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**39-43 KING STREET,
MANCHESTER**

NOISE IMPACT ASSESSMENT

Report **16934-NIA-01 RevC**

Prepared on 05 January 2022

Issued For:

Origin Manchester GP on behalf of Origin Manchester LP



Executive Summary

This noise impact assessment has been undertaken in order to assess proposed bar use at the basement level of 39-43 King Street, Manchester

Proposals will include customer seating and standing areas, where it is understood amplified and live music will be played at an 'entertainment' level.

There are currently no plans for external fixed plant attached to the bar. If these plans change, full noise impact calculations will be undertaken in order to predict the level of noise expected at the closest residential window.

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements of Manchester City Council.

Calculations were undertaken for the nearest residential receiver, identified as 51 King Street. Additional calculations were undertaken for proposed restaurant and existing office premises above the site. It should be noted that if there are closer receivers that Clement Acoustics is not aware of, a reassessment will be necessary, and this should therefore be confirmed by the Client.

It has been demonstrated that compliance with the established criterion is feasible, dependant on the proposed mitigation measures and noise management plan set out in this report.

If there is any deviation from the above, Clement Acoustics must be informed, in order to establish whether a reassessment is necessary.

Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

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16934-SP1	Indicative Site Plan
16934-TH1	Environmental Noise Time History
16934-DWG1	Indicative Drawing of Proposed Basement Constructions
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

Document Revision	Date of Revision	Reasons for Revision	Revision By
0	19/11/2021	First Issue	Jamie Newton AMIOA
RevA	30/11/2021	Revisions to descriptions of proposals	Duncan Martin MIOA
RevB	17/12/2021	Revisions to background noise level and acoustic door recommendations	Duncan Martin MIOA
RevC	05/01/2022	Updated Section 7.1 further to comments from MCC	Duncan Martin MIOA

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Sixteen Real Estate to measure existing background noise levels at 39-43 King Street, Manchester. Measured noise levels have been used to determine noise emissions criteria for a proposed bar in agreement with the planning requirements of the Manchester City Council.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures. An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

Proposals are to redevelop a basement unit within 39-43 King Street, Manchester for use as a bar, a venue for drinks with minimal food offering. Proposals will include customer seating and standing areas, where it is understood amplified and live music will be played at an 'entertainment' level.

The proposed opening hours of the bar are as follows:

- 12:00 - 02:00 Daily

The site is located in a pedestrianised area of Manchester city centre, bound by St Ann's Alley to the north, King Street to the south, and commercial premises to the east and west. The surrounding area is predominantly commercial in nature.

Residential and commercial receivers have been identified in the locations shown in the attached site plan. The area is predominantly commercial, with uses such as retail units surrounding the site and restaurants with a restaurant premise proposed and office accommodation existing above.

Residential receivers were identified through a combination of an onsite inspection of the area, and council tax checks on available online databases. The closest residential receiver was identified as 51 King Street, located approximately 10 m to the east of the site. If there are any receivers closer to that identified within this report then a further assessment will need to be carried out. Therefore, the closest noise sensitive receiver should be confirmed by the client before any works are undertaken.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Measurements were undertaken at one position as shown on indicative site drawing 16934-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest affected receiver.

The surroundings and position used for the monitoring location are described in Table 3.1.

Position No.	Description
1	The microphone was mounted on a 1 st storey window at the back of the building. The microphone was positioned > 1 m in front of the window. ^[1]

Table 3.1: Description of unattended monitoring locations

Note [1]: The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 15:30 on 12 November 2021 and 11:00 on 15 November 2021.

The measurement procedure generally complied with BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

3.2 Weather Conditions

At the time of set-up and collection of the monitoring equipment and during the attended measurements, the weather conditions were generally dry with light winds. It is understood that the weather conditions during the unattended survey remained generally dry with wind speeds below 5 m/s, and occasional precipitation in the afternoon and evening of 12 November 2021.

It is considered that the weather conditions did not significantly adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

3.3 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 RESULTS

4.1 Unattended Noise Survey Results

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured at the location shown in site drawing 16934-SP1.

Measured noise levels are shown as a time history in Figure 16934-TH1, with average ambient and minimum background noise levels summarised in Table 4.1.

