

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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17 Quay Street, Manchester

Environmental noise survey report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Summary

Sandy Brown has been appointed to provide acoustic design advice in relation to the proposed Cat-A refurbishment of 17 Quay Street, including the installation of new HVAC systems at 17 Quay Street in 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 10:45 on 20 July 2022 and 12:15 on 25 July 2022.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 57 dB during the daytime and $L_{A90,15min}$ 49 dB at night.

Based on the requirements of the Manchester City Council, the relevant plant noise limits at the worst affected existing noise sensitive premises are L_{Aeq} 52 dB during the day, and L_{Aeq} 44 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.

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1 Introduction

Sandy Brown has been appointed to provide acoustic design advice in relation to the proposed Cat-A refurbishment of 17 Quay Street, including the installation of new HVAC systems at 17 Quay Street in 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 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.

2 Site description

2.1 The site and its surroundings

The site location (shown in red) in relation to its surroundings is shown in Figure 1.

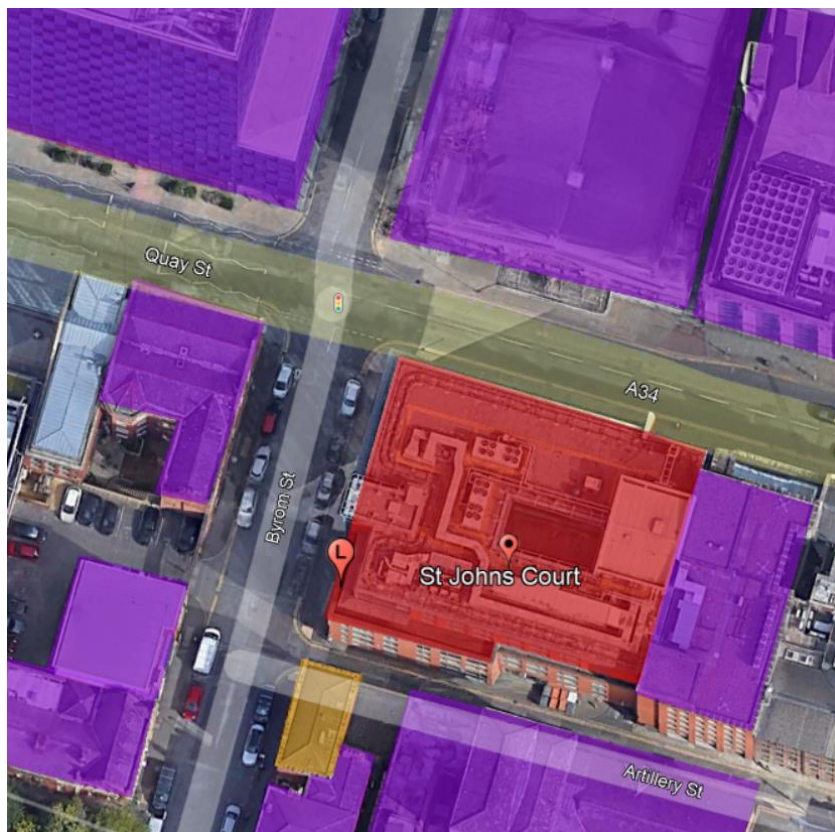


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The site is surrounded to the south by residential premises (Artillery House) and a number of commercial premises including David Royden Lawyer and Inner Space Meditation Centre. To the east of the site there are commercial premises including the Handelsbanken building. To the west of the site there are commercial premises including SkinViva Clinic and Pay Justice Limited and to the north of the site there is the Manchester Opera House and other commercial premises to the left and right of it.

Commercial premises are shown in Figure 1 highlighted in purple, and residential premises are highlighted in orange.

3 Building services noise egress criteria

3.1 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 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.

3.2 Local authority criteria

Manchester City Council provides guidance in relation to plant noise emissions in MCC Noise and planning guidance/Section 3.7.1.5, and states the following in relation to plant noise egress:

'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.'

