

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Shipyards, Manchester

Acoustic planning report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Summary

Sandy Brown has been commissioned by Manchester Quays Two Limited to provide acoustic advice in relation to the proposed development at Shipyards, Manchester, which is located on the corner of New Quay Street and Water Street.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was performed between 11:02 on 19 August 2022 and 15:22 on 21 August 2022. The representative background sound levels measured during the survey were L_{A90} 49 dB during the daytime and L_{A90} 47 dB at night.

Based on the requirements of Manchester City Council 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} 44 dB during the daytime, and L_{Aeq} 42 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.

Manchester City Council require entertainment noise breakout to be limited to be no higher than 5 dB below the background noise levels in octave bands outside nearby noise sensitive receptors. Limits have been set based on the noise survey results.

The survey results and limits have been used to inform the acoustic planning assessments including amplified sound breakout/egress, and terrace noise egress.

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1 Introduction

Sandy Brown has been commissioned by Manchester Quays Two Limited to provide acoustic advice in relation to the proposed development at Shipyards, Manchester, which is located on the corner of New Quay Street and Water Street.

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.

In addition this report presents assessments of operational noise egress including terrace occupation noise and amplified music breakout from within the building.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown outlined in red in Figure 1. The site is bounded by Quay Street to the east, Water Street to the south, and The River Irwell to the north.

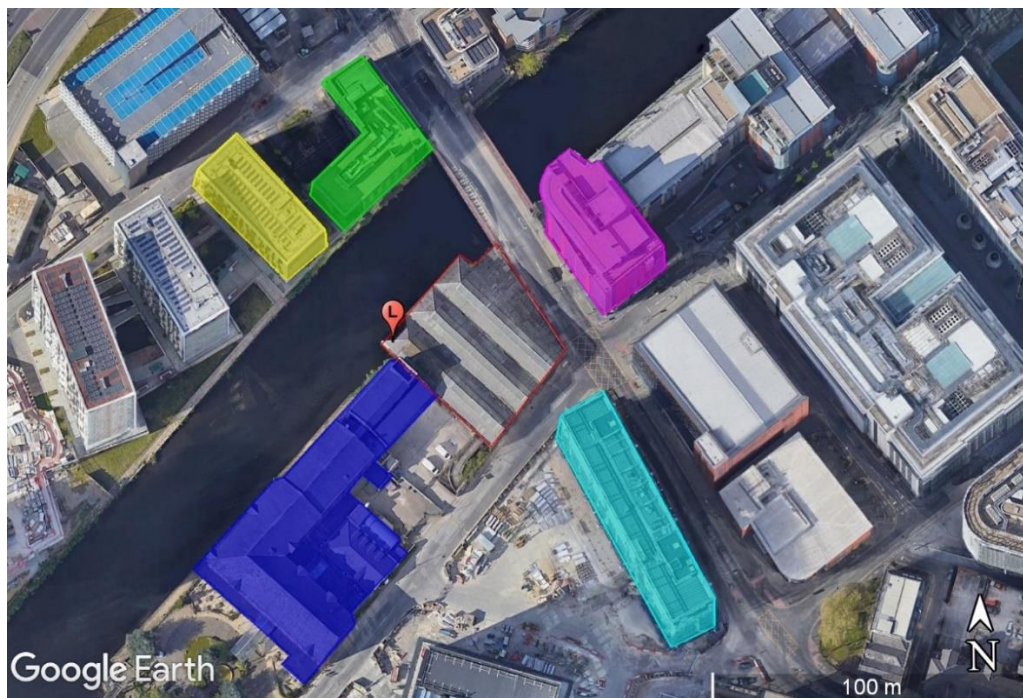


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The site is adjacent to the following noise sensitive premises (hotel and residential):

- Manchester Marriott, Victoria and Albert – Hotel (highlighted in blue in Figure 1).
- The Slate Yard – residential (highlighted in yellow in Figure 1)
- Premier Inn – Hotel (highlighted in green in Figure 1).
- Left Bank – Mixed use, residential (highlighted in pink in Figure 1)

Additionally, the site is close to the following commercial premises:

- Globe & Simpson, St John's Yard – Offices (highlighted in cyan in Figure 1).

Globe & Simpson has a fully sealed facade and is therefore considered to be less noise sensitive than the hotel and residential premises set out above.

