



STEWART DEAN

60A OLDHAM STREET, MANCHESTER

NOISE ASSESSMENT FOR PLANNING PURPOSES

22 March 2022

AEC REPORT: P4406/R1e/NRS

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1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Mr Stewart Dean to undertake noise assessment in relation to the proposed part conversion of a former Toni & Guy academy into a bar and live music venue on the ground floor and basement level at 60A Oldham Street, Manchester. The other part (Demise 2) of the former Toni & Guy academy has not been considered in this assessment.
- 1.2 This report is understood to be in support to the planning application of the above development.
- 1.3 Acoustic terminology is discussed in brief in Appendix A.

2.0 BACKGROUND AND SITE DESCRIPTION

- 2.1 The proposed site is bound by Oldham Street to the north-west, and commercial units to the north-east, south-west and south-east, as identified on the attached Figure 1.
- 2.2 Oldham Street is a busy city centre street which houses a number of cafes, bars and restaurants.
- 2.3 As mentioned above, the proposed site includes a bar area on the ground floor and a live music venue in the basement, as indicated on the attached Figure 2.
- 2.4 It is understood that only background music will be played on the ground floor bar area using small speakers, whereas amplified music will be played in the basement music venue.
- 2.5 The nearest noise sensitive receptor (NNSR) to the proposed bar and live music venue would be the residential apartments on the first-floor of the same building.
- 2.6 It is also understood that the bar and live music venue would be operational from 1700h till 0230h, from Thursday to Saturday.
- 2.7 Based on a review of the provisional drawings, it is understood that windows are only present to the north-western façade of the site.

3.0 NOISE MEASUREMENTS

Sound Insulation Measurements

- 3.1 The separating floor between both the basement venue and the ground floor bar area; and the ground floor bar area and the first-floor residential apartment is a timber floor construction lined with a plasterboard ceiling.
- 3.2 An airborne sound insulation test was undertaken between the proposed music venue on the basement and the bar area on the ground floor; and between the ground floor bar area and the residential apartment on the first-floor on Friday 25 June 2021.
- 3.3 The performance is summarised below in Table 3.1. Details of all measured data and equipment calibration are held on file by AEC and can be made available on request.
- 3.4 It was observed during testing that the major weakness in terms of noise transfer was through the floor and flanking via the external brick walls.

Table 3.1 – Summary of Sound Insulation Achieved by Existing Structures

Source Location	Receiving Room	Sound Level Difference, dB at Octave Band Centre Frequency, Hz							D _w (dB)
		63	125	250	500	1k	2k	4k	
Basement Venue	Ground Floor Bar Area	22	21	19	18	18	19	20	19
Ground Floor Bar Area	First Floor Apartment	46	52	55	61	63	57	65	61

Background Noise Levels

- 3.5 An attended night-time noise level survey was undertaken by AEC between Monday 2 August 2021, 2330h and 0030h on Tuesday 3 August 2021 and between Tuesday 8 March 2022, 0030 to 0230h external to the proposed site on Oldham Street, identified as Location A on the attached Figure 1.
- 3.6 An extended unattended noise level survey was undertaken between Monday 2 August 2021, 1500h and 0830h on Tuesday 3 August 2021 at a single location representative of the mechanical services plant, at ground floor level, identified as L on the Figure 1. Full logged data over 15-minute periods are held on file by AEC and is available on request.
- 3.7 All measurements were undertaken in general accordance with BS7445-1: 2003 'Description and measurement of environmental noise. Guide to quantities and procedures'.
- 3.8 A full measurement procedure is presented in Appendix B and the measured data is presented in Table B1 and Graph B1.
- 3.9 The background noise level measured at Location A, external to the proposed site was around 50dBL_{A90,15mins} due to road traffic on Oldham Street.

- 3.10 The background noise level during the night-time period measured at Location L, was around $60\text{dBL}_{A90,15\text{mins}}$ due to surrounding mechanical services plant.
- 3.11 The spectrum data at each of the octave band centre frequencies of the measured background noise level is presented below in Table 3.2.

Table 3.2 – Night-time Background Noise Level ($\text{dBL}_{A90,T}$) at each of the Octave Centre Band Frequencies

Location	dBA	Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
A - Oldham Street	50	50	47	47	47	46	43	37
L - Plant Location	60	49	66	65	56	53	50	43

4.0 BASIS OF ASSESSMENT

- 4.1 The assessment is based on Manchester City Council's (MCC's) '*Planning and Technical Guidance*' (P&TG) published in December 2015.
- 4.2 With respect to noise from entertainment venue, MCC's P&TG states that '*Music noise levels in the 63Hz and 125Hz octave centre frequency bands (L_{eq}) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (L_{eq}), respectively*'.
- 4.3 It also states that '*Entertainment noise (L_{Aeq}) should be controlled to 10dB below the background noise level (L_{A90}) without the entertainment noise present, in each octave band at the nearest noise sensitive location*'.
- 4.4 With respect to mechanical services plant, P&TG states that '*Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location*'.

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

Noise Transfer From Basement Venue Into Apartments Above

- 5.1 AEC has previously measured ambient noise levels from a rock / pop band performing in a typical city center music venue and the measured noise levels are presented in Table 5.1, below. These levels have been used in the assessment below.

