



Ref: P4071/L02/AGB

29 July 2021

To:	Ben Jackson	of:	ISG
Cc:	As per email distribution	of:	

Dear Ben

Camberwell School – Pre-completion Testing

Further to AEC's testing undertaken on Thursday 22 July 2021, the results are presented below compared to the required performance standards identified in the Department for Education and Education Funding Agency's Building Bulletin 93 '*Acoustic design of schools – performance standards*' (Feb 2015).

In addition to the internal measurements, external rooftop mechanical plant verification measurements have been undertaken and the measured noise levels compared to Manchester City Council's requirements.

1.0 AIRBORNE SOUND INSULATION

Measurements were undertaken in accordance with ISO 16283-1:2014 Acoustics — '*Field measurement of sound insulation in buildings and of building elements Part 1: Airborne sound insulation*'. However, in all instances, cabinet speakers were used.

The measured sound insulation performance of the walls between different areas are presented in Table 1.1, below, compared to the required values.

Table 1.1 – Measured Sound Insulation Performance Compared to Requirements

*

Source Room	Receive Room	Sound Insulation dB D _{nT,w} (T _{mf} max)		Requirements Achieved?
		Measured	Required	
053 Classroom	052 Classroom	49	50	Yes*
053 Classroom	054 Safe Space	46	50	No (See note 1)
063 Classroom	064 Classroom	48	50	Yes*
060 CCR Room	063 Classroom	50	50	Yes
076 Classroom	079 Safe Space	45	50	No (See note 1)
076 Classroom	075 Classroom	48	50	Yes*
083 Resource	084 Office	47	45	Yes
083 Resource	082 Bubble Room	43	45	Yes*

***Considered to be within reasonable tolerance**

It should be noted that a difference in sound insulation performance of up to 2dB is not perceptible for people with normal hearing and, as such, where the measured performance is up to 2dB below the required limit, this is considered to be a pass within reasonable tolerance.

Note 1 – It was noted that the weakness was over the top of the partition. If necessary, to improve the sound insulation performance across these walls, it should be ensured that there are not gaps around the perimeter of the profile fillers. Furthermore, it is considered that the profile fillers should be painted to each face using an intumescent paint (to a reasonable thickness i.e. not a single thin coat).

2.0 REVEBERATION TIMES

Reverberation time (RT) measurements were undertaken in line with methodology in BS EN ISO 3382-2: 2008 '*Acoustics – Measurement of room acoustic parameters – Part 2: Reverberation time in ordinary rooms*'.

The measured RT compared to the required performance is presented in Table 2, below.

It is important to note that the RT measurements were undertaken in unfurnished classrooms and, when furniture is fitted in the space, this will provide a significant level of scattering, reducing the measured RT by typically around 0.3s. As such, the measured RTs in empty rooms have been adjusted to account for this.

Furthermore, for the classrooms, the wall panels had not been fitted at the time of the measurements and, this has also been accounted for.

In the case of the hall, there were a lot of construction items still in place (e.g. scaffolding, stacks of wall panels, machinery), which can result in an artificially low RT measurement. However, in addition, there were still a lot of acoustic panels to be installed. As such, the measured RT has been adjusted to reflect this.

Where a measured RT is within 0.1 seconds of the target RT, this has been deemed to be within reasonable tolerance.

Table 2.1 – Measured RTs Compared to the Required Values

Room	RT, s (T _{mf} 125Hz to 4kHz)		Requirements Achieved?
	Measured	Required	
0.23 Hall	≈0.9	0.8 to 1.2	Yes (measured 500Hz to 2kHz)
0.18 Classroom	0.5	0.4	Yes*
0.54 Safe Space	0.7	0.6	Yes* (measured 500Hz to 2kHz)
0.64 Classroom	0.5	0.4	Yes*
0.60 CCR	0.6	1.0	Yes (measured 500Hz to 2kHz)
0.75 Classroom	0.5	0.4	Yes*
0.79 Safe Space	0.5	0.6	Yes (measured 500Hz to 2kHz)

***Within reasonable tolerance.**

All rooms complied with BB93 requirements based on recognised calculation methodology and based on this, a reasonable on-site tolerance of 0.1s is considered reasonable.

