



Ref: P4378/R01a/NRS (email attachment)

19 May 2021

To:	Victoria Welch	of:	WSP
Cc:		of:	

Dear Victoria,

9 Stevenson's Square, Manchester – Noise Assessment for Planning Purposes

1.0 INTRODUCTION

- 1.1 Acoustic and Engineering Consultants Limited (AEC) has been instructed by WSP to assess the potential impact of noise breaking out from the proposed conversion of the ground floor office space into a cafe/restaurant located at 9 Stevenson's Square, Manchester on nearby residents.
- 1.2 The report presents an assessment of the proposals and considers the following elements:
- Patron noise from the external seating area;
 - Plant noise break-out.
- 1.3 It should be noted that AEC's noise measurements were undertaken during the Governments lockdown due to the Covid-19 pandemic. During the lockdown all entertainment venues were operating under restrictions. Therefore, the amount of road traffic and pedestrians in the area was reduced and all associated building services plant was not operating.
- 1.4 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 located on the ground floor of 9 Stevenson's Square, Manchester, as identified on the attached Figure 1. Previously, the ground floor area was understood to be office space.
- 2.2 Stevenson's Square forms part of the Northern Quarter district of Manchester which is known for its various bars and clubs. The neighbouring unit to the proposed development is the Quarter House Beer and BBQ.
- 2.3 It should be noted that Stevenson's Square is currently pedestrianised and is being used by the neighbouring restaurants/bars as an outdoor seating area.
- 2.4 The nearest noise sensitive receptor (NNSR) would be the apartments above Bike Shop, to the south-east of the development, located off Hilton Street, as identified on the attached Figure 1.

Development Layout

- 2.5 The main entrance to the development will be on Stevenson's Square and the proposed operating times of the venue are understood to be the following:
- | | |
|--------------------|---------------|
| Monday - Tuesday: | 0900 - 2300h. |
| Wednesday: | 0900 - 0000h. |
| Thursday: | 0900 - 0100h. |
| Friday - Saturday: | 0900 - 0300h. |
| Sunday: | 0900 - 0100h. |
- 2.6 It is understood that an external seating area will be located on Stevenson Square, as identified on Figure 1. AEC also understand that there will be no amplified music played in the external seating area.
- 2.7 Based on the current proposals, in addition to retaining the existing toilet extract fan there will also be a new kitchen extract system. The mechanical extract system for the development will exhaust into the rear courtyard.

3.0 NOISE CLIMATE

- 3.1 An attended noise level survey was undertaken by AEC between 2330h on Wednesday 12 May 2021 and 0030h on Thursday 13 May 2021. Measurements were undertaken at a single location representative of the nearest noise sensitive receptor, identified as A on the attached Figure 1.
- 3.2 All measurements were undertaken under free-field conditions in general accordance with BS7445-1: 2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'. A full measurement procedure is presented in Appendix B and the measured data is presented in Table B1.
- 3.3 During the measurement period, ambient and background noise levels ranged between 53 - 60dB_{LAeq,15min}, and 44 - 49dB_{LA90,15min}, respectively.
- 3.4 The noise climate in the area was due to noise from neighbouring bars/restaurants that as a result of the Government enforced partial lockdown, were operating with restrictions in place.
- 3.5 It should be noted that all non-erroneous activates affecting the measurements such as ambulances, police sirens and street sweepers have been removed from the assessment.
- 3.6 Based on these restrictions, AEC has carried out an analysis of previous noise surveys carried out by other consultants on Stevenson's Square (via the Manchester Planning Portal) to assess whether our measurements are representative.
- 3.7 These surveys detailed that the typical ambient and background noise levels were around 60dB_{LAeq,T} and 54dB_{LA90,T}, respectively, during the night-time period. Therefore, as there is a notable difference in the background noise levels, it could indicate that AEC's measurements are not representative and therefore, the ambient and background noise levels from assessments carried out before restrictions were put in place, have been used in this assessment.

4.0 BASIS OF ASSESSMENT

- 4.1 Manchester City Council has produced 'Planning & Noise – Technical Guidance' (2015) (PNTG) in relation to their requirements for noise assessments to accompany planning applications.
- 4.2 Based on the proposed development, external noise breakout from the seating areas and plant noise affecting the nearest noise sensitive receptor above the Bike Shop are the only areas for consideration. These have been discussed further below.

External Seating Noise Breakout

- 4.3 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 typical background ($54\text{dBL}_{\text{A90,T}}$) and typical ambient noise levels ($60\text{dBL}_{\text{Aeq,T}}$) at the nearest noise sensitive receptor, respectively.

Atmospheric Plant Noise Emissions

- 4.4 Based on guidance presented in MCC's document PNTG, the following is stated in relation to noise level limits for industrial sources such as external building services plant at nearby 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."

- 4.5 As stated above, it is anticipated that typically night-time background noise level in the area would be $54\text{dBL}_{\text{A90,T}}$.
- 4.6 Therefore, AEC would propose that a rating level limit of $49\text{dBL}_{\text{Ar,Tf}}$ be achieved at the nearest noise sensitive receptor during the night-time period. This limit would also ensure that plant noise levels are controlled to the more onerous background noise level ($49\text{dBL}_{\text{A90,T}}$) measured by at AEC at midnight.
- 4.7 As any plant noise limit set during the night-time period would be more onerous, it would by default satisfy the daytime noise limits and hence, this is not discussed further.

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

External Seating Noise Breakout

- 5.1 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

- 5.2 As the seating area is associated with the cafe/restaurant, it has been deemed appropriate to use a noise level representative of '*raised*' speech conversation levels. The sound power level of a person speaking in a *raised* voice is equal to roughly 76dB_{L_{WA}} (ref. ANSI 3.5).
- 5.3 Based on the provided, drawings it is understood that there would be 51 external seating spaces proposed across 14 tables.
- 5.4 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 (51) and G is the assumed group size (3.5).

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

- 5.5 In this scenario, this equates to roughly 15 people speaking at once (51/3.5). Therefore, this would assume that at each table, at least one person is talking at any one time. Taking into account the number of people speaking and the sound power level of raised conversation (76dB_{L_{WA}}), the resultant sound power level would be around 87dB_{L_{WA}}.
- 5.6 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.

$$\begin{aligned}\text{Sound pressure level, } L_p &= L_{WA} - 20\log(r) - 8 \\ L_{WA} &= 87\text{dB} \\ r &= 25\text{m}\end{aligned}$$

- 5.7 Using this methodology, the calculated ambient noise level at the receptor would be 48dB_{L_{Aeq,T}}.

Maximum Noise Levels

- 5.8 In terms of maximum levels from the external seating area, this has been based on the sound power level of a person with a '*shouting*' voice, of around 91dB_{L_{WA}} (ref. ANSI 3.5).
- 5.9 On this basis and using the same calculation methodology as above, the resultant maximum noise level at the receptor would be around 52dB_{L_{Amax,F}}.

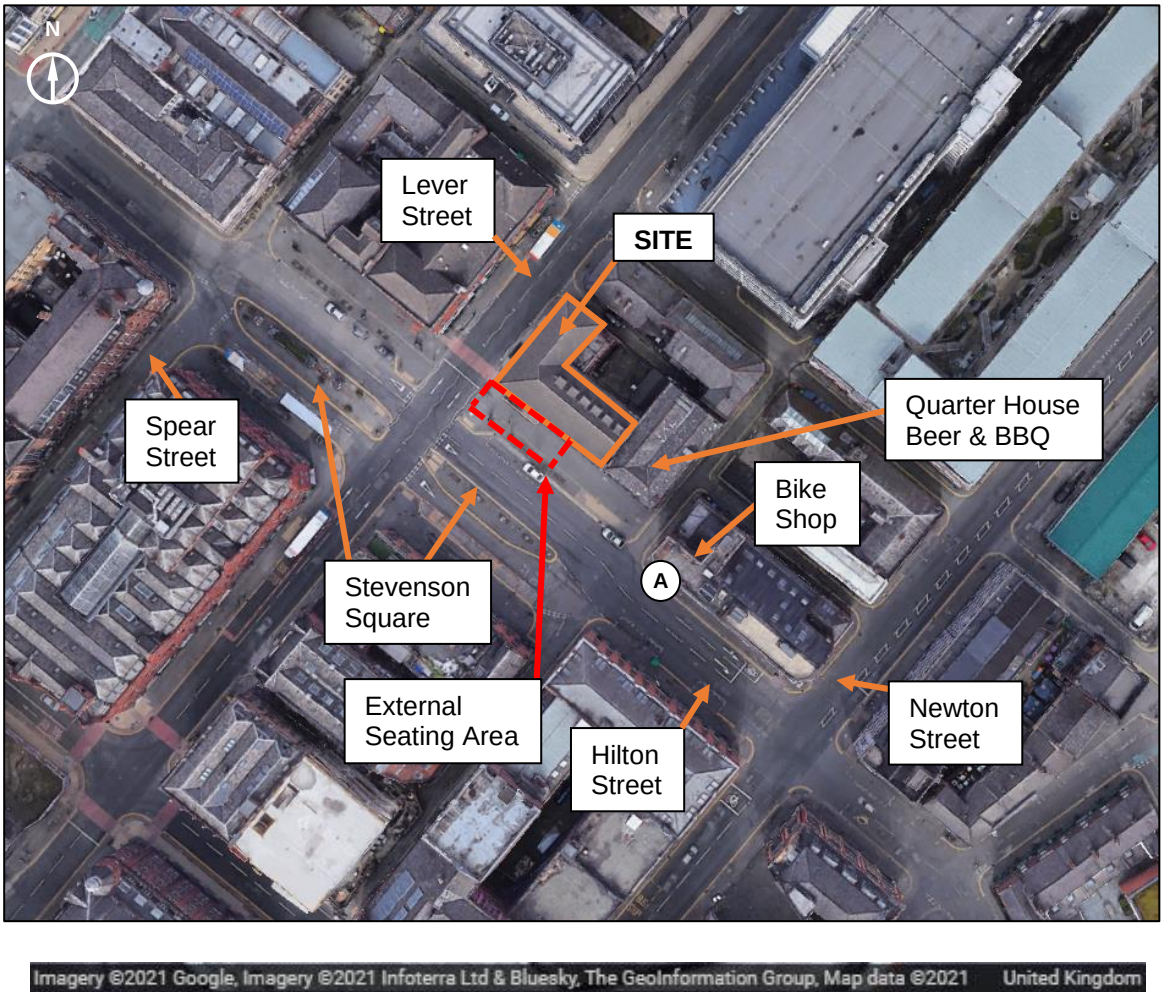
Summary

- 5.10 Comparing the calculated ambient and maximum noise levels of 48dB_{L_{Aeq,T}} and 52dB_{L_{Amax,F}} to the proposed noise level limits of 54dB_{L_{Aeq,15min}} and 60dB_{L_{Amax,F}}, respectively, shows that the limits would not be exceeded and AECs proposed requirements would be achieved.

Atmospheric Plant Noise Emissions

- 5.11 AEC are not currently aware of the specific items of kitchen extract plant that will be installed at the development; however, it is known that all plant items will be located facing the courtyard at the rear of the development. AEC understands that the NNSR would be approximately 35m away and without direct line of sight to the proposed plant items.
- 5.12 Based on this, as a full assessment cannot be undertaken at this stage, only a rating level limit to be achieved at the nearest noise sensitive receptor has been proposed. This was detailed in Section 4 and is $49\text{dBL}_{\text{A},\text{Tr}}$.
- 5.13 Due to the distance to the NNSR and the screening provided by the existing building, the above-mentioned rating level limit should not be onerous and should be achievable with standard mitigation measures. These will be discussed further at the design stage of the development.

FIGURE 1 – Existing Site Showing Monitoring Locations



APPENDIX A – Acoustic Terminology in Brief

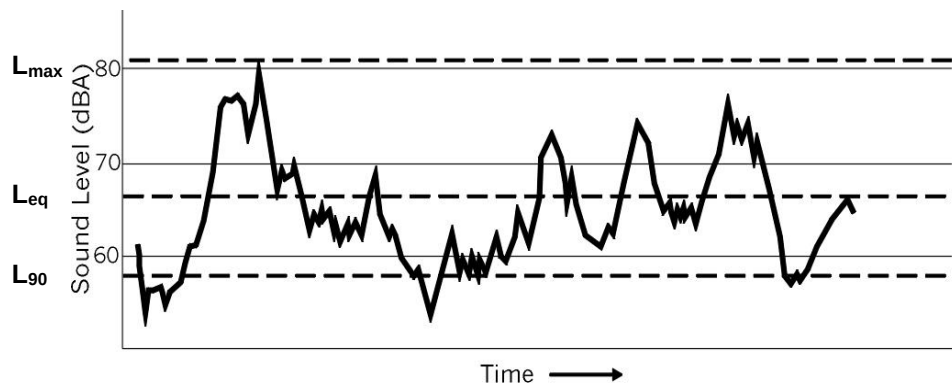
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human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



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, <i>T</i> . 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.

Other Acoustics Units

NRC	Noise Reduction Coefficient – a single figure number sometimes used to describe the performance of sound absorbing materials based on a combination of its absorption coefficient at various frequencies.
NR	Noise Rating – a graphical method for assigning a single number rating to a noise spectrum and is often use to specify noise level limits for mechanical services.
R_w	Single number rating used to describe the <u>laboratory</u> airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
$R_w + C_{tr}$	Single number rating used to describe the <u>laboratory</u> airborne sound insulation properties of a material or building element (normally windows) over a range of frequencies, typically 100-3150Hz, adjusted to adjusted by a spectrum adaptation to provide the reduction of traffic noise.
RT	The RT (Reverberation Time) of a space is defined as the time it takes for the sound pressure level to reduce by 60dB. It is not always possible to measure the full 60dB decay, so the first 20dB decay (T_{20}) or 30dB decay (T_{30}) is used to approximate the reverberation time (T_{60})
$D_{n,e,w}$	Weighted element-normalised level difference. Single number rating used to describe the sound insulation performance.

APPENDIX B – Noise Survey Details

Date & Time of Survey:	Wednesday 12 May 2021, 2330h to 0030h, Thursday 13 May 2021.					
Personnel:	Naveen Ramesh Simha (AEC).					
Equipment Used:	B&K 2260 Real Time Analyser (AEC Kit 2).					
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
	12/05/2021	Night	Dry	8°C	North-eastward and 2 m/s	95%
Measurement Locations:	Measurements were undertaken at a single location adjacent the development site. Identified as A on Figure 1 and described below. A – 2m from nearest carriageway of Hilton 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 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	2330 – 2345	59.6	49.4	83.4	Ambient and maximum noise level from Quarter House Beer and BBQ.
	2345 – 0000	59.1	48.9	72.5	
	0000 – 0015	53.1	44.4	68.8	Ambient and maximum noise level due to distant road traffic on Spear Street and Newton Street.
	0015 – 0030	53.8	43.6	76.1	