

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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No.3 Circle Square, Manchester

Acoustic planning report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

Sandy Brown Ltd

Registered in England & Wales

No. 13227735

post@sandybrown.com

www.sandybrown.com

Registered Office: 55 Charterhouse Street, London EC1M 6HA

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Version	Date	Comments	Author	Reviewer
A	5 Apr 22		Christian Clark	James Atha
B	16 Jun 22	Updates following comments from Deloitte	Christian Clark	James Atha

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Summary

Sandy Brown has been commissioned by Bruntwood Scitech to provide acoustic advice in relation to the proposed development at No.3 Circle Square 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 13:00 on 21 March 2022 and 15:15 on 23 March 2022. The survey results have been used to set appropriate limits for atmospheric noise emissions from building services plant, operational noise and amplified sound in line with the requirements of Manchester City Council.

The average measured ambient noise levels at the unattended measurement position were $L_{Aeq,15min}$ 65 dB during the day and $L_{Aeq,15min}$ 61 during the night. The sample measurements around the site boundary ranged between $L_{Aeq,15min}$ 63-73 dB during the daytime. The representative measured free-field background sound levels measured during the survey were $L_{A90,15min}$ 61 dB during the daytime and $L_{A90,15min}$ 51 dB at night.

The noise data collected has been used to determine the following plant noise limits which are applicable at the facade of the nearby noise sensitive receptors.

- L_{Aeq} 54 dB during the daytime at 1 m from the facade of Vita Students, Princess House, Premier Inn, Manchester Institute of Biotechnology and Manchester Technology Centre
- L_{Aeq} 51 dB during the night at 1 m from the facade of Vita Students, Princess House and Premier Inn.

These limits include a 3 dB correction for facade reflections applied to the background noise level. This correction is also be applicable to noise associated the plant, ensuring that the overall plant noise level is 5 dB below the background noise level outside the facade.

These limits are cumulative for all normally operating plant associated with the scheme. Corrections for any attenuation catching characteristics will need to be considered as the design progresses.

Criteria for operational noise associated with use of the terrace spaces have been suggested. It is considered that an external noise limit of $L_{Aeq,1hr}$ 55 dB between 07:00 – 23:00 hrs would be appropriate outside nearby noise sensitive receptors due to people speaking on the terraces. The predicted worst-case levels meet this outside the nearest commercial receptors and are significantly below this outside the nearest residential premises. Manchester City Council does not normally support use of external terraces after 11pm or amplified sound on external terraces. If this is proposed, further assessment will be required.

Limits to amplified sound egress has been advised in octave bands based on the requirements of Manchester City Council. This will need to be considered further as the design progresses for the screening room, events space and retail units.

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1 Introduction

Sandy Brown has been commissioned by Bruntwood Scitech to provide acoustic advice in relation to the proposed development at No.3 Circle Square, Manchester.

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing sound levels on and around the site to allow appropriate limits for noise egress from the development to be set in line with the requirements of Manchester City Council.

This report presents the survey method and results, and appropriate limits for noise egress from the development.

2 Site description

The Site is bound by Newman Street (formerly Brancaster Road) to the north, Princess Street to the east, Premier Inn and MSCP, and Mancunian Way to the south and Manchester Technology Centre to the West.

The Site is currently surrounded by hoarding and is mostly hardstanding, and has been used as a construction compound for building works around the masterplan area.

The Proposed Development will deliver 26,000 sqm of commercial office space over 15 floors with external roof terraces, and associated ground floor amenity space. The Proposed Development also includes new landscaped area to be known as Symphony Gardens.

2.1 The site and its surroundings

The existing site location in relation to its surroundings is shown in Figure 1. The proposed site boundary is outlined in red.