3 Development proposals

A food/market hall unit (shell & core) is proposed within the existing Albert Shed on the corner of Water Street and Quay Street.

New build elements are proposed to the building envelope given the current dilapidated condition of the building.

External plant is proposed to the rear of the building on the River Irwell elevation.

External seating terraces are also proposed to the rear of the building on the River Irwell elevation.

4 Noise egress criteria

4.1 Plant noise egress

4.1.1 *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.

4.1.2 Local Authority criteria – Manchester City Council

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.’

4.1.3 Local Authority criteria – Salford City Council

It is noted that two of the nearby noise sensitive receptors (Premier Inn and The Slate Yard) fall within the Local Authority of the City of Salford. As such, Salford City Council’s (SCC) criteria will need to be considered within the assessments.

SCC typically state that plant noise egress should be controlled to 5 dB below the background sound level at facades of the worst-affected nearby noise sensitive premises.

4.2 Entertainment noise breakout

4.2.1 Local Authority criteria – Manchester City Council

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

‘Entertainment noise ($L_{Aeq, 5min}$) should be controlled to 5 dB below the typical background noise level (L_{A90}) in each octave band at the nearest noise sensitive location’

4.2.2 Local Authority criteria – Salford City Council

Salford City Council do not provide any fixed limits in relation to entertainment noise egress. although often reference the Institute of Acoustics ‘*Good Practice Guide on the Control of Noise from Pubs and Clubs*’, which provides the criteria summarised in Table 1.

Table 1 Summary of guidance from the IOA ‘Good Practice Guide on the Control of Noise from Pubs and Clubs’

Entertainment times	Criteria
< 30 per year ^[1]	L_{Aeq} (EN) should not exceed L_{A90} (WEN) by more than 5 dB
> 30 per year ^[1]	L_{Aeq} (EN) should not exceed L_{A90} (WEN) by more than 5 dB. L_{10} (EN) should not exceed L_{90} (WEN) by more than 5 dB in any 1/3 octave band between 40 and 160 Hz
Once per week or continues beyond 23:00 hours	L_{Aeq} (EN) should not exceed L_{A90} . (WEN). L_{10} (EN) should not exceed L_{90} by more than 5 dB in any 1/3 octave band between 40 and 160 Hz

^[1] Not more than once a week and ends by 23:00 hours

EN = Entertainment noise level, WEN = Representative background noise level without the entertainment noise, both measured 1 m from the facade of the nearest noise sensitive premises.

4.3 Operational noise egress (terraces)

MCC and SCC 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 2. This has been successfully adopted for assessment of noise egress from occupants of external amenity spaces on other similar schemes in the area.

Table 2 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 Victoria and Albert Hotel, Premier Inn, Left Bank and The Slate Yard.

Given that speech noise associated with the terraces 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 close to noise sensitive receptors after 23:00, therefore use after 23:00 is not likely to be possible.

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

Manchester City Council typically require the maximum number of terrace occupants to be confirmed.

5 Noise survey method

The survey included unattended noise measurements over a 3 day duration.

Details of the equipment used and the noise indices measured are provided in Appendix A. The unattended measurements were taken over 5 minute periods between 11:02 on 19 August 2022 and 15:22 on 21 August 2022. The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2.



Figure 2 Photograph showing location of the unattended noise monitoring equipment

The microphone was positioned on a tripod extended out of the rear elevation of the existing building overlooking the River Irwell. This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises. 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 traffic on New Quay Street.

Less significant noise sources included faint distant construction noise and general traffic noise from nearby minor roads.

6.2 Noise 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 3.

Table 3 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Friday 19 August 2022	57 ^[2]	52
Saturday 20 August 2022	55	53
Sunday 21 August 2022	52 ^[2]	-
Average	55	53

^[2] Measurement not made over full period due to monitoring start and end time (the measurement on 19 August 22 was over 12 hours, and on 21 August 22 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.

