



Project: Bury Market & Flexihall
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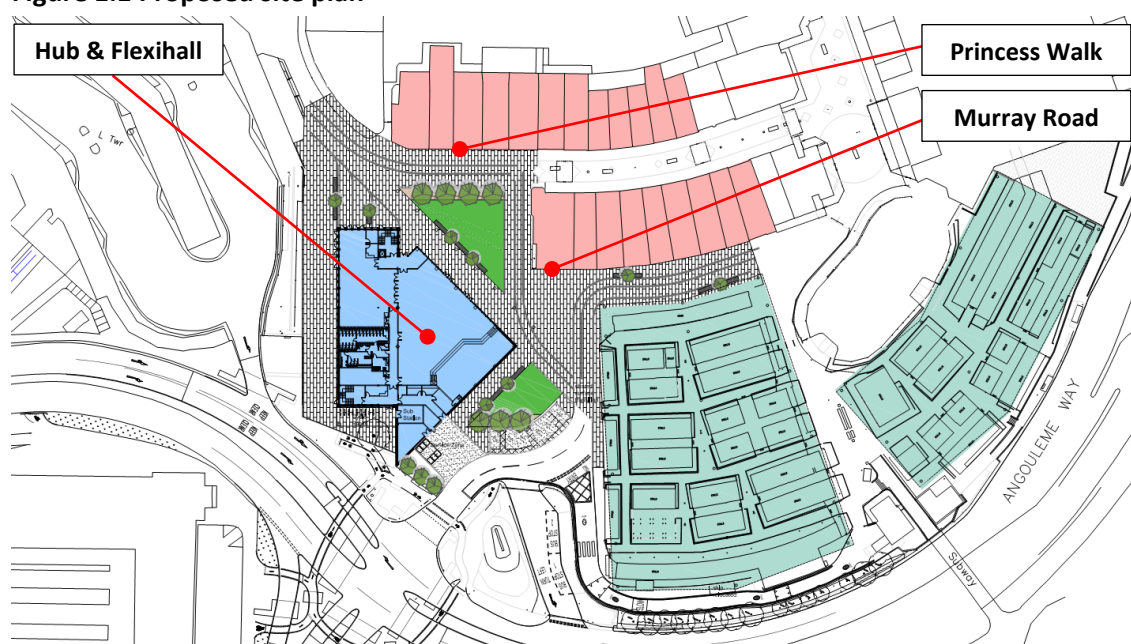
Technical Note 2

TN2 Flexihall Façade Review

1.0 Introduction

- 1.1 Sharps Redmore has been appointed to provide acoustic advice for the redevelopment of Bury Market. The project includes the renovation of the existing market hall area, plus a new Flexihall building to accommodate events, functions and meetings, with office space too.
- 1.2 This Technical Note addresses requirements to control noise egress from events via the building façade. Noise from building services, or noise egress from ventilation openings, are reviewed separately.
- 1.3 A noise survey was undertaken in January 2022 from which representative sound levels have been determined to identify suitable assessment criteria. The details of the survey are included in the acoustic specification.
- 1.4 It is understood that there are no specific criteria for entertainment noise within Local Planning Guidance. As such guidance from Manchester City Council has been adopted for consideration.
- 1.5 The closest noise-sensitive locations (NSL) to the development are residences on Murray Road and above shops on Princess Parade. These are shown below in Figure 1.1.