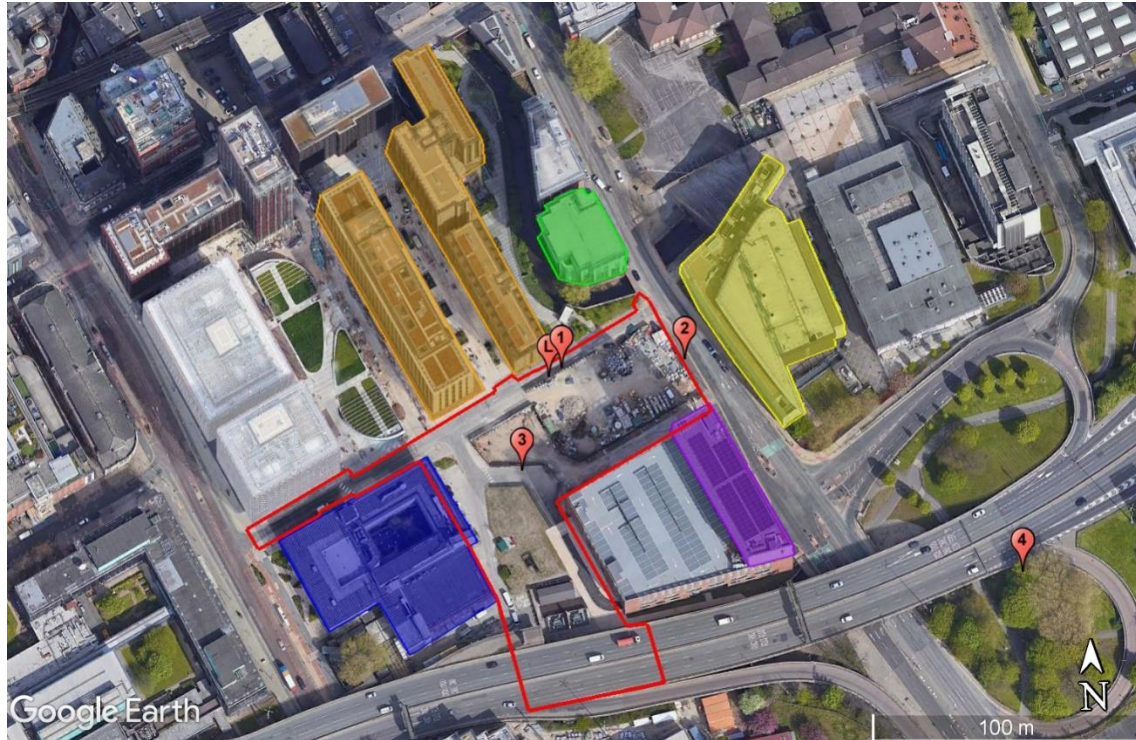


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The site is adjacent to residential premises Vita Students (shown in orange in Figure 1) to the North, Princess House (shown in green in Figure 1) to the North. Directly to the South of the site above a 6 storey carpark is Premier Inn (shown in purple in Figure 1).

Office premises near the site include Manchester Institute of Biotechnology (shown in yellow in Figure 1) and Manchester Technology Centre (shown in blue in Figure 1).

3 Noise survey method

The survey included unattended and attended noise measurements.

3.1 Attended measurements

Attended sample measurements were taken by Christian Clark at 4 locations around the site. These are indicated in Figure 1 as positions 1 to 4. The measurements were carried out on 21 March 2022, over 15 minute periods during the daytime.

At each position the microphone was mounted on a tripod approximately 1.2 m above the ground level and at least 1 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.

3.2 Unattended measurements

Unattended noise monitoring was undertaken at the site over 2 days (in total).

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 13:00 on 21 March 2022 and 15:15 on 23 March 2022. The equipment was installed and collected by James Atha and Christian Clark.

The unattended measurement position used during the survey is indicated in Figure 1, denoted by the position letter 'L'. A photograph from the measurement location is provided in Figure 2. The location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.



Figure 2 Photograph from measurement position 'L'

3.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

4 Noise survey results

4.1 Observations

The dominant noise sources observed at the site during the survey were from road traffic, predominantly from Princess Street and Mancunian Way, and to a lesser degree from Oxford Road. Less significant noise sources included pedestrians on Brancaster Road.

4.2 Noise measurement results

4.2.1 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. Measured minimum background sound levels are given in Table 2. The unattended measurements were free-field.