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

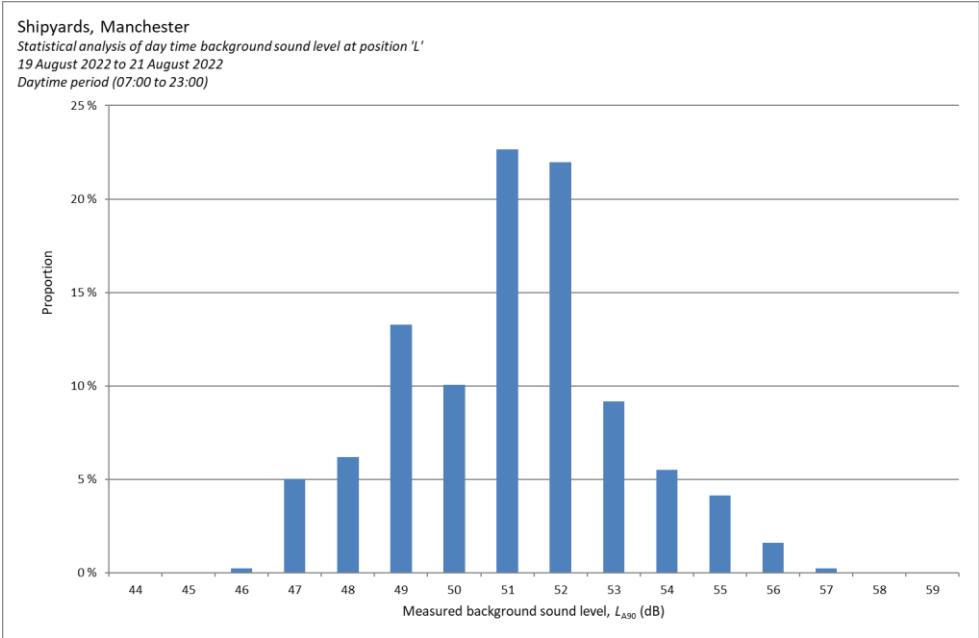


Figure 3 Statistical analysis of daytime background sound levels at position 'L'

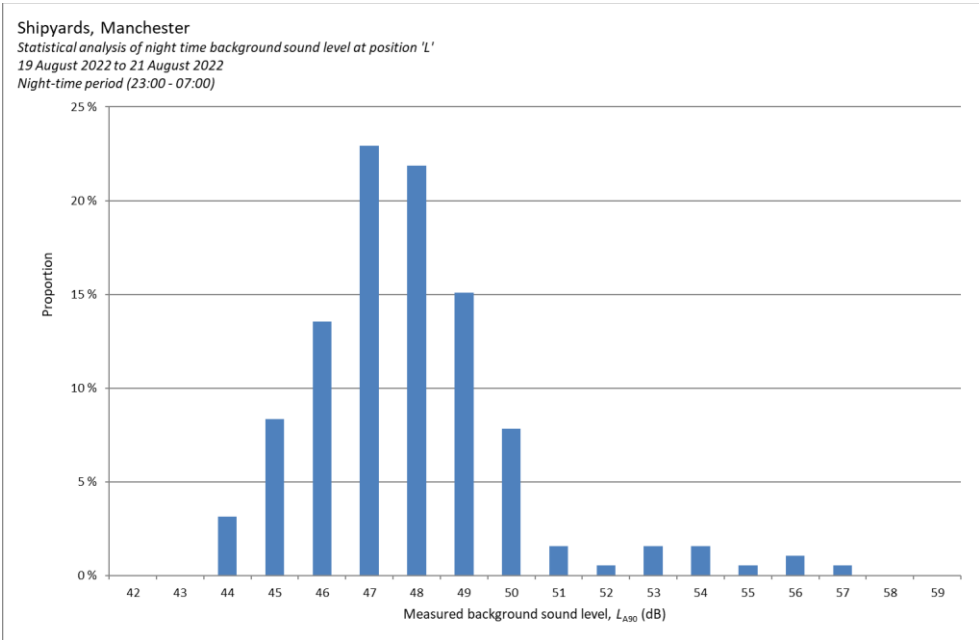


Figure 4 Statistical analysis of night-time background sound levels at position 'L'

From this analysis, the representative background sound levels measured during the survey were $L_{A90,5min}$ 49 dB during the daytime and $L_{A90,5min}$ 47 dB at night.

7 Plant noise egress

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 4.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits would apply at all premises outlined in section 2.2 during the day, and residential and hotel premises including Manchester Marriott, Premier Inn, Left Bank and The Slate Yard at night.

