

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

22072-R02-A

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34-36 King Street

Plant noise egress measurement and assessment

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Summary

Sandy Brown has been commissioned to carry out an installed plant noise egress assessment in order to discharge Planning Condition 3 for the development at 34-36 King Street, Manchester, M2 6AZ.

Noise measurements of the installed plant items have been carried out for a typical daytime operation mode. An assessment of plant noise egress to the nearby noise sensitive receptors has been carried out.

The predicted plant noise egress levels meet the plant noise egress limits at all nearby noise sensitive receptors, therefore Planning Condition 3 can be discharged.

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1 Introduction

Sandy Brown has been commissioned to carry out an installed plant noise egress assessment in order to discharge Planning Condition 3 for the development at 34-36 King Street, Manchester, M2 6AZ.

Noise measurements of the installed plant items have been carried out for a typical daytime operation mode. An assessment of plant noise egress to the nearby noise sensitive receptors has been carried out in accordance with the plant noise egress limits as set out in Sandy Brown report 22072-R01-E *Noise survey and plant noise egress assessment* dated 6 June 2022 to meet Planning Condition 3 set by Manchester City Council.

This report provides details of the noise survey, including measurement results and the plant noise egress assessment.

1 Site description

1.1 The site and its surrounding

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



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

1.2 Adjacent premises

The site is adjacent to 30 King Street to the west (highlighted in yellow in Figure 1) and 40-42 King Street to the east (highlighted in blue in Figure 1). Both premises are mixed commercial and offices.

The site is also close to 19-23 King Street (commercial – highlighted in orange in Figure 1) and 25 King Street (commercial – highlighted in cyan in Figure 1) to the North, and Dalton Place (offices – highlighted in green in Figure 1) to the South

2 Assessment criteria

2.1 Planning Condition 3

The wording for Planning Condition 3 is set out below as received:

“a) Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with the recommendations in the Noise survey and plant noise egress assessment prepared by Sandy Brown referenced 22072-R01-E dated 6 June 2022 received by the City Council as Local Planning Authority on 10 June 2022. The measures shall be implemented in full prior to first use of the development.

b) Prior to first use of the equipment, a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.”

2.2 Plant noise egress criteria

The plant noise egress limits for the development have been taken from Sandy Brown Report 22072-R01-E *Noise survey and plant noise egress assessment* dated 6 June 2022. These have been reproduced in Table 1.

Table 1 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)	44
Night-time (23:00-07:00)	40
Office-hours (08:00-18:00 Monday to Friday)	46

[1] The limits set out in Table 1 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.

2.2.1 Attention catching features

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.

3 Survey

3.1 Measurement method

Attended sample measurements were taken on the rooftop plant deck at 34-36 King Street.

These were taken at two locations, 1 m away from plant items operating at design duty. Background measurements were also carried out with the plant switched off.

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

3.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

3.3 Plant noise measurements

The results of the plant noise measurements are detailed in Table 2.

Table 2 Plant noise measurement results

Measurement ref	Plant item/Background noise level	Sound pressure level measured, $L_{Aeq,1min}$ (dB)	Notes
1	2 x PUZ-M100VKA 2 x SUZ-M35VA	54	1 m away from condenser stacks, dominated by condensers
2	Background	51	Same position as measurement 1, plant switched off
3	1 x PUZ-M100VKA 1 x SUZ-M35VA	54	1 m away from condenser stack, dominated by condensers
4	Background	52	Same position as measurement 3, plant switched off

4 Plant noise egress assessment

4.1 Plant items and locations

Mitsubishi condensers were mounted on the rooftop plant deck. These were 3 x Mitsubishi PUZ-M100VKA and 3 x Mitsubishi SUZ-M35VA.

A photograph of the rooftop plant deck is provided in Figure 2.



Figure 2 Photograph of the rooftop plant deck including externally mounted plant items

4.2 Assessment

Assessment of the plant noise egress has been carried out to the 5 nearest noise sensitive premises as identified in the initial noise survey and plant noise egress assessment.

The assessment is based on the measured plant noise levels set out in Table 2, and includes distance attenuation and partial screening from the building parapet where applicable to the nearest noise sensitive premise.

The results of the assessment are set out in Table 3.

Table 3 Predicted noise level at noise sensitive premises

Noise sensitive premises	Predicted noise level, L_{Aeq} (dB)
40-42 King Street	37
Dalton Place	30
19-23 King Street	27
25 King Street	27
30 King Street	33

The predicted noise levels at all nearest noise sensitive premises are expected to meet the plant noise limits outlined in Table 1.

Therefore, Planning Condition 3 set by Manchester City Council can be discharged.

4.2.1 Attention catching characteristics

Regarding intermittence, the specific sound level of each plant was measured to be at least 5 dB below the representative background sound level, and as such any intermittency is not expected to be readily distinctive against the residual acoustic environment. Therefore, no corrections for intermittency are considered to be appropriate. Additionally, no intermittent characteristics were noted during the site visit.

Regarding tonality, an analysis of third-octave band measurements has been undertaken in line with BS 4142, as well as observations made on site. No tonal characteristics were identified through either method.

In summary, no attention catching features were noted, therefore no corrections are required.

Appendix A

Survey details

Equipment

Attended noise measurements were taken using a Brüel & Kjær 2250 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
2250 (F)				
Sound level meter	2250/3011964	Brüel & Kjær	8 Sep 23	UCRT21/2089, UCRT21/2090
Microphone	4189/3100176	Brüel & Kjær	8 Sep 23	UCRT21/2089, UCRT21/2090
Pre-amp	ZC0032/26376	Brüel & Kjær	8 Sep 23	UCRT21/2089, UCRT21/2090
Calibrator	4231/3019123	Brüel & Kjær	8 Sep 23	UCRT21/2086

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.

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.

The reported temperature during the survey was 18°C.

These weather conditions are considered suitable for obtaining representative measurements.