



THE MANCHESTER COLLEGE

**WYTHENSHAW CAMPUS
BROWNLEY ROAD, WYTHENSHAW**

PLANNING NOISE ASSESSMENT

23 November 2021

AEC REPORT: P4095/R1/WJK

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DOCUMENT STATUS

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Revision	Date	Document Details	Author	Checked
-	23/11/21	Original Document	WSK	AGB

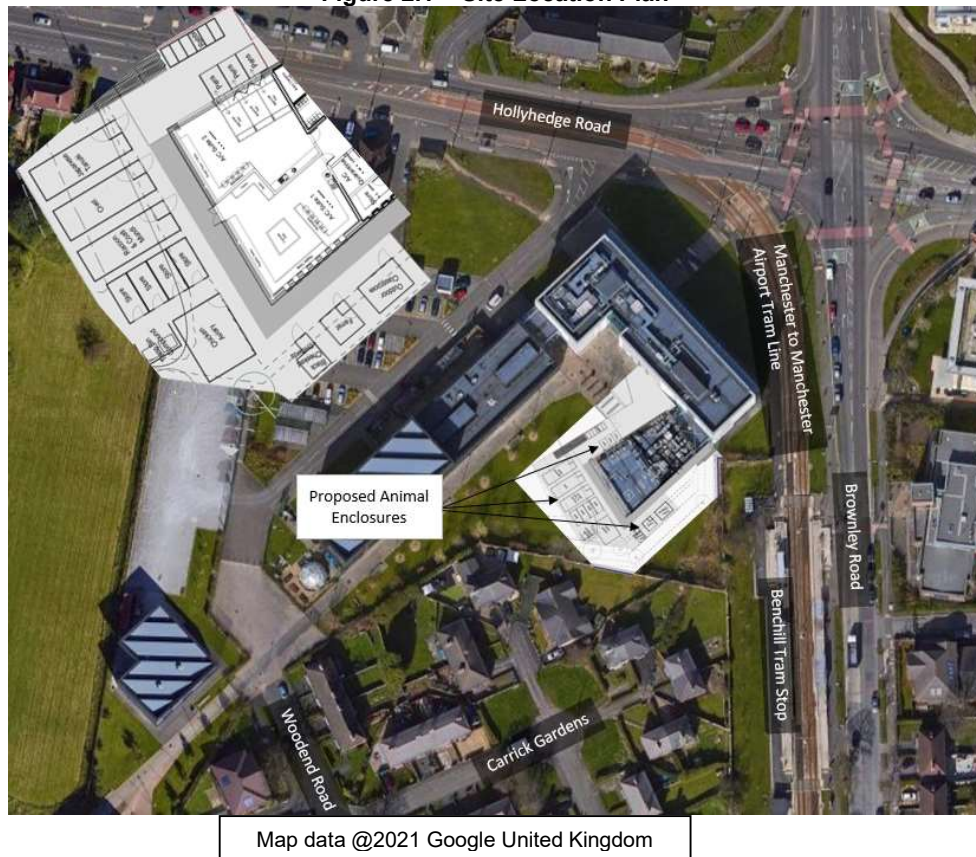
1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Ellis Williams Architects on behalf of The Manchester College to undertake a noise impact assessment relating to the wider refurbishment of the Manchester College Wythenshawe Campus. This report is required for submission to the Local Authority for planning.
- 1.2 This report presents details of the baseline noise survey that has been undertaken to determine the existing noise climate at the nearest noise sensitive properties and provides an assessment of the noise impact from activities associated with the college, with reference to the requirements of Manchester City Council (MCC).
- 1.3 It is understood that although there is to be no additional plant as part of the scheme, there are to be some alterations to the existing plant. The proposals also include a number of external animal enclosures in which racoons, ferrets, Japanese Tanukis and chickens are to be permanently housed, which are to be located on the land to the south of the college on the south-east and south-west elevations.
- 1.4 Although not a requirement for planning, this report also considers the implications of the measured external noise levels with regard to the indoor ambient noise levels in accordance with the requirements of the Department for Education and Education Funding Agency's Building Bulletin 93 '*Acoustic design of schools – performance standards*' (Feb 2015) (BB93).
- 1.5 Acoustic terminology used throughout this report is described in brief in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 The college is located approximately 15m from Brownley Road which runs along the eastern elevation of the site. Hollyhedge Road runs approximately 20m to the north. The Manchester city centre to Manchester Airport tram line runs between Brownley Road and the college and along Hollyhedge Road, with Benchill tram stop to the south-east of the site.
- 2.2 The nearest noise sensitive residential properties are located at Woodend Road and Carrick Gardens directly to the south of the college.
- 2.3 A plan showing the location of the proposed animal enclosures and the closest residential receivers is provided on Figure 2.1, below.