Table 4 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, $L_{Aeq,5min}$ (dB)
Daytime (07:00-23:00)	44
Night-time (23:00-07:00)	42

[1] The limits set out in Table 4 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.

7.2 Assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features.

It is noted that condensers are currently proposed to the North facade, directly facing the nearest residential noise sensitive receptor 'The Slate Yard', as shown in Figure 5.

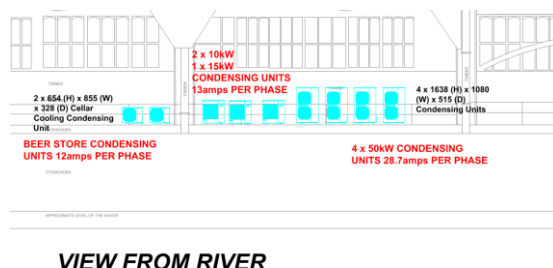


Figure 5 Condensers proposed at the river-side facade

Mitigation measures will likely be necessary to control the level of plant noise egress from the development, such as use of low-noise equipment selections, acoustic packages and/or acoustic screening. At this stage, no noise data has been provided for the condenser units, so this will need to be assessed as the design progresses.

8 Amplified sound egress

8.1 Amplified sound egress limits

Based on the criteria set out in Section 4.2, and measurement results, entertainment noise breakout is to be limited to ensure the octave-band levels set out in Table 5 outside the nearest noise sensitive receptors are not exceeded.

Table 5 Entertainment noise breakout limits at 1 m from nearby noise sensitive premises

	Entertainment noise breakout limits at 1 m from nearby noise sensitive premises, $L_{eq, 5min}$ (dB)							
	Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Daytime (07:00 -23:00)	48	44	42	42	40	34	26	14
Night-time (23:00 – 07:00)	48	43	42	40	38	31	23	13

These criteria are equivalent to L_{Aeq} 44 dB during the daytime and L_{Aeq} 42 dB at night.

8.2 Building envelope sound insulation

Initial proposals for the building envelope have been provided to inform the amplified sound breakout assessment, as shown in Figure 6

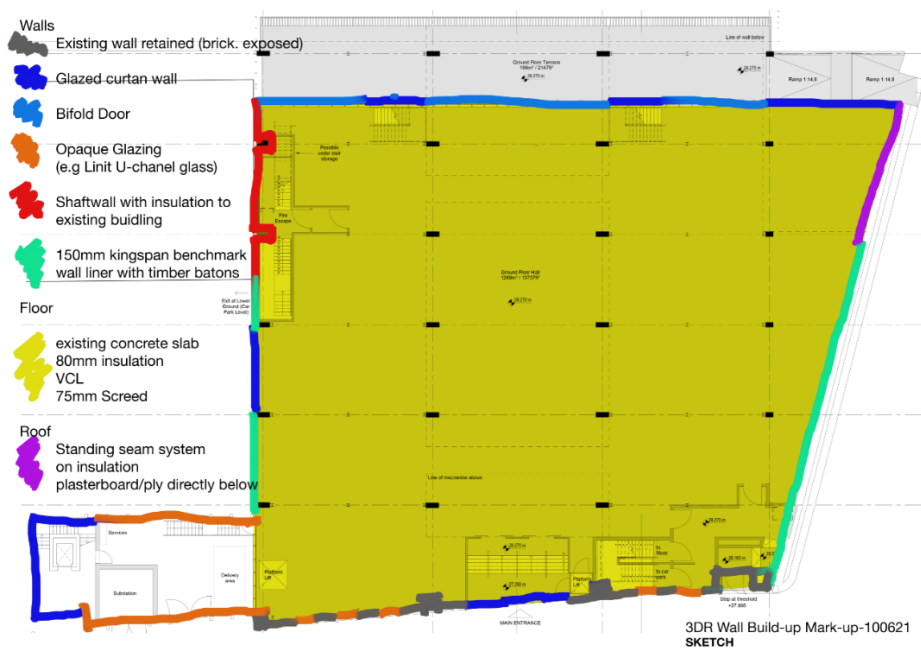


Figure 6 Facade mark-up showing indicative cladding constructions for each elevation

The bi-fold doors indicated have since been omitted from the design.

Given that the proposals for the external cladding system are still under development, a number of assumptions have been made. Standard constructions have been assumed for the initial assessment and are summarised in table 1.