Table 5.1 – Typical Ambient Noise Level, $dBL_{Aeq,T}$ From a City Centre Music Venue

Noise Levels	dBA	Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
Ambient Levels, ($dBL_{Aeq,T}$)	100	103	99	94	96	97	92	86

- 5.2 In order to provide a robust assessment of the potential impact of the basement music venue on the first-floor apartments, calculations based on the typical ambient noise levels in the music venue; and the airborne sound insulation of the separating floors presented in Table 3.1 have been undertaken and are provided in Table 5.2 below.

Table 5.2 – Comparison of Noise Level in the First Floor Apartment due to Ambient Noise Level in the Basement Music Venue with Criteria

Item	dBA	Octave Band Centre Frequency's, Hz						
		63	125	250	500	1k	2k	4k
Typical Ambient Noise Level in Basement Venue, $L_{eq,T}$	100	103	99	94	96	97	92	86
Sound Insulation of the separating floor to Bar Area, D_w	-	-22	-21	-19	-18	-18	-19	-20
Resultant Noise Level in the Ground Floor Bar Area, $L_{eq,T}$	82	81	78	75	78	79	73	66
Sound Insulation of the separating floor to First Floor Apartment, D_w	-	-46	-52	-55	-61	-63	-57	-65
Resultant Noise Level in the First Floor Apartment, $L_{eq,T}$	22	35	26	20	17	16	16	1
MCC Criteria	-	47	41	-	-	-	-	-
Difference	-	-12	-15	-	-	-	-	-

- 5.3 As identified above, noise levels in the first-floor apartment from the basement music venue would be below the MCC criteria at both the 63Hz and 125Hz octave band centre frequencies.
- 5.4 Based on the above calculation, the noise level in the basement venue, needs to be controlled to no greater than $105dBL_{eq}$ and $101dBL_{eq}$ at 63Hz and 125Hz, respectively in order to comply with the MCC criteria. In addition, the overall broadband noise level in the basement venue needs to be limited to $102dB(A)$.

Noise Transfer From Bar Area Into Apartments Above

- 5.5 As mentioned above only background music will be played using small speakers in the ground floor bar area.
- 5.6 AEC has previously measured ambient noise levels from a busy city center bar with background music being played and the typical ambient noise levels measured around the seating area and the bar counter are presented in Table 5.3, below. These levels have been used in the assessment below.

Table 5.3 – Typical Ambient Noise Level, $dBL_{Aeq,T}$ From a City Centre Bar

Noise Levels	dBA	Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
Ambient Levels, ($dBL_{Aeq,T}$)	76	63	72	71	74	72	68	60

- 5.7 In order to provide a robust assessment of the potential impact of the ground floor bar area (including noise from the basement venue transferred into bar area) on the first-floor apartments, calculations based on the typical ambient noise levels in the bar area; and the airborne sound insulation of the separating floor between the bar area and the apartment presented in Table 3.1 have been undertaken and are provided in Table 5.4 below.

Table 5.4 – Comparison of Noise Level in the First Floor Apartment due to Ambient Noise Level in the Ground Floor Bar Area with Criteria

Item	dBA	Octave Band Centre Frequency's, Hz						
		63	125	250	500	1k	2k	4k
Typical Ambient Noise Level in Ground Floor Bar Area, $L_{eq,T}$	76	63	72	71	74	72	68	60
Noise Level in the Bar Area due to Basement Venue, $L_{eq,T}$	82	81	78	75	78	79	73	66
Resultant Noise Level in the Ground Floor Bar Area, $L_{eq,T}$	83	81	79	77	80	80	74	67
Sound Insulation of the separating floor to First Floor Apartment, D_w	-	-46	-52	-55	-61	-63	-57	-65
Resultant Noise Level in the First Floor Apartment, $L_{eq,T}$	23	35	27	22	19	17	17	2
MCC Criteria	-	47	41	-	-	-	-	-
Difference	-	-12	-14	-	-	-	-	-

- 5.8 As identified above, noise levels in the first-floor apartment due to the ground floor bar area (including noise from the basement venue transferred into bar area) would be below the MCC criteria at both the 63Hz and 125Hz octave band centre frequencies.
- 5.9 Based on the above calculation, the ambient noise level due to activities in the ground floor bar area alone, needs to be controlled to no greater than 83 dBL_{eq} and 81 dBL_{eq} at 63Hz and 125Hz, respectively in order to comply with the MCC criteria. In addition, the overall broadband noise level in the bar area needs to be limited to 85dB(A).

- 5.10 In addition, AEC recommends that the external walls around both the basement and ground floor areas are lined independently with 12.5mm thick BG SoundBloc plasterboards with insulation in the cavity in order to avoid noise flanking through external walls.

Noise Break-Out

- 5.11 In terms of noise break-out, the external envelope of the proposed site is constructed from masonry columns with glazed windows and door in between.
- 5.12 The glazing on the north-western façade of the proposed site is assumed to be 10mm Laminated single glazed panel with an expected sound insulation performance of around 34dBR_w.
- 5.13 Noise breakout calculations have been undertaken based on the proposed layout and external elevations shown on the Plans For Property drawing Rev C dated 22.06.21; the previously measured typical ambient noise level in the basement venue and ground floor bar area; the sound insulation performance of the separating floor between the basement and ground floor; the sound insulation performances of the non-masonry areas, and distance attenuation to the nearest noise sensitive properties.
- 5.14 Noise Break-out calculations are undertaken external to the first-floor apartments at both 60A Oldham Street and 60 Oldham Street.
- 5.15 A summary of the calculation due to noise breaking out of the basement venue and ground floor bar area external to the first-floor apartments at 60A and 60 Oldham Street is presented in Tables 5.5 and 5.6, respectively, below along with the comparison to the background noise levels.

