

To:	Craig Jones	of:	theCAVE Architecture & Design
Cc:	As per email distribution list	of:	

Dear Craig

Gun Street, Manchester – Noise Assessment for Planning Purposes

1.0 INTRODUCTION

- 1.1 Acoustic and Engineering Consultants Limited (AEC) has been instructed by the theCAVE Architecture & Design to assess the potential impact of noise breaking out from the proposed café that is to be located within the ground floor of the SIP Car Park located on the junction of Gun Street and George Leigh Street in Ancoats, Manchester.
- 1.2 In addition to detailing the baseline noise levels measured for the site, this report presents an assessment of the proposals for the site and considers the following elements:
 - Music and patron noise break-out from the cafe;
 - Patron noise from the external seating area;
 - Potential Plant noise break-out.
- 1.3 Acoustic terminology is used throughout this report and is discussed in brief in Appendix A at the back of this report.

2.0 SITE DESCRIPTION & DEVELOPMENT LAYOUT

Site Description

- 2.1 The proposed development is to be located within a section of the ground floor of the SIP car park and will front on the area where Gun Street meets George Leigh Street. A site location plan is identified on Figure 2.1, below.

Figure 2.1 – Proposed Site Location

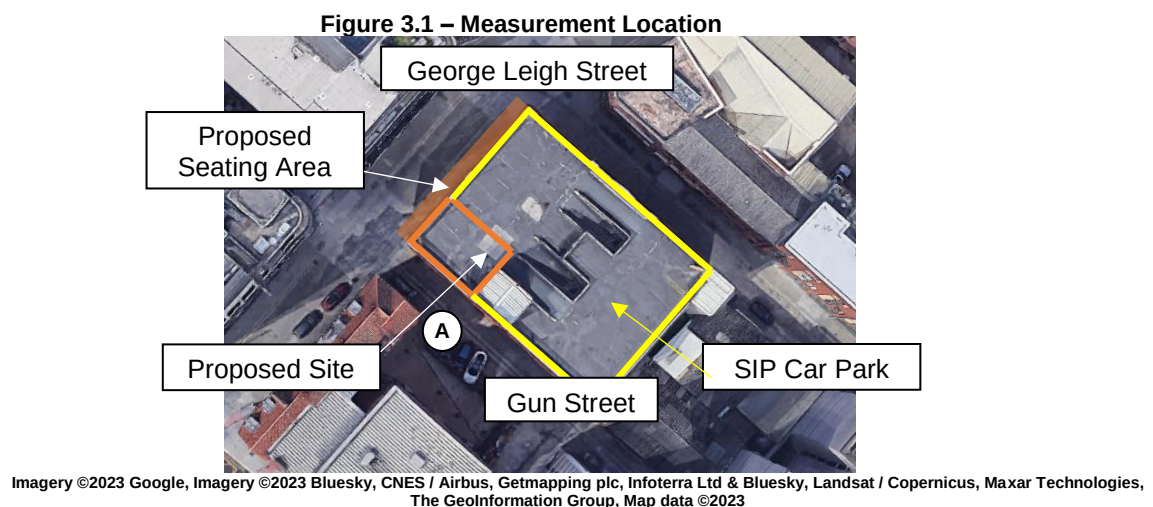


Imagery ©2023 Google, Imagery ©2023 Bluesky, CNES / Airbus, Getmapping plc, Infoterra Ltd & Bluesky, Landsat / Copernicus, Maxar Technologies, The GeoInformation Group, Map data ©2023

- 2.2 The proposed operating times of the site are 0730 – 2200h, Monday to Sunday. Access to the site will be directly off George Leigh Street. An elevation outline is highlighted in Figure C.1 of Appendix C at the back of this report alongside a proposed site layout in Figure C.2.
- 2.3 The site will have a single air conditioning unit that will be housed internally within the car park. The location of this is identified on Appendix C and it is understood that this will operate in line with the venue opening times. It is understood that a Midea MOX33OU-18HFNB-Q(GA) unit will be installed.
- 2.4 Serving the WC of the site will be an EXELAIR VX100S 100mm Axial Bathroom Extractor Fan which will be located on the southern elevation of the site.
- 2.5 Gun Street is a through-road connecting Blossom Street and George Leigh Street. The location of the nearest noise sensitive receptor is located on Gun Street, approximately 15m away within The Hudson Buildings development.
- 2.6 Opposite the site on George Leigh Street are a number of office buildings which are located approximately 10m away.
- 2.7 As previously stated, the site will function primarily as a café and will, therefore, only have provisions for low level background music.
- 2.8 As part of the works, there will be an external seating area that fronts onto George Leigh Street. The seating area will not have any external amplified music and will have provisions for approximately 10 seats.
- 2.9 As per Figure C.1, much of the external envelope will be comprised of the existing brickwork, however, a sliding door will be inserted on the George Leigh Street elevation and separate doors will also be installed on the Gun Street elevation. At this stage, any window and door openings have been assumed to be standard double glazing with a sound insulation performance of 29dBR_w.

