The Trading Route, Manchester

Noise Impact Assessment

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24071-R01A-BT The Trading Route Manchester

Client: Magpie Union Ltd

Date: 28/10/2024

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	08/09/2024	Original Issue	Simon Fuller BEng	Susan Witterick BSc MIOA
R01A	08/09/2024	Updated to address Local Authority comments	*Ben Tomlin* Ben Tomlin BSc MIOA	*Susan Witterick* Susan Witterick BSc MIOA

1 INTRODUCTION

1.1 dBx Acoustics Ltd has been appointed by Magpie Union Ltd to provide a noise impact assessment to support a planning application for a bar to be known as The Trading Route within the Manchester Goods Yard building, Goods Yard Street, Manchester, M3 3BG.

1.2 The bar will operate from 08:00h-00:00h on weekdays, and 08:00h-02:00h on weekends.

1.3 This report details a site noise survey, and provides an assessment of entertainment noise emissions, plant noise emissions, and sound insulation to the adjacent tenancies.

1.4 The Local Authority is Manchester City Council.

1.5 This report updates the dBx Acoustics' original report ref *24071-R01-SF* dated 08/09/2024 to consider comments from Manchester City Council's environmental health department relating to doors.

1.6 A glossary of acoustic terminology has been supplied in Appendix A to assist the reader.

2 ACOUSTIC CRITERIA

Local Authority Requirements

2.1 Planning permission for The Goods Yard was granted by Manchester City Council (MCC), reference 121511/FO/2018. The following conditions are applicable to this assessment;

> *Condition 20) Where entertainment noise is proposed the L_{Aeq} (entertainment noise) should be controlled to 10dB below the L_{A90} (without entertainment noise) at the facade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63HZ and 125Hz octave frequency bands should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.*
>
> *Condition 21) 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.*

Landlord's Requirements

2.2 It is understood that the Landlord requires an assessment of potential noise transfer to the adjacent demises. No quantitative criteria have been set.

BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

Indoor Ambient Noise Levels within Offices

2.3 With respect to intrusive external noise, BS 8233 identifies the British Council for Offices (BCO) Guide to Specification for general acoustic guidance on offices. BS 8233 highlights that complaints from office workers typically arise from the intrusion of external noise, high internal noise levels from services, low background noise, excessive reflections from room surfaces, and inadequate sound insulation between offices. Advice is provided within the BS 8233 guidance in respect of the internal design of offices, including open-plan offices for speech privacy and the control of noise.

2.4 The relevant criteria for offices are reproduced in Table 1.

Table 1: BS 8233 Acoustic Design Criteria for Offices

Activity	Location	Design Range	
		$L_{Aeq,\,T}$ (dB)	L_{AFmax} (dB)
Study and work requiring concentration	Executive office	35 – 40	50
Work requiring acoustic privacy	Open plan office	45 – 50	55
Speech or telephone Communications	Corridor, circulation space	45 – 55	50

BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

2.5 BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating Level is determined and compared with the existing local Background Sound Level.

2.6 The Rating Level (dB $L_{Ar,Tr}$) is evaluated from the Specific Noise Level by including cumulative corrections to account for factors such as distinguishable tone, impulsivity, intermittency or other readily distinguishable sound characteristics.

2.7 The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

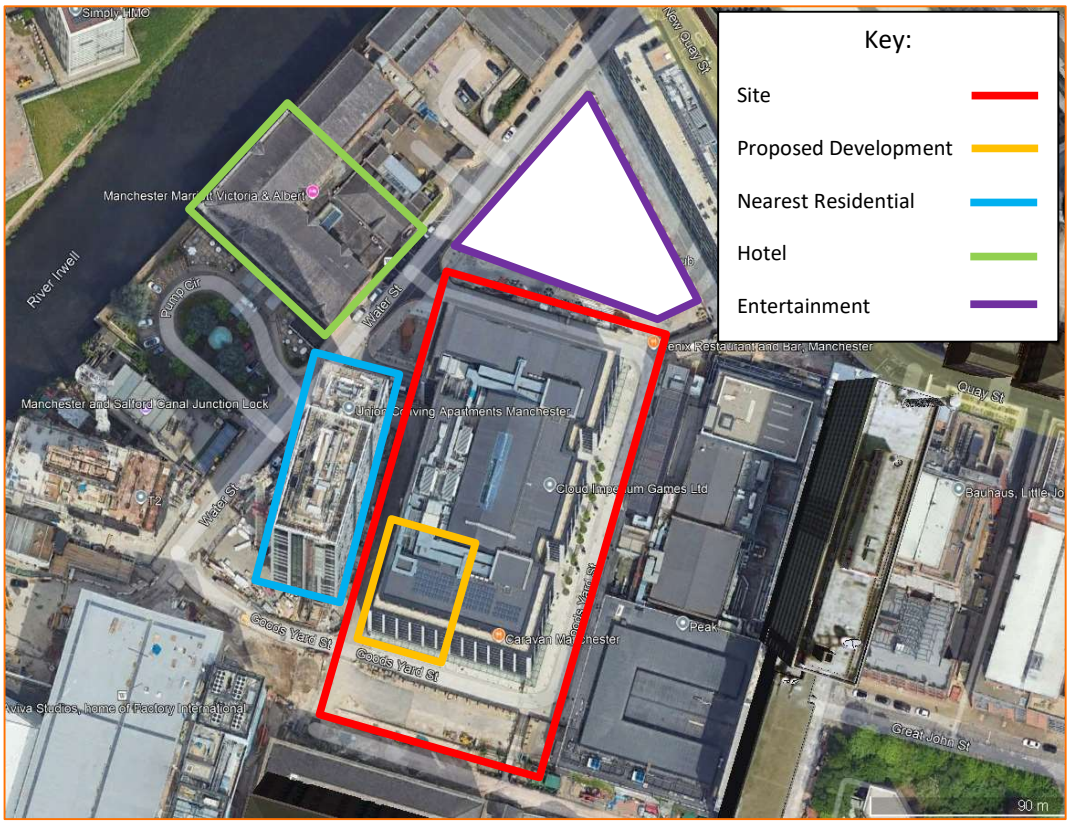
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3 SITE DESCRIPTION

3.1 The Trading Route will occupy the south-western unit in The Goods Yard. Figure 1, below, shows the site location, and nearest noise sensitive receptors.

Figure 1: Site Location Plan



3.2 The nearest noise sensitive receptors are identified as the Union Co-living Apartments immediately to the west (approximately 10m), and the Marriot Hotel to the north-west.

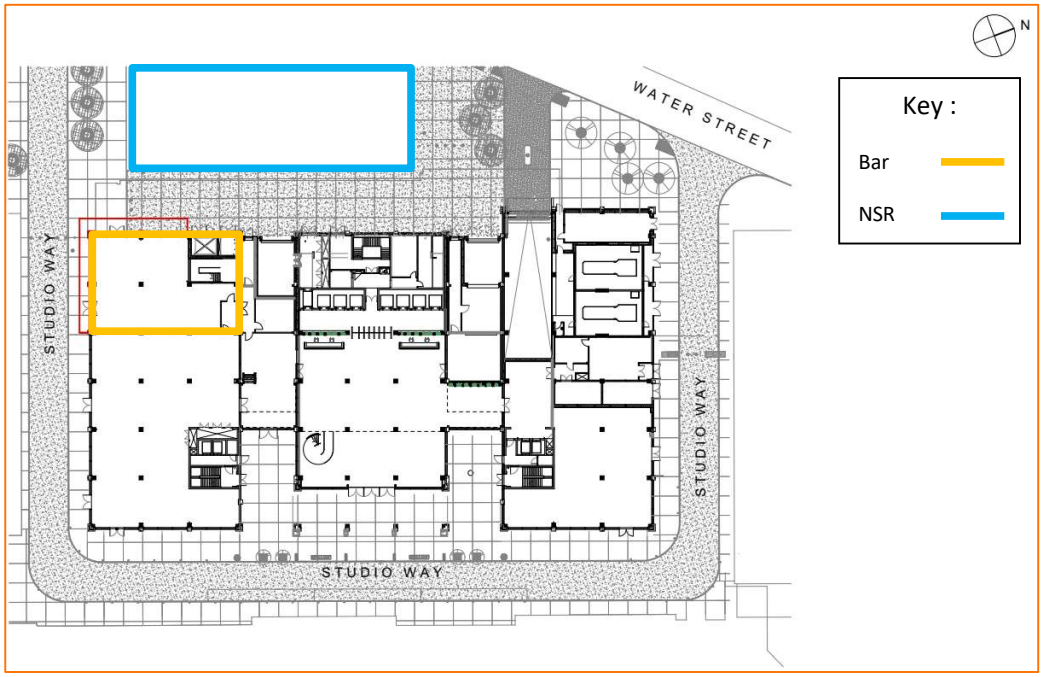
3.3 Within the building itself, the adjacent tenant unit is Caravan which is a bar/restaurant. The first floor is assumed to be in use as offices.

Proposed Development

3.4 The proposed development comprises a bar with music at the ground floor level. The bar's opening times are 08:00h-00:00h on weekdays and 08:00h-02:00h at weekends.

3.5 Figure 2, below, shows the location of the unit within the Goods Yard building and in relation to the adjacent apartments and adjacent commercial unit on Studio Way.

Figure 2: Proposed New-Build Layouts on Site



4 NOISE SURVEY

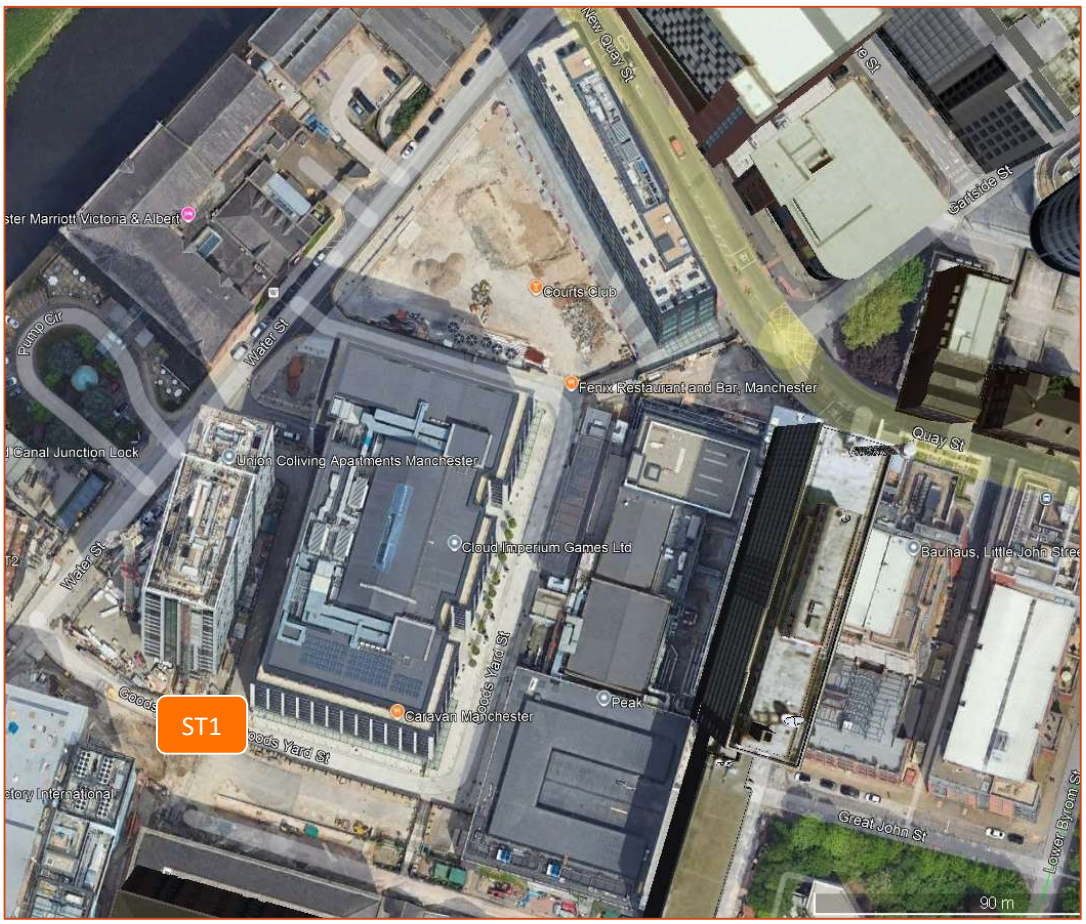
Methodology

4.1 Night-time attended measurements were carried out between 23:00h and 01:00h on Tuesday 27th August 2024, representative of the worst case for potential noise impact arising from operation of The Trading Route.

4.2 Site security did not permit noise monitoring immediately in front of the apartments. Measurements were therefore undertaken immediately to the south of the apartment building, as shown in Figure 3, below.

4.3 All measurements were in free-field conditions and the microphone was set 1.5m from the ground.

Figure 3: Noise Measurement Location



Equipment

4.4 The equipment used during the noise survey is detailed in Table 2, below.

Table 2: Equipment Used in the Environmental Noise Survey

Equipment	Manufacturer & Part No	Serial Number
Meter	NOR 140	1403443
Pre-Amp	NOR 1209	12967
Microphone	NOR 1225	18437
Calibrator	B&K 4231	1821323

4.5 The sound level meter was calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator, which had been calibrated not more than one year prior to the survey.

Weather Conditions

4.6 Weather conditions throughout the survey period were suitable for environmental measurements with wind speeds of less than 5 m/s. No significant precipitation was recorded during the noise survey. The temperature was around 12°C.

Noise Sources

4.7 The night-time noise climate at the site was dominated by road traffic noise (RTN) from New Quay Street approximately 150m north of the site, and plant noise from the north-western corner of The Goods Yard. Distant road traffic on Trinity Way was audible.

4.8 Two train movements were observed during the survey, but did not impact the measured noise levels.

5 SURVEY RESULTS

5.1 Table 3, below, shows a summary of the night-time noise levels measured. Measurements were taken over 15-minute periods.