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)
Monday 21 March 2022	64 ^[1]	61
Tuesday 22 March 2022	65	60
Wednesday 23 March 2022	65 ^[1]	-
Average	65	61

^[1] Measurements not taken over full 16 hour period.

Table 2 Minimum background sound levels measured during the unattended survey

Date	Daytime (07:00 - 23:00)	Night (23:00 - 07:00)
	$L_{A90, 15 \text{ min}}$ (dB)	$L_{A90, 15 \text{ min}}$ (dB)
Monday 21 March 2022	58 ^[1]	49
Tuesday 22 March 2022	59	49
Wednesday 23 March 2022	61 ^[1]	-

^[2] Measurement not made over full period due to monitoring start and end time.

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

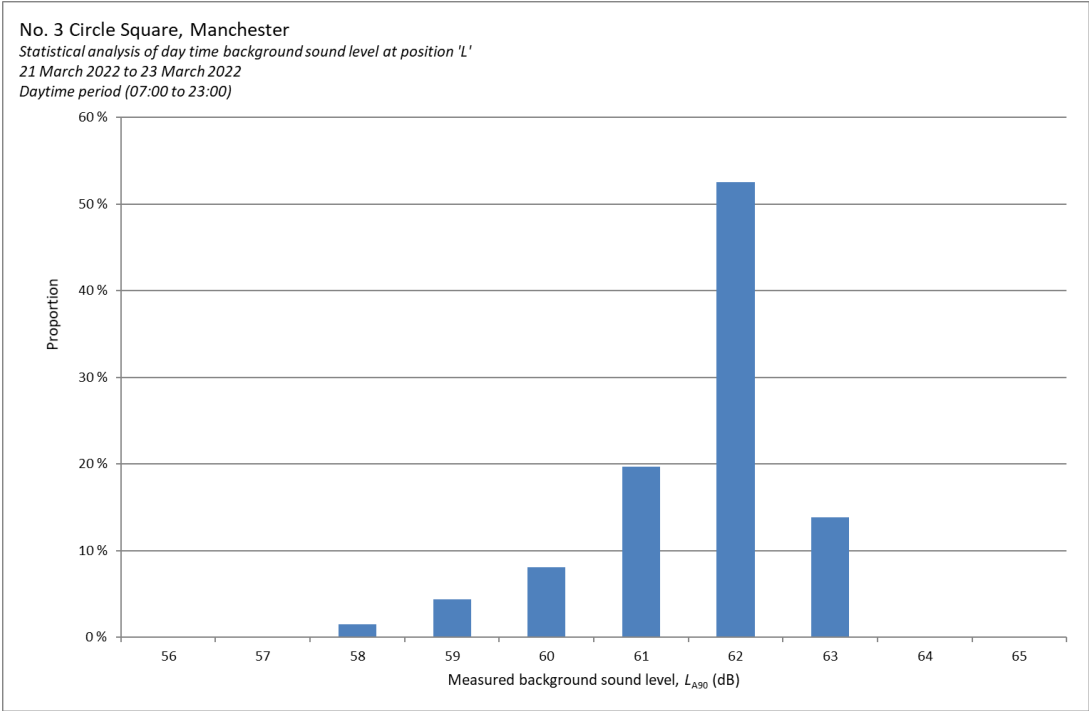


Figure 3 Statistical analysis of day-time background noise levels at position 'L'