Time Period	Average ambient noise level $L_{eq: T}$	Minimum/Typical background noise level $L_{90: 5min}$
Daytime (07:00 - 23:00)	61 dB(A)	48 dB(A)
Night-time (23:00 - 07:00)	56 dB(A)	45 dB(A)
Proposed Operating Hours (12:00 - 02:00)	61 dB(A)	46 dB(A)

Table 4.1: Average ambient and minimum background noise levels

5.0 NOISE CRITERIA

5.1 Local Authority Criteria

The Local Authority general criteria for noise emissions are as follows:

“Where entertainment noise is proposed the LAeq (entertainment noise) shall be controlled to 10dB below the LA90 (without entertainment noise) in each octave band at the façade of the nearest noise sensitive location, and internal noise levels at structurally adjoined residential properties in the 63Hz and 125Hz octave frequency bands shall be controlled so as not to exceed (in habitable rooms) 47dB and 41dB, respectively.”

Correspondence from Manchester City Council indicates that regardless of proposed operating hours, criteria should be based on the minimum measured background noise levels during night-time hours. Based on the results of the environmental noise survey and these requirements, Table 5.1 presents the proposed plant noise emission criteria to be achieved at 1 m from the nearest noise sensitive receiver.

Period	Plant Noise Emission Limit $L_{eq,T}$
Night-time (23:00 - 07:00)	35 dB(A)

Table 5.1: Plant noise emission limits

Noise emissions should also be 10 dB below the spectral background noise level in each frequency band.

5.2 Commercial Receivers

The closest receivers to the proposed bar facility are directly above, with a proposed ground floor restaurant and commercial offices on the upper floors of 39-43 King Street.

In order to assess whether noise emissions will be controlled to an acceptable level, guidance has been sought in British Standard 8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’

In Table 6 of the Standard, guidance is given on typical noise levels for non-domestic buildings where concentration or communication may be required. The relevant guidance given in this table is summarised in Table 5.2.

Objective	Location	Design range $L_{Aeq,T}$ dB
Study and work requiring concentration	Staff/meeting room	35-45 dB(A)
	Executive office	35-40 dB(A)
Speech or telephone communications	Cafeteria ^[1]	50-55 dB(A)

Table 5.2: BS8233 recommended internal background noise levels

[1] Considered suitably representative for a restaurant

Based on the use of the adjacent space, we would recommend noise emissions should not exceed the design ranges shown in Table 5.2.

6.0 NOISE IMPACT ASSESSMENT - INTERNAL ACTIVITIES

6.1 Proposed Activities

As the building is not currently in use as a bar, manual measurements were taken of a similar sized venue, with patrons present and live music played back at what is considered to be an entertainment level. In this way, an assessment will be provided for the worst-case scenario of loudest noise levels.

The measured noise levels that will be used in calculations are as shown in Table 6.1.

Source	Sound Pressure Level (dB) in each Frequency Band, at source								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Live and Amplified Music	93	98	91	89	90	84	79	73	93

Table 6.1: Measured Music Noise Levels

These levels will be used to calculate the current noise breakout to nearby noise sensitive receivers.

For all calculated levels shown below, full formulae used and spectral calculations are shown in Appendix B.

6.2 Noise Breakout Assessment – Commercial Receivers

A proposed ground floor restaurant and existing first floor office are located directly above the proposed bar. The weakest path for noise transmission will be through the separating floor to the adjacent space.

In order to predict the transmission of noise to adjacent spaces, calculations have been undertaken using the following standard acoustic formula:

$$SPL_{receiver} = SPL_{source} - SRI_{separation} + 10 \log_{10} S - 10 \log_{10} A$$

Where:

- $SRI_{separation}$ is the sound reduction of the separating floor [see below],
- S is the area of the transmitting floor,
- and A is the absorption area of the receiving room.

The sound insulation of the separating floor between first floor and ground floor was measured through sound insulation testing on site.

High volume “white” noise was generated from a loudspeaker in the source room, positioned in order to obtain a diffuse sound field. A spatial average of the resulting one-third octave band noise levels between 50 Hz and 10 kHz was obtained by using a moving microphone technique over a minimum period of 15 seconds at each of two positions.