Table 3: Measured Night-Time Noise Levels

Location	Time (hh:mm)	Ambient Noise Level (dB $L_{Aeq,T}$)	Typical Background Noise Level (dB $L_{A90,\ 15mins}$)
ST1	23:15	48	47
	00:35	48	47

5.2 The measured ambient and background noise levels were consistent throughout the survey period and can therefore be considered a good representation of noise levels affecting the residential receptor.

5.3 A pre-development noise survey was carried out in the area in 2018 to support the planning application for the residential units (reference 125655/FO/2019). This survey identified a background noise level of 48-49dB$L_{A90,T}$ at Manchester Goods Yard. This further supports the relevance of the measured noise levels presented in Table 3, above.

5.4 The octave band background noise level measured during the current noise survey and as used in this assessment is presented in Table 4, below.

Table 4: Octave Band Background Noise Level, dB$L_{A90,T}$

Background Noise Level, dB$L_{90,T}$								
63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dBA
50	50	48	44	42	37	28	22	47

6 NOISE BREAK-OUT TO RESIDENTIAL RECEPTORS

External Wall Construction

6.1 The façade facing the residential receptor consists of AGC curtain walling, comprising Stratobel 55.4 laminated glass (11.56mm), 16mm argon gap, and Stratobel 55.2 laminated glass 10.86mm). The manufacturer quotes a sound insulation performance of 40dBR_w.

6.2 The Insul software package has been used to establish the octave band performance of this construction.

6.3 The specification of the external doors has not been provided. Laboratory test data for a Pure Commercial door achieving 38dBR_w has been used in this assessment.

6.4 The manufacturer's data for the curtain walling and door, as well as the predicted octave band performance of the curtain walling, are presented in Appendix B.

Calculation

6.5 The composite sound insulation of the building façade has been calculated based on the relative area of the door and glazing and used in calculations to predict noise emissions to the residential receptors at a distance of 10m.

6.6 On this basis, the limiting sound pressure level within Trading Route for compliance with MCC requirements has been established.

6.7 The calculation is presented as Calculation 1, below.

Calculation 1: Entertainment Noise Emissions

Room to Exterior

Date: 45543
Job No: 24071
Project: Trading Route
Title: Noise emissions to residential apartments

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Room Lp	80	76	83	89	92	87	79	73	94	92
Wall SRI	25	21	30	40	44	45	46	46		

Wall dimensions length: 15 m
height: 4 m

Distance from wall to receive: 10 m

Directivity index of location (0, 3, 6 or 9): 3

0 = free space
3 = junction with surface
5 = junction of two surfaces
6 = junction of three surfaces

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Receive Lp	40	40	38	34	32	27	18	12	37	32

6.8 It should be noted that this is the predicted noise level outside the nearest affected building (Union Co-living Apartments on Water Street).

Doors

6.9 The Local Authority has requested an assessment of noise levels with doors open.

6.10 This is not straightforward to consider; the doors will only be open for short periods of time when people enter or leave, and the sound insulation of the partially opened door will vary considerably.

6.11 The composite sound reduction index (SRI) of the façade is around 41dBR_w. The composite SRI of the façade with a 2m x 2m hole is around 17dBR_w.

6.12 As the door will slowly move from closed to partially opened, the SRI will never reach as low as 17dBR_w, as the door is never fully removed, but as a worst case, it is assumed the composite SRI will vary between 17dBR_w and 41dBR_w. For simplicity, it is assumed that the overall composite SRI as patrons enter or leave will be around half of the difference between the two values, i.e. around 29dBR_w.

6.13 Using the same methodology as Calculation 1, above, the predicted noise level at the NSR with the door partially opened is 52dB$L_{Aeq,T}$.

6.14 Furthermore, as the door is only open for short periods of time, it is necessary to correct for the time periods.

6.15 It is therefore necessary to estimate the time taken to open a door and enter or leave a building.

6.16 It is suggested that an average time period of 5s per person to enter or leave seems reasonable.

6.17 It is understood that a worst case of 75 people entering or leaving the building in an hour is expected.

6.18 On this basis, at an average of 5s per person, a total door open time of 375s in every hour period can be expected in the worst case hour, with the door closed for the remainder of the time.

6.19 On this basis, the sound pressure level at the NSR has been corrected for the duration of each, using Correction = 10*log(T/3600), in seconds.

6.20 When the door is closed, the correction is 10*log(3225/3600) = 0dB; for open, it is 10*log(375/3600) = -10dB.

6.21 The time corrected SPL has then been calculated for both the open and closed periods, and added together.

6.22 As this results in a small exceedance over the criterion with the internal noise levels as used in Calculation 1, the allowable internal music noise level has therefore been corrected appropriately.

6.23 This calculation is shown as Calculation 2, below.

Calculation 2 – SPL at NSR with doors open

	No. people	Time total, s	60mins, s						
Time open/person	5	75	375	3600	-10				
Time closed			3225	3600	0				
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Proposed Internal SPL	80	76	83	89	92	87	79	73	**94**
SPL @ nsr, door open	47	45	47	48	49	44	35	29	**52**
Time correction	-10	-10	-10	-10	-10	-10	-10	-10	
SPL, door Open	37	35	37	38	39	34	25	19	**42**
SPL Door Closed	40	40	38	34	32	27	18	12	**37**
Sum, dBLAeq,1hour	42	41	41	40	40	35	26	20	**43**
MCR limit	40	40	38	34	32	27	18	12	
Exceedance	2	1	3	6	8	8	8	8	
Corrected limiting music noise level	**78**	**75**	**80**	**83**	**84**	**79**	**71**	**65**	**87**

6.24 It should be noted that this is the worst case predicted hour; assuming 75 people enter or leave between 00:00-01:00h. In practice, this traffic is only expected during early evenings on Friday or Saturday, when ambient and background noise levels will be higher. In the period for which background noise levels were measured (00:00-01:00h), no more than 15 people entering or leaving are expected.

6.25 Furthermore, the calculation assumes that the double doors are open to the extent of a 2mx2m hole; in practise, the 'hole' formed will be significantly smaller (e.g. when only one leaf is used), and the doors will still provide partial screening when half open. This calculation is therefore very much an absolute worst case.

6.26 However, assuming as an absolute worst case, , the predicted hour-long average is presented in Calculation 2, below. It should be noted that the people are assumed to enter and leave regularly over the hour period, and hence the average noise levels of shorter assessment periods (e.g. 5 minutes) would be identical.

6.27 It can therefore be seen that as a worst case, with 75 people entering or leaving, the overall average noise level is around 43dB$L_{Aeq,1hour}$ at the NSR.

6.28 This is still 5dB below the ambient noise level, and 4dB below the background noise levels, and would therefore be barely audible if not inaudible at the NSR.

6.29 Furthermore, even outside the NSR, the predicted low frequency octave band SPLs also meet MCC's entertainment noise criteria for structurally connected buildings of 47dB$L_{eq,T}$ and 41dB$L_{eq,T}$ at 63Hz and 125Hz, respectively.

6.30 MCC's guidance document states;

> *"Therefore, a criterion that would achieve a condition of 'inaudible' / 'virtually inaudible' which is applicable for new residential developments that are structurally connected to entertainment venues (or vice versa) would be:*
>
> *'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively'."*

6.31 Inside the building, music noise would reduce by a further 15dB, with windows open for ventilation, and significantly lower when closed, and hence low frequency noise levels would be lower 27dB, and would therefore by MCC's guidance be completely inaudible.

6.32 For clarity, Table 5, below, summarises the Local Authority criteria for entertainment noise breakout and the corresponding limiting noise level within the bar.

Table 5: Limiting Noise Level Summary

	Octave Band Centre Frequency, Hz								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dBA
Background noise level, $dBL_{A90,T}$	50	50	48	44	42	37	28	22	47
Entertainment criterion at residential façade, $dBL_{eq,T}$	40	40	38	34	32	27	18	12	37
Limiting entertainment noise sound pressure level in venue, $dBL_{eq,T}$	78	75	80	83	84	79	71	65	87

6.33 Measurements made by dBx Acoustics for typical city-centre bars with amplified music indicate that typical internal levels can be expected to be up to 85$dBL_{Aeq,T}$.

6.34 On this basis, it can be seen that compliance with MCC requirements as detailed in Planning Condition 20 should be readily achievable for this scheme.

7 NOISE TRANSFER TO ADJACENT DEMISES

7.1 It is understood that the Landlord requires an assessment of potential noise transfer to the adjacent demises within The Goods Yard. These are a bar/restaurant at ground floor, and office accommodation at first floor.

Separating Floor

7.2 The separating floor comprises a 250mm pre-tensioned concrete slab and a raised access floor.

7.3 For open plan office accommodation, BS8233:2014 recommends an indoor ambient noise level of 45-50dB$L_{Aeq,T}$.

7.4 For entertainment noise to be generally inaudible within the offices, it would be necessary for noise transfer to be at least 10dB lower than this, i.e. no higher than 35-40dB$L_{Aeq,T}$.

7.5 Based on the limiting sound pressure level for compliance with MCC noise emission criteria detailed in Table 5, above, and the predicted sound insulation performance of the 250mm concrete slab (without the additional sound insulation provided by any raised access floor). This is presented as Calculation 3, below.

Calculation 3: Noise Transfer to Offices Above

Room to Room

Date: 05/09/2024
Job No: 24071
Project: Trading Route
Title: Noise Transfer - Floor

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room Lp	80	76	83	89	92	87	79	73	94	92
Receive room RT	1	1	1	1	1	1	1	1		
Floor SRI	46	46	50	58	64	69	74	74		

Receive room dimensions; height: 3 m
width: 15 m
length: 15 m

Interface dimensions; height: 15 m
width: 15 m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room Lp	37	33	36	34	31	21	8	2	35	31

7.6 It can be seen that the separating floor construction is appropriate to control noise transfer from Trading Route to the offices above, such that no disturbance to office occupants would be expected.

Noise Transfer to Adjacent Unit

7.7 The separating construction between the commercial units is understood to comprise 140mm blockwork. It is not known if this has been lined with plasterboard within Caravan or whether a lining is proposed within Trading Route.

7.8 Calculations of noise transfer have therefore been carried out on a worst-case basis of the limiting entertainment noise level within Trading Route (see Table 5, above), and the predicted sound insulation performance of a 140mm blockwork wall.

7.9 The calculation is presented as Calculation 4, below.

Calculation 4: Noise Transfer to Adjacent Unit

Room to Room

Date:	05/09/2024
Job No:	24071
Project:	Trading Route
Title:	Noise Transfer - Wall

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room Lp	80	76	83	89	92	87	79	73	94	92
Receive room RT	1	1	1	1	1	1	1	1		
Wall SRI	39	42	39	46	53	59	64	64		

Receive room dimensions; height:	4	m
width:	30	m
length:	15	m
Interface dimensions; height:	22	m
width:	4	m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room Lp	36	29	39	38	34	23	10	4	38	34

7.10 The worst-case predicted noise transfer to the adjacent commercial unit is 38dB$L_{Aeq,T}$. In practice it is unlikely that entertainment noise levels in Trading Route would reach the limiting level of 94dB$L_{Aeq,T}$ and as such the resulting noise transfer would be much lower.

7.11 dBx Acoustics has measured ambient noise levels in the order of 50dB$L_{Aeq,T}$ within bars and restaurants during typical operations. On this basis, noise transfer from Trading Route to Caravan would be expected to be inaudible.

8 NOISE FROM BUILDING SERVICES

8.1 Planning Condition 21 requires that noise from building services should be controlled to 5dB below the background noise level ($dBL_{A90,T}$) at the nearest noise sensitive receptor.

8.2 On the basis of the background noise level recorded during the noise survey, presented in Section 5, above, the limiting noise level for plant affecting the residential receptor when assessed in accordance with BS4142:2014 is therefore $42dBL_{Ar,Tr}$.

Proposed Plant

8.3 The proposed plant comprises 3 no. condensing units located within the basement car park, 1 no. supply fan (inlet in the southern façade), and 2 no. extract fans which discharge within the façade opposite the residential premises.

8.4 It is understood that there are no openings within the basement façade which would allow noise from the condensing units to impact upon the residential receptors, and as such these are not considered further.

8.5 The supply and extract fans are Systemair K315L Sileo units with a manufacturer's sound power level of $75dBL_{w,A}$ at the inlet and $78dBL_{w,A}$ at the outlet.

8.6 Silencers are indicated to EF001 and SF001 but not to EF002 serving the WCs. The insertion loss of these silencers has not been provided for review.

8.7 Calculations have been undertaken based on the fan sound power and duct layout to calculate the resultant sound pressure level at the residential receptor.

8.8 Based on the manufacturer's data, the fans have no acoustically distinctive characteristics.

8.9 In order to meet MCC's requirements, the atmosphere side ductwork of *all three fans* requires silencers achieving the following minimum insertion loss;

Table 6: Required Silencer Insertion Loss, dB

Silencer Insertion Loss, dB							
63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
0	0	8	7	17	14	14	25

8.10 This can be readily achieved using 600mm length circular silencers. When silencer selections have been received.

9 SUMMARY AND CONCLUSION

9.1 dBx Acoustics Ltd has been appointed by Magpie Union Ltd to provide a noise impact assessment to support a planning application for a new bar within the Goods Yard building, Goods Yard Street, Manchester, M3 3BG.

9.2 The latest proposed opening time of the bar is 02:00h at weekends.

9.3 This report is intended to support discharge of Planning Conditions 20, relating to entertainment noise emissions, and 21, relating to noise from building services, affecting the adjacent residential receptor which is approximately 10m to the west.

9.4 A noise survey at a location representative of the noise sensitive receptor has been undertaken during the night time period in order to establish appropriate criteria for noise emissions.

9.5 An assessment of potential entertainment noise break-out has been carried out based on the installed curtain walling and door. It is demonstrated that Manchester City Council's criteria can be met with an ambient noise level within the bar of up to 87dB$L_{Aeq,T}$.

9.6 Based on the base build constructions, an assessment of noise transfer to the horizontally adjacent commercial unit and vertically adjacent office has also been undertaken. It is demonstrated that the base build constructions are sufficient to mitigate noise transfer such that no adverse impact on the adjacent tenancies would be expected.

9.7 Plant noise emission limits have been set in accordance with Manchester City Council requirements under Planning Condition 21. An assessment of noise emissions has been carried out based on the manufacturer's noise data for the supply and extract fans. Silencers are required on the atmospheric side of all ductwork; a minimum insertion loss for these silencers is presented within the report.

9.8 Taking the above into account, noise should not be a limiting factor in any planning application.

APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (Lp) the reference quantity is 2x10-5 N/m2. The sound pressure level existing when microphone measured pressure is 2x10-5 N/m2 is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A-weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
R_w	**Weighted Sound Reduction Index**, a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.

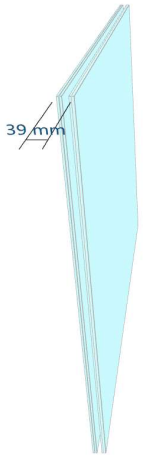
APPENDIX B – SOUND INSULATION DATA

NB: in calculations, 4dB has been removed from the predicted octave band performance of the curtain walling at all frequencies, to correspond to the manufacturer's quoted performance of 40dBR_w.

Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
- Key No. 5554
Job Name:
Job No.: Initials:susan
Date:05/09/2024
File Name:insul

Notes:



Rw 45 dB
C -2 dB
Ctr -7 dB

Mass-air-mass resonant frequency = =129 Hz

Panel Size = 2.0 m x 1.5 m

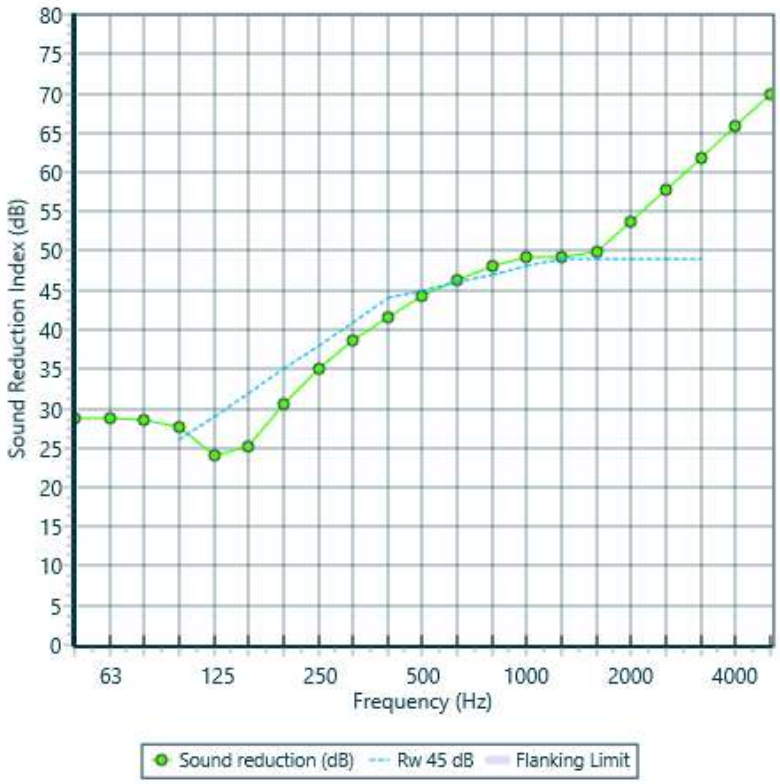
Partition surface mass = 52.5 kg/m²

System description

Pane 1 : 1 x 11.52 mm Laminated Glass (generic PVB) ~ Laminate 1.52 mm

air: 16 mm
Pane 2 : 1 x 11.52 mm Laminated Glass (generic PVB) ~ Laminate 1.52 mm

freq.(Hz)	R(dB)	R(dB)
50	29	
63	29	29
80	29	
100	28	
125	24	25
160	25	
200	31	
250	35	34
315	39	
400	42	
500	44	44
630	46	
800	48	
1000	49	49
1250	49	
1600	50	
2000	54	53
2500	58	
3150	62	
4000	66	65
5000	70	



Certificate of Test

Title: Sound Insulation Measurements of Pure Commercial on behalf of Senior Architectural Systems

Certificate of Test Number: 29979

Customer's Name & Address:

Senior Architectural Systems Ltd
Eland Road
Denaby Main
Doncaster
DN12 4HA

Our Ref: N950

VTC Job No: TR0164-3VQ5

Your Ref: PO 6477

Date: 8 April 2021

Date sample(s) received: 11 December 2020

Sample(s) received from: Senior Architectural Systems

Sample No(s): A8155-8&9

Tested by: ..... J Adams
J Adams (position: Assistant Engineer)

Authorised by: .....
S Collins (position: Materials Testing Manager)

VINCI Technology Centre UK Limited

0333 566 9000

info@technology-centre.co.uk

www.technology-centre.co.uk

Stanbridge Road, Leighton Buzzard, Bedfordshire, LU7 4QH

Registered office, Watford, England. Registered No. 05640885

If unsigned by the tester this is because the tester is site based and therefore unable to sign this Certificate of Test. However, all work has been checked, validated and approved prior to inclusion.

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This Certificate of Test and the results shown are based upon the information, drawings, samples and tests referred to herein.

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UKAS TESTING
0057

TECHNOLOGY CENTRE

1. Test Reference.

Laboratory measurement of sound insulation of building elements to BS EN ISO 10140 Part 2: 2010, Measurement of airborne sound insulation.

2. Testing Laboratory

VINCI Technology Centre UK Limited – UKAS Testing Laboratory no. 0057

3. Supplier.

Senior Architectural Systems Ltd
Eland Road
Denaby Main
Doncaster
DN12 4HA

4. Tests requested by.

Senior Architectural Systems Ltd
Eland Road
Denaby Main
Doncaster
DN12 4HA

5 Test opening.

The sample required a test opening 2020mm wide by 2200mm high, this was formed in an in-fill partition between the source and receiving rooms of the transmission suite. The partition was constructed with two separate leaves of five layers of plasterboard on independent timber frames with 200mm of mineral wool and an air gap of 115mm. All joints in the partition were sealed with tape and the periphery was mastic sealed to the permanent structure (*this is the standard partition construction which may need to be varied to suit the particular sample*).

6. Test Sample.

Two samples were tested, these comprised:

Sample Nos. A8155-8&9

A8155-8:

Pure Commercial 30.8mm double glazed units

6mm Planiclear cool-lite skin 176ii heatsoak toughened glass outer pane

16mm argon filled cavity- black warm edge spacer

8.8mm Planiclear acoustic clear laminated glass inner pane

A8155-9

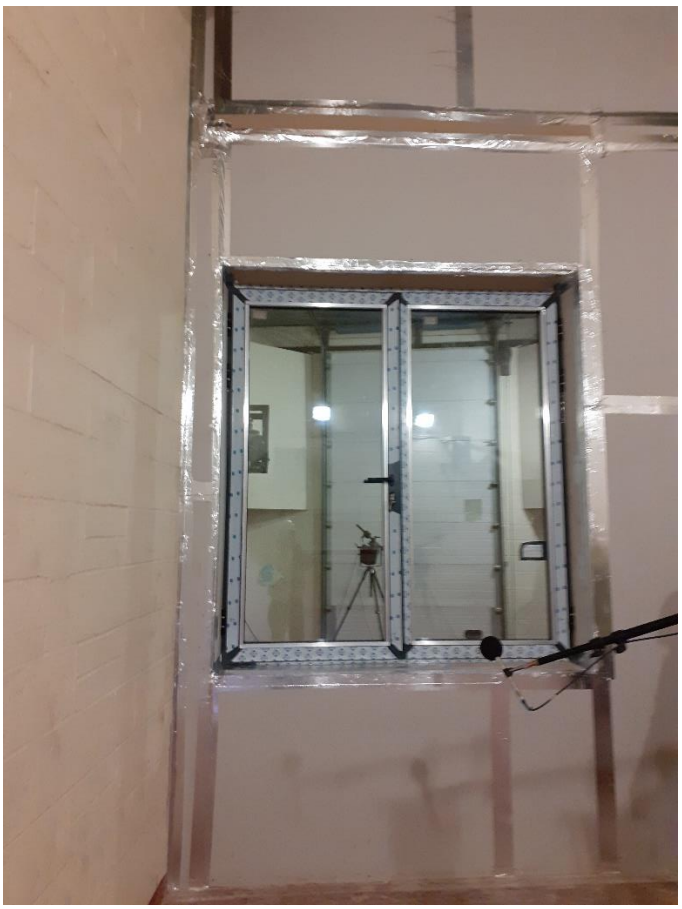
Pure Commercial 32.8mm double glazed units

6mm Planiclear cool-lite skin 176ii heatsoak toughened glass outer pane

16mm argon filled cavity- black warm edge spacer

10.8mm planiclear acoustic clear laminated glass inner pane

Photo 1 – Test specimen installed. Photo ref. 20201209_141444



See Appendix for drawings.

Installation was as close as possible to the method employed on site.

Information has been provided by the customer, and has not been verified independently by Technology Centre.

7. Test procedure.

This was in compliance with the requirements of BS EN ISO 10140-2: 2010 and was controlled by the in-house test proforma TestPro13 REV 0, this consists of the following major elements:

Measure receiving room reverberation time.

Reverberation time measured using third octave band noise over the frequency range of interest.

Measure receiving room background noise level.

Measure level difference between source and receiving rooms.

Level difference measured using broadband Pink noise in real time.

Calculate sound reduction index.

Using level difference and correction for receiving room absorption calculated from the reverberation time.

Equipment:

The following equipment is to be used for this measurement.

Equipment Description	**Inventory Number**
Sound level meter, NOR 140	CLR702, CLR 703
Power Amplifier, NOR 280	S0683A
Microphone, Norsonic type 1220	Serial number 62398
Microphone, Norsonic type 1225	Serial number 96195
Calibrator type Nor 1255	CLR 037
Loudspeaker, Norsonic type 229	S0686A
Rotating boom, Nor 265	CLR 695, CLR 696

8. Results.

The figure attached as page 5 gives the measured 1/3rd octave Sound Reduction Index (R) values both graphically and in tabular form. Also quoted is the Weighted Sound Reduction Index (R_w) with the two adaptation terms C and C_{tr}.

R_w is the single figure rating calculated in accordance with BS EN ISO 717-1 1997 using the reference curve shown on the graph. C adapts the Weighted Sound Reduction Index to 'pink' noise and C_{tr} adapts it to traffic noise, reference should be made to BS EN ISO 717-1 for the relevant adaptation term for various noise sources.

To enable comparison with the required specification the following table gives the octave band values converted from 1/3rd octave figures in compliance with the method given in BS EN ISO 10140 Part 1.

A8155-8

Freq Hz	63	125	250	500	1k	2k	4k	5k
R dB	25	23	30	36	40	37	42	45

A8155-9

Freq Hz	63	125	250	500	1k	2k	4k	5k
R dB	26	23	30	37	40	38	43	45

Test Sample Drawings and results

(un-numbered page)

Sound reduction index according to ISO 10140-2

Laboratory measurements of airborne sound insulation of building elements

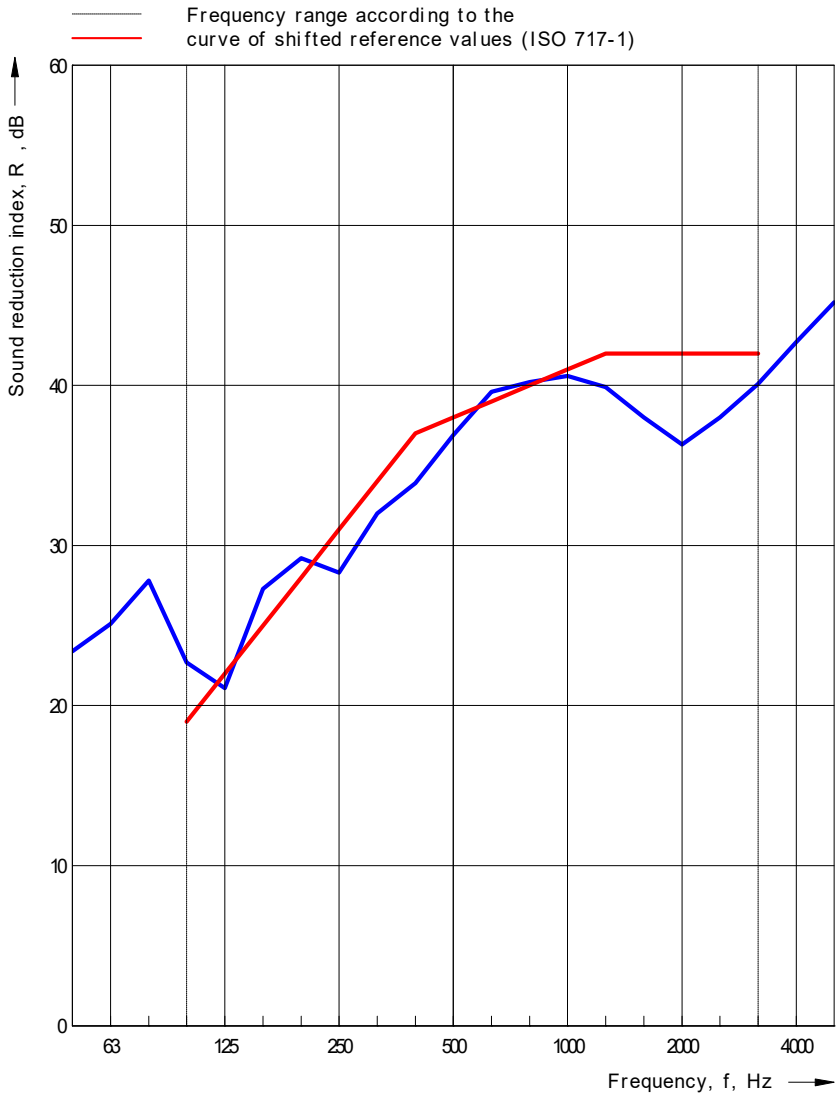
Client:	Senior Architectural Systems	Date of test:	10/12/2020
Manufacturer:	Senior Architectural Systems		
Test room identification:	VINCI Technology Cente Airborne Transmission Suite		
Test specimen mounted by:	Senior Architectural Systems		

Product identification:

Description of the specimen: A8155-8
Pure Commercial 30.8mm double glazed units
6mm Planiclear cool-lite skn 176ii heatsoak toughened glass outer pane
16mm Argon filled cavity- black warm edge spacer
8.8mm Planiclear acoustic clear laminated glass inner pane

Barometric pressure:	98.2	kPa
Size of test opening:	4.36	m²
Mass per unit area:		kg/m²
Temperature:	21.0	°C
Air humidity:	63	%
Source room volume:	145	m³
Receiving room volume:	125.0	m³

Frequency f [Hz]	R 1/3 octave [dB]
50	23.4
63	25.1
80	27.8
100	22.7
125	21.1
160	27.3
200	29.2
250	28.3
315	32.0
400	33.9
500	36.9
630	39.6
800	40.2
1,000	40.6
1,250	39.9
1,600	38.0
2,000	36.3
2,500	38.0
3,150	40.1
4,000	42.7
5,000	45.2



Rating according to ISO 717-1

$R_w(C;C_{tr})$ = 38 (-1; -4) dB

Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method.

$C_{50\text{-}3150}$ = -1 dB
$C_{tr,50\text{-}3150}$ = -4 dB
$C_{50\text{-}5000}$ = -1 dB
$C_{tr,50\text{-}5000}$ = -4 dB
$C_{100\text{-}5000}$ = -1 dB
$C_{tr,100\text{-}5000}$ = -4 dB

Company: Technology Centre

No. of test report:29979

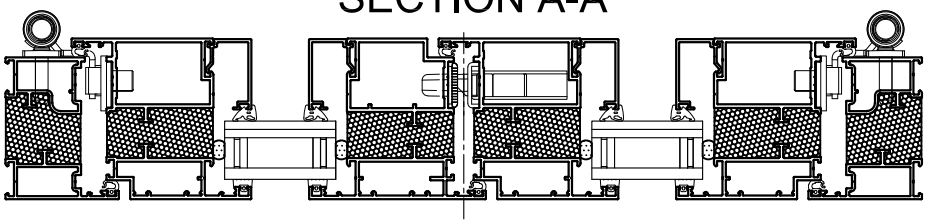
Date: 09/12/2020 Signature: J. Adams

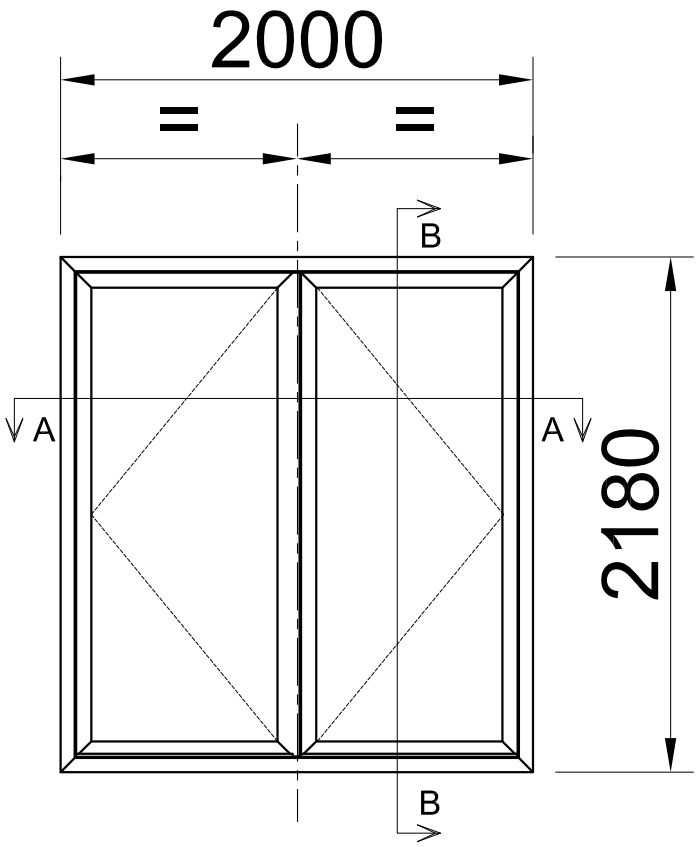
SOUND REDUCTION INDICES TEST 2	Rw	C	C_{tr}
GLASS AND DOOR FRAMES	38dB	-1dB	-4dB
For frequency range ratings, please refer to specific test report.			

DIRECT SOUND TRANSMISSION OF PURe COMMERCIAL, OPEN IN, REBATED MEETING STILE, DOUBLE DOOR, EQUAL SPLIT	
OUTER FRAME	PUR301300
VENT FRAME	PUR311312 + PUR315316
ADDITIONAL	EPS010 Around Glass (Between Glass & Vent)
GLASS SPEC	6mm Toughened - 16mm Argon Gas Cavity - 8.8mm Acoustic Laminate. **Glass Only Ratings - 42 dB Rw, -2dB C, -7dB C_{tr}.**

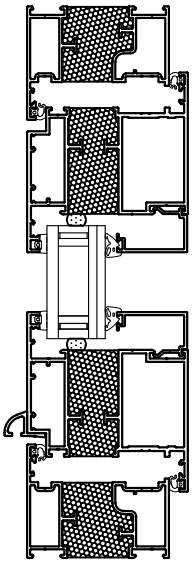
TEST CERTIFICATES ARE AVAILABLE UPON REQUEST.
REPORT REFERENCE: A8155-8

SECTION A-A





SECTION B-B



Sound reduction index according to ISO 10140-2

Laboratory measurements of airborne sound insulation of building elements

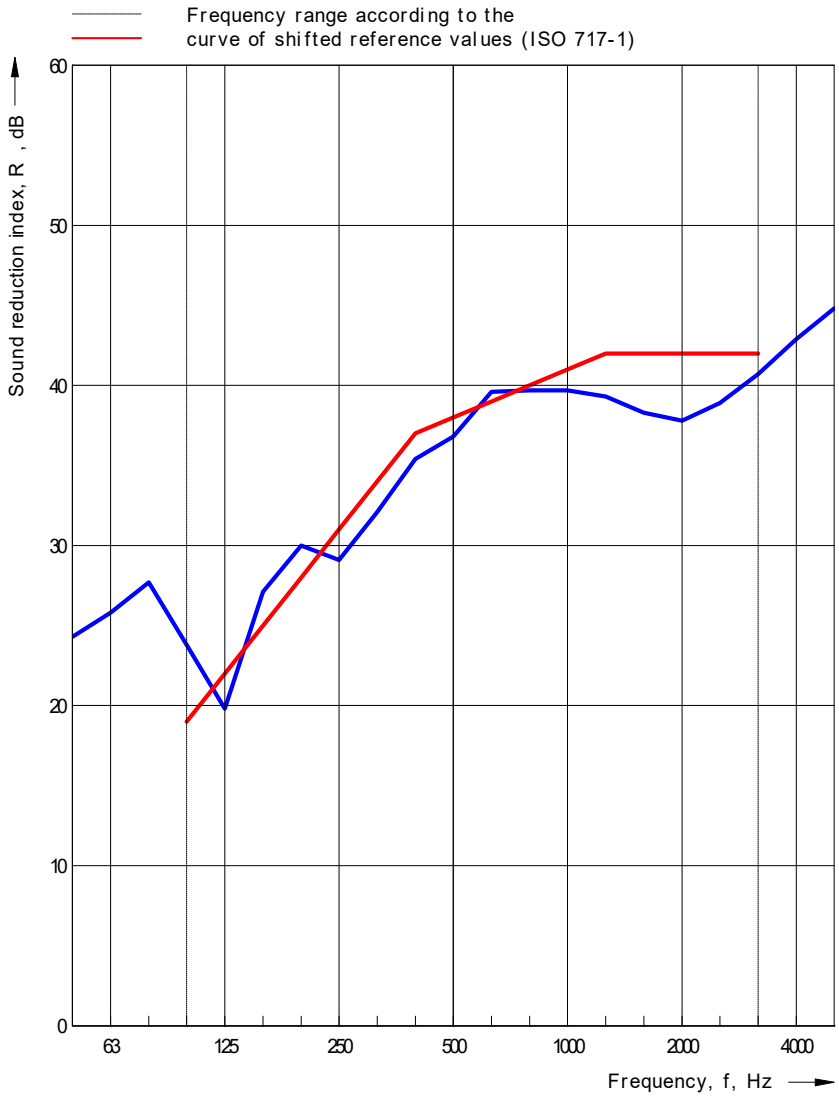
Client:	Senior Architectural Systems	Date of test:	10/12/2020
Manufacturer:	Senior Architectural Systems		
Test room identification:	VINCI Technology Centre Airborne Transmission Suite		
Test specimen mounted by:	Senior Architectural Systems		

Product identification:

Description of the specimen: A8155-9
Pure Commercial 32.8mm double glazed units
6mm Planiclear cool-lite skn 176ii heatsoak toughened glass outer pane
16mm Argon filled cavity- black warm edge spacer
10.8mm Planiclear acoustic clear laminated glass inner pane

Barometric pressure:	98.2	kPa
Size of test opening:	4.36	m²
Mass per unit area:		kg/m²
Temperature:	19.0	°C
Air humidity:	75	%
Source room volume:	145	m³
Receiving room volume:	125.0	m³

Frequency f [Hz]	R 1/3 octave [dB]
50	24.3
63	25.8
80	27.7
100	23.8
125	19.8
160	27.1
200	30.0
250	29.1
315	32.1
400	35.4
500	36.8
630	39.6
800	39.7
1,000	39.7
1,250	39.3
1,600	38.3
2,000	37.8
2,500	38.9
3,150	40.7
4,000	42.9
5,000	44.8



Rating according to ISO 717-1

$R_w(C;C_{tr})$ = 38 (-1; -4) dB

Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method.

$C_{50\text{-}3150}$ = -1 dB $C_{50\text{-}5000}$ = 0 dB $C_{100\text{-}5000}$ = 0 dB

$C_{tr,50\text{-}3150}$ = -4 dB $C_{tr,50\text{-}5000}$ = -4 dB $C_{tr,100\text{-}5000}$ = -4 dB

Company: Technology Centre

No. of test report:29979

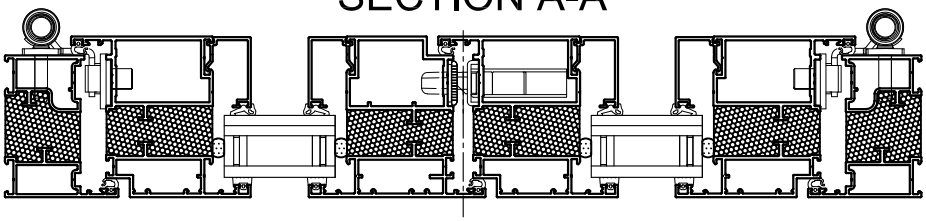
Date: 09/12/2020 Signature: D. Adams

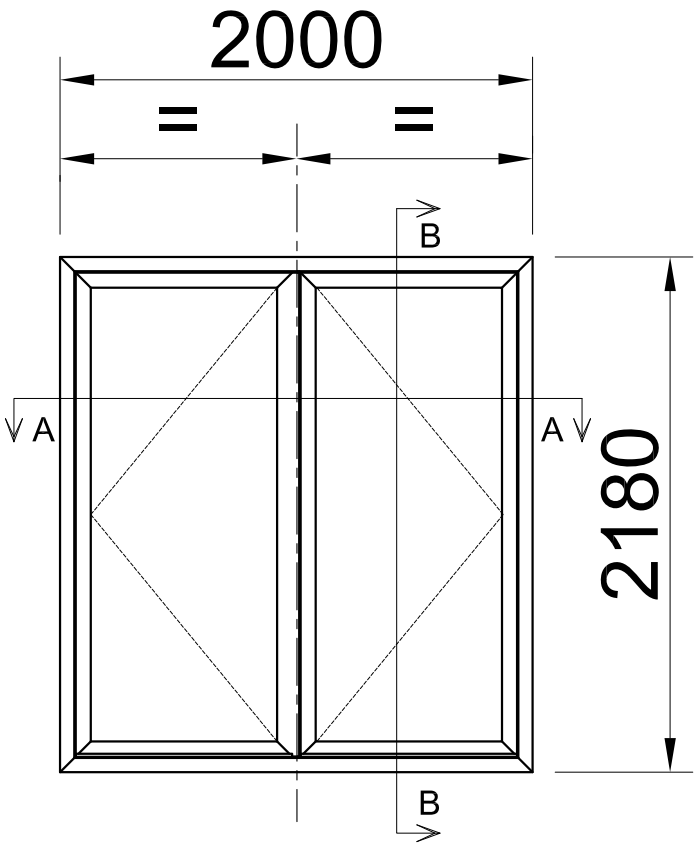
SOUND REDUCTION INDICES TEST 1	Rw	C	C_{tr}
GLASS AND DOOR FRAMES	38dB	-1dB	-4dB
For frequency range ratings, please refer to specific test report.			

DIRECT SOUND TRANSMISSION OF PURe COMMERCIAL, OPEN IN, REBATED MEETING STILE, DOUBLE DOOR, EQUAL SPLIT	
OUTER FRAME	PUR301300
VENT FRAME	PUR311312 + PUR315316
ADDITIONAL	EPS010 Around Glass (Between Glass & Vent)
GLASS SPEC	6mm Toughened - 16mm Argon Gas Cavity - 10.8mm Acoustic Laminate. **Glass Only Ratings - 42 dB Rw, -2dB C, -6dB C_{tr}.**

TEST CERTIFICATES ARE AVAILABLE UPON REQUEST.
REPORT REFERENCE: A8155-9

SECTION A-A





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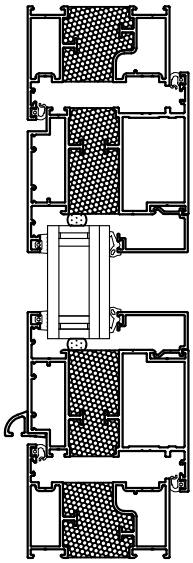


AGC Glass Europe - Avenue Jean Monnet 4 - 1348 Louvain-la-Neuve - Belgium

Estimation of sound reduction indexes

External glass :	Stratobel 55.2
Spacer :	16
Internal glass :	Stratobel 55.2

International Standard	
EN ISO 717-1 (1996)	
Rw	40 dB
(C;Ctr)	-1;-5 dB

These sound reduction indexes are estimated (no test).They correspond to glazings which are 1,23m. by 1,48 m. In-situ performances may vary according to the effective glazing dimensions, frame system, noise sources etc.The accuracy of the given indexes is +/- 2dB.

Securing glazing (DIN 18008-4)

Project data

Project:	Manchester Goods yard	**Position:**	GL-01 Curtain
Description:	750 x 2300	**User:**	ADMIN
Company:		**Date:**	10/09/2019

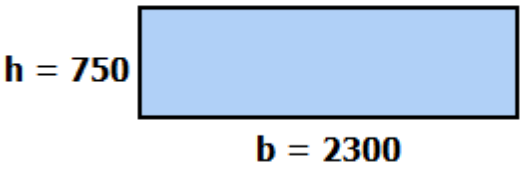
Geometry

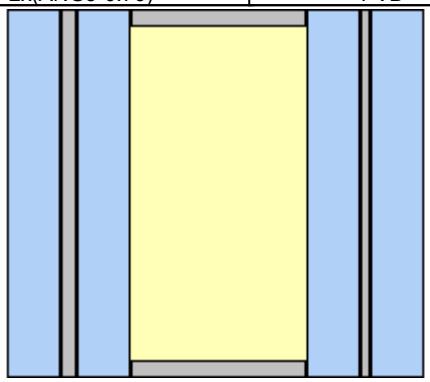
Vertical glazing **Membrane stress**

Installation	90.0°	**Width b**	2300 mm
Shape	Rectangle	**Height h**	750 mm
Support	Four-sided		
Securing glazing		Category A	

Construction

Nr.		Producer	Description	Gas/ Composite layer	Thickness
1	Glass outside	Sommer Informatik GmbH	2x(ANG5-1.52)	PVB	11.52
2	GD1		Chromatech	90% Argon	16.00
3	Glass inside	Sommer Informatik GmbH	2x(ANG5-0.76)	PVB	10.76





Own weight

Total weight 86.25 kg

cos(90.0°) = 0.00

	top / external	Middle	Bottom / Internal
Own weight	0.25 kN/m²	-	0.25 kN/m²
effective	**0.00 kN/m²**	**-**	**0.00 kN/m²**

Wind load

Manual input

	Load outside	Load indoors
Load case: Pressure	**1.67 kN/m²**	**0.00 kN/m²**
Load case: Suction	**-1.67 kN/m²**	**0.00 kN/m²**

Air Load

	GD1	GD2	isochorous pressure
Summer	29 K	-	-20 hPa
Winter	-25 K	-	40 hPa
Load summer	**11.86 kN/m²**	**-**	
Load winter	**-12.50 kN/m²**	**-**	

Local heights

	Installation	Production	Load
Load case max.	-	-	**7.20 kN/m²**
Load case min.	-	-	**-3.60 kN/m²**

Line load

Load on inner pane (Pressure)

Load **0.74 kN/m** **Location above FFL** 381 mm

Proof OK (max. utilization: 90.75 %)

max. chord shortening 0.12 mm (Load case 9)
Proof of impact resistance required. Pendulum fall height according to DIN 18008-4, Tab. A.1: 900 mm
max. Load case: full bond, outside, Nr. 4: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00)
Specifications differ from the standard: Limit of deflection

The edge protection is not a component of this proof
conditions for proof of impact resistance according to DIN 18008-4, appendix C.2 not fulfilled
Report E DIN 18008-2:2018-05, 6.4.1

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			dw* (mm)	ds* (mm)
Load case combinations (Gamma * Psi)	LSG (Float) 2 x 5.00		6.30	7.07
negative stress values to illustrate the direction of the deflection	LSG (Float) 2 x 5.00		6.30	7.07

* Deflection at the point of load attack of the line load or single load. Values for the middle of the glass in brackets.

Result	**Usability Deflection mm**				**Sustainability Stress N/mm²**				
without lamination	**f**	**zul f**		**res. gap**	(kmod)	**Ed**	**Rd**	**Utilisation**	
Nr. 1: Weight (1.35 * 1.00), Line load (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**-1.82**	*	**OK**	**15.65**	(0.70)	**-8.68**	**34.65**	**25 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.17 (-2.17)**	*	**OK**		(0.70)	**-15.33**	**34.65**	**44 %**	**OK**
Nr. 2: Weight (1.00 * 1.00), Wind suction (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**-2.24**	**11.54**	**OK**	**16.27**	(0.70)	**-10.68**	**34.65**	**31 %**	**OK**
LSG (Float) 2 x 5.00	**-1.97**	**11.54**	**OK**		(0.70)	**-9.41**	**34.65**	**27 %**	**OK**
Nr. 3: Weight (1.35 * 1.00), Wind pressure (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**2.24**	**11.54**	**OK**	**15.73**	(0.70)	**10.68**	**34.65**	**31 %**	**OK**
LSG (Float) 2 x 5.00	**1.97**	**11.54**	**OK**		(0.70)	**9.41**	**34.65**	**27 %**	**OK**
Nr. 4: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00)									
LSG (Float) 2 x 5.00	**-3.06**	**11.54**	**OK**	**22.11**	(0.40)	**-9.72**	**19.80**	**49 %**	**OK**
LSG (Float) 2 x 5.00	**3.06**	**11.54**	**OK**		(0.40)	**9.72**	**19.80**	**49 %**	**OK**
Nr. 5: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00)									
LSG (Float) 2 x 5.00	**2.58**	**11.54**	**OK**	**10.83**	(0.40)	**8.21**	**19.80**	**41 %**	**OK**
LSG (Float) 2 x 5.00	**-2.58**	**11.54**	**OK**		(0.40)	**-8.21**	**19.80**	**41 %**	**OK**
Nr. 6: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 0.60), Line load (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**-1.39**	*	**OK**	**12.25**	(0.70)	**-9.43**	**34.65**	**27 %**	**OK**
LSG (Float) 2 x 5.00*	**-5.14 (-5.14)**	*	**OK**		(0.70)	**-26.63**	**34.65**	**77 %**	**OK**
Nr. 7: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 0.60), Line load (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**-5.43**	*	**OK**	**20.39**	(0.70)	**-22.27**	**34.65**	**64 %**	**OK**
LSG (Float) 2 x 5.00*	**-1.04 (-1.04)**	*	**OK**		(0.70)	**-13.60**	**34.65**	**39 %**	**OK**
Nr. 8: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 1.00), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**-1.73**	*	**OK**	**12.46**	(0.70)	**-11.10**	**34.65**	**32 %**	**OK**
LSG (Float) 2 x 5.00*	**-5.27 (-5.27)**	*	**OK**		(0.70)	**-25.79**	**34.65**	**74 %**	**OK**
Nr. 9: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 1.00), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**-5.77**	*	**OK**	**20.61**	(0.70)	**-23.91**	**34.65**	**69 %**	**OK**
LSG (Float) 2 x 5.00*	**-1.17 (-1.17)**	*	**OK**		(0.70)	**-12.74**	**34.65**	**37 %**	**OK**
Nr. 10: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Wind suction (1.50 * 0.60), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**-0.04**	*	**OK**	**10.75**	(0.70)	**-4.28**	**34.65**	**12 %**	**OK**
LSG (Float) 2 x 5.00*	**-5.29 (-5.29)**	*	**OK**		(0.70)	**-24.59**	**34.65**	**71 %**	**OK**
Nr. 11: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Wind suction (1.50 * 0.60), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**-5.64**	*	**OK**	**22.02**	(0.70)	**-22.09**	**34.65**	**64 %**	**OK**
LSG (Float) 2 x 5.00*	**0.38 (0.38)**	*	**OK**		(0.70)	**-6.59**	**34.65**	**19 %**	**OK**
Nr. 12: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind pressure (1.50 * 0.60), Line load (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**1.31**	*	**OK**	**11.93**	(0.70)	**3.40**	**34.65**	**10 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.77 (-2.77)**	*	**OK**		(0.70)	**-15.34**	**34.65**	**44 %**	**OK**
Nr. 13: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind pressure (1.50 * 0.60), Line load (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**-2.79**	*	**OK**	**18.79**	(0.70)	**-9.63**	**34.65**	**28 %**	**OK**
LSG (Float) 2 x 5.00*	**1.28 (0.00)**	*	**OK**		(0.70)	**2.49**	**34.65**	**7 %**	**OK**
Nr. 14: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind pressure (1.50 * 1.00), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**2.75**	*	**OK**	**11.93**	(0.70)	**10.27**	**34.65**	**30 %**	**OK**
LSG (Float) 2 x 5.00*	**-1.33 (-1.33)**	*	**OK**		(0.70)	**-6.98**	**34.65**	**20 %**	**OK**
Nr. 15: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind pressure (1.50 * 1.00), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**-1.36**	*	**OK**	**20.07**	(0.70)	**-2.77**	**34.65**	**8 %**	**OK**
LSG (Float) 2 x 5.00	**2.71**	*	**OK**		(0.70)	**6.13**	**34.65**	**18 %**	**OK**
Nr. 16: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Wind pressure (1.50 * 0.60), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**2.65**	*	**OK**	**10.43**	(0.70)	**8.55**	**34.65**	**25 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.92 (-2.92)**	*	**OK**		(0.70)	**-13.29**	**34.65**	**38 %**	**OK**
Nr. 17: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Wind pressure (1.50 * 0.60), Line load (1.50 * 0.70)									

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LSG (Float) 2 x 5.00	**-3.01**		*	**OK**	**21.70**	(0.70)	**-9.44**	**34.65**	**27 %**	**OK**
LSG (Float) 2 x 5.00	**2.69**		*	**OK**		(0.70)	**4.81**	**34.65**	**14 %**	**OK**
Nr. 18: Weight (1.35 * 1.00), Low installation (1.00 * 1.00)										
LSG (Float) 2 x 5.00	**0.58**	**11.54**		**OK**	**14.84**	(0.25)	**1.84**	**12.38**	**15 %**	**OK**
LSG (Float) 2 x 5.00	**-0.58**	**11.54**		**OK**		(0.25)	**-1.84**	**12.38**	**15 %**	**OK**
Nr. 19: Weight (1.35 * 1.00), High installation (1.00 * 1.00)										
LSG (Float) 2 x 5.00	**-1.16**	**11.54**		**OK**	**18.31**	(0.25)	**-3.67**	**12.38**	**30 %**	**OK**
LSG (Float) 2 x 5.00	**1.16**	**11.54**		**OK**		(0.25)	**3.67**	**12.38**	**30 %**	**OK**
Nr. 20: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 0.60)										
LSG (Float) 2 x 5.00	**0.44**	**11.54**		**OK**	**12.60**	(0.70)	**-0.75**	**34.65**	**2 %**	**OK**
LSG (Float) 2 x 5.00	**-2.96**	**11.54**		**OK**		(0.70)	**-11.30**	**34.65**	**33 %**	**OK**
Nr. 21: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 0.60)										
LSG (Float) 2 x 5.00	**-3.63**	**11.54**		**OK**	**20.75**	(0.70)	**-13.69**	**34.65**	**40 %**	**OK**
LSG (Float) 2 x 5.00	**1.12**	**11.54**		**OK**		(0.70)	**1.67**	**34.65**	**5 %**	**OK**
Nr. 22: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**-0.45**	**11.54**		**OK**	**12.71**	(0.70)	**-5.01**	**34.65**	**14 %**	**OK**
LSG (Float) 2 x 5.00	**-3.75**	**11.54**		**OK**		(0.70)	**-15.04**	**34.65**	**43 %**	**OK**
Nr. 23: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**-4.52**	**11.54**		**OK**	**20.86**	(0.70)	**-17.93**	**34.65**	**52 %**	**OK**
LSG (Float) 2 x 5.00	**0.34**	**11.54**		**OK**		(0.70)	**-2.08**	**34.65**	**6 %**	**OK**
Nr. 24: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Wind suction (1.50 * 0.60)										
LSG (Float) 2 x 5.00	**1.25**	**11.54**		**OK**	**11.00**	(0.70)	**1.81**	**34.65**	**5 %**	**OK**
LSG (Float) 2 x 5.00	**-3.76**	**11.54**		**OK**		(0.70)	**-13.83**	**34.65**	**40 %**	**OK**
Nr. 25: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Wind suction (1.50 * 0.60)										
LSG (Float) 2 x 5.00	**-4.39**	**11.54**		**OK**	**22.27**	(0.70)	**-16.09**	**34.65**	**46 %**	**OK**
LSG (Float) 2 x 5.00	**1.89**	**11.54**		**OK**		(0.70)	**4.10**	**34.65**	**12 %**	**OK**
Nr. 26: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Line load (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**-0.04**		*	**OK**	**12.09**	(0.70)	**-3.02**	**34.65**	**9 %**	**OK**
LSG (Float) 2 x 5.00*	**-3.95 (-3.95)**		*	**OK**		(0.70)	**-20.98**	**34.65**	**61 %**	**OK**
Nr. 27: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Line load (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**-4.11**		*	**OK**	**20.24**	(0.70)	**-15.97**	**34.65**	**46 %**	**OK**
LSG (Float) 2 x 5.00*	**0.12 (0.12)**		*	**OK**		(0.70)	**-8.04**	**34.65**	**23 %**	**OK**
Nr. 28: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**0.51**		*	**OK**	**12.19**	(0.70)	**-0.42**	**34.65**	**1 %**	**OK**
LSG (Float) 2 x 5.00*	**-3.30 (-3.30)**		*	**OK**		(0.70)	**-16.39**	**34.65**	**47 %**	**OK**
Nr. 29: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**-3.57**		*	**OK**	**19.57**	(0.70)	**-13.37**	**34.65**	**39 %**	**OK**
LSG (Float) 2 x 5.00*	**0.77 (0.00)**		*	**OK**		(0.70)	**3.44**	**34.65**	**10 %**	**OK**
Nr. 30: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**1.31**		*	**OK**	**10.59**	(0.70)	**2.13**	**34.65**	**6 %**	**OK**
LSG (Float) 2 x 5.00*	**-4.10 (-4.10)**		*	**OK**		(0.70)	**-18.94**	**34.65**	**55 %**	**OK**
Nr. 31: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**-4.33**		*	**OK**	**20.33**	(0.70)	**-15.78**	**34.65**	**46 %**	**OK**
LSG (Float) 2 x 5.00*	**1.53 (0.00)**		*	**OK**		(0.70)	**1.02**	**34.65**	**3 %**	**OK**

Rd = kmod * kc * fk * k1 * k2 / gammaM [k1: 18008-1, 8.3.8] [k2: 18008-1, 8.3.9]
LSG (Float) 2 x 5.00: Rd = kmod * 1.8 * 45.00 * 1.0 * 1.1 / 1.8 = kmod * 49.50
LSG (Float) 2 x 5.00: Rd = kmod * 1.8 * 45.00 * 1.0 * 1.1 / 1.8 = kmod * 49.50

	dw* (mm)	ds* (mm)
Load case combinations (Gamma * Psi)	LSG (Float) 2 x 5.00 10.00	10.00
negative stress values to illustrate the direction of the deflection	LSG (Float) 2 x 5.00 10.00	10.00

* Deflection at the point of load attack of the line load or single load. Values for the middle of the glass in brackets.

