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Architectural & Environmental Acousticians

Noise & Vibration Engineers

Discharge of Planning Condition 15

The Castings, Manchester

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Discharge of Planning Condition 15

Project: THE CASTINGS, MANCHESTER

Report reference: RP02-20728-R2

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1	05 December 2023	Dominic Perrett, MSc AMIOA, Acoustics Consultant	-	Updated plant items
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1. INTRODUCTION

1.1 Cass Allen has been instructed by Midgard Ltd to assess the acoustic design of a new development at The Castings in Manchester.

1.1 The assessment has been carried out in accordance with the requirements of noise related Planning Condition 15 which has been imposed on the development (Planning Application Reference No. 127317/FO/2020). The condition is:

> 15) Prior to occupation of
>
> (a) The residential accommodation; and
>
> (bThe ground floor commercial units
>
> a scheme for the acoustic insulation of any externally mounted ancillary equipment associated with the development to ensure that it achieves a background noise level of 5dB below the existing background (La90) at the nearest noise sensitive location shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment. The approved scheme shall be completed before the premises is occupied and a verification report submitted for approval by the City Council as local planning authority and any non compliance suitably mitigated in accordance with an agreed scheme prior to occupation.The approved scheme shall remain operational thereafter.
>
> Reason - To secure a reduction in noise in order to protect future residents from noise nuisance, pursuant to policies SP1, H1 and DM1 of the Core Strategy.