3.0 INDOOR AMBIENT NOISE LEVELS

All measurements of indoor ambient noise levels (IANL)s were undertaken in line with the Association of Noise Consultants (ANC) guidance for noise measurements in buildings. The measured noise levels are presented in Table 3.1 below, compared to the required values

It should be noted that a difference in noise levels of up to 2dB is not perceptible for people with normal hearing and, as such, where a noise level is 2dB above the required limit, this is considered to be within reasonable tolerance.

Table 3.1 – Measured IANLs Compared to Required

Room	IANL, dBL _{Aeq,30min}		Requirements Achieved?
	Measured	Required	
Rooms Served by Mechanical Plant			
076 Safe Space	35	35	Yes*
048 Circulation	38	45	Yes
081 4D Space	35	35	Yes
082 Bubble Room	33	35	Yes
Naturally Ventilated Rooms			
052 Classroom	30	35	Yes (Windows open)
041 Classroom	34	35	Yes (Windows open)
063 Classroom	30	35	Yes (Windows open)
072 Classroom	34	35	Yes (Windows open)
023 Main Hall	30	35	Yes (Windows open)

* Approximate result (adjusted to represent furnished room)

4.0 ROOFTOP PLANT NOISE

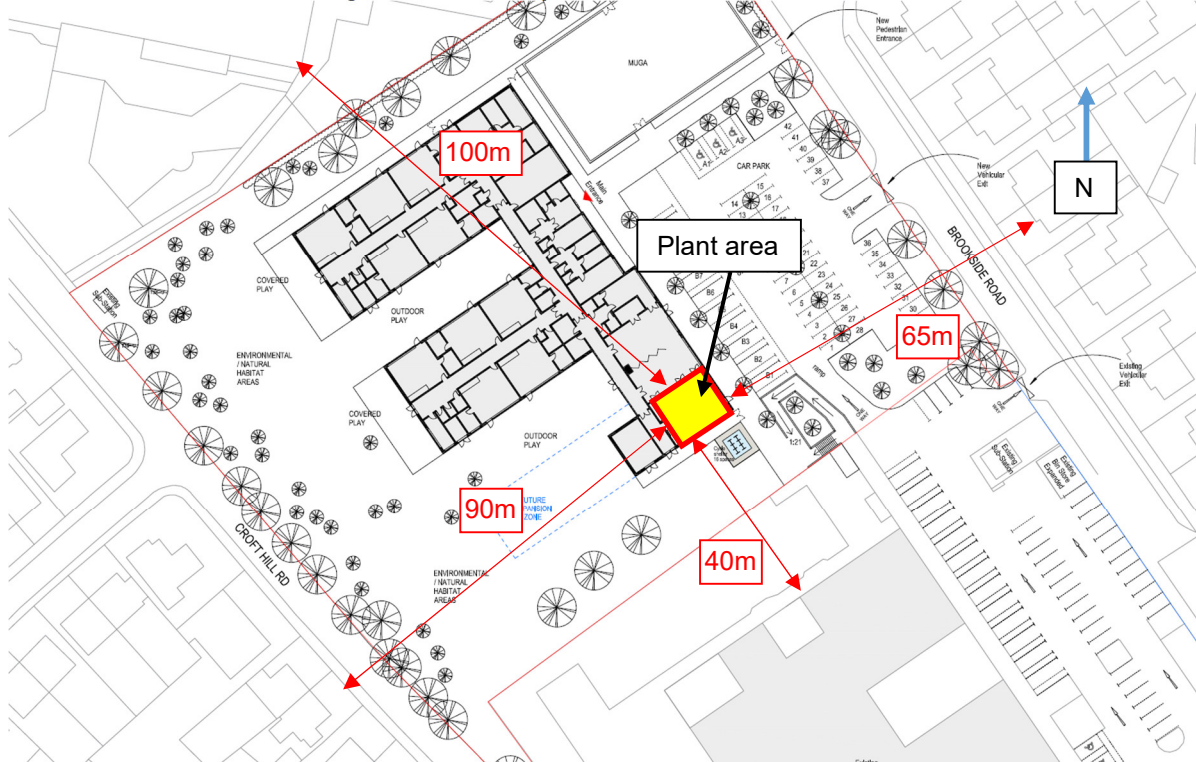
Plant Location and Details

Noise measurements of rooftop plant items were undertaken with all plant operational.