Result	**Usability Deflection mm**				**Sustainability Stress N/mm²**			
full bond	**f**	**zul f**		**res. gap**	(kmod)	**Ed**	**Rd**	**Utilisation**
Nr. 1: Weight (1.35 * 1.00), Line load (1.50 * 1.00)								
LSG (Float) 2 x 5.00	**-0.38**		*	**OK**	**15.77**	(0.70)	**-3.65**	**31.50**	**12 %**	**OK**
LSG (Float) 2 x 5.00*	**-0.62 (-0.62)**		*	**OK**		(0.70)	**-8.36**	**31.50**	**27 %**	**OK**

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Nr. 2: Weight (1.00 * 1.00), Wind suction (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**-0.64**	**11.54**	**OK**	**16.23**	(0.70)	**-6.11**	**31.50**	**19 %**	**OK**
LSG (Float) 2 x 5.00	**-0.42**	**11.54**	**OK**		(0.70)	**-3.96**	**31.50**	**13 %**	**OK**
Nr. 3: Weight (1.35 * 1.00), Wind pressure (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**0.64**	**11.54**	**OK**	**15.77**	(0.70)	**6.11**	**31.50**	**19 %**	**OK**
LSG (Float) 2 x 5.00	**0.42**	**11.54**	**OK**		(0.70)	**3.96**	**31.50**	**13 %**	**OK**
Nr. 4: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00)										
LSG (Float) 2 x 5.00	**-2.57**	**11.54**	**OK**	**21.14**	(0.40)	**-16.33**	**18.00**	**91 %**	**OK**
LSG (Float) 2 x 5.00	**2.57**	**11.54**	**OK**		(0.40)	**16.33**	**18.00**	**91 %**	**OK**
Nr. 5: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00)										
LSG (Float) 2 x 5.00	**2.17**	**11.54**	**OK**	**11.66**	(0.40)	**13.80**	**18.00**	**77 %**	**OK**
LSG (Float) 2 x 5.00	**-2.17**	**11.54**	**OK**		(0.40)	**-13.80**	**18.00**	**77 %**	**OK**
Nr. 6: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 0.60), Line load (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**0.73**	*	**OK**	**12.91**	(0.70)	**2.20**	**31.50**	**7 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.36 (-2.36)**	*	**OK**		(0.70)	**-20.24**	**31.50**	**64 %**	**OK**
Nr. 7: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 0.60), Line load (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**-2.70**	*	**OK**	**19.76**	(0.70)	**-19.58**	**31.50**	**62 %**	**OK**
LSG (Float) 2 x 5.00	**1.07**	*	**OK**		(0.70)	**1.74**	**31.50**	**6 %**	**OK**
Nr. 8: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 1.00), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**0.59**	*	**OK**	**13.07**	(0.70)	**0.86**	**31.50**	**3 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.34 (-2.34)**	*	**OK**		(0.70)	**-19.32**	**31.50**	**61 %**	**OK**
Nr. 9: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 1.00), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**-2.84**	*	**OK**	**19.92**	(0.70)	**-20.92**	**31.50**	**66 %**	**OK**
LSG (Float) 2 x 5.00	**1.08**	*	**OK**		(0.70)	**2.60**	**31.50**	**8 %**	**OK**
Nr. 10: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Wind suction (1.50 * 0.60), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**1.52**	*	**OK**	**11.63**	(0.70)	**7.58**	**31.50**	**24 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.85 (-2.85)**	*	**OK**		(0.70)	**-22.02**	**31.50**	**70 %**	**OK**
Nr. 11: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Wind suction (1.50 * 0.60), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**-3.22**	*	**OK**	**21.11**	(0.70)	**-22.54**	**31.50**	**72 %**	**OK**
LSG (Float) 2 x 5.00	**1.89**	*	**OK**		(0.70)	**8.25**	**31.50**	**26 %**	**OK**
Nr. 12: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind pressure (1.50 * 0.60), Line load (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**1.50**	*	**OK**	**12.64**	(0.70)	**9.53**	**31.50**	**30 %**	**OK**
LSG (Float) 2 x 5.00*	**-1.86 (-1.86)**	*	**OK**		(0.70)	**-15.49**	**31.50**	**49 %**	**OK**
Nr. 13: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind pressure (1.50 * 0.60), Line load (1.50 * 1.00)										
LSG (Float) 2 x 5.00	**-1.93**	*	**OK**	**19.49**	(0.70)	**-12.26**	**31.50**	**39 %**	**OK**
LSG (Float) 2 x 5.00	**1.56**	*	**OK**		(0.70)	**6.48**	**31.50**	**21 %**	**OK**
Nr. 14: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind pressure (1.50 * 1.00), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**1.87**	*	**OK**	**12.62**	(0.70)	**13.06**	**31.50**	**41 %**	**OK**
LSG (Float) 2 x 5.00*	**-1.51 (-1.51)**	*	**OK**		(0.70)	**-11.40**	**31.50**	**36 %**	**OK**
Nr. 15: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind pressure (1.50 * 1.00), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**-1.56**	*	**OK**	**19.47**	(0.70)	**-8.72**	**31.50**	**28 %**	**OK**
LSG (Float) 2 x 5.00	**1.91**	*	**OK**		(0.70)	**10.51**	**31.50**	**33 %**	**OK**
Nr. 16: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Wind pressure (1.50 * 0.60), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**2.29**	*	**OK**	**11.36**	(0.70)	**14.91**	**31.50**	**47 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.35 (-2.35)**	*	**OK**		(0.70)	**-17.27**	**31.50**	**55 %**	**OK**
Nr. 17: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Wind pressure (1.50 * 0.60), Line load (1.50 * 0.70)										
LSG (Float) 2 x 5.00	**-2.45**	*	**OK**	**20.84**	(0.70)	**-15.23**	**31.50**	**48 %**	**OK**
LSG (Float) 2 x 5.00	**2.39**	*	**OK**		(0.70)	**12.99**	**31.50**	**41 %**	**OK**
Nr. 18: Weight (1.35 * 1.00), Low installation (1.00 * 1.00)										
LSG (Float) 2 x 5.00	**0.49**	**11.54**	**OK**	**15.03**	(0.25)	**3.09**	**11.25**	**27 %**	**OK**
LSG (Float) 2 x 5.00	**-0.49**	**11.54**	**OK**		(0.25)	**-3.09**	**11.25**	**27 %**	**OK**
Nr. 19: Weight (1.35 * 1.00), High installation (1.00 * 1.00)										
LSG (Float) 2 x 5.00	**-0.97**	**11.54**	**OK**	**17.94**	(0.25)	**-6.17**	**11.25**	**55 %**	**OK**
LSG (Float) 2 x 5.00	**0.97**	**11.54**	**OK**		(0.25)	**6.17**	**11.25**	**55 %**	**OK**
Nr. 20: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 0.60)										
LSG (Float) 2 x 5.00	**1.11**	**11.54**	**OK**	**13.14**	(0.70)	**5.85**	**31.50**	**19 %**	**OK**

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LSG (Float) 2 x 5.00	**-1.75**	**11.54**	**OK**		(0.70)	**-11.89**	**31.50**	**38 %**	**OK**
Nr. 21: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 0.60)									
LSG (Float) 2 x 5.00	**-2.31**	**11.54**	**OK**	**19.99**	(0.70)	**-15.93**	**31.50**	**51 %**	**OK**
LSG (Float) 2 x 5.00	**1.68**	**11.54**	**OK**		(0.70)	**9.90**	**31.50**	**31 %**	**OK**
Nr. 22: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Wind suction (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**0.86**	**11.54**	**OK**	**13.23**	(0.70)	**3.41**	**31.50**	**11 %**	**OK**
LSG (Float) 2 x 5.00	**-1.91**	**11.54**	**OK**		(0.70)	**-13.47**	**31.50**	**43 %**	**OK**
Nr. 23: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Wind suction (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**-2.57**	**11.54**	**OK**	**20.08**	(0.70)	**-18.37**	**31.50**	**58 %**	**OK**
LSG (Float) 2 x 5.00	**1.52**	**11.54**	**OK**		(0.70)	**8.31**	**31.50**	**26 %**	**OK**
Nr. 24: Weight (1.00 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Wind suction (1.50 * 0.60)									
LSG (Float) 2 x 5.00	**1.79**	**11.54**	**OK**	**11.80**	(0.70)	**10.14**	**31.50**	**32 %**	**OK**
LSG (Float) 2 x 5.00	**-2.42**	**11.54**	**OK**		(0.70)	**-16.17**	**31.50**	**51 %**	**OK**
Nr. 25: Weight (1.00 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Wind suction (1.50 * 0.60)									
LSG (Float) 2 x 5.00	**-2.95**	**11.54**	**OK**	**21.27**	(0.70)	**-19.99**	**31.50**	**63 %**	**OK**
LSG (Float) 2 x 5.00	**2.32**	**11.54**	**OK**		(0.70)	**13.96**	**31.50**	**44 %**	**OK**
Nr. 26: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Line load (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**1.11**	*****	**OK**	**12.77**	(0.70)	**5.87**	**31.50**	**19 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.11 (-2.11)**	*****	**OK**		(0.70)	**-17.87**	**31.50**	**57 %**	**OK**
Nr. 27: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Line load (1.50 * 1.00)									
LSG (Float) 2 x 5.00	**-2.31**	*****	**OK**	**19.63**	(0.70)	**-15.92**	**31.50**	**51 %**	**OK**
LSG (Float) 2 x 5.00	**1.31**	*****	**OK**		(0.70)	**4.11**	**31.50**	**13 %**	**OK**
Nr. 28: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 0.60), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**1.23**	*****	**OK**	**12.84**	(0.70)	**6.96**	**31.50**	**22 %**	**OK**
LSG (Float) 2 x 5.00*	**-1.93 (-1.93)**	*****	**OK**		(0.70)	**-15.36**	**31.50**	**49 %**	**OK**
Nr. 29: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 0.60), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**-2.20**	*****	**OK**	**19.70**	(0.70)	**-14.82**	**31.50**	**47 %**	**OK**
LSG (Float) 2 x 5.00	**1.50**	*****	**OK**		(0.70)	**6.56**	**31.50**	**21 %**	**OK**
Nr. 30: Weight (1.35 * 1.00), Low installation (1.00 * 1.00), Climate winter (1.00 * 1.00), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**1.90**	*****	**OK**	**11.50**	(0.70)	**11.25**	**31.50**	**36 %**	**OK**
LSG (Float) 2 x 5.00*	**-2.60 (-2.60)**	*****	**OK**		(0.70)	**-19.65**	**31.50**	**62 %**	**OK**
Nr. 31: Weight (1.35 * 1.00), High installation (1.00 * 1.00), Climate summer (1.00 * 1.00), Line load (1.50 * 0.70)									
LSG (Float) 2 x 5.00	**-2.84**	*****	**OK**	**20.97**	(0.70)	**-18.89**	**31.50**	**60 %**	**OK**
LSG (Float) 2 x 5.00	**2.14**	*****	**OK**		(0.70)	**10.62**	**31.50**	**34 %**	**OK**

Rd = kmod * kc * fk * k1 * k2 / gammaM [k1: 18008-1, 8.3.8] [k2: 18008-1, 8.3.9]
LSG (Float) 2 x 5.00: Rd = kmod * 1.8 * 45.00 * 1.0 * 1.0 / 1.8 = kmod * 45.00
LSG (Float) 2 x 5.00: Rd = kmod * 1.8 * 45.00 * 1.0 * 1.0 / 1.8 = kmod * 45.00

Edge seal

Maximum edge load 0.47 N/mm

Height D	4 mm
Secondary seal	polysulfide
Spacer	Chromatech

E-Module	*70.0 GPa*	*Poisson's ratio*	*0.23*
Pressure	*100 kPa*	*Density*	*2500 kg/m³*
Aspect ratio e	*0.33*	*short edge*	*750 mm*

Statical coefficient	*Deflection*	*Stress*	*Volume*
int. uniform load	*0.1398*	*0.7143*	*0.0653*
ext. uniform load	*0.1398*	*0.7143*	

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The Trading Route, Manchester

Noise Impact Assessment

dBx Acoustics Ltd
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24071-R01A-BT The Trading Route Manchester

Client: Magpie Union Ltd

Date: 28/10/2024

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	08/09/2024	Original Issue	Simon Fuller BEng	Susan Witterick BSc MIOA
R01A	08/09/2024	Updated to address Local Authority comments	Ben Tomlin BSc MIOA	Susan Witterick BSc MIOA

1 INTRODUCTION

1.1 dBx Acoustics Ltd has been appointed by Magpie Union Ltd to provide a noise impact assessment to support a planning application for a bar to be known as The Trading Route within the Manchester Goods Yard building, Goods Yard Street, Manchester, M3 3BG.

1.2 The bar will operate from 08:00h-00:00h on weekdays, and 08:00h-02:00h on weekends.

1.3 This report details a site noise survey, and provides an assessment of entertainment noise emissions, plant noise emissions, and sound insulation to the adjacent tenancies.

1.4 The Local Authority is Manchester City Council.

1.5 This report updates the dBx Acoustics' original report ref *24071-R01-SF* dated 08/09/2024 to consider comments from Manchester City Council's environmental health department relating to doors.