Figure 1.1 Proposed site plan



North England

Sharps Redmore The Plex, 15 Margaret Street, Wakefield, WF1 2DQ

T 01924 586468 **E** northengland@sharpsredmore.co.uk **W** sharpsredmore.co.uk

Regional Locations North England, South England (Head Office), South West England, Wales, Scotland

Sharps Redmore Partnership Limited Registered in England No. 2593855

Directors RD Sullivan BA(Hons), PhD, CEng, MIOA, MAAS, MASA; KJ Metcalfe BSc(Hons), MIOA; N Durup BSc(Hons), MSc, PhD, CEng, FIOA, MInstP, MASA, MAES; GJ King MIOA, MCIEH

Company Consultant TL Redmore BEng, MSc, PhD, MIOA



1.6 This assessment and noise modelling are based on the following drawings:

- BURMAR-JHA-V2-00-DR-A-0004 Rev P06 Flexihall Ground Floor Plan
- BURMAR-JHA-V2-01-DR-A-0005 Rev P04 Flexihall First Floor Plan
- BURMAR-JHA-V6-XX-DR-A-0003 Rev P06 Proposed Site Plan
- BURMAR-JHA-V2-ZZ-DR-A-0009_P02

2.0 Noise Survey

- 2.1 Sharps Redmore carried out an environmental survey to determine the existing acoustic climate at the site and at nearby noise-sensitive locations.
- 2.2 The survey was undertaken between the 13th and 18th January 2022 such that sufficient data was obtained to represent the daytime and night-time periods, weekdays and weekends, and days which were or were not market days.
- 2.3 Further details regarding the survey are included in the acoustic specification report.
- 2.4 The background sound levels measured during the survey are shown in Table 2.1, and are the results considered relevant to this assessment. Levels are given for the periods which would typically be most sensitive to entertainment noise.

Table 2.1 Background sound levels

Period	Octave band background sound level, L_{90} (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Evening (1900 – 2300 hours)	52	47	45	43	46	40	29
Night (2300 – 0000 hours)	47	43	40	39	38	32	22

3.0 Criteria

- 3.1 The Manchester City Council *Planning & Noise Technical Guidance* (December 2015) states the following for new entertainment venues to demonstrate that music noise from the development is not audible:

“Entertainment noise (L_{Aeq}) should be controlled to 10 dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise-sensitive location.”

- 3.2 Criteria based on the above requirement could result in sound levels in some frequency bands which fall below the threshold of hearing (relative to the measured background sound levels) and below levels which may not be measured by a sound level meter.
- 3.3 As such, based on the results of the noise survey, the above guidance and considerations, it is desirable that the envelope of the building should be designed to control entertainment noise from the Flexihall venue to not exceed the sound levels given in Table 3.1 when measured outside the closest noise-sensitive receptors.

Table 3.1 Proposed criteria for entertainment noise egress

Period	Octave band background sound level, L_{90} (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Evening (1900 – 2300 hours)	48	37	35	33	36	30	19
Night (2300 – 0000 hours)	48	33	30	29	28	22	12

- 3.4 Further to the above, the guidance also provides criteria for appropriate noise levels for entertainment noise within bedrooms, which would achieve a condition of ‘inaudible’ or ‘virtually inaudible’. The guidance states:

“Music noise levels in the 63 Hz and 125 Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47 dB and 41 dB (L_{eq}) respectively.”

4.0 Façade Assessment

- 4.1 Acoustic modelling has been undertaken using SoundPLAN to calculate noise propagation across the site.
- 4.2 The internal sound levels given in Table 4.1 below are representative of a typical entertainment venue playing live music, which are adopted as a reasonable worst-case scenario.

Table 4.1 Entertainment sound levels

Description	Octave band background sound pressure level, L_{eq} (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Entertainment sound level	100	95	95	95	90	90	85

- 4.3 The route of noise egress considered is the glazed section of the north façade which is located opposite the noise-sensitive residences.
- 4.4 Sound level reductions for propagation, field correction, absorption and reflections have been determined from the acoustic model to identify minimum specifications for the windows. These are provided in Table 4.2 below for each period. The acoustic performance must be achieved by the window unit as a whole, including glazing, frame, seals and any opening mechanisms.

Table 4.2 Minimum window specifications

Period	Octave band sound reduction index, SRI (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Evening (1900 – 2300 hours)	42	43	46	49	41	47	52
Night (2300 – 0000 hours)	42	47	51	53	49	55	59

- 4.5 The window acoustic specifications shown above may not be practicably achieved using standard double glazing. The values in the lower frequency bands are particularly difficult to attain.
- 4.6 To achieve the highest level of sound insulation possible for the curtain walling, a high-performance window arrangement would be required. An example is given in Table 4.3 below with the acoustic performance.