1.2 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

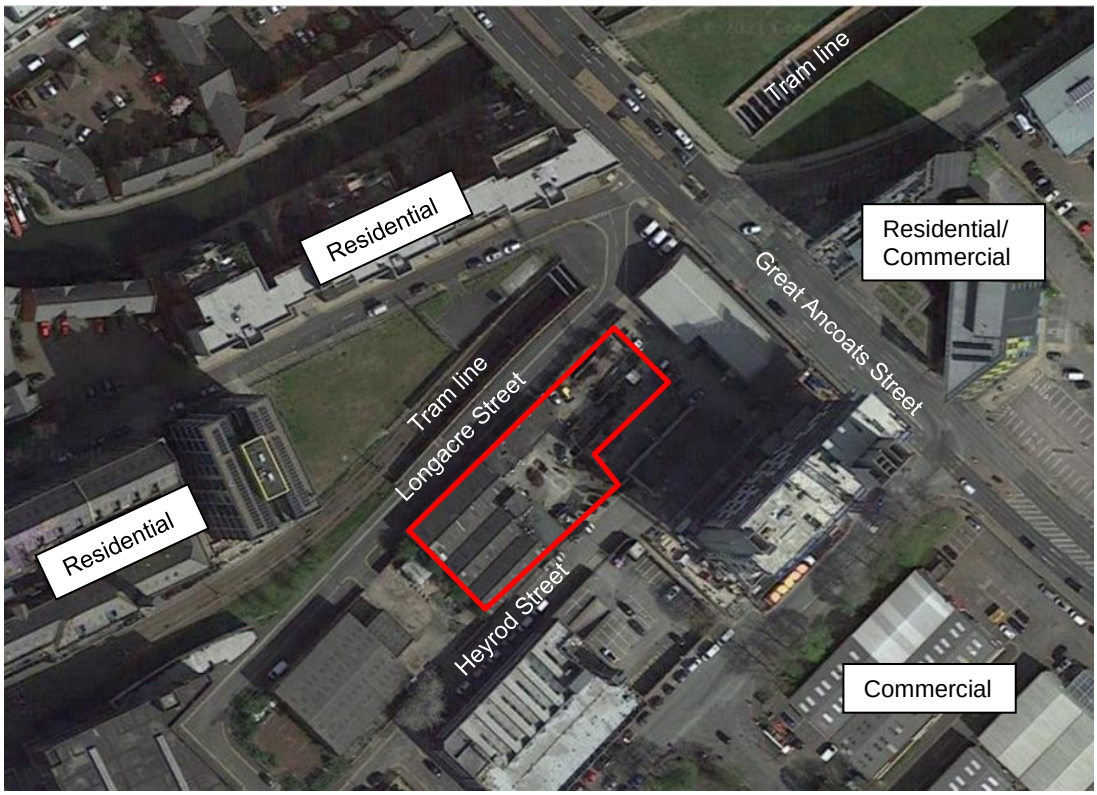
2. PROJECT DESCRIPTION

2.1 The development comprises commercial units at ground floor and mezzanine levels and residential to upper floors, including several communal amenity spaces. A current drawing of the development layout is shown in Appendix 1.

2.2 The site is located in a mixed-use area, bounded to the north by Longacre Street and to the south by Heyrod Street. To the north east of the site is Great Ancoats Street and to the north west of the site is a tram line. To the south of the site is the St James Catholic School.

2.3 The site location is shown in Figure 1 below.

Figure 1 Site Location and Surrounding Area



2.4 To address the requirements of Planning Condition 15, noise emissions from mechanical plant associated with the development at the position of existing sensitive receptors has been assessed.

3. PLANT NOISE IMPACT ASSESSMENT

Design Criteria

3.1 Noise emissions from mechanical plant are addressed in Planning Condition 15 of Planning Consent 127317/FO/2020 issued by Manchester City Council. Condition 15 is shown below:

> 15) Prior to occupation of
>
> (a) The residential accommodation; and
>
> (bThe ground floor commercial units
>
> a scheme for the acoustic insulation of any externally mounted ancillary equipment associated with the development to ensure that it achieves a background noise level of 5dB below the existing background (La90) at the nearest noise sensitive location shall
>
> be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment. The approved scheme shall be completed before the premises is occupied and a verification report submitted for approval by the City Council as local planning authority and any non compliance suitably mitigated in accordance with an agreed scheme prior to occupation.The approved scheme shall remain operational thereafter.
>
> Reason - To secure a reduction in noise in order to protect future residents from noise nuisance, pursuant to policies SP1, H1 and DM1 of the Core Strategy.

3.2 It has been confirmed by Manchester City Council that noise limits only relate to the standard day-to-day background generation of noise of the externally mounted equipment, and not noise levels of externally mounted equipment in rare emergency / testing situations.

Existing site noise levels

3.3 A noise survey was carried out at the site from 6th to 9th September 2021 to assess existing noise levels in the area. The full methodology and results of the survey are provided in Appendix 2.

3.4 The measured background noise levels have been used to develop limits for plant noise emissions from the development at the positions of noise sensitive receptors in accordance with the BS4142 assessment methodology. The limits are shown in Table 1 below.

Table 1 BS4142 Noise Limits - Free-field Levels

Location	Day-time/Evening (0700-2300hrs)	Night-time (2300-0700hrs)
Closest building to North East of site	48 dB LAr,Tr	37 dB LAr,Tr
Closest building to South East of site	48 dB LAr,Tr	37 dB LAr,Tr
The development itself	48 dB LAr,Tr	37 dB LAr,Tr

Note 1 The above limits are 'rated' noise levels. Any mechanical plant noise emissions should have appropriate corrections for the character of the noise applied and still meet these limits.

Proposed mechanical plant design

3.5 Details of the mechanical plant items are shown in Table 2 and also included in Appendix 3.

Table 2 Proposed Mechanical Plant

Plant Item	Location	Noise Data (dBA)
2no. Smoke Extact fans (operating in low speed mode as an environmental extract fan)	Rooftop	42 SPL @ 3 m
1no. AHU (Systemair Topvex SR20-R-EL)	L22 Rooftop	56 SWL
1no. AC unit (Samsung AM060BXMDER/EU)	L22 Rooftop	70 SWL

3.6 Attenuators will be located in the intake and exhaust ducts of the AHU. The insertion loss of the specified attenuators is provided in Table 3 below.