The only plant items located on the rooftop are the kitchen extract and supply fans, the location of which compared to the surrounding noise sensitive receivers is identified on Figure 4.1 below.

The nearest noise sensitive receivers to the site are houses to the northeast and southwest and existing school buildings to the southeast and northwest. The distances between the rooftop plant area and these receivers are identified on Figure 4.1.

Figure 4.1 – Rooftop Mechanical Plant Location



It is important to note that there is a high barrier around all sides of the rooftop plant area with the exception of the south western side. This is shown on Figure 4.2 below, a photograph which was taken from the southwest of the plant area.

Figure 4.2 – Photograph of Rooftop Plant and Surrounding Screen



With the kitchen extract and supply fans running as normal, the measured noise levels were as identified in Table 4.1 below.

Table 4.1 – Measured Plant Noise Levels

Plant Item	Noise Level, dBL _{Aeq,T} @ 1m
Kitchen Extract Fan – Discharge	<65*
Kitchen Extract Fan – Motor	76
Kitchen Supply Fan – Inlet	<64*

*** Affected by motor noise**

Background Noise Levels

AEC undertook noise measurements around the site between 0900 and 1200h on Monday 2 March 2020 as part of the noise assessment for planning purposes as presented in the AEC report P4071/L01b/NRS.

With reference to the measured data, the lowest background noise level was 45dBL_{A90,15min}

Criteria

With respect to noise break out from mechanical services plant, Manchester City Council's (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*'.

Based on a background noise level of 45dBL_{A90,15min} the noise rating level for mechanical plant should be controlled to no greater than 40dB(A) at the most affected residential receiver.

It is considered that the above applies to residential receivers. With regard to the surrounding schools and the new school development, the free-field plant noise level external to classrooms should be no greater than 47dBL_{Aeq} from all items combined. This will control internal noise levels to 35dBL_{Aeq} assuming windows are open for ventilation purposes.

Assessment

With reference to the above, the 'worst-case' plant noise levels at the nearest noise sensitive property are presented in Table 4.2, below.

As identified by Table 4.2, with all plant operating, the noise levels at the most affected residential property would be no greater than 33dB(A). There could be a slightly discernible noise character associated with the motor of the extract fan and, as such an adjustment of +3dB is considered appropriate, resulting in a noise rating level of 36dB(A). This is some 9dB below the lowest measured background noise level and, as such complies with MCC's requirements.

In terms of the existing school buildings, the resultant noise level would be no greater than 30dB(A) and would have no discernible character. As such, this also complies with MCC's requirements and AEC's suggested noise limit.

Table 4.2 – Operational Plant Noise Level at Worst-case Affected Receivers

Plant Item	Measured Noise Level, dBL _{Aeq,T} @ 1m	Distance Attenuation	Screening	Resultant, dBL _{Aeq,T}
Houses on Croft Hill Road (90m distance, line of sight screening)				
Kitchen Extract Fan – Discharge	<65	-39	-5	21
Kitchen Extract Fan – Motor	76	-39	-5	32
Kitchen Supply Fan – Inlet	<64	-39	-5	20
TOTAL				33
Existing Camberwell Park School (40m distance, fully screened)				
Kitchen Extract Fan – Discharge	<65	-32	-15	18
Kitchen Extract Fan – Motor	76	-32	-15	29
Kitchen Supply Fan – Inlet	<64	-32	-15	17
TOTAL				30

In terms of the new school building, internal noise levels are compliant with BB93 with the plant operational and windows to classrooms open. However, it was noted that the rooftop plant was clearly audible and it is considered that a simple metal barrier around all sides of the extract motor would result in the plant being inaudible in classrooms.

I trust the above is clear and of assistance.

Yours sincerely



Andrew Burke

Checked by:

