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Mr S West
Studio Neo
3 Bridgewater Street
Lymm
Cheshire
WA12 0AB

Dear Steve,

Roof Top Plant, Lexicon, Mount Street, Manchester – Plant Noise Assessment

Acoustic and Engineering Consultants Limited (AEC) has been appointed by Studio Neo Architects to undertake a noise assessment of the proposed plant which is to be installed on the roof of the Lexicon Building on Mount Street, Manchester.

This report presents the daytime noise levels measured at the nearest noise sensitive receptor and provides an assessment of the potential impact of the noise source considering relevant guidance and the local authority requirements.

Acoustic terminology is discussed in brief in Appendix A.

INTRODUCTION

It is understood that a scheme to develop an office on the roof of the Lexicon building, Mount Street, Manchester has been prepared by Studio Neo. As a part of the scheme, new mechanical ventilation plant will be installed on the roof.

The nearest noise sensitive receptor to the proposed plant are hotel guestrooms associated with The Midland Hotel, approximately 40m to the south-east of the site, as identified in Figure 1.

It is understood that the plant will operate only during normal office hours, e.g. 0730 to1900h Monday to Friday.

NOISE MEASUREMENTS

Daytime noise levels were measured at a single location (identified as location A on Figure 1) representative of The Midland Hotel guest rooms, on Wednesday 23 January 2019 between 1100 and 1200h.

All measurements were undertaken in general accordance with BS7445 Part 1:2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'.

Full details of the noise surveys are presented in Appendix B with measured noise data presented in Table B1 and a summary of the measured noise levels presented below.

The background noise level was relatively consistent at 59dB$L_{A90,15min}$ due to local road traffic and tram movements.

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BASIS OF ASSESSMENT

In relation to noise from external plant, Manchester City Council (MCC) in their document, '*Planning & Noise, Technical Guidance*' issued in December 2015, specify that the total 'rating' noise level from any building services plant should be controlled to 5dB below the lowest background noise level at the nearest noise sensitive receptor.

As the proposed noise source is plant, the relevant assessment guidance would be BS 4142:2014 '*Methods for rating and assessing industrial and commercial sound'*, (BS4142).

The term '*rating level*' is defined in BS4142 paragraph 9.1, which states:

> "*Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:*
>
> *a) Subjective method;*
> *b) Objective method for tonality;*
> *c) Reference method."*

As AEC have not been provided with noise spectrum data for the unit, the assessment uses the subjective method based on the existing noise climate and AEC's experience.

In addition to the MCC's requirement, as the background noise levels were undertaken at ground floor level close to Peter Street, and the proposed noise source will affect the top storeys of the Midland Hotel, it is proposed that noise from the site is control by a further 3dB.

Therefore, based on the measured background noise levels, the design target for the plant is 51dB$L_{Aeq,T}$ at 40m (83dB$L_{Aeq,T}$ at 1m), assuming there is no acoustic character from the plant.

NOISE ASSESSMENT

AEC understand that a single Daikin mini VRF system with a small heat recovery unit is to be installed. Based on manufacturer's data, the noisiest unit available, emits a sound pressure level of 66dBA at 1m.

Comparing this with the design aim of not exceeding 83dB$L_{Aeq,T}$ at 1m demonstrates that noise due to external plant would be significantly below the proposed design aim for external plant. Even if there was an acoustic character associated with the plant, the limit would still be readily achieved.

CONCLUSION

The above assessment demonstrates that noise from the proposed development would readily achieve Manchester City Council's requirements, and therefore, noise should not be a determining factor in relation to any planning permission being sought.

I trust the above is helpful at this stage, if you need any further information please give me a call.