Table 3 Insertion Loss of AHU Attenuators

Attenuator Location	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
Intake / Exhaust Ducts	3	4	8	18	23	17	15	12

3.7 A detailed 3D noise model of the rooftop plant was developed using Cadna/A environmental noise modelling software. The model was used to calculate noise emissions from mechanical plant at the locations of the surrounding noise sensitive positions. The modelling results are shown in Appendix 4 and are summarised below in Table 4.

Table 4 Predicted Plant Noise Levels

Location	Period		Predicted Noise Level at Receptor	Complies with Planning Condition 15
	Day-time/Evening (0700-2300hrs) Plant Noise Limits	Night-time (2300-0700hrs) Plant Noise Limits		
Closest building to North East of site	48 dB LAr,Tr	37 dB LAr,Tr	33 dB LAr,Tr	Complies
Closest building to South East of site	48 dB LAr,Tr	37 dB LAr,Tr	<30 dB LAr,Tr	Complies
The development itself	48 dB LAr,Tr	37 dB LAr,Tr	35 dB LAr,Tr	Complies

3.8 It can be seen from Table 4 that the predicted noise levels from the mechanical plant comply with the criteria as specified in Planning Condition 15.

4. CONCLUSIONS

4.1 Cass Allen was instructed by Midgard Ltd to assess the acoustic design of the development in line with the requirements of Planning Condition 15.

4.2 Noise emission from mechancal plant items have been predicted at the locations of the nearest noise sensitive receptors and and comply with the requirements of Planning Condition 15.

Appendix 1 Development Layout

Appendix 2 Survey Results

Survey Summary:

The survey comprised short-term operator attended noise measurements and longer-term unattended noise monitoring at the site. Noise levels at the site were generally dictated by road traffic on surrounding roads and noise from tram passes on the nearby tram line.

Survey Period:

06/09/2021 to 09/09/2021

Survey Objectives:

- To identify noise sources that contribute to ambient noise levels at the site;
- To measure noise levels around the site over a typical day and night-time period.

Equipment Used:

Type	Manufacturer	Model	Serial Number
Sound level meter[1]	NTi Audio	XL2	A2A-15506-E0
Calibrator	NTi Audio	600 000 388	15011
Sound level meter[1] (noise logger)	Rion	NL-32	00272007
Sound level meter[1] (noise logger)	Rion	NL-32	01213688
Calibrator	Rion	NC-74	34551703

Note 1: All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

Weather Conditions:

The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain). Weather records for the area confirmed that weather conditions were also generally acceptable for acoustic measurement during the unattended monitoring.

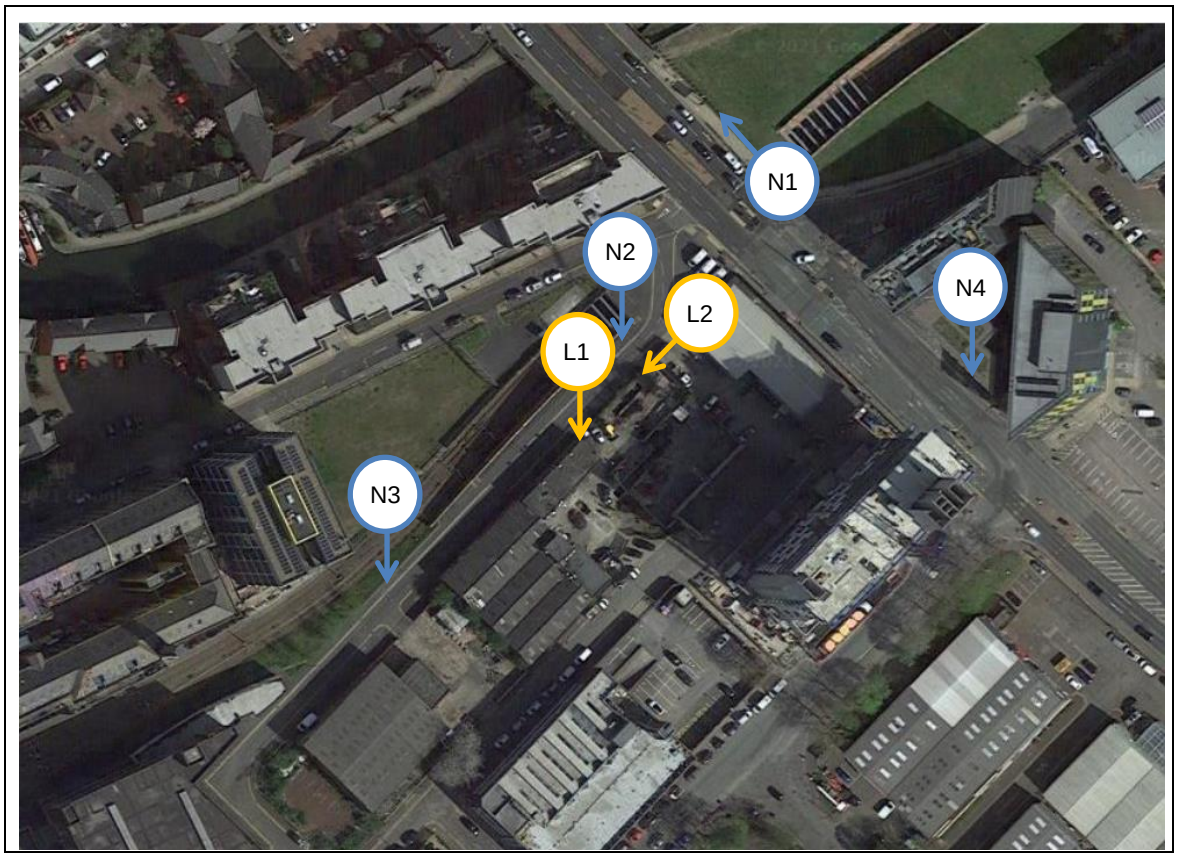
Measurement Positions:

Position (refer plan below)	Description
N1	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Great Ancoats Street.
N2	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Great Ancoats Street and Longacre Street.
N3	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to tram line, Longacre Street and Great Ancoats Street.
N4	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Great Ancoats Street.
L1	Unattended noise logging position. 6.5m above ground level. Free-field. Direct line of sight to Great Ancoats Street and tram line.

Measurement Positions:

Position (refer plan below)	Description
L2	Unattended noise logging position. 4m above ground level. Free-field. Direct line of sight to Great Ancoats Street.

Site Plan showing Measurement Positions:



Attended Noise Monitoring Results:

Date	Position	Time	Meas. Length	LAeq, dB	LAmax, dB	Observations
06/09/2021	N1	14:12	7 secs	69	71	Noise dictated by road traffic from Great Ancoats Street, stop start traffic due to light sequence and positioning. Loose manhole cover considerable clatter when driven over, occasional construction works noticeable in periods of no traffic movement. Maximum levels generally HGV passes and loud car exhausts.
		14:15	5 mins	68	80	
		14:20		71	93	
		14:26	13 secs	72	80	
		14:26	11 secs	68	71	Noise dictated by road traffic from Great Ancoats Street, cars and vans.
		14:26	7 secs	71	75	
	N2	14:30	34 secs	55	68	Noise dictated by road traffic from Great Ancoats Street, loose manhole cover considerable clatter