The same measurement procedure was followed in the receiver room.

The results of the tests were rated in accordance with BS EN ISO 717-1: 1997 “*Rating of sound insulation in buildings and of building elements. Part 1 - Airborne sound insulation*”.

The measured sound insulation performance of the floor between ground floor and first floor spaces is as shown in Table 6.2.

Construction	Stated Sound Reduction in Each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Existing Separating Floor to Restaurant	15	19	23	26	33	38	48	48
Existing Separating Floor to Office	34	36	41	43	42	46	68	68

Table 6.2: Predicted sound reduction of separating floor

With music played back at the levels shown in Table 6.1 noise emissions levels within the adjacent commercial premises due to internal music play back would be as shown in Table 6.3.

Levels have been calculated using the measured amplified music levels, the calculated sound reduction of the separating floor and the formula shown above. Detailed calculations are shown in Appendix B1.

Receiver	Design Range	Noise Level at Receiver (due to amplified music)
Ground Floor Restaurant	50-55 dB(A)	68 dB(A)
First Floor Office	35-40 dB(A)	55 dB(A)

Table 6.3: Noise levels and criteria at Commercial Receiver

As shown in Table 6.3 and Appendix B1, transmission of noise to the proposed restaurant and existing office space above the venue would exceed the relevant design range. The exceedance is at a level that indicates the level of noise could be disruptive in a typical office and restaurant environment.

We would therefore recommend improvements of the existing sound insulation between the basement space, and restaurant and office use above. This is reflected in the noise management plan shown in Section 7.0.

6.3 Internal Noise Transmission to Residential Spaces

No residential receivers have been identified in the same building as the proposed bar, or in any directly connected buildings. We would therefore not anticipate any transmission of structure borne noise to residential receivers.

In order to suitably control the breakout of structure borne noise to commercial receivers in the same building, certain steps are recommended in the proposed mitigation measures, shown in Section 7.0.

6.4 Noise Breakout Assessment – Residential Receiver

Windows to rooms used for residential purposes have been identified at the location shown in attached site plan 16935-SP1. The closest windows are located a minimum of 16 m from the façade of the proposed venue.

As the site is at basement level, the main point of noise breakout is expected to be the entrance doors located on St Anns Alley. In order to provide a robust assessment, it has been assumed that noise at the ground floor entrance to the bar will be identical to that within the main bar area, and a nominal doorset and masonry has been assumed for the façade construction. Laboratory data for glazing and masonry, and a calculated composite sound reduction index for the façade is shown in Table 6.4.

Construction	Stated Sound Reduction in Each Frequency Band							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Hollow Core Door	12	12	13	14	16	18	24	24
Nominal Masonry	39	41	43	48	50	55	55	55
Composite Facade	20	20	21	22	24	26	32	32

Table 6.4: Predicted sound reduction of bar facade

The main entrance doors to the bar are on the north of the building, facing perpendicular to the identified receiver

With music played back at the level shown in Table 6.1, predicted noise emissions levels at nearest residential windows would be as shown in Table 6.5.

Levels have been calculated using the measured music levels, the calculated sound reduction of the venue facade and the formula shown in Appendix B2.

Receiver	Night-time Criterion	Noise Level at Receiver (due to amplified music)
Closest Residential Receiver	35 dB(A)	42 dB(A)

Table 6.5: Noise levels and criteria at Residential Receiver

As shown in Table 6.5 and Appendix B1, transmission of noise to the nearest sensitive windows due to the effects of the events and activities would exceed the set criteria, based on current proposals. The criteria are exceeded overall, and in a number of frequency bands as shown in Appendix B2.

We would therefore recommend improvements of the existing sound insulation offered by the proposed access point into the basement bar on St Anns Alley. This is reflected in the noise management plan shown in Section 7.0.

7.0 PROPOSED MITIGATION MEASURES

7.1 Proposed Floor Upgrade Works

Based on an onsite observation, the existing concrete slab to the majority of the floor is understood to be 250 mm thick, with large holes in the centre and to the west of the site forming the weakest part of the partition.