These constructions should be cross-referenced with the mark-up in Figure 6.

Table 6 Cladding construction assumptions

Zonal mark-up	Proposed construction	Assumptions
<i>Non-glazed external walls</i>		
	Shaftwall with insulation to existing building	Assumed to be capable in achieving a performance of at least R_w 47 dB (R_w+C_{tr} 40 dB), e.g. 'I stud framework with 19 mm Coreboard between studs, and 2 x 12.5 mm internal linings with 25 mm mineral fibre in the cavity (overall zonal allowance of 119 mm).
	150 mm Kingspan Benchmark wall liner with timber batons	150 mm Kingspan Benchmark has a surface mass of 16.5 kg/m ² and is expected to achieve approximately R_w+C_{tr} 24 dB. Capable of achieving up to R_w+C_{tr} 30 dB with wall linings (normal-weight 12.5 mm plasterboard) on studs forming a cavity of at least 70 mm.
	Existing wall retained (brick. exposed)	Capable of achieving at least R_w+C_{tr} 40 dB assuming thickness greater than 102.5 mm.
<i>Glazed external walls</i>		
	Glazed curtain wall	Assumed to be standard thermal double glazing (6 mm glass / 12 mm air / 6 mm glass) capable in achieving at least R_w+C_{tr} 28 dB.
	Bifold Door (omitted)	It is understood that the bifold doors have been omitted from the design. It is assumed this location will instead consist of a glazed curtain wall. The proposed doors are hinged doorsets which are lobbied at the first floor terrace.
	Glazed curtain wall (previously opaque glazing)	Assumed to be standard thermal double glazing (6 mm glass / 12 mm air / 6 mm glass) capable in achieving at least R_w+C_{tr} 28 dB.

Roofing		
	Standing seam system on insulation with plasterboard directly below	Assuming 12.5 mm normal-weight plasterboard ceiling, performance expected to be limited to approximately R_w+C_{tr} 35 dB.

8.2.1 Skylight glazing

Skylights are proposed to the ridge of the roof, these are currently specified as polycarbonate, which is likely to be limited in sound insulation performance.

8.3 Assessment

An events space/stage is proposed to the first floor as shown in Figure 7. It is understood that this space will occasionally be used to host DJs and play amplified music.

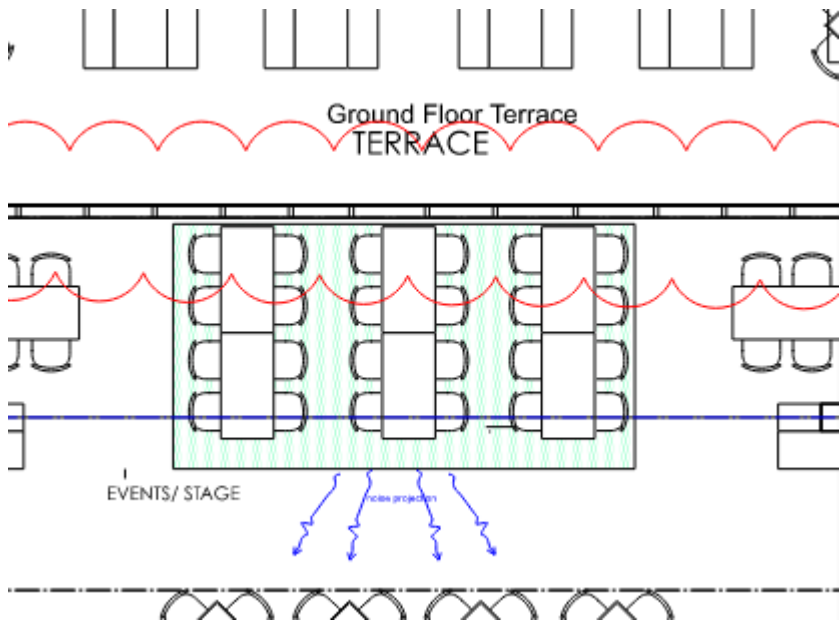


Figure 7 First floor events space

The construction types used in the operational noise assessment are outlined in Section 0, to be read in conjunction with Figure 6 and Table 6.

An assessment has been undertaken to provide guidance on internal limits for amplified sound within the events space. The calculations account for attenuation from distance and screening where relevant.

