

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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LBG, 11 Portland Street, Manchester

Acoustic planning report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Version	Date	Comments	Author	Reviewer
A	6 Sep 23		Kane Mitchell	Mark Howarth
B	18 Sep 23	Typo in summary of plant items – assessment unchanged	Daniel Shaw	Mark Howarth

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Summary

Sandy Brown has been commissioned by HLN Limited to provide acoustic advice in relation to the proposed development at 11 Portland Street, Manchester.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was carried out between 12:30 on 1 June 2023 and 11:45 on 6 June 2023.

The representative background sound levels measured during the survey were:

- $L_{A90,5min}$ 52 dB during the daytime,
- $L_{A90,5min}$ 48 dB during the night.

Based on MCC guidance, using the method outlined in BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*, 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:

- $L_{Aeq,15min}$ 50 dB during the daytime,
- $L_{Aeq,15min}$ 46 dB during the night.

These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

The above 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.

An assessment of plant noise egress has been undertaken. The limits are expected to be met during the daytime, with a setback in operations expected to achieve the night-time limits.

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1 Introduction

Sandy Brown has been commissioned by HLN Limited to provide acoustic advice in relation to the proposed fit out of 11 Portland Street, Manchester.

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, to set appropriate limits for noise egress from building services plant and to inform the acoustic design of the building envelope.

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

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is shown in Figure 1. 11 Portland Street is highlighted in red. It is bordered by Portland Street to the north-west, Aytoun Street to the north-east, Major Street to the south-east and Minshull Street to the south-west.

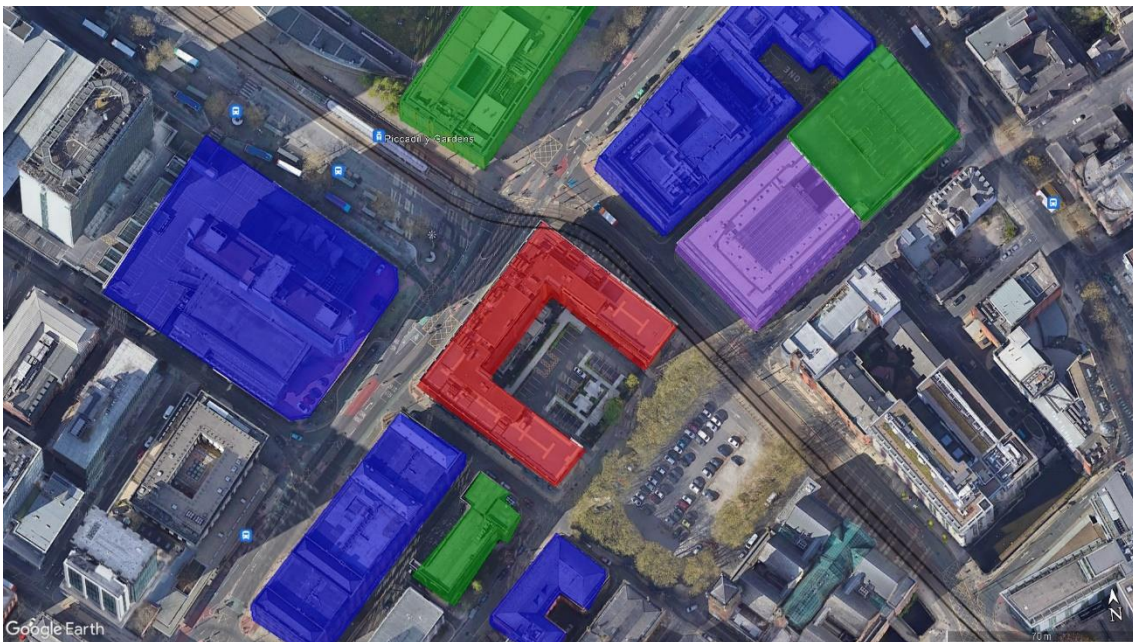


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

Commercial premises are shown in green in Figure 1. 4 Minshull Street is located to the south and 1 Piccadilly is located to the north.

The premises highlighted in blue are mixed use commercial and hotel premises.

Residential premises are highlighted in purple.

3 Development proposals

The works proposed include the light-touch refurbishment of Level 3 and Level 4, and a full Cat-B refurbishment of Level 5 and Level 6.

The facade will remain as per the existing and will be refurbished where necessary.

The proposed spaces include meeting rooms, cellular offices, learning rooms, fitness suite, contemplation / sensory rooms and open plan work areas.

New external condensers are proposed on the roof within individual acoustic enclosures. Details of these are provided below.

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) in Planning and Noise Technical Guidance October 2022 states the following for fixed plant/equipment:

‘The noise assessment should be based on BS 4142, and any application for fixed plant, equipment or machinery must demonstrate that:

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.’

5 Noise survey method

The survey included unattended and attended noise measurements.

5.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 5 days.

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

The unattended measurements were taken over 15 minute periods between 12:30 on 1 June 2023 and 11:45 on 6 June 2023.

The measurement position used during the survey is indicated in Figure 4, denoted by the letter ‘L’. Photographs showing the measurement location are provided in Figure 2 and Figure 3. This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises. The measurement position had direct line of sight to Portland Street and Aytoun Street.

The microphone was located at least 2 m from the rooftop, approximately 30 m above the road and at least 3 m from any other reflective surface.



Figure 2 Rooftop measurement position



Figure 3 Rooftop measurement position, the junction of Portland Street and Aytoun Street is visible

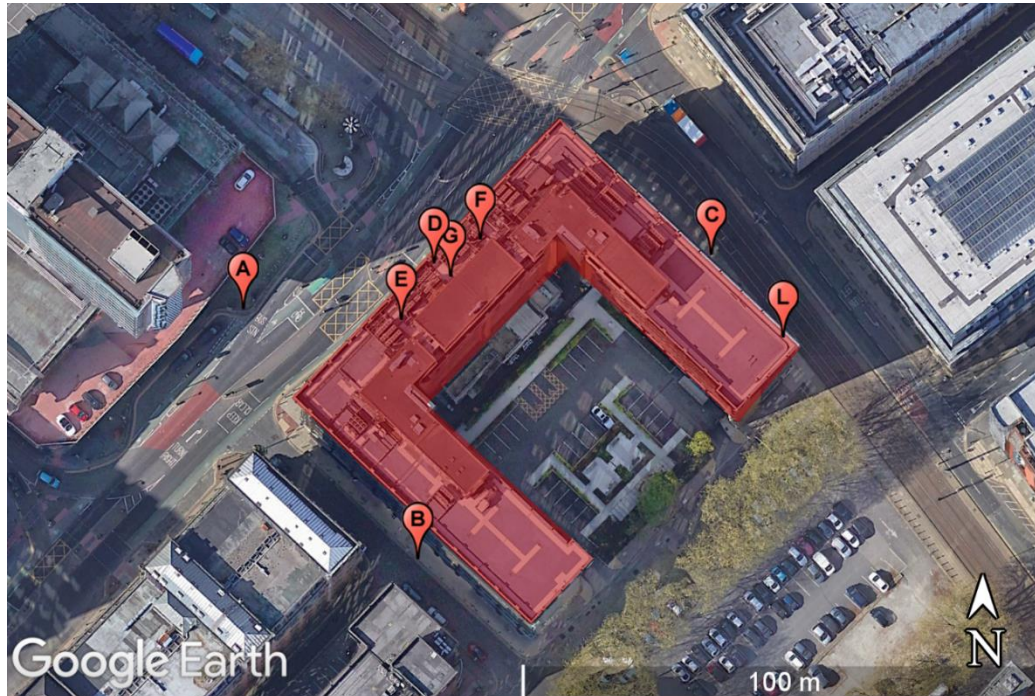


Figure 4 Measurement locations (courtesy of Google Earth Pro)

5.2 Attended measurements

Attended sample measurements were taken at 3 locations at street level around the site. These are indicated in Figure 4 as positions A to C. The measurements were carried out on 6 June 2023, over 15 minute periods, synchronised with the unattended measurements.