Improvement works have therefore been proposed as follows:

- Seal floorboards above slab where possible
- Infill existing wood joists with mineral wool ^[1]
- Sealing board below joists
- 2 layers 15mm plasterboard (1 x gyproc, 1 x soundbloc) flush to slab
- Light-weight suspended metal frame forming 100mm void
- Ceiling formed of 2 layers of 15mm SoundBloc plasterboard.

[1] Mineral wool depth should be adjusted accordingly, such that mineral wool fills $\frac{1}{2}$ to $\frac{2}{3}$ of the void depth.

Indicative section drawing 16934-DWG1 illustrates the construction of the perimeter detail. The intent of the design is to ensure the sound insulation performance of the existing slab is not compromised by the surrounding perimeter weaknesses or missing sections.

7.2 Noise Breakout Assessment

In order to predict the transmission of noise to residential spaces, calculations have been undertaken using the standard acoustic formula set out in Section 6.2.

Taking all factors into account, the predicted transmission level of noise to residential spaces would be as shown in Table 7.1. Detailed spectral calculations are shown in Appendix B2.

Receiver	Design Range	Noise Level at Receiver (due to amplified music)
Ground Floor Restaurant	50-55 dB(A)	41 dB(A)

Table 7.1: Noise levels and criteria at ground floor

As shown in Table 7.1 and Appendix B2, noise transmission to the proposed restaurant space would be expected to comply with the criteria, with the ceiling upgrades undertaken as proposed.

Based on the calculated performance of the above construction, it is also expected that noise breakout to first floor office spaces will be brought down to comply with the criteria.

7.3 Flanking Noise

Structure-borne noise, where noise enters the building structure and transmits around the separating element, can be difficult to predict.

We would recommend that once ceiling upgrades have been installed, an investigation into the level of structure-borne noise transmitted should be undertaken. This should be undertaken using the anticipated levels of music noise during worst case periods as a source.

If it is determined that structure-borne noise needs to be addressed to protect the amenity of restaurant and/or office uses, a scheme of treating the basement floor slab and walls/columns will be recommended.

7.4 Door Upgrades

In order to reduce noise levels between the ground floor entrance and basement bar, a lobby door system is proposed with sealed doorsets with a performance of R_w 35 dB each placed at the top and bottom of the staircase from ground floor to basement level.

Examples of suitable doorsets are summarised as follows:

- External Doors
 - Latham's Steel Security Doorsets – Acoustic Door (up to R_w 38 dB)
- Internal Doors
 - Enfield 35dB Acoustic Door (R_w 35 dB)
 - Sound Service D35 'Medium' Acoustic Door (R_w 35 dB)

Alternative solutions would be acceptable, provided it can be demonstrated with manufacturer data that the sound reduction offered is at least R_w 35 dB.

Levels have been calculated using the measured music levels, the calculated sound reduction of the venue façade with the proposed sealed doorsets and the formula shown in Appendix B2. The summarised predicted noise level is summarised in Table 7.2.

Receiver	Night-time Criterion	Noise Level at Receiver (due to amplified music)
Closest Residential Receiver	35 dB(A)	28 dB(A)

Table 7.2: Noise levels and criteria at Residential Receiver

The criteria are met both overall and spectrally, as shown in Appendix B2.

7.5 General Upgrade Details

Suitable products have been recommended where appropriate. Equivalent products may be used, however, deviations should be agreed by, and confirmed in writing, to Clement Acoustics. All products should be installed as per manufacturer's instructions.

All horizontal plasterboard joints should be staggered.

It should be noted that where junctions are sealed with mastic, the mastic does not need to be specifically 'acoustic'. Provided the mastic is silicone-based and remains flexible when set (i.e. does not crack) it is acceptable for use.

7.6 Noise Management Plan

In order to ensure the calculated noise emission levels are not exceeded, we would recommend following certain steps when operating the bar, as detailed below:

- All loud speakers should be isolated from the building structure. For fixed speakers, this should be achieved using neoprene fixings for all speaker mountings. For free standing speakers, these should be sited on a suitable isolating material.
- The proposed lobby door system should be monitored to ensure only one door set is open at a time
- External doors should be kept closed when not in use, particularly during evening hours (19:00 to 02:00).
- Patrons should also be reminded of the nature of surrounding premises and behaviour outside the premises should be monitored accordingly.