Table 5.5 – Anticipated Ambient Noise Break-Out of the Basement Venue and Bar Area external to Apartment at 60A Oldham Street Compared to the Measured Night-time Background Noise Levels

Details	dB(A)	Octave Band Centre Frequency, Hz						
		63	125	250	500	1k	2k	4k
Typical Ambient Noise Level in Basement Venue, L _{eq,T}	100	103	99	94	96	97	92	86
Sound Insulation of the separating floor to Bar Area, D _w	-	-22	-21	-19	-18	-18	-19	-20
Noise Level in the Bar Area due to Basement Venue, L _{eq,T}	82	81	78	75	78	79	73	66
Typical Ambient Noise Level in Ground Floor Bar Area, L _{eq,T}	76	63	72	71	74	72	68	60
Resultant Noise Level in the Ground Floor Bar Area, L _{eq,T}	83	81	79	77	80	80	74	67
Noise Level outside Apartment at 60A Oldham Street, L _{eq,T}	32	39	37	33	29	29	21	5
Criteria = Background noise level - 10dB, L _{90,T}	40	40	37	37	37	36	33	27
Comparison of Basement Venue Noise Level outside Apartment v Criteria	-8	-1	0	-4	-8	-7	-12	-22

Table 5.6 – Anticipated Ambient Noise Break-Out of the Basement Venue and Bar Area external to Apartment at 60 Oldham Street Compared to the Measured Night-time Background Noise Levels

Details	dB(A)	Octave Band Centre Frequency, Hz						
		63	125	250	500	1k	2k	4k
Typical Ambient Noise Level in Basement Venue, $L_{eq,T}$	100	103	99	94	96	97	92	86
Sound Insulation of the separating floor to Bar Area, D_w	-	-22	-21	-19	-18	-18	-19	-20
Noise Level in the Bar Area due to Basement Venue, $L_{eq,T}$	82	81	78	75	78	79	73	66
Typical Ambient Noise Level in Ground Floor Bar Area, $L_{eq,T}$	76	63	72	71	74	72	68	60
Resultant Noise Level in the Ground Floor Bar Area, $L_{eq,T}$	83	81	79	77	80	80	74	67
Noise Level outside Apartment at 60 Oldham Street, $L_{eq,T}$	31	38	36	32	28	28	20	4
Criteria = Background noise level - 10dB, $L_{90,T}$	40	40	37	37	37	36	33	27
Comparison of Basement Venue Noise Level outside Apartment v Criteria	-9	-2	-1	-5	-9	-8	-13	-23

- 5.16 As identified above, provided the glazing elements on the north-western façade has the above mentioned sound insulation performance, noise levels external to the first-floor apartment from the basement venue and the ground floor bar area would be at least 10dB below the measured background noise levels at both 60 Oldham Street and 60A Oldham Street apartments.
- 5.17 The measured background noise levels (from 2330h to 0230h) are representative of the quietest period during the proposed operational hours (1700 to 0230h).
- 5.18 As the noise break out from the basement venue and the ground floor bar area are below MCC's criteria (background noise level -10dB), the proposed operational hours should not cause any noise disamenity with respect to this element.
- 5.19 It is understood that post completion of proposed works, a verification measurement needs to be undertaken by AEC or others in order to fully comply with MCC's criteria on noise breaking-out from the proposed venue and bar area.

Plant Noise

- 5.20 AEC understand that three items of mechanical services plant mentioned below and whose details are attached in Appendix C are being installed as a part of the proposed development.
- Cellar Cooler Unit;
 - AC unit serving ground floor;
 - AC unit serving basement.

- 5.21 AEC also understand from the client that the cooler unit and the two AC units will be installed at least 1.5m and 4m, respectively from the window of the first-floor apartment which is the NNSR as identified in the attached Figure 3.
- 5.22 The noise from the proposed plant is similar to noise from building services plant associated with surrounding buildings which is not tonal, intermittent or impulsive and, therefore, does not require any acoustic correction.
- 5.23 Based on the above and details of the building services plant items, provided by others, the following noise levels have been determined, as presented in Table 5.6 below.

Table 5.6 – Plant Noise Level Assessment

Plant Item	Type / Reference	Approximate Noise Level at 1m (dBL_{Aeq,T})	Estimated Distance Attenuation (dB)	Resultant Noise Level at Residential Receptors (dBL_{Aeq,T})
Cellar Cooler	J5LC15C	49	-3	46
AC Unit	MOU-24FN8	59	-12	47
AC Unit	MOU-48FN8	63	-12	51
Total NoiseLevel	-	-	-	53
Rating correction	-	-	-	0
Rating Level (dBL _{A,r,Tr})	-	-	-	53

- 5.24 The above assessment indicates that the rating noise level from all plant items combined would be -7dB below the measured background noise level at the nearest noise sensitive receptor and hence comply with MCC's requirements.
- 5.25 It is understood that post completion of proposed works, a verification measurement needs to be undertaken by AEC or others in order to fully comply with MCC's criteria on noise breaking-out from the proposed plant items.
- 5.26 Therefore, noise should not be a determining factor to any planning permission being sought.