At each position the microphone was mounted on a tripod approximately 1.2 m above the ground level and at least 3 m from any other 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.

Additional attended measurements of noise from existing rooftop plant items were taken at 4 locations around the plant deck of 11 Portland Street. These are indicated as positions D-G in Figure 4. The measurements were carried out on 6 June 2023, over 1 minute periods.

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 Aytoun Street and Portland Street.

Less significant noise sources included road traffic elsewhere and the existing rooftop plant items, which is located approximately 30 m away from the unattended measurement position.

6.2 Noise measurement results

6.2.1 Unattended measurement results

Ambient noise levels measured during the unattended survey are presented in Table 1. These measurements are free-field measurements.

Table 1 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Thu 1 June 2023	61 ^[1]	57
Fri 2 June 2023	60	57
Sat 3 June 2023	59	56
Sun 4 June 2023	59	55
Mon 5 June 2023	60	55
Tue 6 June 2023	62 ^[1]	-
Average	60	56

^[1] Measurement not made over full period due to monitoring start and end time (the measurement on 1 June 23 was over 10 hours, and on 6 June 23 over 4 hours); not included in the average.

Daytime and night-time statistical analysis of representative background sound levels for the site are given in Figure 5.

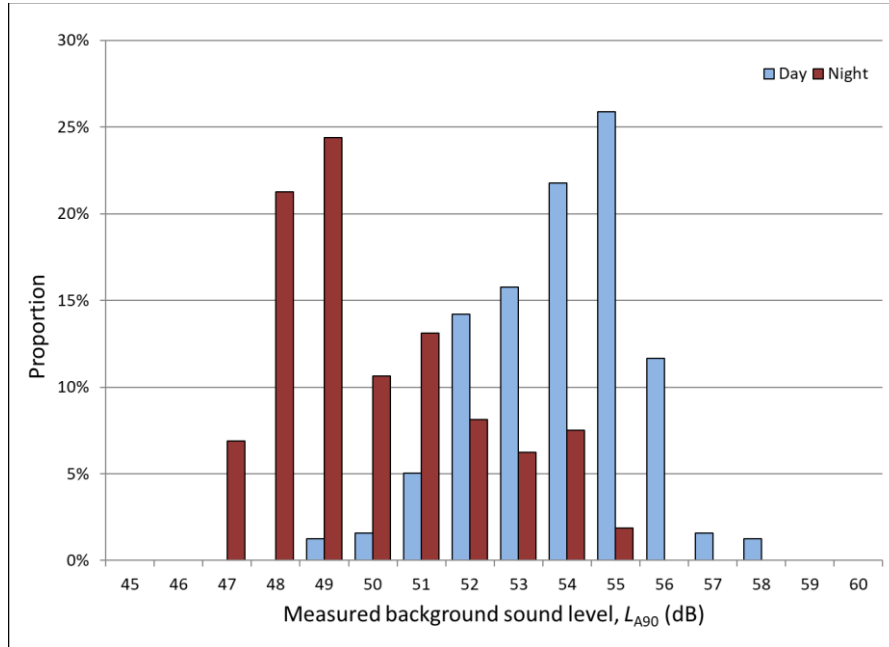


Figure 5 Daytime and night-time background sound levels at location 'L'

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 52 dB during the daytime and $L_{A90,15min}$ 48 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 measurements were free-field measurements, except for measurement G, which was a source measurement 1 m from a louvre at the facade and at least 3 m from any other reflective surface.