Table 1 sets out guidance on maximum internal amplified sound limits within the food/market hall with the current proposals.

Table 7 Internal operational noise limits within the food / market hall (current design)

	Maximum operational noise level, $L_{Aeq,5min}$ (dB)							
	Octave band centre frequency (Hz)							dB(A)
	63	125	250	500	1k	2k	4k	
Daytime (07:00 – 23:00)	74	73	74	79	83	80	76	86
Night-time (23:00 – 07:00)	74	71	74	77	80	77	73	83

The internal limits set out in Table 7 are not suited to events involving loud amplified music. The main contributing weakness in the building envelope is the polycarbonate skylights proposed to the roof. These limits would however be suitable for a food/market hall with background music. These limits have been calculated on the basis that the non-lobbied terrace doors on the mezzanine level are closed when amplified music is present. MCC may insist on lobbied arrangements being provided to any doors which may be regularly opened such as those to the first floor terrace.

9 External terraces

Two external terraces are proposed to the building. One at ground level, and one on the mezzanine level. The proposed terrace spaces are shown in Figure 8, with the ground level terrace highlighted in blue, and the mezzanine level terrace highlighted in red.

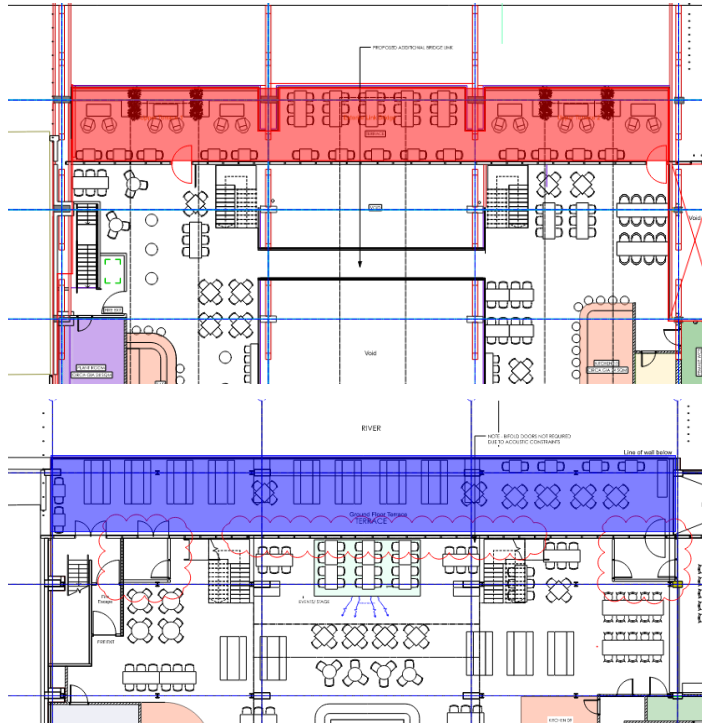


Figure 8 Excerpts of the general arrangements showing the locations of the external terraces

Exact occupancy rates on the terraces have not been confirmed, but from the furniture plans it is assumed that the maximum occupancy is 84 people on the ground level terrace, and 70 people on the mezzanine level.

The maximum terrace occupancies will likely need to be confirmed to MCC.

Calculations have been carried out to determine the potential impact of occupants on the external terraces speaking upon the worst affected dwellings. The calculations take into account losses due to distance and environmental screening.

The calculations have been carried out based on a total of 84 people on the ground level terrace, and 70 people on the mezzanine level terrace. The calculations assume 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 outside the nearest residential noise sensitive receptors are shown in Table 8.

Table 8 Predicted terrace noise egress levels at 1 m from the facade of the nearest noise sensitive receptors

Noise sensitive receptor	Predicted terrace noise egress level 1 m from the facade, L_{Aeq} (dB)
Manchester Marriott, Victoria and Albert	53
Premier Inn	50
The Slate Yard	50
Left Bank	48

Predicted noise levels with all terraces in use at the nearest residential premises are within the suggested criteria, with a worst case of L_{Aeq} 53 dB.

If any external amplified sound is proposed to the terrace areas, an assessment would need to be provided to Manchester City Council and Salford City Council to demonstrate that the proposals would meet with their requirements. However, it is likely that MCC will not permit external amplified sound due to the close proximity of nearby noise sensitive receptors.