FIGURE 1 – Existing Site Showing Monitoring Locations

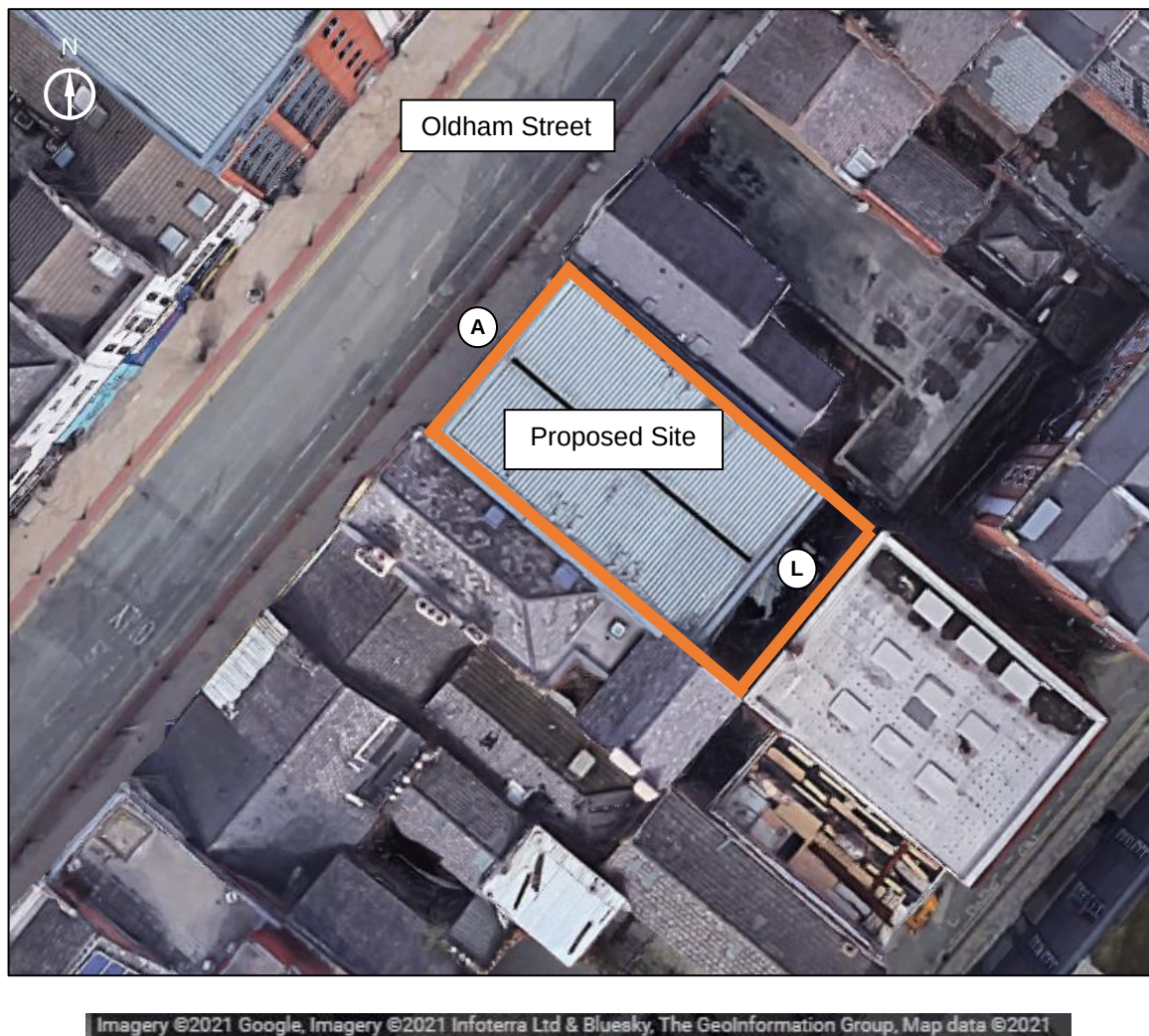
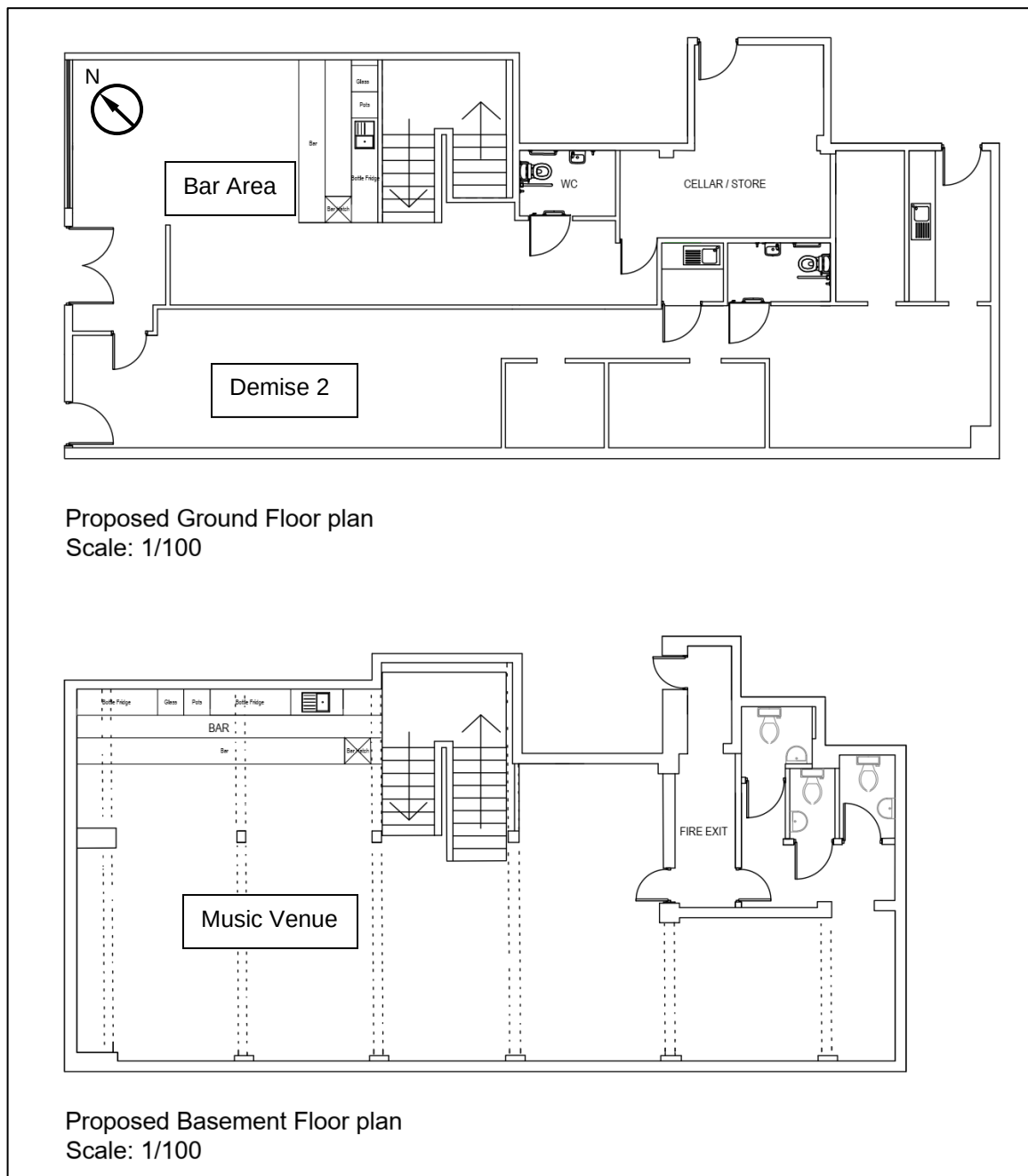