Table 4.3 Example window performance

Description	Octave band sound reduction index, SRI (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
10.8 mm laminated pane (16 mm cavity) 16.8 mm laminated pane	24*	35	41	48	53	55	65

* SRI value at 63 Hz is estimated.

- 4.7 Noise levels at the nearest noise-sensitive receptors can be calculated using the given window arrangement, with predicted levels shown in Table 4.4.

Table 4.4 Predicted entertainment noise levels at nearest receptors

Noise-sensitive receptor	Octave band background sound pressure level, L_{eq} (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Murray Road	66	45	40	34	24	22	6
Princess Walk	62	41	36	30	21	19	3
Meets external criteria during all periods.							
Meets external criteria between 7pm and 11pm, but not between 11pm and 12pm.							
Does not meet external criteria during either period.							

- 4.8 Calculations indicate that noise levels from entertainment noise would exceed the identified criteria external to dwellings.
- 4.9 To evaluate the noise impact against the criteria within dwellings noise ingress calculations are undertaken. These are carried out in accordance with the methodology described by BS 12354-3:2000, with reasonable assumptions made for room dimensions and absorption.
- 4.10 Noise levels are calculated for a partially open window (100,000 mm²) using normalised element level difference ($D_{n,e}$) values described within NANR116, which are as follows:

Table 4.5 NANR116 $D_{n,e}$ values for window type A-3 (200,000 mm²) open area

Description	Octave band normalised element level difference, $D_{n,e}$ (dB)						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
NANR116 window type A-3 opening (100,000 mm ²)	21.3	15.1	18.5	19.0	15.9	20.7	23.6

- 4.11 The calculated internal sound levels due to entertainment noise for receptors on Murray Road and on Princess Walk are shown in Table 4.6 below.

Table 4.6 Calculated internal entertainment sound levels

Noise-sensitive receptor	Octave band background sound pressure level, L_{eq} (dB)							Total dBA
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	
Murray Road	47	33	24	17	10	3	≤0	24
Princess Walk	43	28	20	14	7	≤0	≤0	20

- 4.12 Results show that the criteria for internal sound levels can be achieved based on the parameters described.

5.0 Mitigation Advice

- 5.1 The calculated sound levels are based on a double-glazed window unit, with performance given in Table 4.3. Further reductions in noise egress could be achieved using a higher performing window unit. It is assumed doors within the curtain walling would achieve the same acoustic performance as the windows.
- 5.2 Other façade elements, such as the cladded walls, ventilators and the roof, would need to perform significantly better than the windows.
- 5.3 A noise management plan could be adopted, which may typically include:
- Permitted operational hours for amplified music,
 - Sound level limits for amplified music,
 - Clear noise complaints and monitoring procedure.
- 5.4 A sound level monitor, or noise limiter, within the Flexihall would allow monitoring and/or control of noise levels.

6.0 Conclusions

- 6.1 Based on the parameters described within this report, it is calculated that entertainment noise during events within the Flexihall may give rise to external sound levels at nearby noise-sensitive residences which exceed the typical criteria identified. Subjectively, this means entertainment noise could be audible at low frequencies outside.
- 6.2 Calculations show that noise levels within dwellings would meet the criteria identified, and would therefore be considered 'inaudible' or 'virtually inaudible' internally.
- 6.3 The chosen window specification must perform very well at low frequencies, and could include secondary glazing as an option. Acoustic specifications are for the window unit as a whole, including the glazing, frame, seals and any opening mechanisms.
- 6.4 This assessment considers windows as the worst-performing façade element; external walls and roof constructions would also need to be considered carefully.
- 6.5 Ongoing advice should be sought from the acoustician to review key constructions as the design develops.