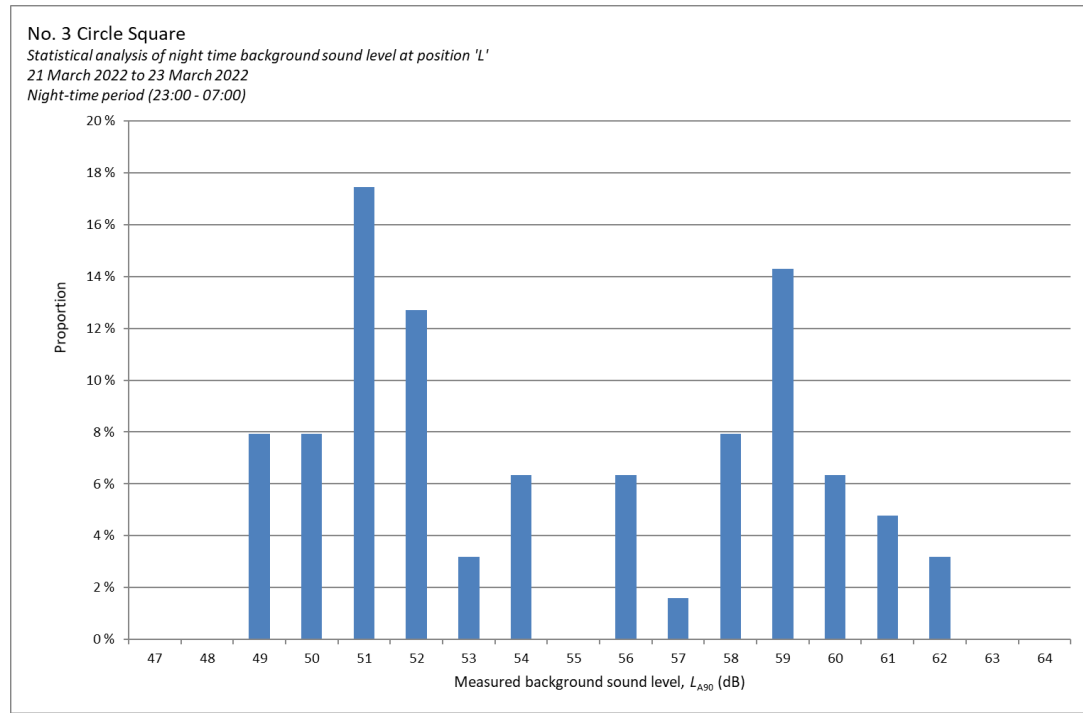


Figure 4 Statistical analysis of day-time background noise levels at position 'L'

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 61 dB during the daytime and $L_{A90,15min}$ 51 dB at night.

4.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 3. Measurements at positions 1 to 3 are facade measurements. Measurements at position 4 are free-field.

Table 3 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{A1,15min}$	$L_{A90,15min}$	
1	12:46	65	74	60	Road traffic from Oxford Road and Princess Street. Pedestrians and occasional road traffic along Brancaster Road
2	13:18	72	79	63	Road traffic on Princess Street
3	13:43	65	71	62	Road traffic from Mancunian Way. Cars leaving and entering carpark
4	14:05	79	84	74	Road traffic from Mancunian Way
2	16:34	73	81	63	Road traffic on Princess Street
1	16:51	63	73	59	Road traffic from Oxford Road and Princess Street. Pedestrians and occasional road traffic along Brancaster Road
4	17:10	78	82	74	Road traffic from Mancunian Way
3	17:29	64	68	62	Road traffic from Mancunian Way. Cars leaving and entering carpark

5 Plant noise egress assessment

5.1 BS 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 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.

5.2 Local authority requirements

Manchester City Council (MCC) provides guidance in relation to plant noise emissions in their *Noise and Planning guidance* document dated May 2022. The following is stipulated:

‘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.’

5.1 Plant noise 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 4.

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 noise levels by the addition of 3 dB to account for reflections from the facade at the receptor. This correction is applicable to both the background noise level and the plant noise, ensuring that the plant noise is limited to be 5 dB below the background noise level outside the facade of the receptor.

In this case these limits would apply at the Manchester Institute of Biotechnology and Manchester Technology Centre during the daytime, and at Vita Students, Princess House and Premier Inn during the day and night-time.

Table 4 Plant noise limits at 1 m from the nearest noise sensitive premises

Noise sensitive receptor	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Vita Students, Princess House, Premier Inn	54	44
Manchester Institute of Biotechnology, Manchester Technology Centre	54	-

The limits set out in Table 4 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.

5.2 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 Operational noise

6.1 External terraces

Two external terraces are proposed at level 14. The exact occupancy rates on the terraces have not been confirmed, but an assumed worst-case of 1 person per square metre has been assumed.