FIGURE 2 – Proposed Basement and Ground Floor Plan



APPENDIX A – Acoustic Terminology in Brief

Sound Description

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discrete frequency - a 'pure tone' - most sound is made up of many different frequencies.

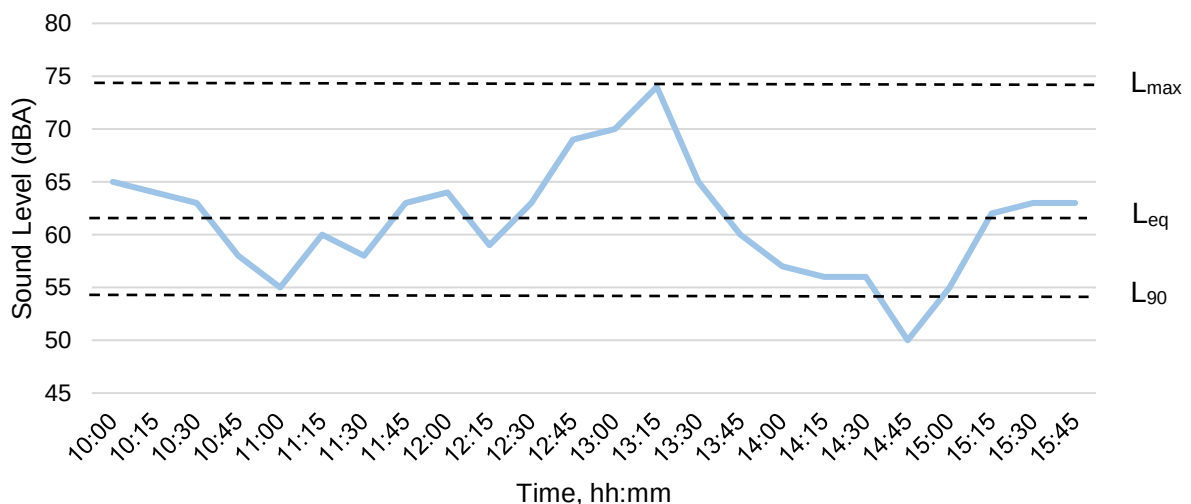
The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA*, normally used to assess the effect of noise on people. The *dBA* weighting emphasises or reduces the importance of certain frequencies within the audible range.

Sound Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the sound.