Date	Position	Time	Meas. Length	LAeq, dB	LAmax, dB	Observations
						when driven over, occasional construction works noticeable.
		14:50	5 mins	62	83	Noise dictated by road traffic from Great Ancoats Street, loose manhole cover, occasional construction works, single tram pass.
		14:55		60	81	
	N3	15:04	9 secs	62	70	Noise dictated by car pass on Longacre Street.
		15:04	7 secs	70	78	Noise dictated by car pass on Longacre Street.
		15:05		66	71	Noise dictated van pass on Longacre Street.
		15:06	20 secs	68	76	Noise dictated by tram pass; nearside, short measurement due to construction noise opposite starting.
		15:08	29 secs	67	77	Noise dictated by tram pass, far side.
		15:20	17 secs	67	74	
		15:29	20 secs	64	74	
		15:30	22 secs	70	77	Noise dictated by tram pass, nearside.
	N4	15:40	5 mins	72	82	Noise dictated by road traffic from Great Ancoats Street, maximum levels from HGV passes, occasional construction works noticeable in periods of no traffic movement
		15:45		72	84	
		15:50	7 secs	73	76	Noise dictated by road traffic on Great Ancoats Street.
		15:50	12 secs	74	77	
	N1	16:30	5 mins	67	80	Noise dictated by road traffic from Great Ancoats Street, maximum levels from HGV passes.
		16:35		69	80	Noise dictated by road traffic from Great Ancoats Street, maximum levels from HGV passes, stationary bus for part of measurement increased LAeq levels.

Unattended Noise Monitoring Results:

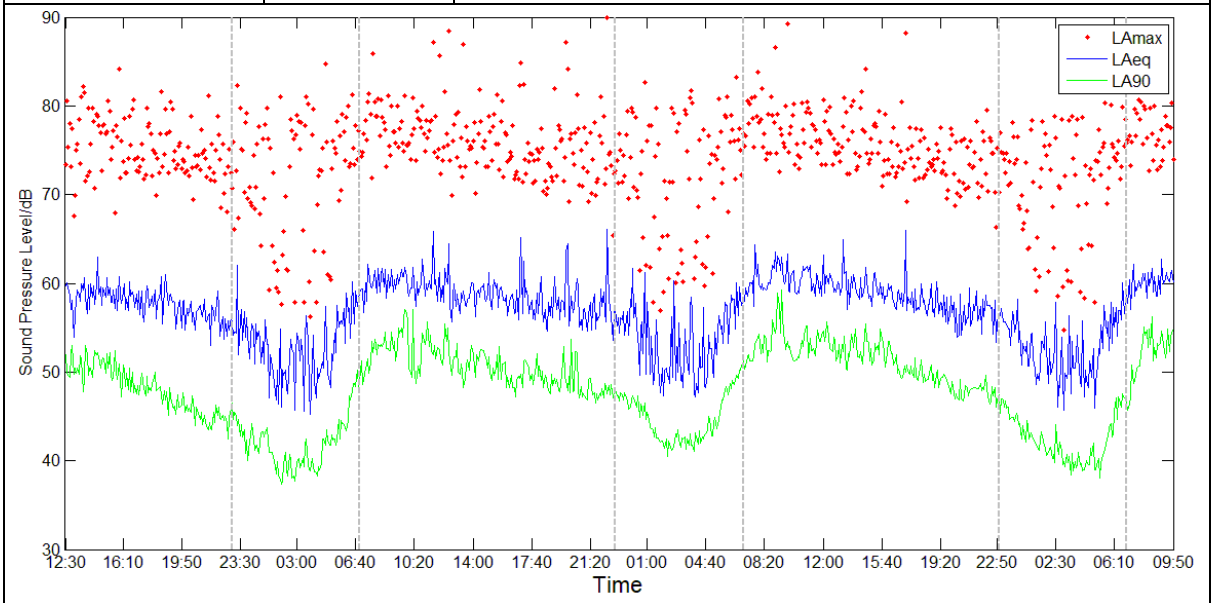
Meas. Period	Position	Daytime (0700-2300hrs)		Night-time (2300-0700hrs)		
		LAeq,16hr, dB	LA90,1hr dB[1]	LAeq,8hr, dB	LA90,5mins, dB[1]	LAmax, dB[2]
06/09/2021 to 09/09/2021	L1	59	52	55	42	78-79
	L2	61	53	56	42	82-83

Note 1: Typical lowest measured during the period shown.