1.6 A glossary of acoustic terminology has been supplied in Appendix A to assist the reader.

2 ACOUSTIC CRITERIA

Local Authority Requirements

2.1 Planning permission for The Goods Yard was granted by Manchester City Council (MCC), reference 121511/FO/2018. The following conditions are applicable to this assessment;

> *Condition 20) Where entertainment noise is proposed the L_{Aeq} (entertainment noise) should be controlled to 10dB below the L_{A90} (without entertainment noise) at the facade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63HZ and 125Hz octave frequency bands should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.*
>
> *Condition 21) 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.*

Landlord's Requirements

2.2 It is understood that the Landlord requires an assessment of potential noise transfer to the adjacent demises. No quantitative criteria have been set.

BS 8233:2014: 'Guidance on sound insulation and noise reduction for buildings'

Indoor Ambient Noise Levels within Offices

2.3 With respect to intrusive external noise, BS 8233 identifies the British Council for Offices (BCO) Guide to Specification for general acoustic guidance on offices. BS 8233 highlights that complaints from office workers typically arise from the intrusion of external noise, high internal noise levels from services, low background noise, excessive reflections from room surfaces, and inadequate sound insulation between offices. Advice is provided within the BS 8233 guidance in respect of the internal design of offices, including open-plan offices for speech privacy and the control of noise.

2.4 The relevant criteria for offices are reproduced in Table 1.

Table 1: BS 8233 Acoustic Design Criteria for Offices

Activity	Location	Design Range	
		$L_{Aeq,\,T}$ (dB)	L_{AFmax} (dB)
Study and work requiring concentration	Executive office	35 – 40	50
Work requiring acoustic privacy	Open plan office	45 – 50	55
Speech or telephone Communications	Corridor, circulation space	45 – 55	50

BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound'

2.5 BS 4142:2014 sets out a procedure for assessing noise impact whereby a Noise Rating Level is determined and compared with the existing local Background Sound Level.

2.6 The Rating Level (dB $L_{Ar,Tr}$) is evaluated from the Specific Noise Level by including cumulative corrections to account for factors such as distinguishable tone, impulsivity, intermittency or other readily distinguishable sound characteristics.

2.7 The assessment of the impact depends upon the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level. An initial estimate of the impact of the specific sound is made by subtracting the Background Sound Level from the Rating Level, while considering the following points:

a) Typically, the greater this difference, the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

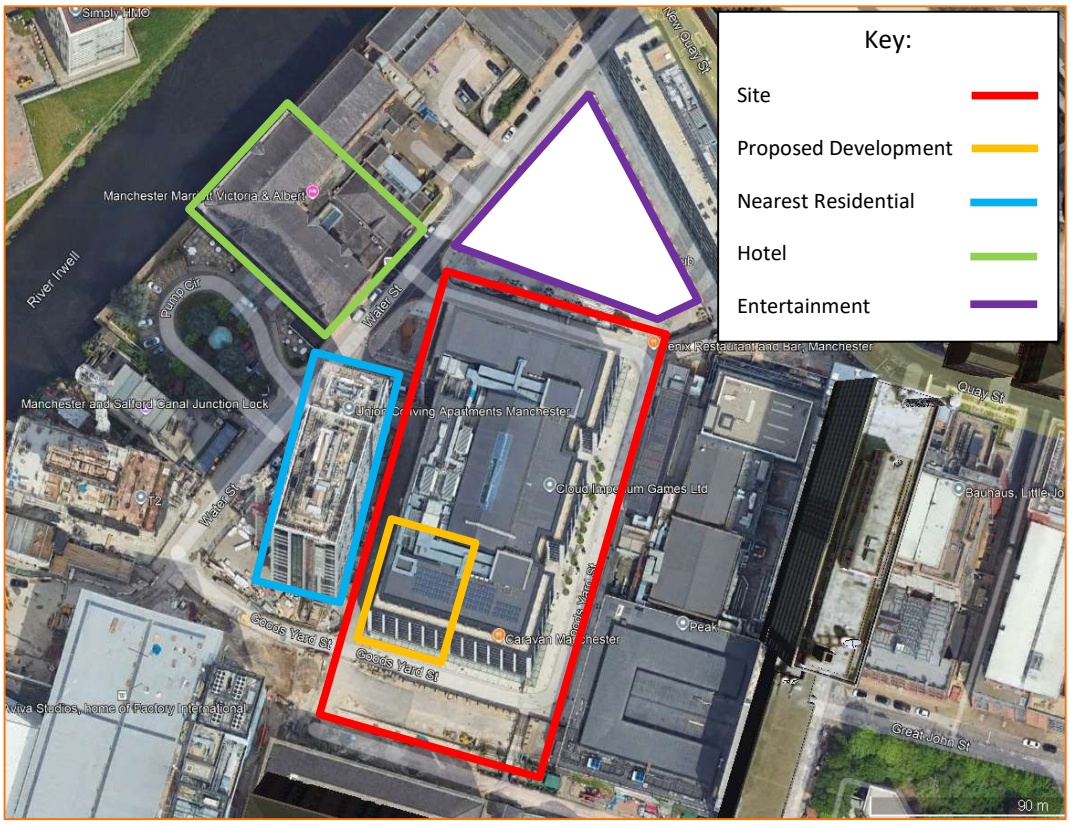
c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3 SITE DESCRIPTION

3.1 The Trading Route will occupy the south-western unit in The Goods Yard. Figure 1, below, shows the site location, and nearest noise sensitive receptors.

Figure 1: Site Location Plan



3.2 The nearest noise sensitive receptors are identified as the Union Co-living Apartments immediately to the west (approximately 10m), and the Marriot Hotel to the north-west.

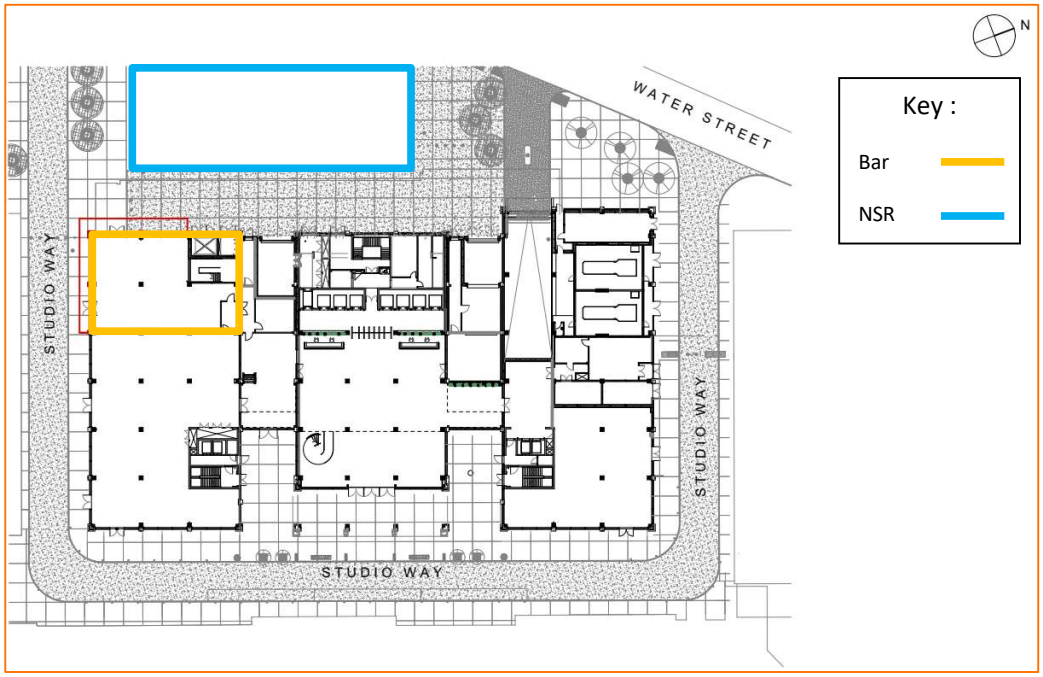
3.3 Within the building itself, the adjacent tenant unit is Caravan which is a bar/restaurant. The first floor is assumed to be in use as offices.

Proposed Development

3.4 The proposed development comprises a bar with music at the ground floor level. The bar's opening times are 08:00h-00:00h on weekdays and 08:00h-02:00h at weekends.

3.5 Figure 2, below, shows the location of the unit within the Goods Yard building and in relation to the adjacent apartments and adjacent commercial unit on Studio Way.

Figure 2: Proposed New-Build Layouts on Site



4 NOISE SURVEY

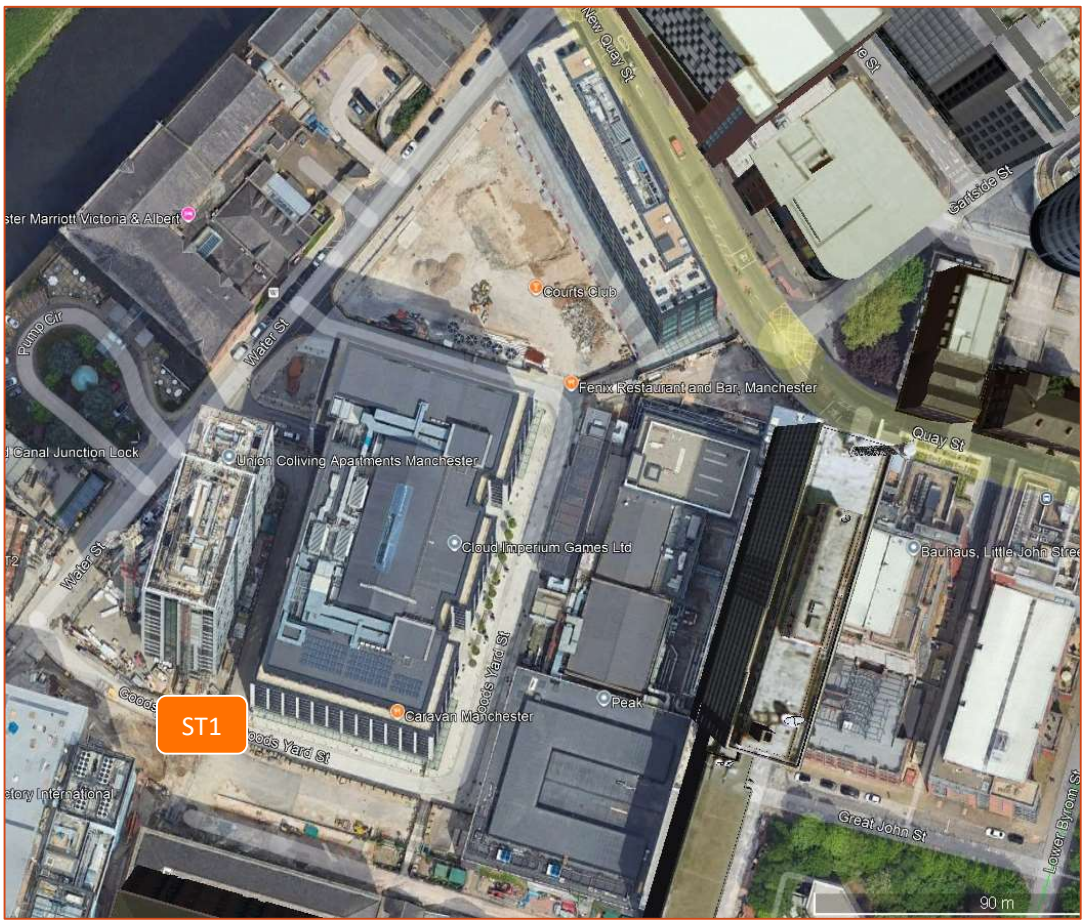
Methodology

4.1 Night-time attended measurements were carried out between 23:00h and 01:00h on Tuesday 27th August 2024, representative of the worst case for potential noise impact arising from operation of The Trading Route.

4.2 Site security did not permit noise monitoring immediately in front of the apartments. Measurements were therefore undertaken immediately to the south of the apartment building, as shown in Figure 3, below.

4.3 All measurements were in free-field conditions and the microphone was set 1.5m from the ground.

Figure 3: Noise Measurement Location



Equipment

4.4 The equipment used during the noise survey is detailed in Table 2, below.

Table 2: Equipment Used in the Environmental Noise Survey

Equipment	Manufacturer & Part No	Serial Number
Meter	NOR 140	1403443
Pre-Amp	NOR 1209	12967
Microphone	NOR 1225	18437
Calibrator	B&K 4231	1821323

4.5 The sound level meter was calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator, which had been calibrated not more than one year prior to the survey.

Weather Conditions

4.6 Weather conditions throughout the survey period were suitable for environmental measurements with wind speeds of less than 5 m/s. No significant precipitation was recorded during the noise survey. The temperature was around 12°C.

Noise Sources

4.7 The night-time noise climate at the site was dominated by road traffic noise (RTN) from New Quay Street approximately 150m north of the site, and plant noise from the north-western corner of The Goods Yard. Distant road traffic on Trinity Way was audible.

4.8 Two train movements were observed during the survey, but did not impact the measured noise levels.

5 SURVEY RESULTS

5.1 Table 3, below, shows a summary of the night-time noise levels measured. Measurements were taken over 15-minute periods.

Table 3: Measured Night-Time Noise Levels

Location	Time (hh:mm)	Ambient Noise Level (dB $L_{Aeq,T}$)	Typical Background Noise Level (dB $L_{A90,\ 15mins}$)
ST1	23:15	48	47
	00:35	48	47

5.2 The measured ambient and background noise levels were consistent throughout the survey period and can therefore be considered a good representation of noise levels affecting the residential receptor.

5.3 A pre-development noise survey was carried out in the area in 2018 to support the planning application for the residential units (reference 125655/FO/2019). This survey identified a background noise level of 48-49dB$L_{A90,T}$ at Manchester Goods Yard. This further supports the relevance of the measured noise levels presented in Table 3, above.

5.4 The octave band background noise level measured during the current noise survey and as used in this assessment is presented in Table 4, below.