8.0 CONCLUSION

An environmental noise survey has been undertaken at 39-43 King Street, Manchester. The results of the survey have enabled criteria to be set for noise emissions from the proposed bar in accordance with the requirements of the Manchester City Council

A noise impact assessment has then been undertaken using previously measured noise data to predict the noise levels, due to the proposed bar, at the nearby noise sensitive receivers.

Calculations show that noise emissions from the proposed units should meet the requirements of the Manchester City Council with the recommended mitigation installed as stated herein.

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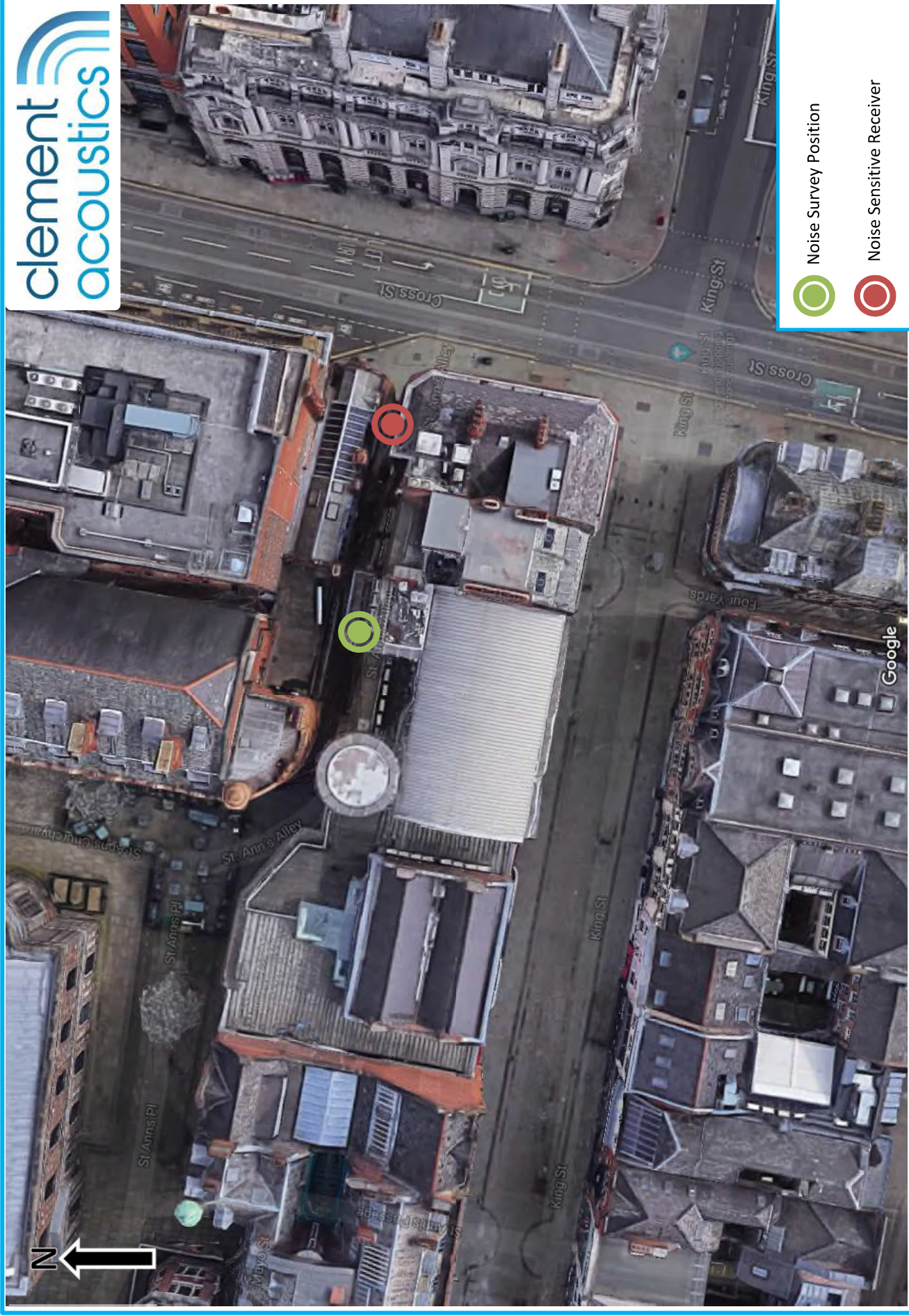