3.0 NOISE CLIMATE

- 3.1 An attended noise level survey was completed by AEC on Tuesday 25 April 2023 between approximately 0730 and 0830h. Measurements were undertaken at a single free-field location representative of the nearest noise sensitive receptor on Gun Street. The location of the measurements is identified as Location A on the attached Figure 3.1, below.



- 3.2 A full measurement procedure is presented in Appendix B and a summary of the measured data is presented in Table B1.
- 3.3 In summary, ambient and background noise levels were approximately 56dB_{L_{Aeq,T}} and 48dB_{L_{A90,T}}. Ambient and background noise levels were due to road traffic on the surrounding roads.
- 3.4 As George Leigh Street is a busier street for road traffic, controlling noise breakout from the site to the levels measured on Gun Street would form a worst-case scenario.

Noise Levels within Cafe

- 3.5 AEC has measured ambient noise levels in a number of cafes with patrons and background music. Based on this as well as the size of the proposed café, an appropriate internal noise level used for the assessment of the site is presented in Table 3.1, below. These figures will be used for the assessment of noise breakout from the site.

Table 3.1 – Measured Ambient Noise Level within Cafe

Noise Level, dB @ Octave Band Centre Frequency, Hz							dB(A)
63	125	250	500	1k	2k	4k	
70	70	65	65	60	60	55	67

4.0 BASIS OF ASSESSMENT

- 4.1 Manchester City Council has produced '*Planning & Noise – Technical Guidance*' (2022) (PNTG) in relation to their requirements for noise assessments to accompany planning applications.
- 4.2 Based on the proposed development, internal noise breakout (mainly due to amplified music) and external noise from the seating areas affecting noise sensitive receptors are the only areas for consideration.

Internal Noise Breakout

- 4.3 In relation to internal noise breakout and amplified music, the PNTG states that "*Entertainment noise ($L_{Aeq,5min}$) should be controlled to 5dB below the typical background noise level (L_{A90}) in each octave band at the nearest noise sensitive location*".
- 4.4 Based on this, the octave band data for the existing background noise level measured is presented in Table 4.1, below, alongside the proposed noise level limit.

Table 4.1 – Noise Level Limit for Entertainment Noise Breakout

Descriptor	Overall, dB	Noise Level, dB @ Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
Background Noise Level	48	61	49	47	45	43	39	29
Proposed Noise Level Limit	43	56	44	42	40	38	34	24

External Seating Noise Breakout

- 4.5 In relation to the external seating areas, there is no guidance relating to controlling noise from this source. Typically, AEC would suggest proposing that ambient and maximum noise levels as a result of the seating areas are controlled so as to not exceed the existing background (48dBL_{A90}) and ambient noise levels (56dBL_{A90}) at the nearest noise sensitive receptor, respectively. This has resulted in noise from other seating areas not being considered intrusive at nearby noise sensitive receptors and, therefore, this will be used as the criteria in this instance.

Atmospheric Plant Noise Emissions

- 4.6 Based on guidance presented in MCC's document PNTG, the following is stated in relation to noise level limits for industrial sources at noise sensitive premises:

"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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location."

- 4.7 Based on the above and the typical background noise level measured by AEC, the rating level from any items of plant should be controlled to not exceed 43dBL_{Ar,Tr}.

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

Internal Noise Breakout

- 5.1 In order to calculate the noise breakout internally from the site, the following external envelope elements will be used. In order to form a robust assessment, it is assumed that the sliding doors fronting George Leigh Street could be left opened for sustained periods of time during warmer periods.
- 5.2 As the walls of the external envelope are expected to have a sound insulation performance at least 10dB greater than the glazing or doors, they will not influence the assessment and have been excluded.

