



To:	Raj W Haider	of:	Commercial Kitchen & Bar Ltd
Cc:	As per email distribution list	of:	

Dear Raj,

16 Tib Lane, Manchester – Noise Assessment

1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Commercial Kitchen & Bar Ltd to undertake a noise assessment in relation to the proposed external mechanical services plant items that are to be installed as part of a ground floor refurbishment of 16 Tib Lane, Manchester, into a new restaurant.
- 1.2 This assessment has been undertaken to demonstrate compliance with the noise requirements of Manchester City Council (MCC).
- 1.3 This report details the baseline noise levels measured external to the nearest noise sensitive receptor to the site, presents the relevant assessment criteria and discusses the implications of the proposed development on the nearest noise sensitive receptor, in line with the guidance from the Local Authority.
- 1.4 Acoustic terminology is discussed in brief in Appendix A.

2.0 BACKGROUND & SITE DESCRIPTION

- 2.1 The proposed external mechanical services plant will be installed to the rear of the refurbished ground floor restaurant, on Bow Lane. The location of the site and the approximate position of the new plant is highlighted on Figure 2.1, below.
- 2.2 The nearest noise sensitive receptor to the plant will be the first-floor office windows that overlook the rear of the site, on Bow Lane.
- 2.3 Located along Bow Lane are a number of existing plant items comprised of air conditioning units, exhausts and various ductwork systems that are serving the surrounding office and commercial units in the area.

Figure 2.1 – Site and Proposed Location of Plant



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- 2.4 At this moment, the operating times of the restaurant are unknown and, therefore, it is assumed to be open until 0100h, Monday to Sunday at the latest. It is assumed that the external plant will be operational in line with these times.

3.0 BASIS OF ASSESSMENT

- 3.1 Manchester City Council (MCC) has outlined their requirements for noise assessments to accompany planning applications in '*Planning & Noise – Technical Guidance*' (2022) (PNTG).
- 3.2 PNTG, states the following in relation to setting noise level limits for industrial sources, such as external services plant, 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".

- 3.3 The term '*rating level*' is defined in BS4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' (BS4142) which describes a method for determining the potential impact of sound from an industrial and/or commercial sources on a noise sensitive receptor.
- 3.4 A '*rating level*' ($dB_{LAf,Tr}$) is obtained by applying a character correction to the '*specific noise level*' ($dB_{Aeq,Tr}$) of a noise source (e.g. plant noise). The correction can be applied if the noise has a defined acoustic character such as being tonal, impulsive, distinctive or intermittent in nature. Further details on when / if these corrections should be applied can be obtained in BS4142.

- 3.5 The impact of the source on the receptor is assessed by comparing the rating level during it's normal operation with the background noise level when it is not operating.
- 3.6 The extent to which the rating level exceeds the background noise level determines the anticipated impact the noise source will have on nearby receptors. This is highlighted in BS4142 and is reproduced in Figure 3.1, below.

Figure 3.1 – Assessment of the Impacts

Scale	Magnitude of Rating Level over Background Noise Level, dB	BS4142 Comments*
	> 10dB	The greater this difference, the greater the magnitude of the significant adverse impact.
	10dB	Likely to be an indication of a significant adverse impact.
	5dB	Likely to be an indication of an adverse impact.
	0dB	Indication of a low impact.
	< 0dB	The lower the rating is below background, the greater the indication of a low impact.

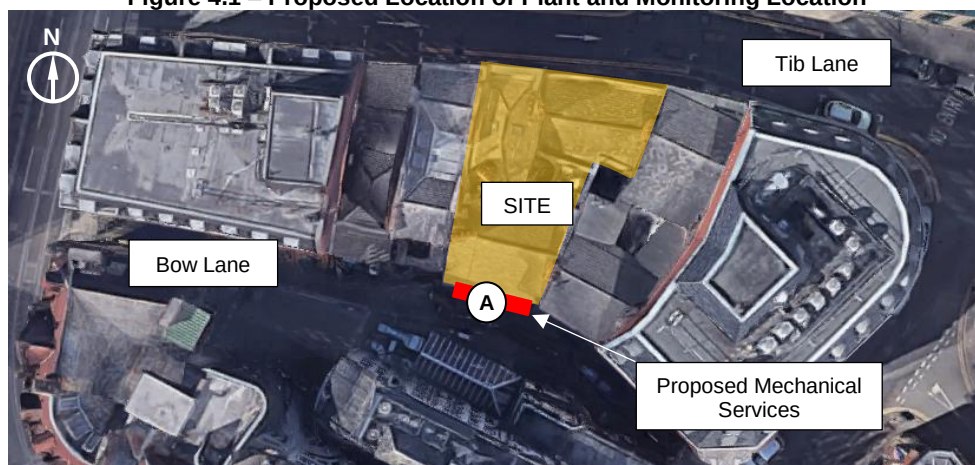
*Please note that these are dependent on the context of the site and noise source(s).