5 January 2022

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5 January 2022



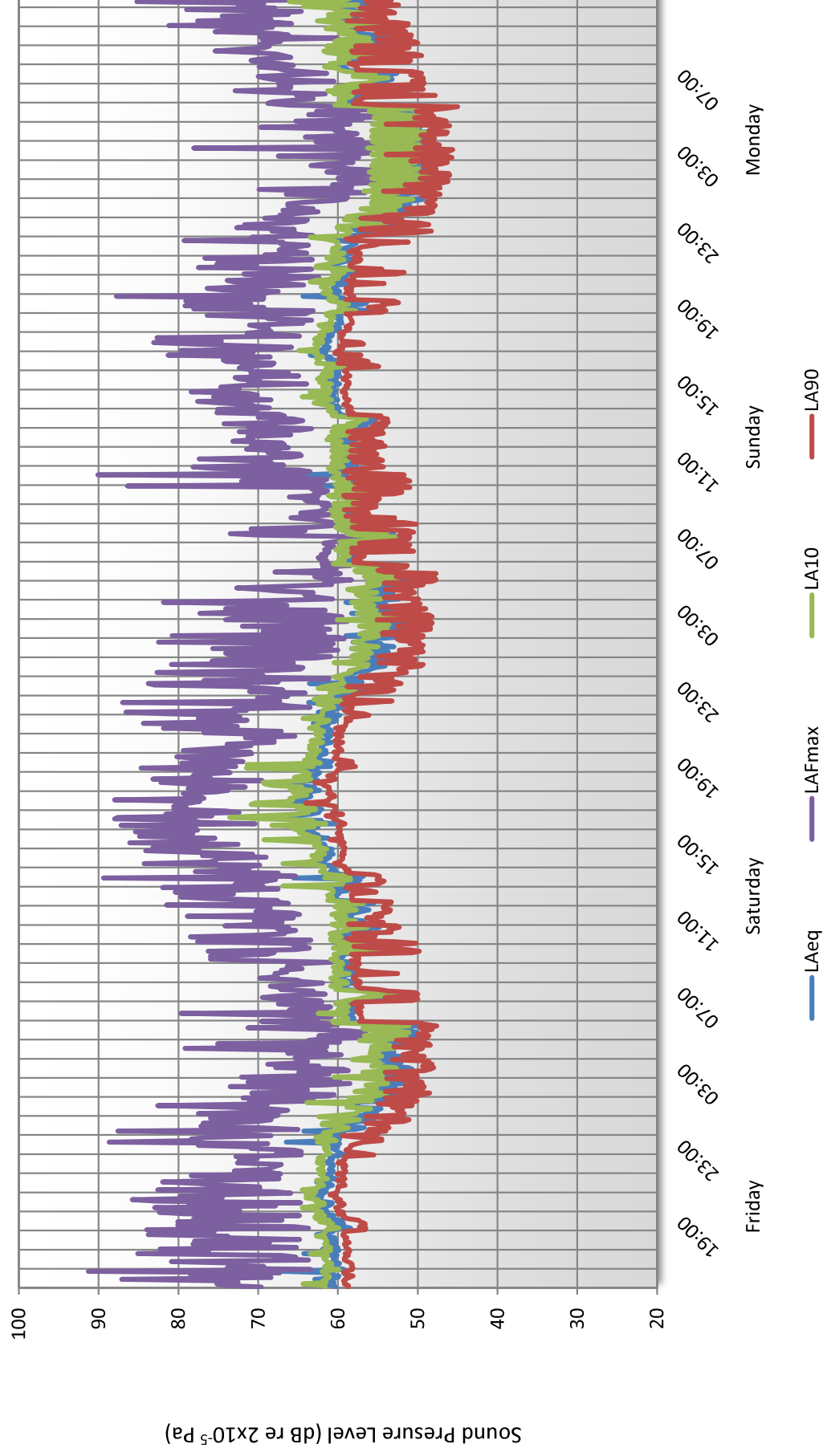
16934-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receiver

