this case these limits would apply at the Forty-Seven Hotel, the Radisson Hotel, and commercial receptors to the north and east shown in Figure 1.

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)	55
Night (23:00-07:00)	54

[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*.

7.2 Proposed plant item

One Mitsubishi PUZ-ZM100VKA2 condenser unit is proposed to be installed on the rooftop.

Acoustic data for this unit is available online and has been shown below in Table 4. The data presented represents the unit in cooling mode, corresponding with the proposed mode of operation. This has been used as the basis for the assessment.

Table 4 Proposed condenser unit sound pressure level data

	Sound pressure level at 1 m, L_{eq} (dB) Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
PUZ-ZM100VKA2	53	52	49	47	44	40	34	27

7.3 Plant noise assessment

The predicted noise levels due to plant noise egress are shown in Table 5.

The full calculations are presented in Appendix D.

Table 5 Predicted noise levels at noise sensitive receptors

Receptor	Predicted free-field noise level at 1 m from the facade of noise sensitive premises, $L_{Aeq,15\ min}$ (dB)
Forty-Seven Hotel	27
The Radisson Hotel	20
Commercial premises to the north	37
Commercial premises to the west	34

The results indicate that the plant noise egress limits will be achieved at all noise sensitive receptors.

The noise levels presented here do not include screening losses. As such, these noise levels are considered worst case and are expected to be lower in-situ.

7.3.1 BS 4142 Character corrections

In our professional experience, newly commissioned and well-maintained condensers do not normally have tonal characteristics or attention catching features such as impulsivity. Even were penalties applied in line with the guidance within BS 4142, these are not likely to exceed 10 dB.

The predicted noise levels fall (even with a penalty correction – where appropriate) well below the plant noise egress criteria for both day and night periods. Therefore, it is expected that the installation of proposed plant will not adversely impact noise sensitive receptors.

8 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 57 dB during the day, and $L_{A90,15min}$ 56 dB during the night.

Based on the requirements of the Local Authority, the relevant plant noise limits at the facade of the worst affected existing noise sensitive premises are L_{Aeq} 55 dB during the day, and L_{Aeq} 54 dB during the night. These have been corrected relative to the measured free-field sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

These limits are cumulative and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be more stringent than those set out above.

An initial assessment of the proposed plant items associated with the development has been carried out. Results indicate that the proposed plant is expected to comply with the plant noise egress limits at all noise sensitive receptors.

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 noise measurements were taken using a Rion NL-52 sound level meter and NTi-XL3 sound level meter, respectively.

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
NL-52 G				
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
NTi-XL3				
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
Calibrator	SV30A/10567	Svantek	20 Sep 26	UCRT24/2251

[1] Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meter 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

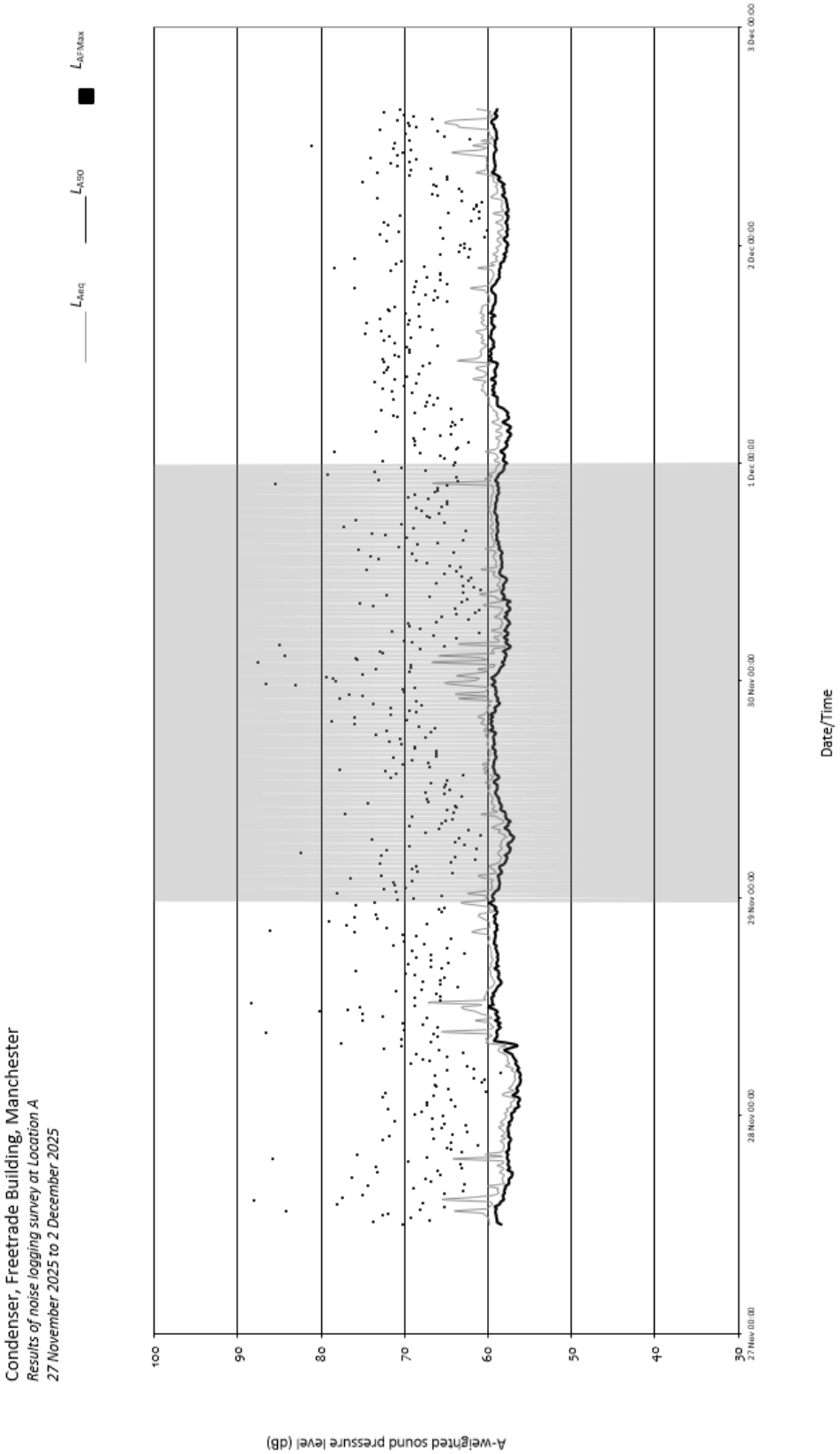
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 1°C at night and 14°C during the day. The windspeed was generally below 5 m/s, with periods where gusts reached up to 11 m/s. A review of the data indicates no significant change in noise levels occurred during this period.