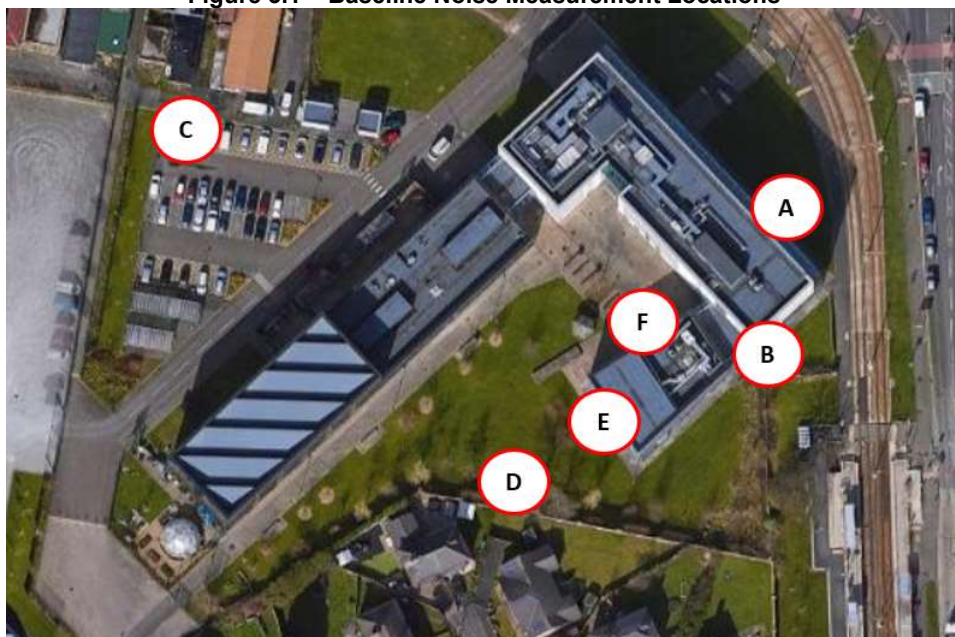
Figure 2.1 – Site Location Plan



3.0 EXISTING NOISE CLIMATE

- 3.1 An attended baseline noise survey was undertaken by AEC on Wednesday 3 November 2021 between 1100 and 1410h at 6 locations shown as A to F on the following Figure 3.1.

Figure 3.1 – Baseline Noise Measurement Locations



3.2 All measurements were undertaken in general accordance with BS7445-1: 2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'. Full details of the measurement procedure are presented in Appendix B with measured data presented in Table B1 of Appendix B.

3.3 A summary of the measured free-field noise levels is provided in the following Table 3.1.

Table 3.1 – Summary of Measured Noise Levels

Location	Time	Duration	Noise Level	
			Background dBL _{A90}	Ambient dBL _{Aeq}
A	11:01	00:15:00	55	65
	12:33	00:15:00	56	62
	13:56	00:15:00	57	61
Average			56	63
B	11:18	00:15:00	49	56
	12:52	00:15:00	50	56
Average			49	56
C	11:36	00:15:00	46	48
	13:09	00:15:00	47	50
Average			46	49
D	12:02	00:15:00	40	47
	13:27	00:15:00	43	48
Average			41	48
E	12:18	00:05:00	42	53
	13:43	00:05:00	44	46
Average			43	51
F	12:24	00:05:00	42	46
	13:49	00:05:00	47	49
Average			44	48

3.4 The standard BS4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' states that a representative background noise level should be used and that the objective is not just to ascertain a lowest background sound level. Therefore, for the purposes of this assessment, the average measured noise levels are considered to be appropriate.

4.0 ASSESSMENT METHODOLOGY

Local Authority Criteria

- 4.1 With respect to noise break out from mechanical services plant, MCC's Planning & Noise Technical Guidance (P&NTG) states that *'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 (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'*.