The figure below shows an example of sound level varying with time. Because of this time variation, the same period of sound can be described by several different levels. The most common of these are described below. It should be noted that in many instances in the main body of text, the unit will be preceded by a *dB* descriptor in the report e.g. $L_{Aeq,T}$ could be written $dBL_{Aeq,T}$.

Example of Sound Varying with Time



Unit Type	Acoustic Unit	Description
Standard Acoustic Units		
Ambient Sound Level	$L_{Aeq, T}$	The equivalent continuous (A-weighted) sound level. It may be thought of as the "average" sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the "ambient" noise level.
Percentile Level	L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe background noise.
Maximum Sound level	L_{Amax}	The maximum (A-weighted) sound level measured during a given time. 'Fast' or 'Slow' meter response should be cited.
Additional Acoustic Units		
Free-field Level	-	This refers to the sound level measured outside, away from reflecting surfaces.
Sound reduction index	R_w	Single number rating used to describe the laboratory airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
Apparent sound reduction index	R'_w	Single number rating used to describe the sound reduction index of an on-site construction over a range of frequencies, typically 100-3150Hz.
Sound Level Difference	D	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Weighted Level Difference	D_w	Single number rating used to describe the on-site airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
Weighted standardized level difference	$D_{nT,w}$	Single number rating used to describe the on-site airborne sound insulation performance properties of a material or building element over a range of frequencies, typically 100-3150Hz, which is calculated in terms of a standardized reverberation time of 0.5 seconds.
BS 4142:2014+A1:2019 Additional Acoustic Units		
Ambient Sound Level	$L_{Aeq, T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level	L_{A90}	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting, F, and quoted to the nearest whole number of decibels.
Rating Level	$L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Specific Sound Level	$L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, r.

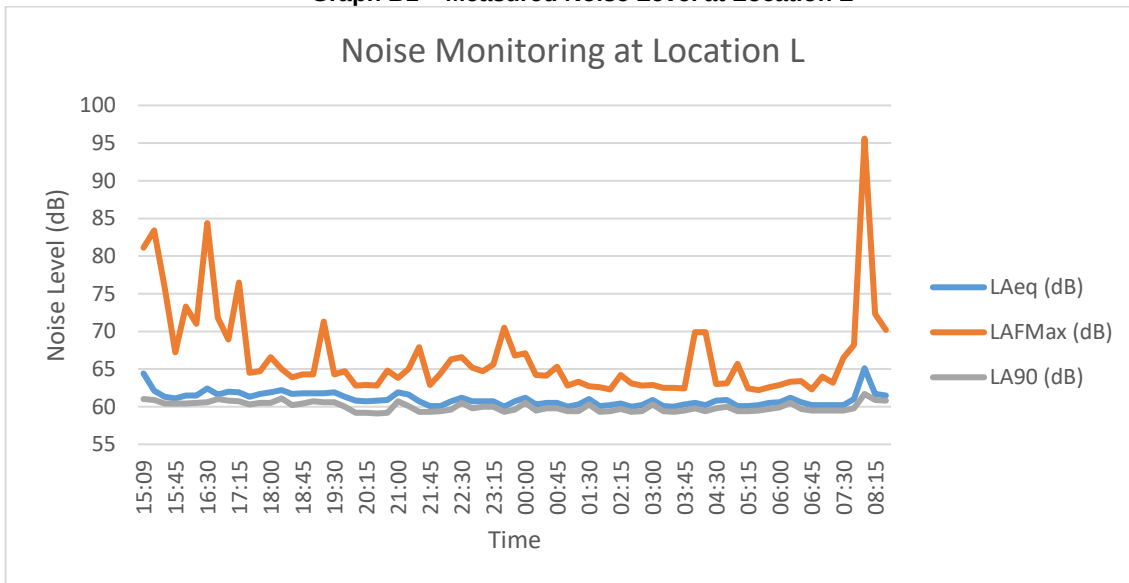
APPENDIX B – Noise Survey Details

Date & Time of Survey:	Unattended: Monday 2 August 2021, 1500h to Tuesday 3 August 2021, 0830h.					
Date & Time of Survey:	Attended: Monday 2 August 2021, 2330h to 0030h, Tuesday 3 August 2021; Tuesday 8 March 2022, 0030 to 0230h.					
Personnel:	Naveen Ramesh Simha (AEC).					
Equipment Used:	Unattended: Cirrus CR:171B Real Time Analyser (AEC Kit 5).					
Equipment Used:	Attended: Cirrus CR:171B Real Time Analyser (AEC Kit 3).					
Calibration:	The sound level analysers, which conforms to BS EN 61672-1: 2013 ' <i>Electroacoustics – Sound level meters - Part 1 Specifications</i> ' for Class 1 Type Z meters, was in calibration and check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. Calibration certificates are available on request.					
Weather Conditions:	Date	Period	Wet/Dry	Temp°C	Wind Speed & Direction	Cloud Cover
	02/08/2021	Day	Dry	15°C	North-westward and 2 m/s	50%
	02/08/2021	Night	Dry	10°C	Northward and 1 m/s	80%
	08/03/2022	Night	Dry	2°C	Eastward and 3 m/s	99%
Measurement Locations:	Unattended: The microphone was connected via an extension cable and fixed externally at a location representative of the mechanical services plant, at ground floor level, identified as L on Figure 1.					
Measurement Locations:	Attended: Measurements were undertaken at single location external to the development site. Identified as A on Figure 1 and described below. A – 2m from nearest carriageway of Oldham Street.					
Measurement Details:	Unattended: Measurements were logged continuously over 1s for post processing and assessment.					
Measurement Details:	Attended: Measurements were undertaken over various periods in terms of L_{eq} , L_{10} , L_{90} , and L_{max} .					
Façade / Free-Field:	Unattended: Free-Field					
Façade / Free-Field:	Attended: A - free-field.					
	Full results for the attended measurements are given in Table B1. The measured daytime and night-time periods for the unattended survey is presented on Graph B1.					
Measured Data:	Full octave band centre frequency data was obtained for all measurements.					