4 Noise survey method

This survey included unattended noise measurements.

4.1 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 at position L were taken over 15 minute periods between 10:45 on 20 July 2022 and 12:00 on 25 July 2022.

The unattended measurement position 'L' used during the survey is shown in Figure 1 relative to the site surroundings and in Figure 2 with an approximate indication of its location on Level 4. The location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

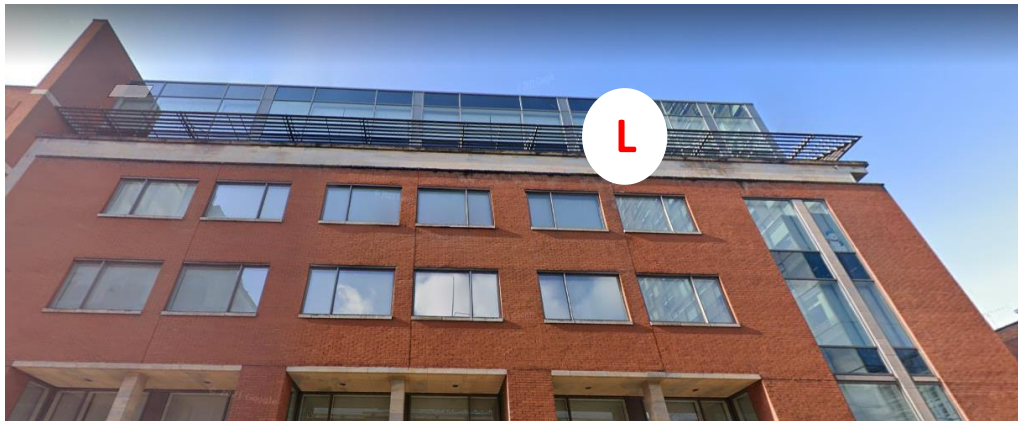


Figure 2 Measurement location 'L' (courtesy of Google Maps)

4.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

5 Noise survey results

5.1 Observations

The dominant noise sources observed at the site during the survey were from road traffic, predominantly from Quay Street, and Byrom Street.

Less significant noise sources included pedestrians and distant construction noise.

5.1.1 Unattended measurement results

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

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 1.

The unattended measurements were façade measurements.

Table 1 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 - 23:00)	Night (23:00 - 07:00)
	$L_{Aeq, 16 \text{ hour}}$ (dB)	$L_{Aeq, 8 \text{ hour}}$ (dB)
Wednesday 20 July 2022	-	63
Thursday 21 July 2022	64	63
Friday 22 July 2022	65	64
Saturday 23 July 2022	64	66
Sunday 24 July 2022	63	62
Average	64	64

Daytime and night time statistical analysis of representative values for the site are given in Figure 3 and Figure 4.

17 Quay Street
Statistical analysis of day time background sound level at position 'L'
20 July 2022 to 25 July 2022
Daytime period (07:00 to 23:00)

