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MEMO P23-139 -M01v1

Project	New Science Block - Xaverian College, Rusholme
Date	12th February 2025
To	Simon Yearsley – Seddon Construction
From	James Shaw, BSc MIOA - Senior Consultant
Subject	**Assessment of External Plant**

This memo sets out the assessment of external plant associated with the new science block at Xaverian College in Rusholme, Manchester.

Planning Condition

Planning permission was granted with a number of noise related conditions. Specifically Condition 16.A relates to external plant and states:

> *"16.A) 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.*
>
> *Prior to commencement of the use hereby approved, the scheme shall be submitted to and approved in writing by the City Council as the local planning authority in order to secure a reduction in the level of noise emanating from the site.*
>
> *The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as the local planning authority.*

Background Noise Survey

The assessment of potential noise impact from the building services equipment was conducted within the proposed opening hours of the new school building, at a time during this period when background sound levels are expected to be at their lowest.

Noise levels were measured outside the nearest dwelling on Crescent Range opposite the school. The noise measurement location was as shown in Figure 1.

The purpose of the noise survey was to establish the prevailing ambient/background noise climate of the area.

Noise measurements were taken in consecutive 15 minute periods between approximately 14:00 – 15:30 on Wednesday 6th January 2021. Calibration checks were carried out both before and after the measurement period with no variance in levels noted. Audio was also recorded during the monitoring period in order to identify sources of noise making up the noise climate. Weather conditions during the survey were considered acceptable for the purposes of the survey and subsequent assessment.

The results of the noise survey are summarised in Table 1.

Table 1: Average of Measured Noise Levels (dB)

Period	$L_{Aeq,15mins}$	$L_{A90,15mins}$
Outside dwellings on Crescent Range	54	45

Condition 16.A of the planning approval requires external plant to be designed so as to achieve a rating level of **5 dB below** the typical background (L_{A90}) level at the nearest noise sensitive location. As such we have adopted the most regularly occurring background noise level (the mode) from the results of our noise survey at the site as the basis for determining the plant noise limit at the nearest dwellings.

The mode of the measured background noise levels was 45 dB L_{A90}. The combined plant limit is therefore **40 dB $L_{Ar,Tr}$.**

Assessment of External Equipment Noise Impact

We understand that the following equipment is proposed for the roof top plant compound (location shown in the Figure 2 enclosed). The equipment consists of 5 Samsung Air Conditioning Condensing Units with the following noise output data:

- 2x AM260AXVGGR/EU: @87 dB(A) (L_{WA})
- 1x AM240AXVGGR/EU: @87 dB(A) (L_{WA})
- 2x AC100BXAPNG/EU: @69 dB(A) (L_{WA})

In addition, a single extract fan is to be installed on the rooftop with the following noise output data:

- 1x ISOR 315- ECK01 - Acoustic Box Fan: @72 dB(A) (L_{WA})

The units are to be located within a rooftop compound with an enclosed permitter but open to the above, the proposed plant screen will provide screening to the nearest dwellings.

A 'TempAir 56T-EXT' air handling unit (AHU) is also proposed on the roof. The AHU will have louvred intakes and exhausts as well as Caice silencers fitted to each of the supply and exhausts.

The likely resulting plant noise level has been calculated, with appropriate allowances for distance and any barrier attenuation. The calculation of the resulting combined noise level outside the nearest dwelling is shown in Table 2 below.

Based on our experience of similar equipment, the rooftop plant would not feature tonal or impulsive characteristics readily distinctive against the residual acoustic environment. Nevertheless the condensers operate on demand and therefore are intermittent. As such, we have applied a +3 dB acoustic feature

correction for intermittency when calculating the rating level of sound from the condensers in accordance with the guidance in BS 4142.

Table 2: Plant Noise Assessment (dB)

Description	Dwellings on Crescent Range
Calculated Specific Sound Level outside dwelling	37
Acoustic feature correction (intermittency)	+3
Noise Limit	40
Rating Level	40
Difference	0

The noise level from rooftop equipment operating in a worst case configuration is 40 dB which meets the adopted noise limit.

We therefore conclude that there will be no unacceptable noise impact from the operation of the building services equipment and that this will meet the criterion for Condition 16.A.