TABLE B1 – Measured Night-Time Noise Levels

Location	Period, h	Noise Level, dB			Comments
		L _{Aeq}	L _{A90}	L _{Amax, F}	
A	2325 – 2340	71.7	56.9	90.8	Ambient noise level due to road traffic on Oldham Street. Maximum noise level due to car pass by.
	2345 – 0000	69.6	55.3	89.3	
	0000 – 0015	67.5	52.7	88.1	
	0015 – 0030	62.7	52.2	83.4	
	0030 – 0045	62.5	51.4	84.6	
	0045 – 0100	61.4	51.3	84.5	
	0100 – 0115	57.1	48.4	77.8	
	0115 – 0130	57.4	48.4	83.4	
	0130 – 0145	55.8	46.2	84.2	
	0145 – 0200	55.5	45.8	81.8	
	0200 – 0215	54.8	45.2	78.5	
	0215 – 0230	54.2	44.9	80.4	

Graph B1 – Measured Noise Level at Location L



APPENDIX C – Mechanical Services Plant Details

BLOCK BUSTER
CELLAR COOLING

DON'T FORGET....
AIR STRAIGHTENER
ALSO AVAILABLE

JCC Cellar Coolers
PRODUCT RANGE

▶ JCC CELLAR COOLER SPECIFICATIONS

R410A

QUICK SELECTION GUIDE

	Quick Selection @ 12.7°C		Cooling Capacities kW @ 32°C Ambient				
	Above ground (max. room m³)	Below ground (max. room m³)	4°C	8°C	10°C	12.7°C	16°C
JCC2 25E / J5LC15C	25	45	2.70	2.78	2.82	2.87	2.94
JCC2 40E / J5LC20C	48	70	3.78	4.02	4.14	4.31	4.53
JCC2 50E / J5LC25C	56	90	4.19	4.45	4.59	4.78	5.02
JCC2 60E / J5LC28C	70	120	5.29	5.53	5.65	5.82	6.03

Criteria:

- Above based on typical UK cellar construction
- 32°C ambient (21°C for below ground); 12.7°C db/10°C wb
- Maximum product load of 16 l/m³, entering room at max temp of 21°C
- Product cooling time 24 hours, plant running time of 18 hours a day

GENERAL SPECIFICATIONS

Model	Nominal Cooling Capacity kW	Unit Airflow m³/h	Noise Level dB(A)	System Pipe Sizes		Maximum Pipe Run		Power Supply V/Ph/Hz	FLA (Amps)	IRA (Amps)	Power To... (Amps)	Inter Connecting Cable	Fuse Rating (Amps)
				Liquid	Suction	Length	Rise						
JCC2 25E / J5LC15C	2.87	2560 / 1631	48 / 29	1/4"	1/2"	25m	5m	230/1/50	6.2	N/A / 24	Indoor	3 Core	16
JCC2 40E / J5LC20C	4.31	2270 / 2208	48 / 29	1/4"	1/2"	25m	8m	230/1/50	7.7	N/A / 27	Indoor	3 Core	20
JCC2 50E / J5LC25C	4.78	2680 / 2480	47 / 32	1/4"	5/8"	25m	8m	230/1/50	8.8	N/A / 63	Indoor	3 Core	25
JCC2 60E / J5LC28C	5.82	2560 / 2463	47 / 34	3/8"	5/8"	25m	8m	230/1/50	12.9	N/A / 65	Indoor	3 Core	32

INDOOR
OUTDOOR

*) Reducer required on indoor unit
Liquid line is the expansion line and no such requires insulating

Criteria	Model	Pre-charged with	TCO ₂ Eq
• Noise levels are free field at 10m	JCC2 25E	0.83kg R410A Additional charge 10g per metre	1.73
• Nominal cooling capacities quoted @ 12.7°Cdb / 10°Cwb internal, 32°C ambient	JCC2 40E	1.38kg R410A Additional charge 15g per metre	2.88
• Condensing units are pre-charged for up to 7.6m pipe run	JCC2 50E	1.54kg R410A Additional charge 15g per metre	3.22
• The maximum pipe run must include the rise - the rise is not additional to the length	JCC2 60E	1.80kg R410A Additional charge 20g per metre	3.76

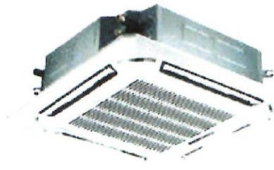
WEIGHTS & DIMENSIONS

Model Indoor	Width (mm) ①	Depth (mm) ②	Height (mm)	Weight (Kg)	Model Outdoor	Width (mm)	Depth (mm)	Height (mm)	Weight (Kg)
JCC2 25E	865	372	489	31	J5LC15C	700	250	540	30
JCC2 40E	865	372	489	33	J5LC20C	855	328	654	47
JCC2 50E	902	370	545	36	J5LC25C	855	328	756	50
JCC2 60E	902	370	545	38	J5LC28C	855	328	756	57