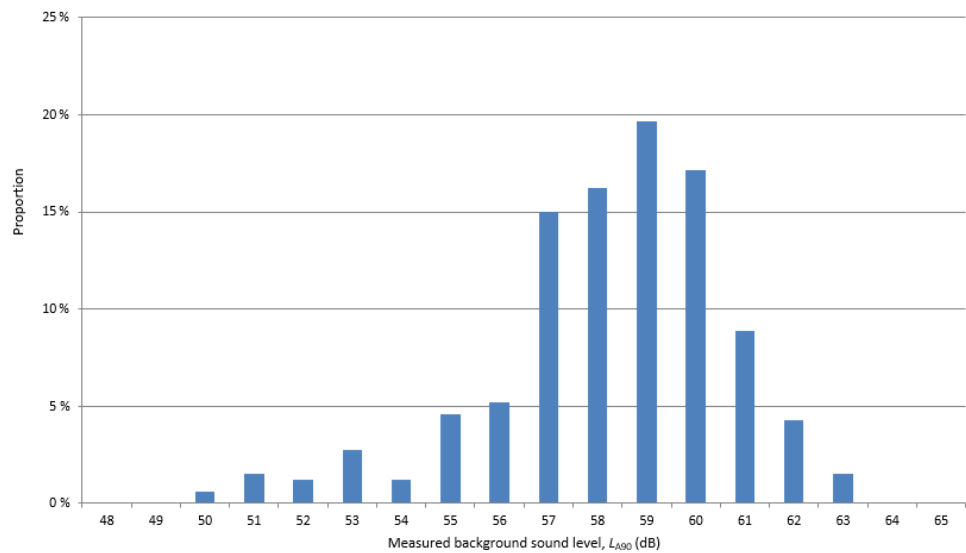


Figure 3 Statistical analysis of daytime background noise levels at position 'L'

17 Quay Street
Statistical analysis of night time background sound level at position 'L'
20 July 2022 to 25 July 2022
Night-time period (23:00 - 07:00)

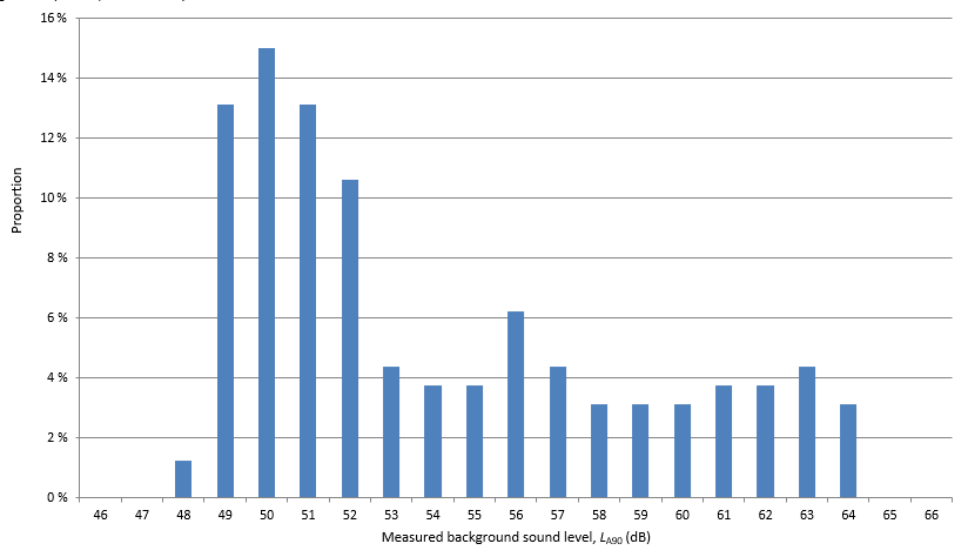


Figure 4 Statistical analysis of night-time background noise levels at position 'L'

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

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 57 dB during the daytime and $L_{A90,15min}$ 49 dB at night.

5.2 Basic limits

Based on the criteria set out in this report and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 2.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as façade levels. These limits have been set to be 5 dB below the typical background noise levels outside the nearest sensitive receptor in line with the requirements of Manchester City Council.

Table 2 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)
Daytime (07:00-23:00)	52
Night-time (23:00-07:00)	44

The limits set out in Table 2 do not include any attention catching features. The 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.

5.3 Plant noise assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, limited information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

6 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 57 dB during the day, and $L_{A90,15min}$ 49 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} 52 dB during the day, and L_{Aeq} 44 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, 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.

Appendix A

Survey details

Equipment

The unattended noise measurements were taken using a Rion NL52 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-52/01143564	Rion	15 Dec 22	TCRT20/1738
Microphone	UC-59/10153	Rion	15 Dec 22	TCRT20/1738
Pre-amp	NH-25/43581	Rion	15 Dec 22	TCRT20/1738
Calibrator	NC-74/34257023	Rion	14 Dec 22	TCRT20/1736

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 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.