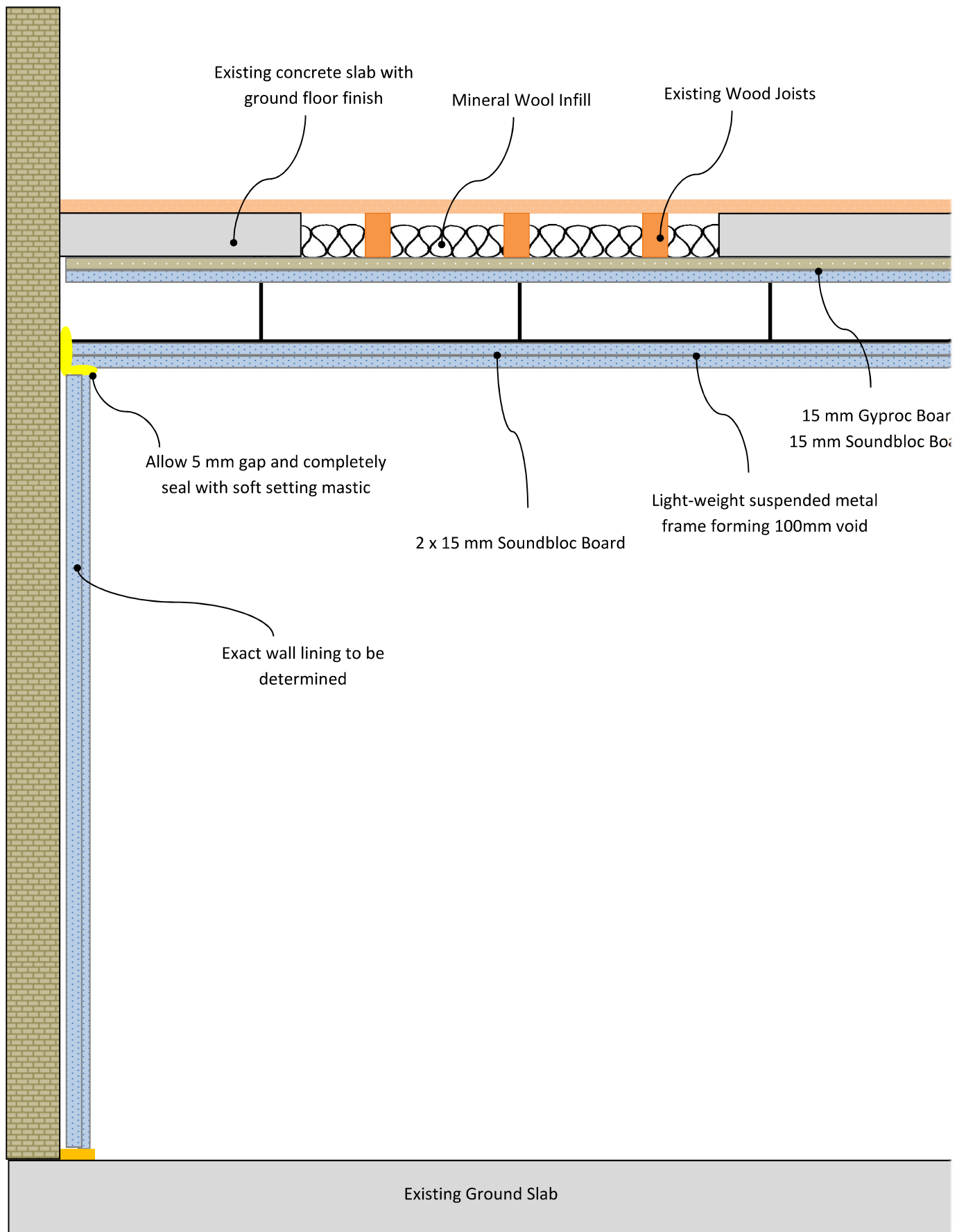
Date: 5 January 2022

39-43 King Street, Manchester

Position 1

Environmental Noise Time History
12 November 2021 to 15 November 2021





GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10 dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3 dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B1

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39-43 King Street, Manchester