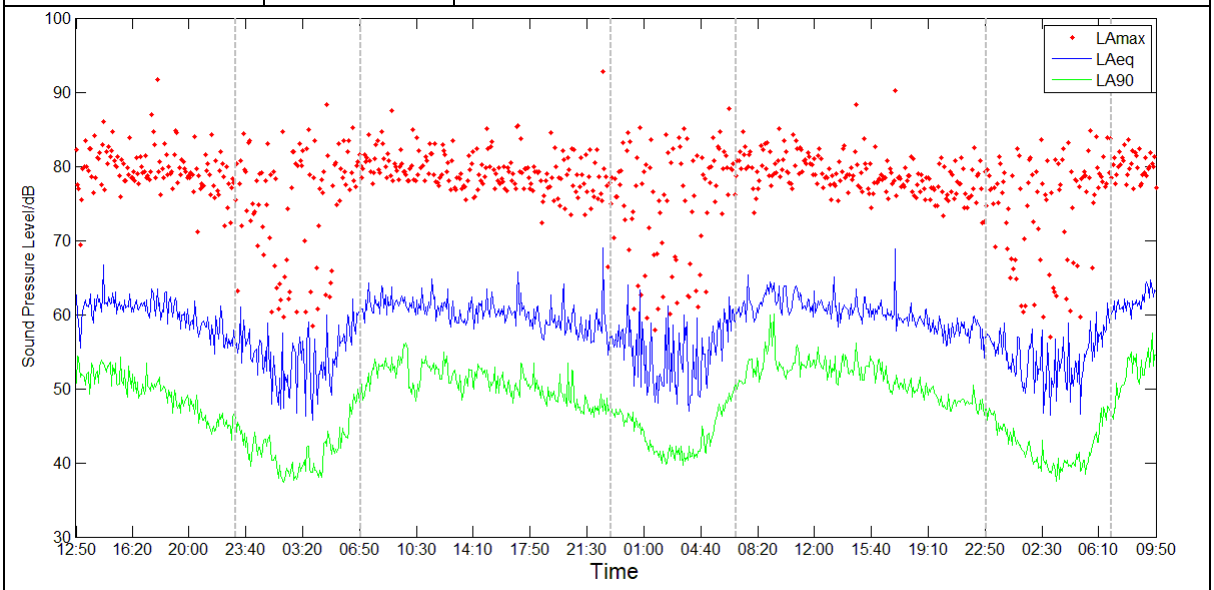
Note 2: Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

Unattended Noise Monitoring Results:

Meas. Period	Position
06/09/2021 to 09/09/2021	L1



Meas. Period	Position
06/09/2021 to 09/09/2021	L2



Appendix 3 Mechanical Plant Items

The Castings

Fan details

Fan Diameter / Size	900 Size / mm
Blades	3
Fan Speed	1440 rpm
Velocity	11.8 m/s
Blade Angle	24°
Installation Type / Form of Running	D / B (Horizontal)
Fan Casing	Long

Idling Loss*	49 Pa
Duty Shaft Power	3.37 kW
Max Shaft Power	3.45 kW
Motor Frame	100L [Class H]
Motor Rating	3.60 kW [IE2]
Full Load Current	7.63 A
Starting Current	37.38 A
Motor Mounting	Pad
Electrical Supply	380-420 Volts 50 Hz 3 Phase
Start Type	Enquire
Motor Winding	Standard
Enclosure	Standard All

High speed noise data

	Sound Spectrum (Hz)								Overall	
	63	125	250	500	1k	2k	4k	8k	Lw*	LpA @ 3 m**
Inlet*	101	99	95	93	91	89	86	82	105	76
Outlet*	102	99	95	93	92	90	87	84	105	77
Breakout*	92	76	67	66	65	61	66	61	92	52

* Lw dB re 10-12W ** dBA re 2x10-5 Pa
Sound data at requested duty.