① Indoor unit width includes water service; add 100mm for 20mm
② Indoor unit depth includes water service; add 100mm for 20mm

SUPER SLIM ROUND FLOW CASSETTE RANGE

BLOCK BOOSTER
AC UNIT



Indoor unit



Outdoor unit



Remote control



		GROUND FL.		BASEMENT	
		MCD-18FNXDO	MCD-24FNXDO	MCD-36FNXDO	MCD-48FNXDO
		MOU-18FNH-QDO	MOU-24FNH-QDO	MOU-36FNH-Q/R/DO	MOU-48FNH-RDO
Nominal Cooling Capacity (min-max)	kW	5.28(1.26-6.15)	7.03(2.23-8.21)	10.55(2.64-12.02)	14.0(4.76-16.12)
Nominal Heating Capacity (min-max)	kW	5.57(1.76-7.03)	7.62(2.43-8.65)	11.14(2.93-13.19)	16.1(3.93-17.59)
UK Total Cooling Capacity	kW	5.8	7.78	11.39	15.28
Seasonal Efficiency SEER/Class	W/W	6.3/A++	6.1/A++	6.1/A++	6.1/A++
Seasonal Efficiency SCOP/Class	W/W	4/A+	4/A+	4/A+	4/A+
Power supply (Indoor)	V-Ph-Hz	220-240-1-50	220-240-1-50	220-240-1-50	220-240-1-50
Power supply (Outdoor)	V-Ph-Hz	220-240-1-50	220-240-1-50	220-240-1-50 380-415-3-50	380-415-3-50
Cooling Current (min-max)	A	7.1(1.2-9.3)	9.5(2.1-12.4)	16.3(2.9-19.6) 7.2(1.2-8.2)	8.3(1.8-9.26)
Heating Current (min-max)	A	6.5(1.4-9.5)	8.9(2.2-12.5)	12.9(2.8-19.8) 5.5(1.2-8.3)	8.2(1.56-8.83)
Max Current	A	10.0	13.5	21.5/10	11.2
Recommended Fuse Size (Indoor)	A	5.0*	5.0*	5.0*	5.0*
Recommended Fuse Size (Outdoor)	A	16	20.0	32 16	16
Interconnecting Wiring	No.	2 Core 1mm² Screened	2 Core 1mm² Screened	2 Core 1mm² Screened	2 Core 1mm² Screened
Indoor air flow (H/M/Lu)	m³/h	1036/867/763	1378/1200/1032	1775/1620/1438	1715/1568/1381
Indoor sound pressure level (H/M/Lu)	dB(A)	41/37/33	41/38/35	47/45/42	49/46/43
Indoor unit	Dimension (WxDxH) (body)	mm	840x840x205	840x840x245	840x840x287
	Packing (WxDxH) (body)	mm	900x900x225	900x900x225	900x900x292
	Dimension (WxDxH) (panel)	mm	950x950x55	950x950x55	950x950x55
	Packing (WxDxH) (panel)	mm	1035x1035x90	1035x1035x90	1035x1035x90
	Net/Gross weight (body)	Kg	21.4/25.1	23/27	27.5/31
Drainage water pipe dia.	mm	5/8	5/8	5/8	5/8
	mm	00Φ32	00Φ32	00Φ32	00Φ32
	mm	00Φ32	00Φ32	00Φ32	00Φ32
Outdoor air flow	m³/h	2100	2700	4000	7500
Outdoor sound pressure level	dB(A)	51.0	55.0	56	59
Outdoor unit	Dimension (WxDxH)	mm	800x333x554	845x363x702	946x410x810
	Packing (WxDxH)	mm	920x390x615	965x395x765	1090x500x875
	Net/Gross weight	Kg	35.6/38.5	66.8/72.6	66.8/73.4 81.5/87.0
Refrigerant	Type	R32	R32	R32	R32
	GWP	675	675	675	675
	Charged quantity	Kg	1.35	1.5	2.4
	Additional Charge	g/m	12	24	24
Refrigerant piping	Liquid side/ Gas side	mm(inch)	Φ6.35/Φ12.7(1/4"/1/2")	Φ9.52/Φ15.9(3/8"/5/8")	Φ9.52/Φ15.9(3/8"/5/8")
	Max. pipe length	m	30	50	65
	Max. height difference	m	20	25	30
Operating temperature	Indoor (Cooling/Heating)	°C	17-32/0-32	17-32/0-33	17-32/0-34
	Outdoor (Cooling/Heating)	°C	15-50/-15-26	-15-50/-15-27	-15-50/-15-28

Nominal Conditions: Cooling: indoor 27°C DB, 19°C WB, outdoor 35°C DB, 24°C WB.
Nominal Conditions: Heating: indoor 20°C DB, outdoor 7°C DB, 6°C WB.

UK Conditions: Summer: indoor 21°C DB, 15°C WB, outdoor 27°C DB.
Sound Pressure is measured 1.5m below the air-outlet at Nominal Conditions.

*Option for power via Outdoor also available.