During the attended noise measurements, the weather was generally clear and dry and no rain occurred.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location A


Condenser, Freetrade Building, Manchester
Results of noise logging survey at Location A
27 November 2025 to 2 December 2025
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
100
90
80
70
60
50
40
30
27 Nov 00:00
28 Nov 00:00
29 Nov 00:00
30 Nov 00:00
1 Dec 00:00
2 Dec 00:00
3 Dec 00:00
Date/Time

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.

Appendix D

Plant noise egress calculations

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Project number	026824	**Project name**	Freetrade Manchester
Calculation revision	A		
Calculation by	GM	**Date created**	09/12/2025
Checked by	MH	**Date checked**	10/12/2025
Calculation description	Forty-Seven Hotel - Night time criteria		

Comments	**Octave band centre frequency (Hz)**								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
Condenser									
Sound pressure level at 1m	53	52	49	47	44	40	34	27	49
Additional source directivity; Q = 2	3	3	3	3	3	3	3	3	
Total sound pressure level at 1m	56	55	52	50	47	43	37	30	52
Losses									
Distance attenuation - Point source, r=26m	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	
Total losses	*28*	*28*	*28*	*28*	*28*	*28*	*28*	*28*	
Sound pressure level after losses	28	27	24	22	19	15	9	2	24
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	31	30	27	25	22	18	12	5	27
Criteria									
Criteria									54
Difference									-27

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Project number	026824	**Project name**	Freetrade Manchester
Calculation revision	A		
Calculation by	GM	**Date created**	09/12/2025
Checked by	MH	**Date checked**	10/12/2025
Calculation description	Radisson Hotel receptor - Night time limits		

Comments	**Octave band centre frequency (Hz)**								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
Condenser									
Sound pressure level at 1m	53	52	49	47	44	40	34	27	49
Additional source directivity; Q = 2	3	3	3	3	3	3	3	3	
Total sound pressure level at 1m	56	55	52	50	47	43	37	30	52
Losses									
Distance attenuation - Point source, r=57m	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	
Total losses	*35*	*35*	*35*	*35*	*35*	*35*	*35*	*35*	
Sound pressure level after losses	21	20	17	15	12	8	2	-5	17
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	24	23	20	18	15	11	5	-2	20
Criteria									
Criteria									54
Difference									-34

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Project number	026824	**Project name**	Freetrade Manchester
Calculation revision	A		
Calculation by	GM	**Date created**	09/12/2025
Checked by	MH	**Date checked**	10/12/2025
Calculation description	Commercial premises to the north - Daytime limits		

Comments	**Octave band centre frequency (Hz)**								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
Condenser									
Sound pressure level at 1m	53	52	49	47	44	40	34	27	49
Additional source directivity; Q = 2	3	3	3	3	3	3	3	3	
Total sound pressure level at 1m	56	55	52	50	47	43	37	30	52
Losses									
Distance attenuation - Point source, r=8m	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	
Total losses	*18*	*18*	*18*	*18*	*18*	*18*	*18*	*18*	
Sound pressure level after losses	38	37	34	32	29	25	19	12	34
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	41	40	37	35	32	28	22	15	37
Criteria									
Criteria									55
Difference									-18

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Project number	026824	**Project name**	Freetrade Manchester
Calculation revision	A		
Calculation by	GM	**Date created**	09/12/2025
Checked by	MH	**Date checked**	10/12/2025
Calculation description	Commercial premises to the west - Daytime limits		

Comments	**Octave band centre frequency (Hz)**								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**dBA**
Condenser									
Sound pressure level at 1m	53	52	49	47	44	40	34	27	49
Additional source directivity; Q = 2	3	3	3	3	3	3	3	3	
Total sound pressure level at 1m	56	55	52	50	47	43	37	30	52
Losses									
Distance attenuation - Point source, r=12m	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	
Total losses	*22*	*22*	*22*	*22*	*22*	*22*	*22*	*22*	
Sound pressure level after losses	34	33	30	28	25	21	15	8	31
Facade correction	3	3	3	3	3	3	3	3	
Total facade sound pressure level at receptor	37	36	33	31	28	24	18	11	34
Criteria									
Criteria									55
Difference									-21