Key:

Not to scale

X Noise Meausrement Location

North

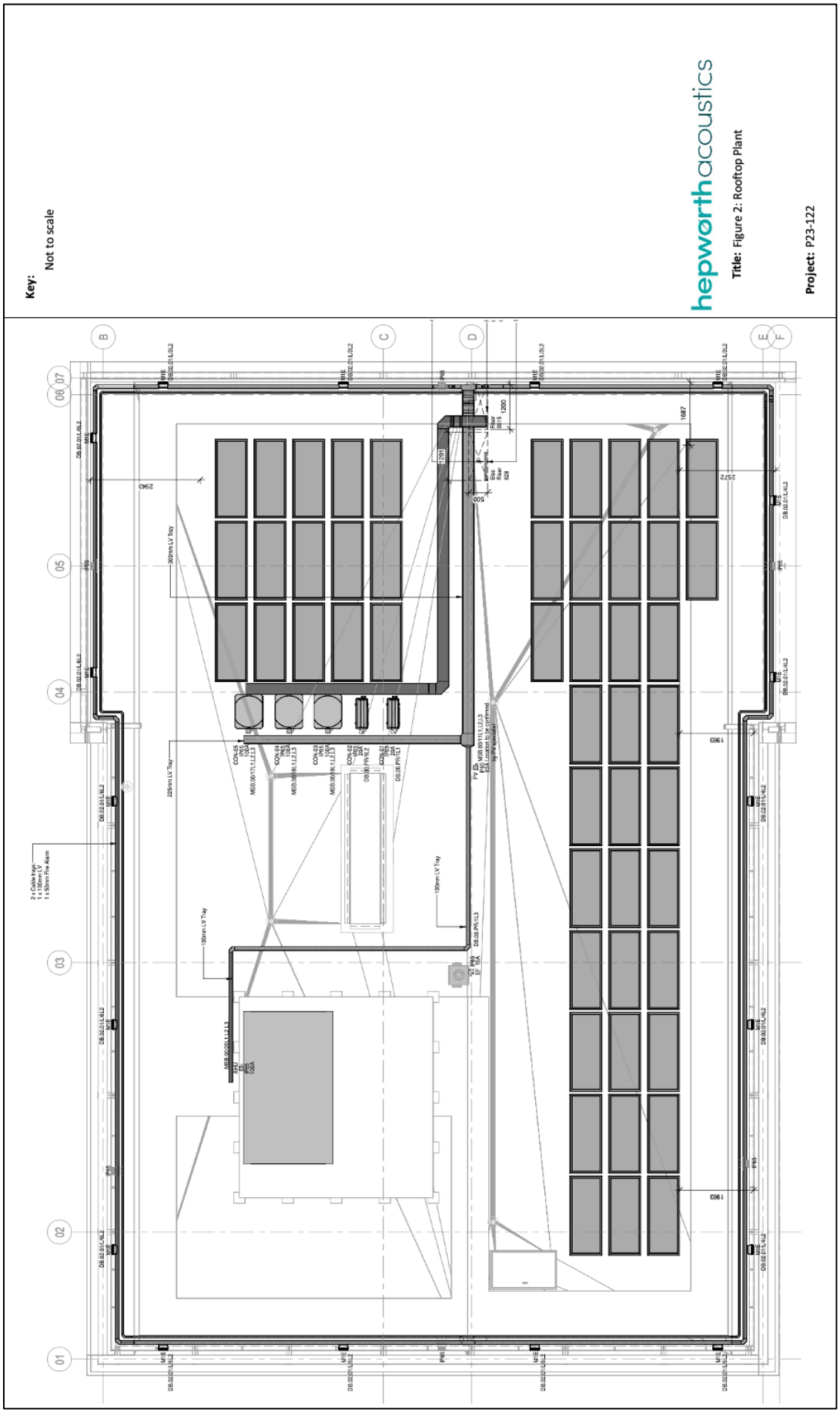
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Title: Figure 1: Site Location & Noise Measurement Position