Table 2 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		L_{Aeq}	L_{AFmax}	L_{A90}	
A – Portland Street	10:00	$L_{Aeq,15min}$ 70	$L_{AFmax,15min}$ 83	$L_{A90,15min}$ 64	Road traffic on Portland St, including buses idling near to measurement position. Trams going between Piccadilly Gardens and Aytoun St. Some pedestrian noise. One ambulance siren during the second measurement
	10:15	$L_{Aeq,15min}$ 70	$L_{AFmax,15min}$ 93	$L_{A90,15min}$ 62	
B – Minshull Street	10:30	$L_{Aeq,15min}$ 66	$L_{AFmax,15min}$ 79	$L_{A90,15min}$ 59	Road traffic on Minshull St and Portland St. Some pedestrian noise. One ambulance siren pass on Portland St during each measurement.
	11:00	$L_{Aeq,15min}$ 68	$L_{AFmax,15min}$ 91	$L_{A90,15min}$ 59	
C – Aytoun Street	11:15	$L_{Aeq,15min}$ 68	$L_{AFmax,15min}$ 84	$L_{A90,15min}$ 56	Road traffic and trams on Aytoun St and Portland St. Trams travelling away from Piccadilly Gardens pass over part of the track which causes a loud, low frequency rumble.
	11:30	$L_{Aeq,15min}$ 68	$L_{AFmax,15min}$ 85	$L_{A90,15min}$ 58	
D	12:17	$L_{Aeq,1min}$ 64	$L_{AFmax,1min}$ 65	$L_{A90,1min}$ 64	Measurement amongst existing rooftop plant items. Dominated by the louvre at facade (see position G). Road traffic noise from Portland St was well screened and barely audible.
	12:18	$L_{Aeq,1min}$ 65	$L_{AFmax,1min}$ 66	$L_{A90,1min}$ 64	
E	12:20	$L_{Aeq,1min}$ 69	$L_{AFmax,1min}$ 70	$L_{A90,1min}$ 68	

Position	Start time	Sound pressure levels (dB)			Noise sources
		L_{Aeq}	L_{AFmax}	L_{A90}	
F	12:21	$L_{Aeq,1min}$ 68	$L_{AFmax,1min}$ 70	$L_{A90,1min}$ 68	Measurement amongst existing rooftop plant items. One plant item dominated the noise level.
	12:25	$L_{Aeq,1min}$ 58	$L_{AFmax,1min}$ 63	$L_{A90,1min}$ 57	Measurement amongst existing rooftop plant items..
	12:26	$L_{Aeq,1min}$ 58	$L_{AFmax,1min}$ 67	$L_{A90,1min}$ 58	
	12:28	$L_{Aeq,1min}$ 70	$L_{AFmax,1min}$ 71	$L_{A90,1min}$ 70	Measurement 1 m from the louvre at the facade.
G	12:29	$L_{Aeq,1min}$ 70	$L_{AFmax,1min}$ 71	$L_{A90,1min}$ 70	

6.3 Plant noise egress 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 background 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 as stated on Table 3.

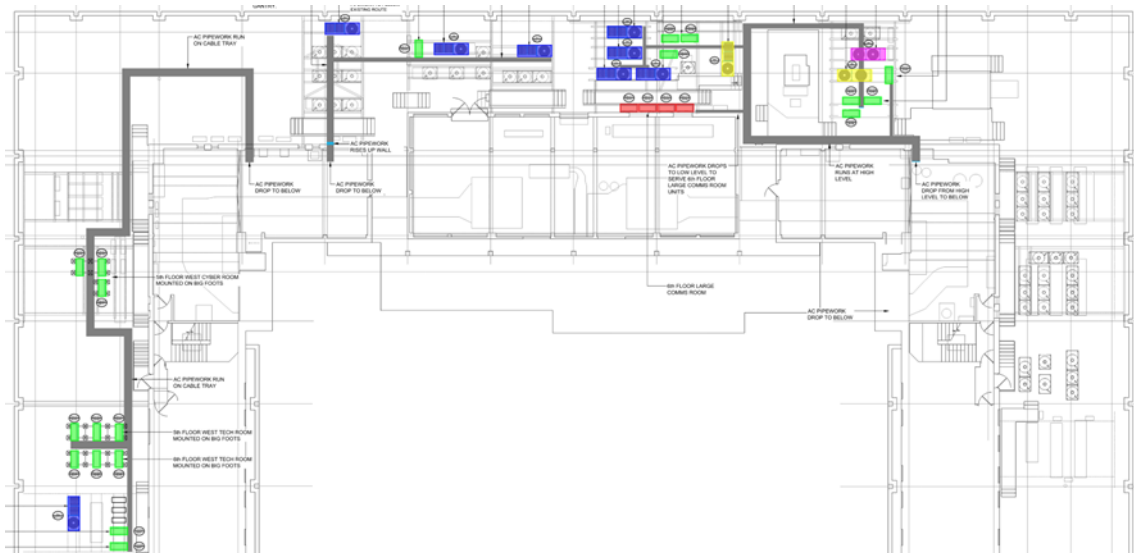
Table 3 Plant noise limits at 1 m from nearest noise sensitive premises