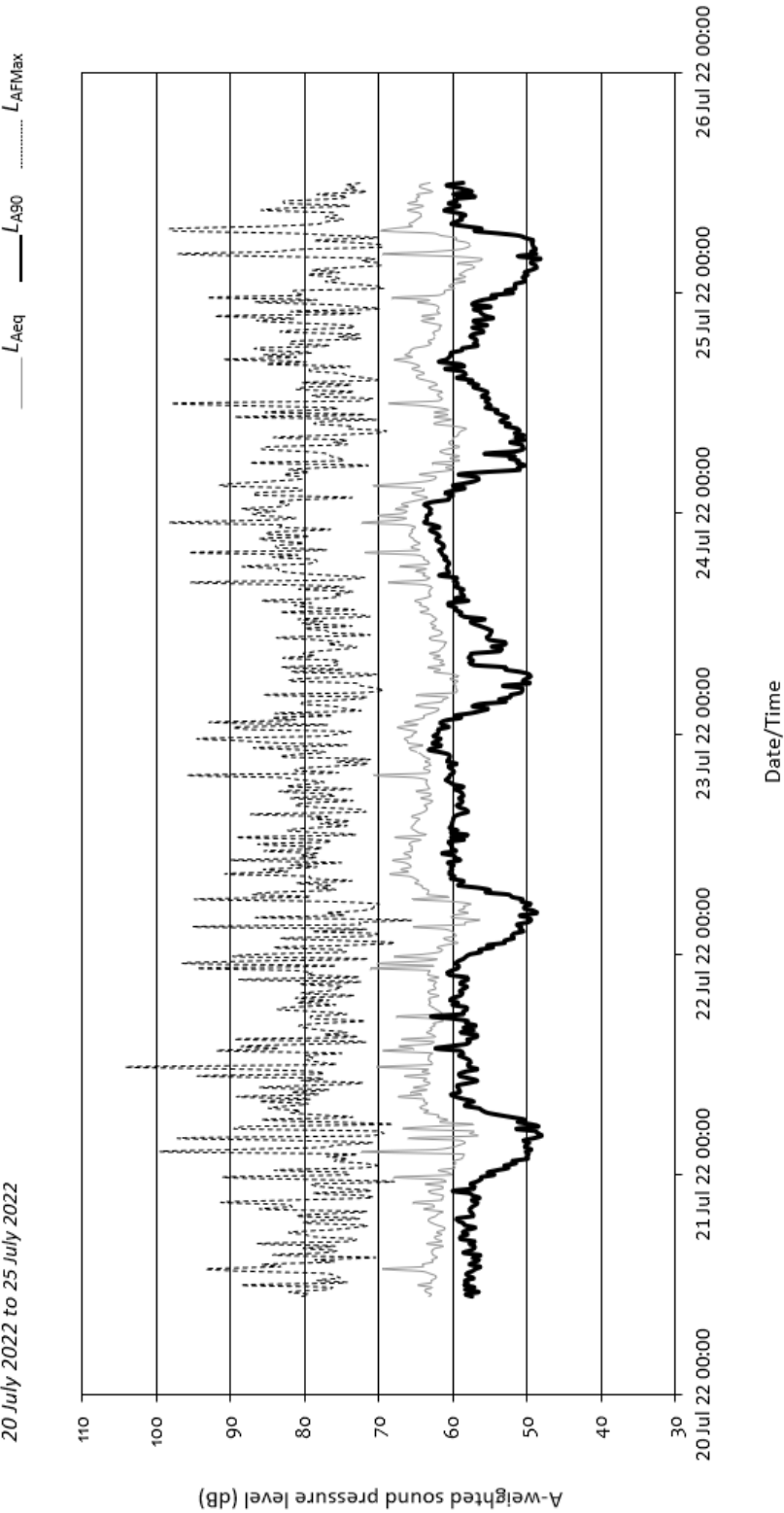
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 13°C at night and 19°C during the day, and the wind speed was less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurement at Location 'L'

17 Quay Street
Results of noise logging survey at 17 Quay Street
20 July 2022 to 25 July 2022



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.