Table 5.1 – Elements of the External Envelope

Elevation	Element	Areas, m ²	Sound Insulation Performance, dBR _w
George Leigh Street	Glazing	(0.9m x 1.5m) 1.35	29
	Sliding Door	(2.9 x 2) 5.8	0 (Open)
Gun Street	Glazing	(2.0m x 1.5m) 3	29
	Door	(1.9m x 2m) 3.8	29

- 5.3 Based on the details in Table 5.1, as well as the distance and screening attenuation, the external noise level as a result of internal noise breakout has been determined at the receptors. This is presented in Table 5.2, below.

Table 5.3 – Allowable Internal Noise Level Limit

Element Noise Level	Overall, dB(A)	Noise Level, dB @Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
Noise Level in Premises (dBL _{Aeq,T})	67	70	70	65	65	60	60	55
Determined Noise Level	38	43	42	37	36	31	31	26
Criteria (Table 4.1)	43	56	44	42	40	38	34	24
Difference to Criteria	-	-13	-2	-5	-4	-7	-3	2

- 5.4 Based on the above, the only exceedances of the proposed criteria would be in the 4kHz frequency band where the criteria is exceeded by 2dB. As this is within measurement tolerance, this is considered marginal and is, therefore, deemed acceptable. Therefore, the requirements of PNTG for noise breakout of the proposed venue would be achieved.

External Seating Noise Breakout

- 5.5 Noise levels in the external seating areas have been determined using the calculation method presented in the J.H. Rindel, C.I Christensen, A.C. Grade research paper: '*Dynamic sound source for simulating the Lombard effect in room acoustic modelling software*' (Proceedings of Inter-Noise 2012, New York, USA, (2012)).

Ambient Noise Levels

- 5.6 As the seating areas are associated with a cafe, it has been deemed appropriate to use a noise level representative of '*normal*' speech conversation levels. The sound power level of a person speaking in a *normal* voice is equal to roughly 68dBL_{WA} (ref. ANSI 3.5).
- 5.7 The calculation methodology assumes that of the 10 people in the seating area, these will be split into a certain number of groups. In order to do this, the first step is to calculate the number of speaking persons (NS) at any one time, where N is the total number of persons (10) and G is the assumed group size (2). This would be considered an absolute worse-case in terms of the number of people in the seating area at any one time.

$$\text{Number of speaking persons (NS)} = N/G$$

- 5.8 In this scenario, this equates to roughly 5 people speaking at once (10/2). Considering the number of people speaking and the sound power level of normal conversation (68dBL_{WA}) the resultant sound power level would be around 75dBL_{WA}.
- 5.9 The equation shown below is then used to convert the sound power to a sound pressure level, where r is the distance to the nearest noise sensitive receiver.

$$\begin{aligned} \text{Sound pressure level, } L_p &= L_{WA} - 20\log(r) - 8 \\ L_{WA} &= 75\text{dB} \\ r &= 10\text{m} \end{aligned}$$

- 5.10 Using this methodology, the calculated ambient noise level would be 47dBL_{Aeq,T}.

Maximum Noise Levels

- 5.11 In terms of maximum levels from the external seating this has been based on the sound power level of a person with a '*loud*' voice, of around 83dBL_{WA} (ref. ANSI 3.5).

- 5.12 On this basis, the resultant maximum noise level considering distance would be around $55\text{dBL}_{\text{Amax, F}}$

Summary

- 5.13 Comparing the calculated ambient and maximum noise levels of $47\text{dBL}_{\text{Aeq, T}}$ and $55\text{dBL}_{\text{Amax, F}}$ to the proposed noise level limits of $48\text{dBL}_{\text{Aeq, 15min}}$ and $56\text{dBL}_{\text{Amax, F}}$, respectively, shows that the limits would not be exceeded and AECs proposed requirements would be achieved.

Atmospheric Plant Noise Emissions

- 5.14 As previously stated, there are two items of external plant that will serve the development which are the air conditioning unit and WC extractor fan unit. An assessment of noise breakout from each of these items of plant is presented in Table 5.4, below.
- 5.15 Based on the requirements of PNTG, all items of plant in combination should be controlled to not exceed $43\text{dBL}_{\text{Ar, Tr}}$ at the receptor on Gun Street.

