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Mr L Tomlinson
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Dear Luke

Grindsmith, Bridge Street, Manchester – Noise Assessment

INTRODUCTION

Manchester City Council (MCC) has requested a noise assessment of the building services plant installed at Grindsmith, 62 Bridge Street, Manchester.

The assessment is required to comply with MCC's planning condition which states:

"Given the flue is in situ, you will need to undertake actual noise assessment of the equipment in operation at the receptors identified and measurements should be taken at the facade of the receptors. If there are windows facing the extract terminal, background noise levels (without plant) and with plant noise should also be obtained from this location as well as at ground level."

This report presented below provides details of AEC's on-site measurements and associated assessment to comply with MCC's requirements.

NOISE SURVEY

External background and plant noise levels were measured by AEC on 17 December 2019, between around 1400 and 1500h at two locations, A & B. Location A was at ground floor level of the new apartments, within the window opening where the ground floor glazing will be. Location B was at the first floor level within the window opening where the first floor glazing for the new apartments will be. The new build apartments are directly behind Grindsmith, forming an enclosed space thus screening road traffic noise and other noise sources associated with the area. The measurement locations can be seen in Figures 1 and 2.

Noise levels were measured with the fan at two speeds; the 'worst case' normal operating speed and switched off.

A full measurement procedure is presented in Appendix B. A summary of the plant noise and background noise levels measured are presented in Table 1 below.

Table 1 - Measured Noise Levels

Location	Fan Speed	Ambient Noise, dBL _{Aeq,t}	Background Noise, dBL _{A90}
A	Worst Case Speed	56.4	55.8
	Switched Off	45.9	44.2
B	Worst Case Speed	56.2	55.6
	Switched Off	46.5	45.0

ASSESSMENT

General Description of Fan Location

The kitchen plant is mounted on the rear wall of Grindsmith and the flue extends to the top of the building. There is also a kitchen extract fan on the rear wall at ground floor level. The rear façade of the new build apartments is approximately 3m from the rear wall of Grindsmith.

External Noise Assessment

BS 4142:2014 '*Methods for rating and assessing industrial and commercial sound*' (BS4142), provides guidance on assessing noise from commercial properties. This standard provides a method of assessing plant noise (called the specific noise level) by comparing it to the existing background noise level, without the plant operating. A penalty is applied to the specific noise depending on the presence and intensity of any acoustic character (tonality, intermittency, impulsivity) to determine a noise 'rating level' ($L_{Ar,T}$).

The BS 4142 assessment of the building services plant on the nearest residential properties is provided in Table 2 below.

Table 2- 4142 Assessment at Nearest Residential Properties

Details	Level, dB		Comments
	Ground Floor	First Floor	
Measured Background Noise Level	$L_{A90} = 44.2$	$L_{A90} = 45.0$	When Plant was not operating.
Specific Noise Level at nearest Residence	$L_{Aeq} = 56.4$	$L_{Aeq} = 56.2$	Plant operating.
Noise Character Correction	-	-	Noise is continuous, broadband with no tonal content.
Difference from Background Noise level	12.2	11.2	Plant noise is likely to have a significant impact on the nearest property.

According to BS 4142 "*a difference of around +10dB or more is likely to be an indication of significant adverse impact, depending on context.*" Ideally, the plant noise would be at least 5dB below the background noise level. Therefore, as the difference is greater than 10dB, mitigation is recommended to control noise from the building services plant.

Mitigation

Based on the assessment, a 16-17dB reduction could be required to bring the plant noise to at least 5dB below the background noise level.

The fans were measured operating at their highest realistic duty (worst case). If the fans can be operated at lower speeds then this could provide a reasonable noise reduction. A workable fan speed limit would need to be agreed and put in place and additional mitigation may still be required.

Other mitigation measures that require consideration include:

- A silencer/attenuator for the fan seen in Figure 1.
- An acoustic enclosure or acoustic fan jacket to the fan shown in Figure 2.

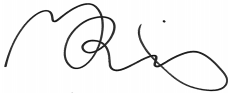
It should also be noted that the flue appears rigidly fixed to the rear wall. This may limit the improvement provided by any mitigation measures.

Suitable products for mitigation may be found from suppliers such as:

- <http://www.isolatedsystems.com/products/acoustic-products.html>
- <https://www.allawayacoustics.co.uk/>

I hope the above is clear and please contact us if you require further assistance.

Regards



Michael Ridley

Checked by: DMT

Figure 1 – Measurement Location A



Figure 2 – Measurement Location B



APPENDIX A – Acoustic Terminology in Brief

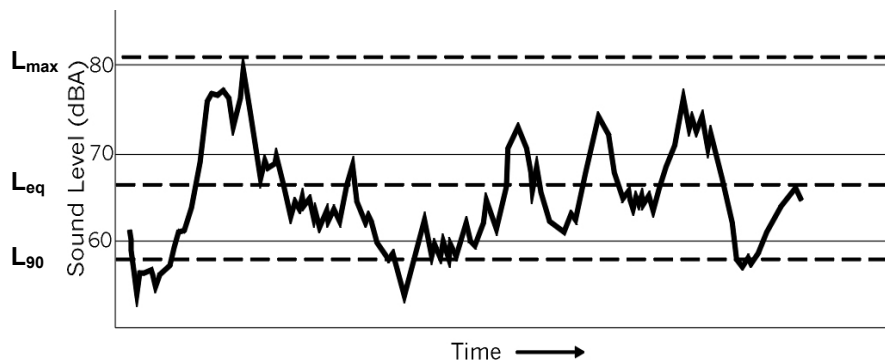
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human 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.

APPENDIX B – Noise Survey Details

Date & Time of Survey:	Tuesday 17 December 2019, 1400 to 1500h					
Personnel:	Michael Ridley (AEC)					
Equipment Used:	Cirrus CR:171B Real Time Analyser (AEC Kit 5)					
Calibration:	The sound level analysers, which conforms to BS EN 61672-1: 2003 ' <i>Electro acoustics – 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
	17-12-2019	Day	Dry	3°C	Southerly 1.7 m/s	10%
Measurement Locations:	Measurements were undertaken at 2 around the development site. Identified as A to B. A – 3m from the extraction fan outlet on the rear wall of Grindsmith at ground floor level. B – 3m from the extraction flue on the rear wall of Grindsmith at first floor level.					
Measurement Details:	Measurements were undertaken over various periods in terms of L_{eq} , L_{10} , L_{90} , and L_{max} .					
Façade / Free-Field:	A&B - free-field.					
Measured Data:	Full octave band centre frequency data was obtained for all measurements.					