Acoustic Calculation used for Room to Room Transmission:

$$SPL_2 = SPL_1 - R + 10 \log_{10} S - 10 \log_{10} A$$

Basement Bar to Ground Floor Restaurant - Existing Floor

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Measured Sound Pressure Level									
Predicted Music Source Noise Level Within Basement Bar	93	98	91	89	90	84	79	73	93
Measured Sound Reduction of separating floor, dB (R)	-15	-19	-23	-26	-33	-38	-48	-48	
Correction for total area of floor (S = 150m ²)	22	22	22	22	22	22	22	22	
Correction for absorption area of receiver room (A = 97m ²)	-20	-20	-20	-20	-20	-20	-20	-20	
Sound pressure level at receiver	80	81	70	65	59	48	33	27	68

Design Criterion 50 - 55

Basement Bar to First Floor Office - Existing Floor

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Measured Sound Pressure Level									
Predicted Music Source Noise Level Within Basement Bar	93	98	91	89	90	84	79	73	93
Measured Sound Reduction of separating floor, dB (R)	-34	-36	-41	-43	-42	-46	-68	-68	
Correction for total area of floor (S = 150m ²)	22	22	22	22	22	22	22	22	
Correction for absorption area of receiver room (A = 64m ²)	-18	-18	-18	-18	-18	-18	-18	-18	
Sound pressure level at receiver	63	66	54	50	52	42	15	9	55

Design Criterion 35 - 40

Basement Bar to Ground Floor Restaurant - Proposed Floor

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Measured Sound Pressure Level									
Predicted Music Source Noise Level Within Basement Bar	93	98	91	89	90	84	79	73	93
Calculated Sound Reduction of Upgraded Separating Floor, dB (R)	-35	-47	-53	-58	-57	-60	-70	-68	
Correction for total area of floor (S = 150m ²)	22	22	22	22	22	22	22	22	
Correction for absorption area of receiver room (A = 97m ²)	-20	-20	-20	-20	-20	-20	-20	-20	
Sound pressure level at receiver	60	52	40	33	34	26	11	7	41

Design Criterion 50 - 55

APPENDIX B2

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39-43 King Street, Manchester

Acoustic Calculation used for Indoor to Outdoor Transmission:

$$SPL_{outdoor} = SPL_{indoor} - SRI_{composite} + 10 \log_{10} S + 10 \log \left(\frac{Q}{4\pi r^2} \right) - 6dB$$

Basement Bar Breakout - Nominal Door Set

Basement Bar to Ground Floor Restaurant - Existing Floor

Receiver: Identified Residential Window

Source: Amplified Music Levels

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Sound Pressure Level									
Predicted Source Noise Level Within Basement Bar	93	98	91	89	90	84	79	73	93
Predicted Sound Reduction of Ground Floor Door Area, dB (SRI)	-20	-20	-21	-22	-24	-26	-32	-32	
Correction for total area of building facade (S = 20m ²)	13	13	13	13	13	13	13	13	
Correction for directivity (Q) and distance (r) (Q=4, r = 16m)	-35	-35	-35	-35	-35	-35	-35	-35	
Non reverberant correction	-6	-6	-6	-6	-6	-6	-6	-6	
Sound pressure level at receiver due to music play back	45	50	42	39	38	30	19	0	42
Measured Background Noise Level	52	51	49	42	39	31	29	25	45
Difference	-7	-1	-7	-3	-1	-1	-10	-25	-3

Basement Bar Breakout - Proposed Door Set

Receiver: Identified Residential Window

Source: Amplified Music Levels

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Sound Pressure Level									
Predicted Source Noise Level Within Basement Bar	93	98	91	89	90	84	79	73	93
Sound Reduction of Proposed Door Area, dB (SRI)	-29	-29	-34	-39	-41	-44	-44	-44	
Correction for total area of building facade (S = 20m ²)	13	13	13	13	13	13	13	13	
Correction for directivity (Q) and distance (r) (Q=4, r = 16m)	-35	-35	-35	-35	-35	-35	-35	-35	
Non reverberant correction	-6	-6	-6	-6	-6	-6	-6	-6	
Sound pressure level at receiver due to music play back	36	41	29	22	21	12	7	0	28
Measured Background Noise Level	52	51	49	42	39	31	29	25	45
Difference	-16	-10	-20	-20	-18	-19	-22	-25	-17