6.1.1 Proposals

The proposed terrace spaces at level; 14 are shown in Figure 5.

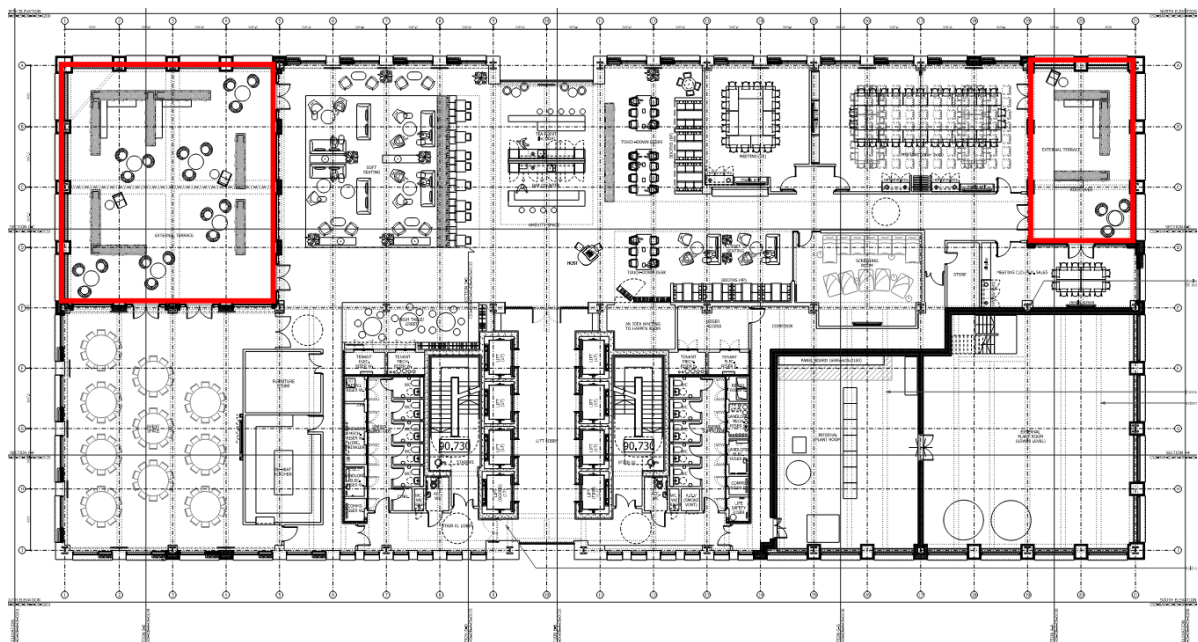


Figure 5 Location of the proposed level 14 terraces

6.1.2 Guidelines on noise egress

MCC do not stipulate any specific criteria in relation to noise egress associated with operational noise from the occupants of external amenity spaces. However the *Noise and Planning Guidance* document dated May 2022 refers to the WHO *Guidelines for Community Noise* 1999.

The guideline values provided in the WHO guidelines for the impact of community noise on residential premises is given in Table 5.

Table 5 WHO guidelines for impact from community noise

Specific environment	Health effect	Noise level
Outdoor living areas	Serious annoyance, daytime and evening	$L_{Aeq,16hr}$ 55 dB
	Moderate annoyance, daytime and evening	$L_{Aeq,16hr}$ 50 dB
Outside bedrooms	Sleep disturbance, window open	$L_{Aeq,8hr}$ 45 dB

The worst affected nearby residential premises to the proposed terraces are the apartments located at Vita Students.

Given that speech noise associated with the rooftop terrace is only likely to occur during peak periods and not for the whole 16 hour time base given during the daytime (07:00 to 23:00), and that the existing ambient noise levels exceed those provided in the WHO guidelines, the health effects are likely to be less severe than those stated. On the basis of the above, it is considered that an external noise level of $L_{Aeq,1hr}$ 55 dB between 07:00 – 20:00 hrs would be appropriate.

Manchester City Council do not typically permit the use of external terraces after 23:00, therefore use after 23:00 may not be possible.

Manchester City Council do not typically permit any external amplified sound on external terraces.