Table 4: Octave Band Background Noise Level, dB$L_{A90,T}$

Background Noise Level, dB$L_{90,T}$								
63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dBA
50	50	48	44	42	37	28	22	47

6 NOISE BREAK-OUT TO RESIDENTIAL RECEPTORS

External Wall Construction

6.1 The façade facing the residential receptor consists of AGC curtain walling, comprising Stratobel 55.4 laminated glass (11.56mm), 16mm argon gap, and Stratobel 55.2 laminated glass 10.86mm). The manufacturer quotes a sound insulation performance of 40dBR_w.

6.2 The Insul software package has been used to establish the octave band performance of this construction.

6.3 The specification of the external doors has not been provided. Laboratory test data for a Pure Commercial door achieving 38dBR_w has been used in this assessment.

6.4 The manufacturer's data for the curtain walling and door, as well as the predicted octave band performance of the curtain walling, are presented in Appendix B.

Calculation

6.5 The composite sound insulation of the building façade has been calculated based on the relative area of the door and glazing and used in calculations to predict noise emissions to the residential receptors at a distance of 10m.

6.6 On this basis, the limiting sound pressure level within Trading Route for compliance with MCC requirements has been established.

6.7 The calculation is presented as Calculation 1, below.

Calculation 1: Entertainment Noise Emissions

Room to Exterior

Date: 45543
Job No: 24071
Project: Trading Route
Title: Noise emissions to residential apartments

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Room Lp	80	76	83	89	92	87	79	73	94	92
Wall SRI	25	21	30	40	44	45	46	46		

Wall dimensions length: 15 m
height: 4 m

Distance from wall to receive: 10 m

Directivity index of location (0, 3, 6 or 9): 3

0 = free space
3 = junction with surface
5 = junction of two surfaces
6 = junction of three surfaces

Frequency	63	125	250	500	1k	2k	4k	8k	A	NR
Receive Lp	40	40	38	34	32	27	18	12	37	32

6.8 It should be noted that this is the predicted noise level outside the nearest affected building (Union Co-living Apartments on Water Street).

Doors

6.9 The Local Authority has requested an assessment of noise levels with doors open.

6.10 This is not straightforward to consider; the doors will only be open for short periods of time when people enter or leave, and the sound insulation of the partially opened door will vary considerably.

6.11 The composite sound reduction index (SRI) of the façade is around 41dBR_w. The composite SRI of the façade with a 2m x 2m hole is around 17dBR_w.

6.12 As the door will slowly move from closed to partially opened, the SRI will never reach as low as 17dBR_w, as the door is never fully removed, but as a worst case, it is assumed the composite SRI will vary between 17dBR_w and 41dBR_w. For simplicity, it is assumed that the overall composite SRI as patrons enter or leave will be around half of the difference between the two values, i.e. around 29dBR_w.

6.13 Using the same methodology as Calculation 1, above, the predicted noise level at the NSR with the door partially opened is 52dB$L_{Aeq,T}$.

6.14 Furthermore, as the door is only open for short periods of time, it is necessary to correct for the time periods.

6.15 It is therefore necessary to estimate the time taken to open a door and enter or leave a building.

6.16 It is suggested that an average time period of 5s per person to enter or leave seems reasonable.

6.17 It is understood that a worst case of 75 people entering or leaving the building in an hour is expected.

6.18 On this basis, at an average of 5s per person, a total door open time of 375s in every hour period can be expected in the worst case hour, with the door closed for the remainder of the time.

6.19 On this basis, the sound pressure level at the NSR has been corrected for the duration of each, using Correction = 10*log(T/3600), in seconds.

6.20 When the door is closed, the correction is 10*log(3225/3600) = 0dB; for open, it is 10*log(375/3600) = -10dB.

6.21 The time corrected SPL has then been calculated for both the open and closed periods, and added together.

6.22 As this results in a small exceedance over the criterion with the internal noise levels as used in Calculation 1, the allowable internal music noise level has therefore been corrected appropriately.

6.23 This calculation is shown as Calculation 2, below.

Calculation 2 – SPL at NSR with doors open

	No. people	Time total, s	60mins, s						
Time open/person	5	75	375	3600	-10				
Time closed			3225	3600	0				
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dBA**
Proposed Internal SPL	80	76	83	89	92	87	79	73	**94**
SPL @ nsr, door open	47	45	47	48	49	44	35	29	**52**
Time correction	-10	-10	-10	-10	-10	-10	-10	-10	
SPL, door Open	37	35	37	38	39	34	25	19	**42**
SPL Door Closed	40	40	38	34	32	27	18	12	**37**
Sum, dBLAeq,1hour	42	41	41	40	40	35	26	20	**43**
MCR limit	40	40	38	34	32	27	18	12	
Exceedance	2	1	3	6	8	8	8	8	
Corrected limiting music noise level	**78**	**75**	**80**	**83**	**84**	**79**	**71**	**65**	**87**

6.24 It should be noted that this is the worst case predicted hour; assuming 75 people enter or leave between 00:00-01:00h. In practice, this traffic is only expected during early evenings on Friday or Saturday, when ambient and background noise levels will be higher. In the period for which background noise levels were measured (00:00-01:00h), no more than 15 people entering or leaving are expected.

6.25 Furthermore, the calculation assumes that the double doors are open to the extent of a 2mx2m hole; in practise, the 'hole' formed will be significantly smaller (e.g. when only one leaf is used), and the doors will still provide partial screening when half open. This calculation is therefore very much an absolute worst case.

6.26 However, assuming as an absolute worst case, , the predicted hour-long average is presented in Calculation 2, below. It should be noted that the people are assumed to enter and leave regularly over the hour period, and hence the average noise levels of shorter assessment periods (e.g. 5 minutes) would be identical.

6.27 It can therefore be seen that as a worst case, with 75 people entering or leaving, the overall average noise level is around 43dB$L_{Aeq,1hour}$ at the NSR.

6.28 This is still 5dB below the ambient noise level, and 4dB below the background noise levels, and would therefore be barely audible if not inaudible at the NSR.

6.29 Furthermore, even outside the NSR, the predicted low frequency octave band SPLs also meet MCC's entertainment noise criteria for structurally connected buildings of 47dB$L_{eq,T}$ and 41dB$L_{eq,T}$ at 63Hz and 125Hz, respectively.

6.30 MCC's guidance document states;

> *"Therefore, a criterion that would achieve a condition of 'inaudible' / 'virtually inaudible' which is applicable for new residential developments that are structurally connected to entertainment venues (or vice versa) would be:*
>
> *'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively'."*

6.31 Inside the building, music noise would reduce by a further 15dB, with windows open for ventilation, and significantly lower when closed, and hence low frequency noise levels would be lower 27dB, and would therefore by MCC's guidance be completely inaudible.

6.32 For clarity, Table 5, below, summarises the Local Authority criteria for entertainment noise breakout and the corresponding limiting noise level within the bar.

Table 5: Limiting Noise Level Summary

	Octave Band Centre Frequency, Hz								
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dBA
Background noise level, $dBL_{A90,T}$	50	50	48	44	42	37	28	22	47
Entertainment criterion at residential façade, $dBL_{eq,T}$	40	40	38	34	32	27	18	12	37
Limiting entertainment noise sound pressure level in venue, $dBL_{eq,T}$	78	75	80	83	84	79	71	65	87

6.33 Measurements made by dBx Acoustics for typical city-centre bars with amplified music indicate that typical internal levels can be expected to be up to 85$dBL_{Aeq,T}$.

6.34 On this basis, it can be seen that compliance with MCC requirements as detailed in Planning Condition 20 should be readily achievable for this scheme.

7 NOISE TRANSFER TO ADJACENT DEMISES

7.1 It is understood that the Landlord requires an assessment of potential noise transfer to the adjacent demises within The Goods Yard. These are a bar/restaurant at ground floor, and office accommodation at first floor.

Separating Floor

7.2 The separating floor comprises a 250mm pre-tensioned concrete slab and a raised access floor.

7.3 For open plan office accommodation, BS8233:2014 recommends an indoor ambient noise level of 45-50dB$L_{Aeq,T}$.

7.4 For entertainment noise to be generally inaudible within the offices, it would be necessary for noise transfer to be at least 10dB lower than this, i.e. no higher than 35-40dB$L_{Aeq,T}$.

7.5 Based on the limiting sound pressure level for compliance with MCC noise emission criteria detailed in Table 5, above, and the predicted sound insulation performance of the 250mm concrete slab (without the additional sound insulation provided by any raised access floor). This is presented as Calculation 3, below.

Calculation 3: Noise Transfer to Offices Above

Room to Room

Date: 05/09/2024
Job No: 24071
Project: Trading Route
Title: Noise Transfer - Floor

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room Lp	80	76	83	89	92	87	79	73	94	92
Receive room RT	1	1	1	1	1	1	1	1		
Floor SRI	46	46	50	58	64	69	74	74		

Receive room dimensions; height: 3 m
width: 15 m
length: 15 m

Interface dimensions; height: 15 m
width: 15 m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room Lp	37	33	36	34	31	21	8	2	35	31

7.6 It can be seen that the separating floor construction is appropriate to control noise transfer from Trading Route to the offices above, such that no disturbance to office occupants would be expected.

Noise Transfer to Adjacent Unit

7.7 The separating construction between the commercial units is understood to comprise 140mm blockwork. It is not known if this has been lined with plasterboard within Caravan or whether a lining is proposed within Trading Route.

7.8 Calculations of noise transfer have therefore been carried out on a worst-case basis of the limiting entertainment noise level within Trading Route (see Table 5, above), and the predicted sound insulation performance of a 140mm blockwork wall.

7.9 The calculation is presented as Calculation 4, below.

Calculation 4: Noise Transfer to Adjacent Unit

Room to Room

Date:	05/09/2024
Job No:	24071
Project:	Trading Route
Title:	Noise Transfer - Wall

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Source room Lp	80	76	83	89	92	87	79	73	94	92
Receive room RT	1	1	1	1	1	1	1	1		
Wall SRI	39	42	39	46	53	59	64	64		

Receive room dimensions; height:	4	m
width:	30	m
length:	15	m
Interface dimensions; height:	22	m
width:	4	m

Frequency	63	125	250	500	1K	2K	4K	8K	A	NR
Receive room Lp	36	29	39	38	34	23	10	4	38	34

7.10 The worst-case predicted noise transfer to the adjacent commercial unit is 38dB$L_{Aeq,T}$. In practice it is unlikely that entertainment noise levels in Trading Route would reach the limiting level of 94dB$L_{Aeq,T}$ and as such the resulting noise transfer would be much lower.

7.11 dBx Acoustics has measured ambient noise levels in the order of 50dB$L_{Aeq,T}$ within bars and restaurants during typical operations. On this basis, noise transfer from Trading Route to Caravan would be expected to be inaudible.

8 NOISE FROM BUILDING SERVICES

8.1 Planning Condition 21 requires that noise from building services should be controlled to 5dB below the background noise level ($dBL_{A90,T}$) at the nearest noise sensitive receptor.

8.2 On the basis of the background noise level recorded during the noise survey, presented in Section 5, above, the limiting noise level for plant affecting the residential receptor when assessed in accordance with BS4142:2014 is therefore $42dBL_{Ar,Tr}$.

Proposed Plant

8.3 The proposed plant comprises 3 no. condensing units located within the basement car park, 1 no. supply fan (inlet in the southern façade), and 2 no. extract fans which discharge within the façade opposite the residential premises.

8.4 It is understood that there are no openings within the basement façade which would allow noise from the condensing units to impact upon the residential receptors, and as such these are not considered further.

8.5 The supply and extract fans are Systemair K315L Sileo units with a manufacturer's sound power level of $75dBL_{w,A}$ at the inlet and $78dBL_{w,A}$ at the outlet.

8.6 Silencers are indicated to EF001 and SF001 but not to EF002 serving the WCs. The insertion loss of these silencers has not been provided for review.

8.7 Calculations have been undertaken based on the fan sound power and duct layout to calculate the resultant sound pressure level at the residential receptor.

8.8 Based on the manufacturer's data, the fans have no acoustically distinctive characteristics.

8.9 In order to meet MCC's requirements, the atmosphere side ductwork of *all three fans* requires silencers achieving the following minimum insertion loss;

Table 6: Required Silencer Insertion Loss, dB

Silencer Insertion Loss, dB							
63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
0	0	8	7	17	14	14	25

8.10 This can be readily achieved using 600mm length circular silencers. When silencer selections have been received.

9 SUMMARY AND CONCLUSION

9.1 dBx Acoustics Ltd has been appointed by Magpie Union Ltd to provide a noise impact assessment to support a planning application for a new bar within the Goods Yard building, Goods Yard Street, Manchester, M3 3BG.

9.2 The latest proposed opening time of the bar is 02:00h at weekends.

9.3 This report is intended to support discharge of Planning Conditions 20, relating to entertainment noise emissions, and 21, relating to noise from building services, affecting the adjacent residential receptor which is approximately 10m to the west.

9.4 A noise survey at a location representative of the noise sensitive receptor has been undertaken during the night time period in order to establish appropriate criteria for noise emissions.

9.5 An assessment of potential entertainment noise break-out has been carried out based on the installed curtain walling and door. It is demonstrated that Manchester City Council's criteria can be met with an ambient noise level within the bar of up to 87dB$L_{Aeq,T}$.

9.6 Based on the base build constructions, an assessment of noise transfer to the horizontally adjacent commercial unit and vertically adjacent office has also been undertaken. It is demonstrated that the base build constructions are sufficient to mitigate noise transfer such that no adverse impact on the adjacent tenancies would be expected.

9.7 Plant noise emission limits have been set in accordance with Manchester City Council requirements under Planning Condition 21. An assessment of noise emissions has been carried out based on the manufacturer's noise data for the supply and extract fans. Silencers are required on the atmospheric side of all ductwork; a minimum insertion loss for these silencers is presented within the report.

9.8 Taking the above into account, noise should not be a limiting factor in any planning application.

APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (Lp) the reference quantity is 2x10-5 N/m2. The sound pressure level existing when microphone measured pressure is 2x10-5 N/m2 is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A-weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
R_w	**Weighted Sound Reduction Index**, a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.

APPENDIX B – SOUND INSULATION DATA

NB: in calculations, 4dB has been removed from the predicted octave band performance of the curtain walling at all frequencies, to correspond to the manufacturer's quoted performance of 40dBR_w.

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