Time of the day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Daytime (07:00-23:00)	50
Night-time (23:00-07:00)	46

^[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.

7.1 Proposed items of plant

- Daikin RZAG100NV1 condensers highlighted in green - L_{Aeq} 50 dB at 1 m
- Daikin RZAG125NV1 condensers highlighted in red - L_{Aeq} 52 dB at 1 m
- Daikin REYA8A+REYA10A condenser units highlighted in purple - L_{WA} 83 dB
- Daikin REYA12A+REYA14A condenser units highlighted in yellow - L_{WA} 86 dB
- Daikin REYA12A+REYA16A condenser units highlighted in blue - L_{WA} 88 dB.



All Daikin REY units are to have individual dedicated acoustic enclosures, comprising 300 mm acoustic louvres to the coil faces and a barrier to the other faces, which includes an absorbent inner face. Sound reduction indices for each item are provided below for reference, with the entire enclosure specified to provide a minimum overall reduction of 9 dBA.

Table 4 Summary of acoustic enclosure performances

Enclosure element	Sound reduction index (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
300 mm Allaway acoustic louvre	5	6	8	11	18	25	20	16
Allaway acoustic enclosure panel	16	20	24	35	44	51	53	46

7.2 Assessment

The nearest overlooking noise sensitive receptor is the Mercure Hotel 30 m to the west, which overlooks the rooftop. The Britannia Hotel is located 12 m to the south but is screened from the rooftop.

The plant items are not expected to be tonal or exhibit any other attention-catching features at the receptors, and so those penalties have not been applied.

Taking into account attenuation with distance, reflections from the receptor facade, and the minimum performance of the acoustic enclosures, noise levels at the Mercure hotel are predicted to be L_{Aeq} 50 dB, which meets the daytime limits.

The Daikin REY VRV units will not operate during the night (23:00 - 07:00). The predicted noise level at the Mercure Hotel during the night is L_{Aeq} 41 dB, which meets the night-time limits.

8 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 52 dB during the day, and $L_{A90,15min}$ 48 dB during the night.

Based on the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are L_{Aeq} 50 dB during the day, and L_{Aeq} 46 dB during the night. These have been corrected relative to the measured free-field background 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. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied.

An initial assessment of the proposed plant items associated with the development has been carried out. As long as the recommended mitigation measures and night-time setback are incorporated within the design, the proposed plant items are expected to comply with the relevant noise limits.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-52 sound level meter.

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-52/00932326	Rion	21 Mar 25	TCRT23/1250
Microphone	UC-59/05549	Rion	21 Mar 25	TCRT23/1250
Pre-amp	NH-25/32354	Rion	21 Mar 25	TCRT23/1250
Calibrator	NC-74/34125432	Rion	21 Mar 25	TCRT23/1248
Sound level meter	NL-52/01143564	Rion	15 Dec 24	TCRT22/1766
Microphone	UC-59/10153	Rion	15 Dec 24	TCRT22/1766
Pre-amp	NH-25/43581	Rion	15 Dec 24	TCRT22/1766
Calibrator	NC-74/34257023	Rion	15 Dec 24	TCRT22/1765

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 BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Weather conditions

During the attended noise measurements, the weather was generally clear and dry and no rain occurred. Wind speeds did not exceed 5 m/s.

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 6°C at night and 21°C during the day, and the wind speed was less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location L

LBG, 11 Portland Street, Manchester
Results of noise logging survey
1 June 2023 to 6 June 2023