6.1.3 Assessment

Noise modelling has been carried out to determine the potential impact of occupants of the terraces speaking upon the worst affected dwellings. 3D modelling has been carried out to assess the impact of the noise egress.

Noise calculations have been carried out with a total of:

- 200 people on the north west terrace
- 75 people on the north east terrace

The model assumes half of the people are talking simultaneously, of which 20% are talking with raised voices. Normal levels for speech of L_{Aeq} 60 dB at 1 m and raised voices of L_{Aeq} 66 dB at 1 m have been used in the assessment, as defined in ISO 9921.

The predicted operational noise levels to the nearby noise sensitive receptors are shown in Figure 6.

Predicted noise levels with all terraces in use at the nearest residential premises are well within the suggested criteria, with a worst-case level of L_{Aeq} 41 dB. This is also below the existing daytime background noise levels measured during the survey.

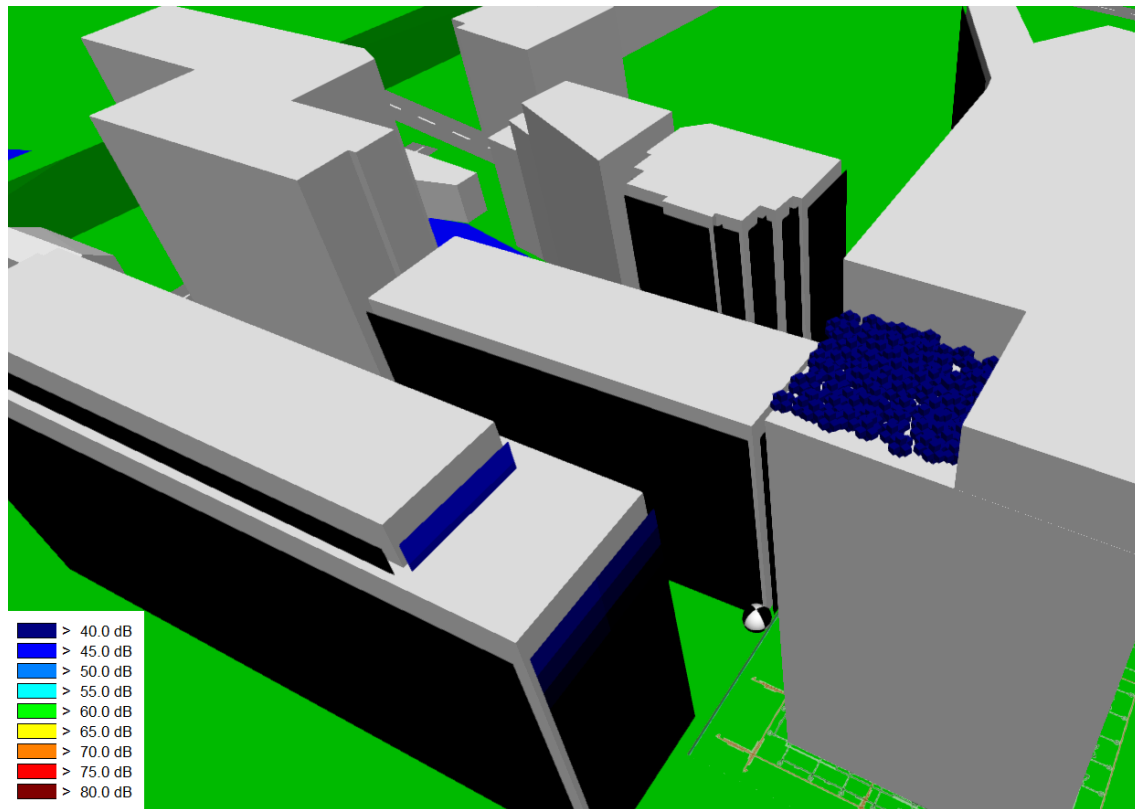


Figure 6 Predicted noise egress levels during the daytime

If any external amplified is proposed to the terrace areas, an assessment would need to be provided to Manchester City Council to demonstrate that the proposals would meet with their requirements, which are discussed below.