Table 5.4 – Atmospheric Plant Noise Breakout Assessment

Plant Item	Sound Pressure Level	Distance Attenuation, dB	Additional Attenuation, dB	Determined Specific Noise Level, $\text{dBL}_{\text{Aeq, Tr}}$
Air Conditioning Unit	53dB at 1.5m	-17 ($=20 \cdot \log(1.5/10)$)	-15*	21
WC Extractor Fan Unit	41dB at 3m	-4 ($=20 \cdot \log(3/5)$)	0	37
			Total	37

*Nominal figure used to represent attenuation provided by the walls to the café that separate the air conditioning unit from the receptor.

- 5.16 Based on the proposals, AEC would not consider the proposed items of plant to be either intermittent or impulsive. As the determined specific noise level of $37\text{dBL}_{\text{Aeq, Tr}}$ is some 11dB below the existing background noise level, neither of the plant items would be considered readily distinctive against the prevailing noise climate.
- 5.17 AEC does not have any information on whether either item of plant would have any tonal characters, however, as there is 6dB of tolerance to the rating level limit of $43\text{dBL}_{\text{Ar, Tr}}$, this would allow for any potential uncertainty.
- 5.18 Based on the above, noise from the proposed item of plant would not exceed the proposed rating level limit and the requirements of PNTG would be met.

Yours sincerely



Ross Chamberlain

Checked by:



APPENDIX A – Acoustic Terminology in Brief

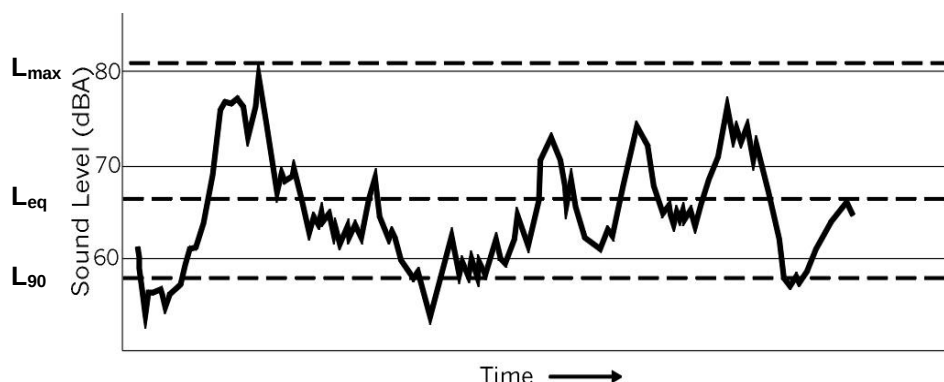
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (Hz), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discreet 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 $dB L_{Aeq,T}$



Example of Sound Level Varying With Time

$L_{Aeq,T}$	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.
$L_{A90,T}$	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe background noise.
L_{Amax}	The maximum (A-weighted) sound level measured during a given time. ‘Fast’ or ‘Slow’ meter response should be cited.
Free-field Level	This refers to the sound level measured outside, away from reflecting surfaces.
Façade Level	This refers to the sound level measured outside, at 1m from a hard reflecting surface, typically 3dB greater than the free-field level.

APPENDIX B – Noise Survey Details

TABLE B.1 – Measurement Procedure

Date & Time of Survey:	Tuesday 25 April 2023, 0730 – 0830h.					
Personnel:	Ross Chamberlain (AEC).					
Equipment Used:	B&K 2250 Real Time Analyser (AEC Kit 1)					
Calibration:	The sound level analyser, 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
	25/04/23	Day	Dry	3°C	Negligible	10%
Measurement Locations:	Measurements were undertaken at one location identified as A on Figure 3.1. This location was measured in the middle of Gun Street.					
Measurement Details:	Measurements were undertaken over various periods in terms of L_{eq} , L_{10} , L_{90} , and L_{max} .					
Façade / Free-Field:	A - free-field.					
	Full results for the attended measurements are given in Table B.2.					
Measured Data:	Full octave band centre frequency data was obtained for all measurements.					

TABLE B.2 – Measured Daytime Noise Levels

Location	Period, h	Noise Level, dB				Comments
		L_{Aeq}	L_{A10}	L_{A90}	$L_{Amax, F}$	
A	0730 – 0745	55.9	56.2	47.2	77.3	Ambient and background noise levels were due to road traffic in the area. Maximum noise levels were due to car pass-bys on Gun Street.
	0747 – 0802	56.0	57.4	49.0	74.5	
	0813 - 0828	56.8	56.6	47.9	80.1	

APPENDIX C – Site Outline

Figure C.1 – Site Outline



Figure C.2 – Site Floorplan