BS4142: 2014+A1:2019

- 4.2 BS4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (BS4142), provides the method for rating and assessing industrial and commercial sound by comparing the specific sound level (that directly attributable to the industrial/commercial sound) to the prevailing background sound level ($dBL_{A90, T}$) over relevant periods that the commercial/industrial activities occur.

- 4.3 It is necessary to determine the specific sound level from the industrial/commercial activities over a period of one hour during the daytime and/or 15 minutes during the night-time. The specific sound level relates to the specific commercial/industrial sound source only and has to be corrected to take account of other sound sources generally in the area, residual sound. Daytime is normally considered to be over the period 0700 to 2300 hours, and night-time 2300 to 0700 hours.

- 4.4 BS4142, in section 9, identifies that 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 present at the assessment location, such features are taken into account by adding a correction to the specific sound level to obtain the rating level. A correction should be applied if one or more of the following features occur, or are expected to be present for new or modified sound sources:

Tonality- for sound ranging from not tonal to prominently tonal a correction of 0 to 6dB should be considered.

Impulsivity- A correction of up to 9dB can be applied for sound that is highly impulsive, considering both the rapidity and overall change in sound level.

Other- Where a sound features characteristics that are neither tonal nor impulsive but are readily distinctive against the residual environment a penalty of 3dB can be applied.

Intermittency- If intermittency is distinctive against the residual environment a penalty of 3dB can be applied.

- 4.5 The significance of the potential impact is indicated by the difference between the background sound level and the rating level. Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
 - Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.

4.6 With regard to undertaking the assessment, BS4142 indicates that the context of the sound must be taken into consideration.

World Health Organisation (WHO) Guidelines for Community Noise

- 4.7 In terms of the proposed animal enclosures, there is no specific guidance or criteria for the assessment of this type of noise. Table 4.1 of the World Health Organisation (WHO) 'Guidelines for Community Noise', 1999 (WHO Guidelines) provides internal and external noise levels for specific environments that indicate the thresholds for onset of potential sleep disturbance for the night-time period.
- 4.8 The WHO Guidelines were translated into UK practice through BS8233:1999 which has since been superseded by BS8233:2014 and provides guideline values for internal ambient noise levels for dwellings. The recommended criteria would generally apply to external noise as it affects the internal acoustic environment for steady sources without a specific character, such as road traffic and should relate to noise levels within the space during normal hours of occupation.
- 4.9 In addition to the above, the WHO document suggests a noise limit of 50dB_{L_{Aeq}, 16hour} external to living areas to stop the majority of people from being '*moderately annoyed most of the time*'.
- 4.10 A summary of the recommended internal and external noise levels from these documents is shown in the following Table 4.1.

Table 4.1 – Recommended Noise Levels

Location	Noise Limit, dB		
	Daytime	Night-time	
	0700 – 2300h	2300 – 0700h	
	L _{Aeq, T}	L _{Aeq, T}	L _{Amax, T}
Indoor - Living Room (Resting)	35	-	-
Indoor - Dining Room/Area	40	-	-
Bedroom - (Sleeping/Daytime Resting)	35	30	45
Outdoor living area (Limit to avoid moderate annoyance, daytime and evening)	50	-	-

- 4.11 Where noise sources have a specific character, such as being intermittent in nature, containing a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has a strong low frequency content, BS8233 suggests that lower noise limits may be appropriate. The values provided in WHO Table 4.1 could be applied to a situation, in cases where the noise is not attributable to a specific source, (i.e. it is NOT anonymous), and a 5dB reduction to the values in Table 4.1 is considered to be appropriate.
- 4.12 In addition to the above, WHO suggests that the reduction in external to internal noise levels from a window that is partially open for ventilation purposes is up to 15dB.

Internal Noise Level Limits

- 4.13 Internal noise levels in different rooms inside the college are to be in accordance with limits specified in Table 1 of BB93, which lists the upper limits for indoor ambient noise levels (IANL).

The internal noise limits are a requirement of Building Regulations but are not strictly a planning requirement. The required internal ambient noise levels are shown in the following Table 4.2.