- 3.7 Based on the above, by ensuring the noise from the proposed plant is controlled to -5dB below the existing background noise level, at the nearest noise sensitive receptor, this would give a good indication that there is a low impact.

4.0 NOISE MEASUREMENTS

- 4.1 In order to measure the typical background noise level at the nearest noise sensitive receptor, an unattended noise level survey was undertaken by AEC between 1500h, Thursday 02 February 2023 until 0900h, Friday 03 February 2023.
- 4.2 Measurements were undertaken externally at the façade of the first-floor offices located above the proposed items of plant. The measurement location is identified as A on Figure 4.1, below.

Figure 4.1 – Proposed Location of Plant and Monitoring Location

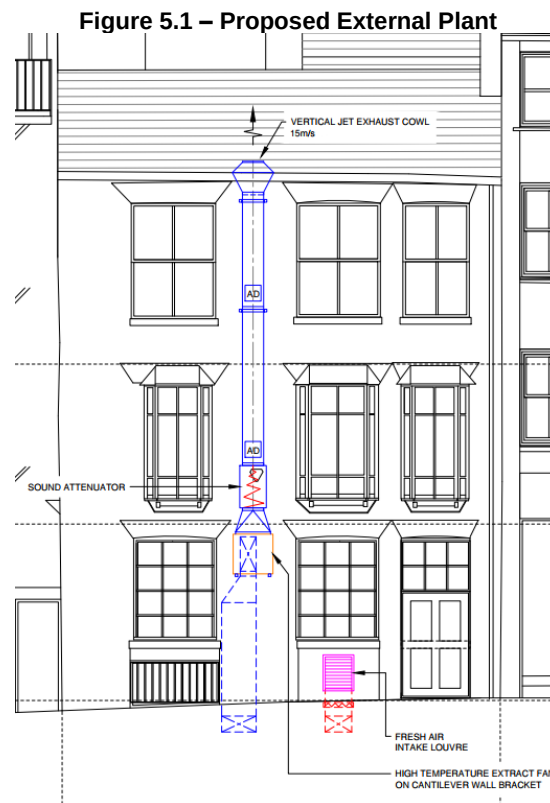


Imagery @2022 Google, Imagery @2022 Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map Data @2022

- 4.3 All measurements were undertaken under free-field conditions and in general accordance with BS7445-1: 2003 'Description and measurement of environmental noise. Guide to quantities and procedures'. A full measurement procedure for the survey is presented in Table B.1 of Appendix B and the measured data is presented in Graph B.1.
- 4.4 During the survey, the noise climate was solely affected by existing plant noise from the mechanical services plant located along Bow Lane. The background noise levels during the daytime and night-time periods were consistently 63dBL_{A90,1h} and 63dBL_{A90,15min}, respectively.

5.0 ASSESSMENT

- 5.1 Based on the measured background noise level highlighted in Section 4.3, in order to comply with the MCC criteria, the rating level from the proposed mechanical services plant should be designed to achieve 58dBL_{Ar,Tr}.
- 5.2 Figure 5.1 below presents the external plant system that will be installed on Bow Lane. As identified, it will be comprised of a fresh air intake louvre (connected to an internal supply fan) and an extract fan that is connected to a vertical duct and jet exhaust cowl. A sound attenuator will be fixed to the extract fan exhaust ductwork; however, details have not been confirmed therefore AEC has calculated without it and then specified a minimum performance requirement.



- 5.3 Table 5.1, below, presents the manufacturer noise level data for these units. Please note that the figures provided are for the supply fan, extract fan, and extract fan breakout.

Table 5.1 – Details of Plant Equipment

Noise Source	Noise Level, dB @ Octave Band Centre Frequency, Hz								Sound Power, dBL _w	Sound Pressure Level, dBL _{pA} @ 3m
	63	125	250	500	1k	2k	4k	8k		
Supply Fan Inlet	-	64	60	56	53	49	46	44	66	38
Extract Fan Exhaust	71	89	82	79	76	73	68	62	90	61
Extract Fan Breakout	50	76	69	62	59	58	54	50	77	46

- 5.4 Based on the above Figure 5.1, there are three areas where noise breakout should be considered: via the fresh air intake louvre, via the extract fan casing breakout, and via the exhaust cowl.
- 5.5 Table 5.2, below, provides a summary of the total rating level from all items of plant identified above which have been based off the calculated specific noise levels. The specific noise levels have been determined from the noise levels presented in Table 5.1, above, the attenuation of any ductwork (as a result of their dimensions), as well as the distance to the first-floor office receptor. Calculations for each are provided in Appendix A.
- 5.6 For comparison purposes, the prevailing background noise level is also presented in Table 5.2.