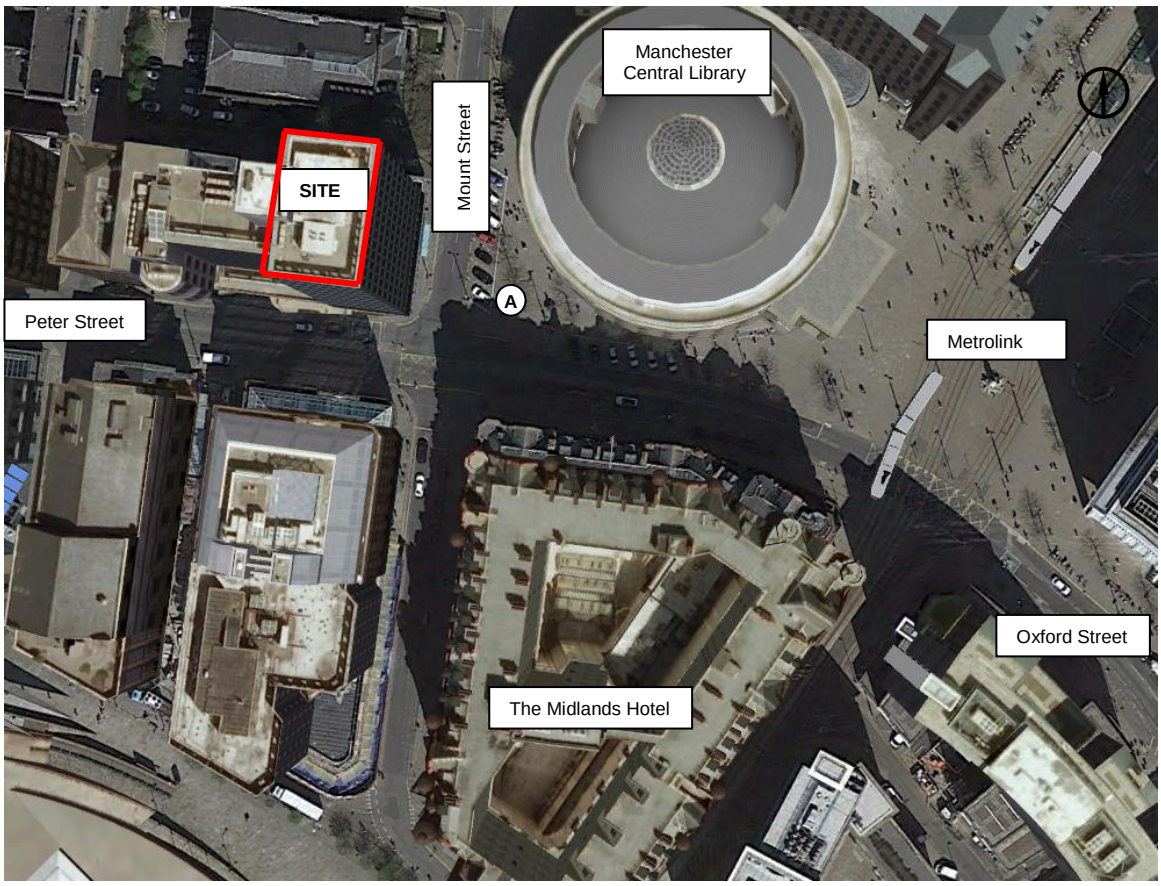
Regards



Naveen Simha

Checked by: PJK

FIGURE 1 – Existing Site Showing Monitoring Locations



Map data @2018 Google United Kingdom

APPENDIX A – Acoustic Terminology in Brief

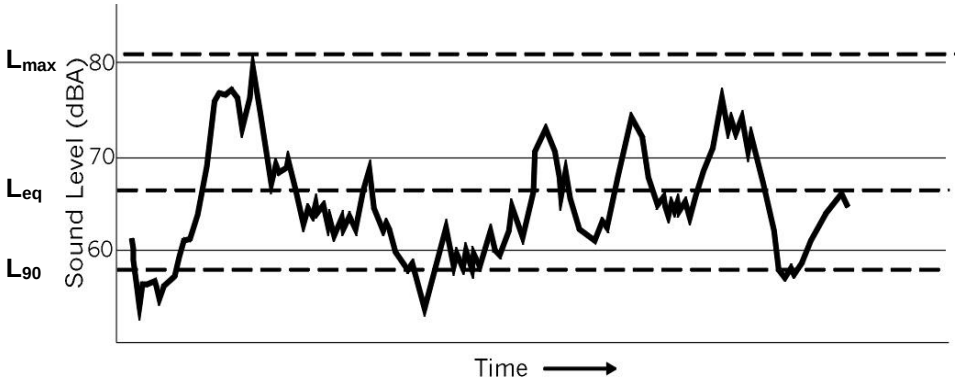
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz *(Hz)*, that is, cycles per second. The human 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 proceeded by a dB descriptor in the report e.g. $L_{Aeq,T}$ could be written $dBL_{Aeq,T}$



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.

$L_{A10,T}$ The (A-weighted) sound level exceeded for 10% of a measurement period. It is the value often used to describe traffic noise.

$L_{A90,T}$ 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:	Wednesday 23 January 2019, 1000 to 1200h					
Personnel:	Naveen Ramesh Simha (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 *'Electro acoustics – sound level meters - Part 1 Specifications'* 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**
	23-01-2019	Day	Wet	-2°C	Southward and 1.78 m/s	100%
Measurement Locations:	Measurements were undertaken at 1 location around the development site. Identified as 'A' on Figure 1 and described below. A – 4m from nearest carriageway of Peter Street					
Measurement Details:	Measurements were undertaken over various periods in terms of L_{eq}, L_{10}, L_{90}, and L_{max}.					
Façade / Free-Field:	***Attended:*** A & B - 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 Daytime Noise Levels

Location	Period, h	Noise Level, dB				Comments
		L_{Aeq}	L_{A10}	L_{A90}	$L_{Amax, F}$	
A	1108 – 1123	66.3	69.2	59.5	81.7	Road traffic on Peter Street and tram movement
	1127 – 1142	65.6	69.0	58.6	77.9	
	1142 – 1157	65.7	69.2	58.6	81.1	