Table 4.2 – Upper Limits for IANL

Type of Room	Noise Level, dBL _{Aeq,30min}
Classrooms	35
Learning Resource / Office / Staff room	40

5.0 ASSESSMENT

Noise Break-In

- 5.1 The main source affecting each elevation of the college building was transportation noise from road traffic and tram movements.
- 5.2 It is understood that as part of the refurbishment, there is a requirement to mechanically ventilate the new spaces that are to be created. Windows on the north-east elevation overlooking Brownley Road would need to remain closed in order to meet the upper limits for indoor ambient noise levels for classrooms, learning resource spaces, offices and staff rooms. Windows on the south-east elevation would need to remain closed to meet the requirements for classrooms. The upper limits for learning resource spaces, offices and staff rooms would just be exceeded by 1dB. For rooms on all other elevations, the criteria would be achieved with windows open for natural ventilation.

Mechanical Plant Noise

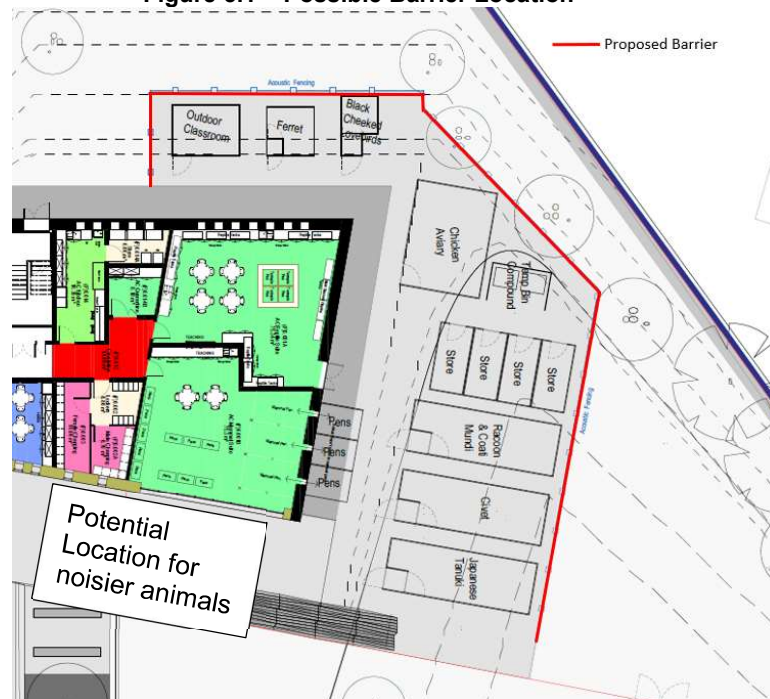
- 5.3 It was observed during the baseline noise survey that noise from the existing mechanical plant was not audible at any measurement location. Based on the measured daytime background noise levels at the closest residential properties on Carrick Gardens, any alterations to the external mechanical plant should result in a noise rating level of no greater than 36dBL_{Aeq} in order to comply with Manchester City Council's requirement of 5dB below the typical background (L_{A90}) level at the nearest noise sensitive location. It is not anticipated that any alterations to the existing plant would result in a significant increase in noise levels.
- 5.4 This element will be reviewed by AEC as part of the detailed design assessment as the relevant information becomes available.

Animal Enclosures

- 5.5 It is understood that the animals are to be kept in the enclosures during the daytime and night-time periods. In terms of potential noise associated with the enclosures, in order to meet the suggested noise limits discussed above including a 5dB correction to allow for the noise character, noise levels should not exceed approximately 50dB(A) at 1m from the enclosures.
- 5.6 Assuming that the attenuation of external to internal noise levels provided by a partially open window is 15dB (as per WHO guidance), an external limit of 50dB(A) would result in a noise level within bedrooms for the night-time period of 25dB(A) and a noise level in external areas of around 30dB(A) if the effect of the screening provided by garden fences is taken into account. This is around 10dB below the measured daytime background noise level.

- 5.7 At this time, the noise levels associated with these types of animals is not known. If it is considered that a higher noise level is likely to be generated by the animals, a barrier will be constructed around the enclosures as shown in Figure 5.1, below. BS 5228 Code of practice for noise and vibration control on construction and open sites (2009) gives a working approximation of the effect of a barrier between the source and receiving position. An attenuation of 10dB is assumed when a noise screen completely hides the source from the receiver as such, the barrier would need to be high enough to completely screen the enclosures from the residential windows. In addition, the barrier should have a minimum mass per unit area of around 10kg/m², which would typically be achieved, for example, with a close boarded timber fence.
- 5.8 In the event that any particular animals are noisier than others, consideration should be given to locating these enclosures behind the college building shown below.