Project: P20-537

Figure 1 – Site Location & Noise Measurement Position

Figure 2: Rooftop Plant



Samsung AM260AXVGGR/EU & AM 240AXVGGR/EU

Specifications







Model			AM180AXVGGR/EU	AM200AXVGGR/EU	AM220AXVGGR/EU	AM240AXVGGR/EU	AM260AXVGGR/EU
Electrical							
Power Supply		Φ, #, V, Hz	3Φ, 4, 380~415 V, 50 Hz	3Φ, 4, 380~415 V, 50 Hz	3Φ, 4, 380~415 V, 50 Hz	3Φ, 4, 380~415 V, 50 Hz	3Φ, 4, 380~415 V, 50 Hz
Minimum SSC value		MVA	6.4	7.0	7.4	9.3	10.2
MCA		A	39.2	43.0	46.0	55.0	60.0
MFA		A	50	63	63	63	75
Interconnecting Communication Cable		mm²	Screened 0.75-1.5mm², 2 Core, F1 F2 Connection				
Performance[1]							
Horsepower		HP	18	20	22	24	26
Capacity (Rated)	Nominal Cooling Capacity	kW	50.4	56.0	61.6	67.2	72.8
	Nominal Heating Capacity	kW	50.4	56.0	61.6	67.2	68.0
	Max Heating Capacity	kW	56.7	63.0	69.3	75.6	81.9
Operating Temperature Range	Cooling	℃	-5 ~ 50	-5 ~ 50	-5 ~ 50	-5 ~ 50	-5 ~ 50
	Heating	℃	-25 ~ 24	-25 ~ 24	-25 ~ 24	-25 ~ 24	-25 ~ 24
Maximum quantity of connectable indoor units		ea	32	36	40	43	47
Energy Efficiency[2]							
Seasonal Efficiency (Ducted)	SEER	W/W	7.50	6.50	6.20	5.90	5.40
	SCOP	W/W	4.80	4.50	4.30	3.90	3.90
	ηs,c	%	297.0	257.0	245.0	233.0	213.0
	ηs,h	%	189.0	177.0	169.0	153.0	153.0
Seasonal Efficiency (Cassettes)	SEER	W/W	7.05	6.81	7.04	5.94	5.45
	SCOP	W/W	4.45	4.27	4.39	3.9	3.90
	ηs,c	%	279.0	269.4	278.6	234.6	215.0
	ηs,h	%	175.0	167.8	172.6	153.0	153.0
Fan							
Type		-	Propeller	Propeller	Propeller	Propeller	Propeller
Discharge Direction			Top	Top	Top	Top	Top
Number of Fans		ea	2	2	2	2	2
Fan Motor	Model	-	BLDC	BLDC	BLDC	BLDC	BLDC
	Output x n	W	620 x 2	620 x 2	620 x 2	620 x 2	620 x 2
Airflow Rate		m³/min	313	313	342	365	365
		L/s	5209	5209	5698	6089	6089
Static Pressure	Max	Pa	110	110	110	80	80
Compressor							
Type		-	Inverter Scroll x 1	Inverter Scroll x 1	Inverter Scroll x 2	Inverter Scroll x 2	Inverter Scroll x 2
Output x n		kW	8.93 x 1	8.93 x 1	6.67 x 2	6.67 x 2	6.67 x 2
Piping Connections							
Liquid Pipe		ø, mm (inch)	15.88 (5/8)	15.88 (5/8)	15.88 (5/8)	15.88 (5/8)	19.05 (3/4)
Gas Pipe		ø, mm (inch)	28.58 (1-1/8)	28.58 (1-1/8)	28.58 (1-1/8)	34.92 (1-3/8)	34.92 (1-3/8)
Discharge Gas Pipe		ø, mm (inch)	22.22 (7/8)	28.58 (1-1/8)	28.58 (1-1/8)	28.58 (1-1/8)	28.58 (1-1/8)
Refrigerant							
Type			R410A (Fluorinated greenhouse gas, GWP=2088)				
Factory Charging		kg	10.5	10.5	10.5	14.0	14.0
		tCO_2e	21.92	21.92	21.92	29.23	29.23
Sound							
Sound Pressure Level	Cooling	dB(A)	59	61	64	65	65
	Heating	dB(A)	63	63	65	67	67
Sound Power Level		dB(A)	81	84	86	87	87

Samsung AC100BXAPNG/EU:







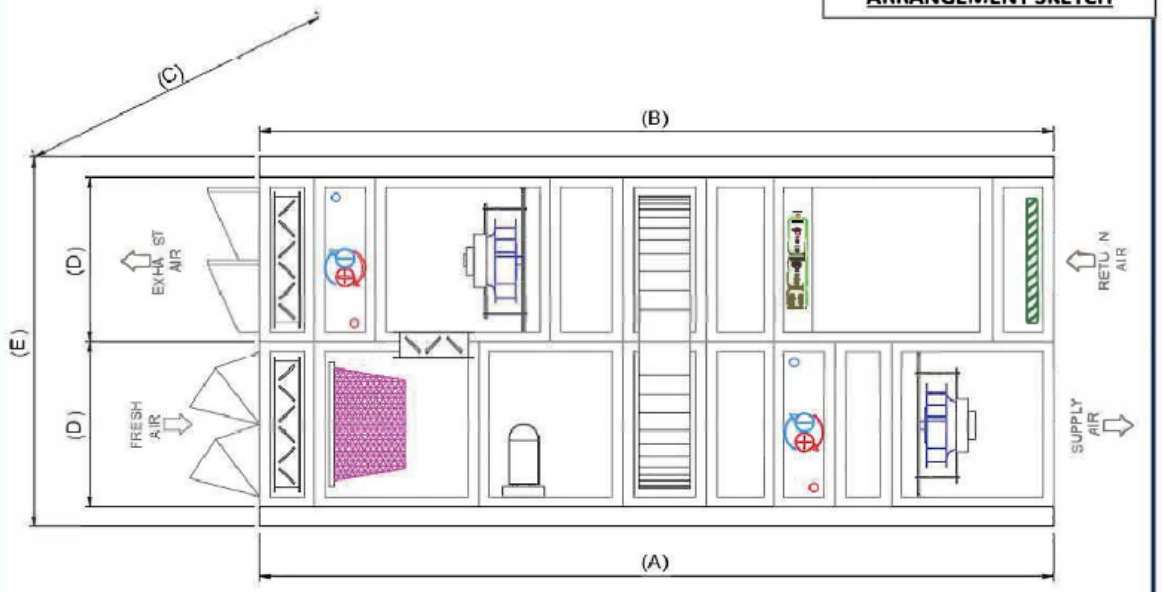
Indoor Unit Outdoor Unit - Mono-Phase Outdoor Unit - Tri-Phase			AC052BN4PKG/EU AC052BXAPKG/EU -	AC071BN4PKG/EU AC071BXAPKG/EU AC071BXAPNG/EU	AC100BN4PKG/EU AC100BXAPKG/EU AC100BXAPNG/EU	AC120BN4PKG/EU AC120BXAPNG/EU	AC140BN4PKG/EU AC140BXAPNG/EU
Capacity							
	Cooling (Min/Nominal/Max)	kW	1.10 / 5.00 / 8.00	2.40 / 7.10 / 10.00	3.80 / 10.00 / 13.30	3.80 / 12.10 / 14.50	4.10 / 13.40 / 17.10
	Heating @ +7 ℃ (Min/Nominal/Max)	kW	1.10 / 6.00 / 9.50	2.20 / 8.00 / 13.0	2.80 / 11.20 / 20.00	2.80 / 13.20 / 22.50	2.80 / 15.50 / 22.80
	Heating @ -5 ℃	kW					
	Heating @ -15 ℃	kW					
Performance							
Energy Efficiency Cooling	SEER[1]	W/W	8.5/A+++	8.5/A+++	8.0/A++	8.0/A++	8.0/A++
	Power Consumption	kWh/a	206	292	438	-	-
	Pdesignc	kW	5.0	7.1	10	12.1	13.4
	EER	W/W	4.31	4.33	4.26	4.28	4.06
Energy Efficiency Heating	SCOP[1]	W/W	4.9/A++	4.8/A++	4.8/A++	4.7/A+	4.7/A+
	Power Consumption	kWh/a	1171	1604	2479	-	-
	Pdesignh (average)	kW	4.1	5.5	8.5	9.5	9.5
	COP[1]	W/W	4.38	4.52	4.44	4.13	3.97
Airflow Rate	Indoor Unit (H/M/L)	m³/min	13.5 / 12.7 / 11.8	24.8 / 21.3 / 18.9	34.0 / 28.0 / 22.0	35.2 / 29.2 / 23.2	35.2 / 29.2 / 24.4
Sound Power	Indoor Unit	dB(A)	49	52	61	61	61
	Outdoor Unit	dB(A)	63	64	69	70	70
Sound Pressure	Indoor Unit (H/M/L)	dB(A)	33/31/29	35/32/29	44/39/33	45/40/35	45/41/37
	Outdoor Unit (H/L)	dB(A)	48/47	49/47	50/47	56/54	52/50

TempAir 56T – EXT (Air Handling Unit)

TECHNICAL SPECIFICATION

Unit Reference: AHU 01
Unit Model: TempAir 56T - EXT
Location: External
Configuration: Double Stacked

ARRANGEMENT SKETCH



A – SUPPLY LENGTH (mm)	B – EXTRACT LENGTH (mm)	C – UNIT WIDTH (mm)	D – SECTION HEIGHT (mm)	E – O/A UNIT HEIGHT (mm)	UNIT WEIGHT (kg)
4095	4095	2420	1350	2950	3334