Table 5.2 – Resultant Plant Noise Levels

Noise Source	Specific Noise Level, dBL _{Aeq,Tr}	Acoustic Feature Corrections, dB – See 5.6 – 5.9	Rating Level, dBL _{Ar,Tr}		Existing Background Noise Level, dBL _{A90,T}	Exceedances, dB
			Individual	Combined		
Fresh Air Intake Louvre	40	+0	40	66	63	+3
Extract Fan Casing Breakout	53		53			
Extract Fan Exhaust Cowl	66		66			

- 5.7 In terms of applying any acoustic feature corrections, based on manufacturer test data, none of the items of plant would be considered tonal. Due to the fact that the plant items will remain running for a number of hours, they have also not been considered impulsive or intermittent.
- 5.8 As per BS4142, 'where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residential acoustic environment, a penalty of 3dB can be applied'.
- 5.9 As the highest specific sound level of 66dBL_{Aeq,Tr} is only 1dB above the prevailing ambient noise level on Bow Lane, this is not considered to be 'readily distinctive against the residual acoustic environment'. Therefore, no acoustic feature corrections have been applied.
- 5.10 Based on the above, the combined rating level from all items of plant would exceed the background noise level by 3dB. As a result, this would not meet MCC's criteria of being -5dB below the existing background noise level and could be an indication of an adverse impact.
- 5.11 However, as previously stated, the attenuation provided by the silencer has not been included in the calculations and, therefore, this would reduce the noise from the extract fan exhaust cowl. As this is the dominating noise source from Table 5.2, in order to ensure MCC's criteria is achieved, this silencer would need to provide at least 8dB of attenuation. The following minimum insertion loss performance is provided in Table 5.3.

Table 5.3 – Minimum Silencer Insertion Loss Performance Requirement for Extract Exhaust Silencer

Item	Insertion Loss (dB) in Each Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
300mm Long Straight Through Silencer	-2	-3	-5	-9	-11	-10	-9	-7

- 5.12 Provided the correct silencer is installed on the extract fan exhaust, as per the above specification (this should be confirmed with AEC prior to installation), the requirements of MCC would be achieved.

I hope the above is clear and of assistance at this stage.

Yours sincerely



Ross Chamberlain

Checked by: 

APPENDIX A – Acoustic Terminology in Brief

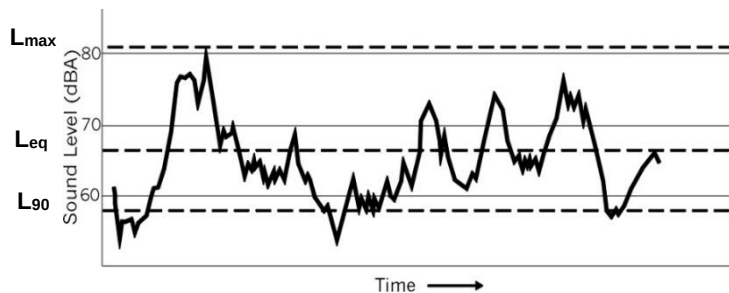
General

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 noise 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 emphasizes or reduces the importance of certain frequencies within the audible range

Sound / Noise Units

The figure below shows an example of sound level varying with time. Because of this variation over time the same period of noise can be described by several different levels. The most common of these are described below.



Commonly Used Descriptors for Sound / Noise

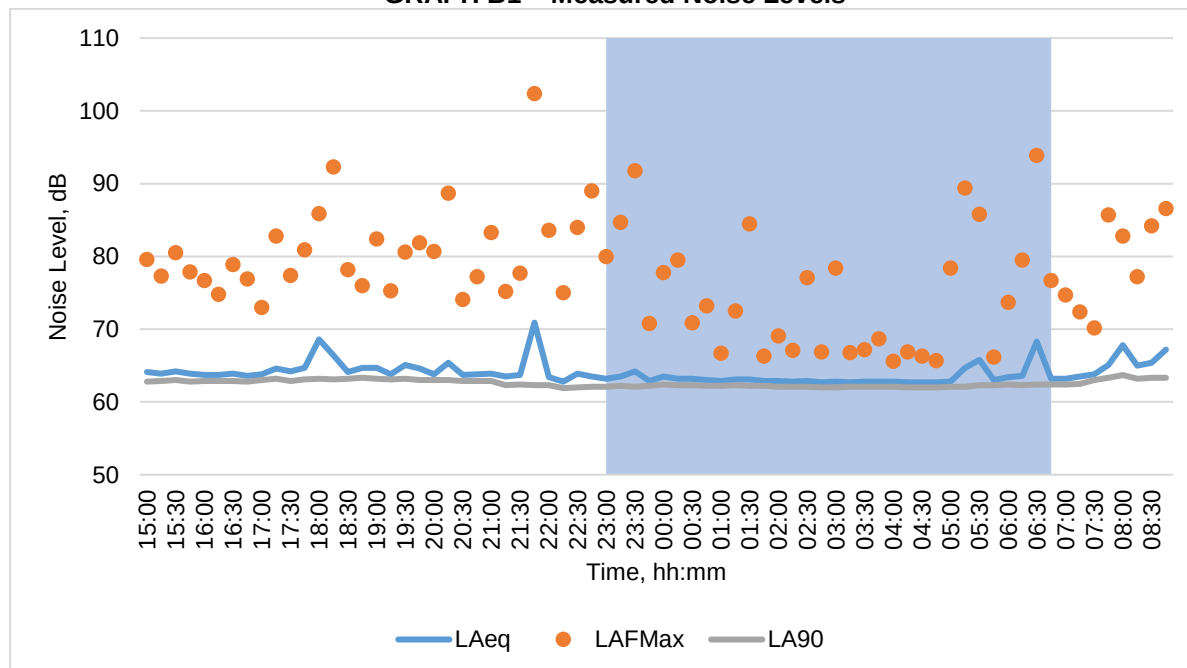
Free-field Level	This refers to the sound level measured outside, away from reflecting surfaces.
Background Sound Level, L_{A90}	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting, F, and quoted to the nearest whole number of decibels.
Rating Level, L_{A,r,T,r}	Specific sound level plus any adjustment for the characteristic features of the sound

APPENDIX B – Measurement Details

TABLE B1 – Measurement Procedure

Date & Time of Survey:	1500h, Thursday 02 February 2023 to 0900h, Friday 03 February 2023.					
Personnel:	Ross Chamberlain (AEC).					
Equipment Used:	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
	02/02/23	Day	Dry	10°C	Negligible	80%
	02/02/23 – 03/02/23	Night		5°C		60%
	03/02/23	Day		7°C		90%
Measurement Locations:	Measurements were undertaken at a single location out of a first floor window overlooking Bow Lane, as identified as A on Figure 4.1.					
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 Graph B1.					
Measured Data:	Full octave band centre frequency data was obtained for all measurements.					

GRAPH B1 – Measured Noise Levels



APPENDIX C – Calculations

Fresh Air Intake Louvre

Ductwork Calculation											
63	125	250	500	1000	2000	4000	dB(A)				
64	64	60	56	53	49	46	59	38			
								In Duct Lw	LpA @ 3m		
								Silencer			
								Silencer 2			
W (mm)	550	H (mm)	650	L (m)	3.9			Ductwork Dimensions			
0.8	0.7	0.3	0.2	0.2	0.2	0.2		Duct attenuation /m, dB			
3.198	2.574	1.287	0.624	0.624	0.624	0.624		Total Duct Attenuation			
								Plenum Box			
								Bends		0	
0	0	0	0	0	0	0		Dimension	400	mm	
0	0	0	0	0	0	0		Branches		0	no. of
8	4	1	0	0	0	0		Output end reflection			
52.8	57.4	57.7	55.4	52.4	48.4	45.4	58	Lw to atmosphere			
								Distance to receptor		3	m
								Plane Reflections		3	
								Lw - 20*log(d)-11+plane reflections		40.0	
								d = distance			

Extract Fan Casing Breakout

Plant Calculation											
Extract Fan											
c=f*wavelength		63	125	250	500	1000	2000	4000	8000	Overall	
Outlet / Inlet / Breakout		50	76	69	62	59	58	54	50		
A Weighting		-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1		LpA @
Resultant		23.8	59.9	60.4	58.8	59	59.2	55	48.9		3
10^(L/10)		240	977237	1096478	758578	794328	831764	316228	77625	67	46
							Distance to receptor		2	m	
							Plane Reflections		3		
						Lw - 20*log(d)-11+plane reflections			53		
						d = distance					

Extract Fan Exhaust Cowl

Ductwork Calculation											
63	125	250	500	1000	2000	4000	dB(A)				
71	89	82	79	76	73	68	82	61			
							In Duct Lw	LpA @ 3m			
							Silencer				
							Silencer 2				
W (mm)	400	H (mm)	400	L (m)	6.5		Ductwork Dimensions				
0.1	0.1	0.1	0.2	0.2	0.2	0.2	Duct attenuation /m, dB				
0.455	0.65	0.65	1.04	1.495	1.495	1.495	Total Duct Attenuation				
							Plenum Box				
							Bends	0			
0	0	0	0	0	0	0	Dimension	400 mm			
0	0	0	0	0	0	0	Branches	0 no. of			
7	3	1	0	0	0	0	Output end reflection				
63.5	85.4	80.4	78.0	74.5	71.5	66.5	80	Lw to atmosphere			
							Distance to receptor	2	m		
							Plane Reflections	3			