6.2 Amplified sound egress

6.2.1 Limits

The cumulative noise level resulting from amplified sound egress associated with the scheme should not exceed 5 dB below the existing background (L_{A90}) in each octave band at 1 m from the most affected windows of the nearest noise sensitive premises. These limits are set out in Table 6. This is in line with the MCC *Noise and Planning Guidance* document dated May 2022. A 3 dB correction has been applied to both the free-field background noise level and amplified sound limit to account for reflections from the facade of the receptor.

Table 6 Amplified sound limits at 1 m from the nearest noise sensitive premises

	Maximum sound pressure level at 1m from noise sensitive premises, $L_{eq,5min}$ (dB)							
	Octave-band centre frequency (Hz)							L_{Aeq}
	63	125	250	500	1k	2k	4k	
Daytime (07:00 – 23:00)	59	53	53	54	57	48	39	59
Night (23:00 – 07:00)	49	43	43	44	47	38	29	49

6.2.2 Assessment

It is anticipated that amplified sound will be generated within the screening room at level 14. This space is fully buffered from the facade, with no direct door access or opening windows. As such amplified sound breakout via the roof will be the primary factor and this will be assessed in detail as the design progresses to ensure that the limitations set out above are met.

If any amplified sound is proposed for the retail units, the events space or on any of the external terraces, the cumulative egress level to the nearby noise sensitive receptors will also need to be controlled to meet with the limits set above. This will need to be assessed as the design progresses.

If loud amplified sound is proposed within these areas, lobbied entrance door arrangements would typically be stipulated by Manchester City Council to help mitigate noise breakout.

Amplified sound transfer and operational noise will need to be considered as part of the design to ensure that noise breakout and transfer within the building are suitably controlled.

6.3 Deliveries

It is recommended that deliveries/collections to the site be limited to be during the daytime only, 0700-2300 hrs, to reduce the risk of noise disturbance to nearby noise sensitive receptors.

7 Conclusion

An environmental noise survey has been carried out at the site.

Key noise sources at the site were noted as traffic on Princess Street and Mancunian Way.

Measured ambient noise levels were in the range $L_{Aeq,15min}$ 62 to 68 dB during the day, and $L_{Aeq,15min}$ 56 to 65 during the night. The representative background sound levels measured during the survey were $L_{A90,15min}$ 61 dB during the daytime and $L_{A90,15min}$ 51 dB at night.

The noise data collected has been used to determine the following plant noise limits:

- L_{Aeq} 54 dB during the daytime at 1 m from the facade of Vita Students, Princess House, Premier Inn, Manchester Institute of Biotechnology and Manchester Technology Centre
- L_{Aeq} 51 dB during the night at 1 m from the facade of Vita Students, Princess House and Premier Inn.

Criteria for operational noise associated with use of the terrace spaces have been suggested. It is considered that an external noise limit of $L_{Aeq,1hr}$ 55 dB between 07:00 – 23:00 hrs would be appropriate outside nearby noise sensitive receptors due to people speaking on the terraces. The predicted worst-case levels meet this outside the nearest commercial receptors and are significantly below this outside the nearest residential premises. Manchester City Council does not normally support use of external terraces after 11pm or amplified sound on external terraces. If this is proposed, further assessment will be required.

Limits to amplified noise egress has been advised in octave bands based on the requirements of Manchester City Council. This will need to be considered further as the design progresses, particularly if the unit proposed includes any loud amplified sound.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Svantek SV307 sound level meter and a Bruel & Kier 2250 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
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
SV307				
Sound level meter	SV307/82059	Svantek	16 Mar 23	00001105-2b
Microphone	ST30/82581	Svantek	16 Mar 23	00001105-2b
Calibrator	SV36/76710	Svantek	16 Mar 23	00001105-2a

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.
- $L_{A1,T}$ The A-weighted sound pressure level exceeded for 1% of the measurement period.
- $L_{A90,T}$ 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 with occasional rain.

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between -2°C at night and 18°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

No. 3 Circle Square, Manchester
Results of noise logging survey at position 'L'
21 March 2022 to 23 March 2022