Figure 5.1 – Possible Barrier Location



APPENDIX A - Acoustic Terminology in Brief

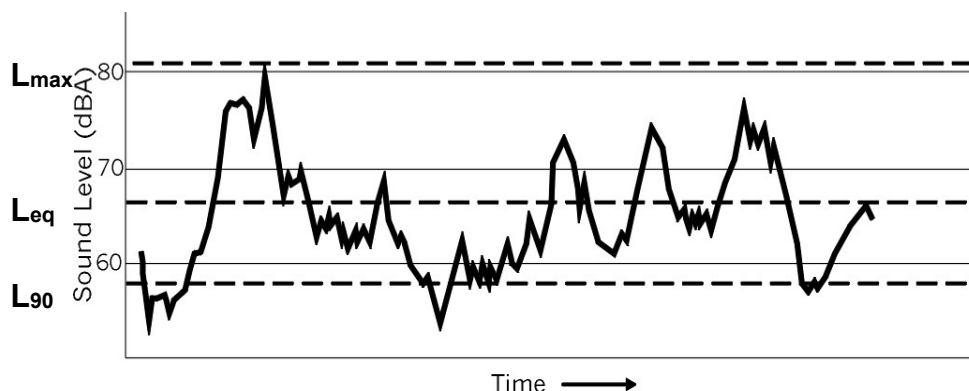
Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human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

Noise 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 noise.

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



Example of Sound Level Varying With Time

$L_{Aeq,T}$	The equivalent continuous (A-weighted) sound level. 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}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value used to describe the "background" noise.
L_{Amax}	The maximum (A-weighted) sound level during a measurement period.
Free-field	This refers to the sound level measured outside, away from reflecting surfaces.
L_{AE}	The A-weighted sound exposure level is the equivalent noise level of an event as if the event was of one-second duration and allows the overall average, L_{Aeq} , level to be determined over different time periods for a number of events. L_{AE} is a mathematical unit which cannot easily be described in terms of perception.

APPENDIX B – Noise Survey Details

Date & Time of Survey:	Wednesday 3 November 2021, 1100h to 1410h.				
Personnel:	Warren King, (AEC).				
Equipment Used:	Cirrus CR:171B Real Time Analyser (AEC Kit 3).				
Calibration:	The sound level analyser, which conforms to BS EN 61672-1: 2003 ' <i>Electro acoustics – sound level meters - Part 1 Specifications</i> ' for Class 1 Type Z meters, were 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:	Day	Period	Wet/Dry	Temp	Wind Direction
	03/11/21	Day	Dry	9°C	Variable
Measurement Locations:	Measurement locations are shown as A to F on Figure 3.1.				
Measurement Details:	Measurements were logged over various periods in terms of L_{eq} , and L_{90} .				
Façade / Free-Field:	The measurements were undertaken under free-field conditions.				
Measured Data:	Full results for the measurements are given in Table B1. Full octave band centre frequency data was obtained for all measurements.				

TABLE B1 – Measured Daytime Noise Levels

Location	Time	Noise Level		Notes
		dBL _{A90}	dBL _{Aeq}	
A	11:01	55.4	64.5	Road traffic, aircraft and tram noise. Siren
B	11:18	48.5	56.2	Road traffic, aircraft and tram noise. Siren
C	11:36	45.8	48.3	Road traffic, aircraft and children in playground of nearby school. Siren
D	12:02	39.5	47.2	Distant road traffic, aircraft and siren
E	12:18	41.6	52.9	Aircraft and students outside college
F	12:24	41.6	45.9	Aircraft and siren
A	12:33	55.8	62.4	Road traffic, aircraft and tram noise. Siren
B	12:52	49.5	55.5	Road traffic, aircraft and tram noise.
C	13:09	46.6	49.6	Road traffic, tram, aircraft and children in playground of nearby school.
D	13:27	42.6	47.9	Aircraft and siren, road traffic.
E	13:43	44.2	46.1	Aircraft, road traffic.
F	13:49	46.7	48.8	Aircraft, road traffic.
A	13:56	56.5	61	Road traffic and trams