Appendix A

Survey details

Equipment

The unattended 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	16 Mar 23	TCRT21/1182
Microphone	UC-59/05549	Rion	16 Mar 23	TCRT21/1182
Pre-amp	NH-25/32354	Rion	16 Mar 23	TCRT21/1182
Calibrator	NC-74/34125432	Rion	16 Mar 23	TCRT21/1181

[2] 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 meter and its measurement chain 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

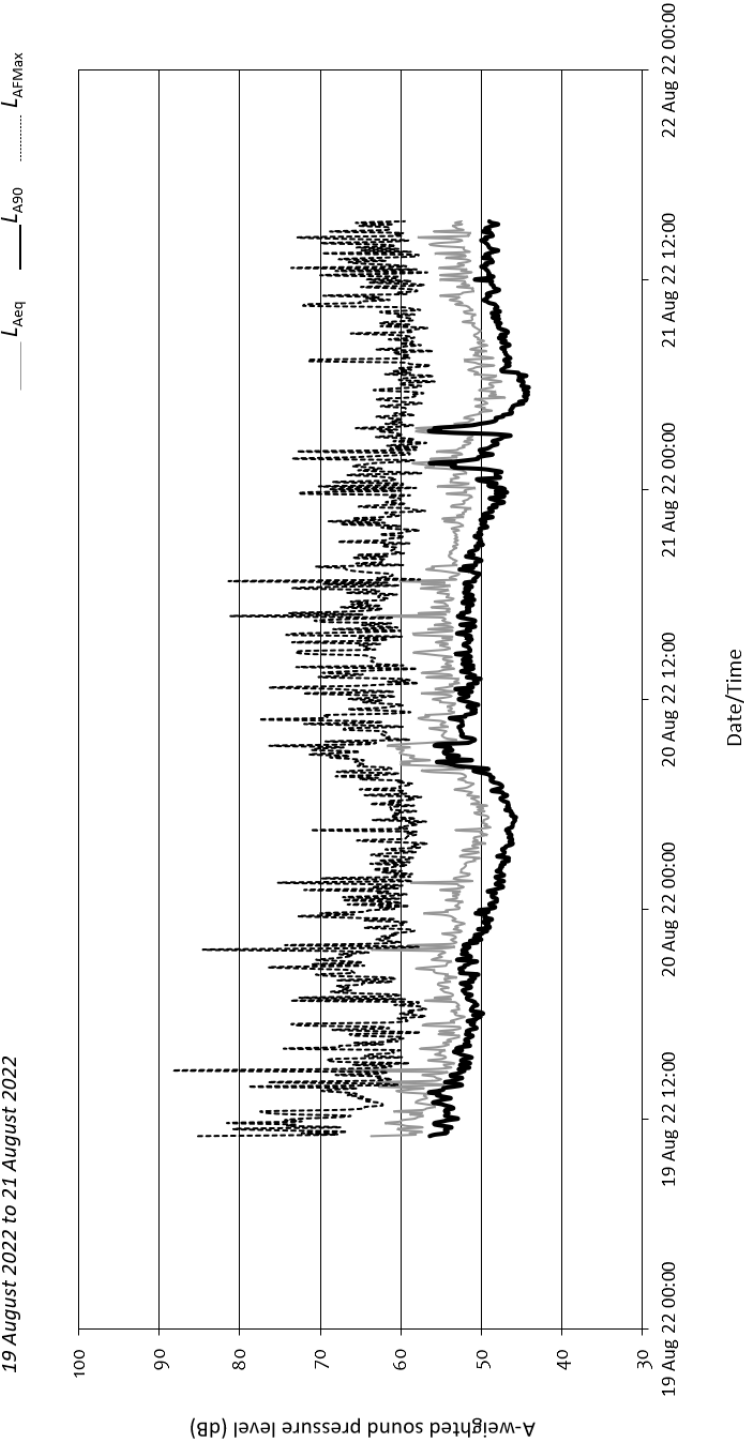
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 13°C at night and 23°C during the day, and the wind speed was generally less than 5 m/s, however occasional gusts were noted up to 10 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at position 'L'

Shipyards, Manchester
Results of noise logging survey at position 'L'
19 August 2022 to 21 August 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.