Low speed noise data

	63	125	250	500	1K	2K	4K	8K	dba @ 3 metres
Inlet	73	67	60	51	53	52	49	49	41
Outlet	74	68	61	53	55	54	52	51	42
900mm B1D Silencer	-3	-5	-10	-17	-13	-11	-10	-8	

AHU Details

systemair

Share code	4xyehrbj		
Project name	The Castings	L21 HRU	
Project number		30/06/2023	
Model name	Topvex SR20-R-EL5,2 ODK - 254309	Page 2 / 19	

Unit data		
Item number	254309	
Unit name (optional)	L21 HRU	
Airflow range	117 - 635 l/s	
Notes		
Inlet air intake	None	
Exhaust air outlet	None	

Ecodesign		
Trade name	Systemair	
Product name	Topvex SR20	
Fulfills Ecodesign 2018	Yes	
Unit category	NRVU	
Unit type	BVU	
Drive	Integrated VSD	
Heat recovery type	Regenerative	
Temperature ratio	81.0	%
Nominal airflow	300	l/s
P nom	0.568	kW
SFP int	1,078	W/(m³/s)
Face velocity	1.29	m/s
Nominal pressure	200	Pa
Ps int. Supply	264	Pa
Ps int. Extract	265	Pa
Supply fan efficiency	49.3	%
Extract Fan efficiency	48.7	%
External leakage	2	%
Internal leakage	3	%
Sound power level (LwA)	56	dB (A)

	Octave bands [Hz]								
Sound power level	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1k [dB]	2k [dB]	4k [dB]	8k [dB]	Total dB [dB(A)]
Supply	71	64	62	56	56	52	44	35	61
Outdoor	67	63	56	46	45	34	24	13	52
Extract	71	65	61	49	45	38	29	24	56
Exhaust	77	69	61	54	52	48	40	35	59
Surrounding	57	52	56	46	44	41	30	24	51
Sound pressure at 3m									30

Sound results according to EN 13053.

AC Details

DVM S Eco Heat Recovery (With Heat Recovery Changer Kit)

- Horizontal discharge and rear suction by means of two propeller BLDC Inverter fans.
- Each module houses one Twin BLDC Rotatory compressor.
- Night Silent Mode available.
- Eurovent certified and ErP (Ecodesign) compliant.
- Four-way direction piping connection.

Model				AM040NXMDER/EU	AM050NXMDER/EU	AM060NXMDER/EU
Power Supply			Φ, V, Hz	1Φ, 220~240 V, 50 Hz	1Φ, 220~240 V, 50 Hz	1Φ, 220~240 V, 50 Hz
Performance	hp		hp	4	5	6
	Capacity	Cooling	kW	12.1	14.0	15.5
		Heating	kW	12.1	14.0	15.5
Power	Power Input (Nominal)	Cooling	kW	2.69	3.41	4.13
		Heating	kW	2.58	3.11	3.65
	Current Input (Nominal)	Cooling	A	4.1	5.2	6.3
		Heating	A	3.8	4.5	5.3
	Current	MCA	A	22.0	24.0	30.0
		MFA	A	25	30	40
Energy Efficiency[1]	EER (Nominal Cooling)		W/W	4.50	4.11	3.75
	COP (Nominal Heating)		W/W	4.80	4.70	4.45
	SEER		W/W	10.50	10.10	9.50
Compressor	Type		-	Twin BLDC Rotary	Twin BLDC Rotary	Twin BLDC Rotary
	Output		kW	4.04	4.04	4.04
	Oil	Type	-	PVE	PVE	PVE
		Initial Charge	cc	1,700	1,700	1,700
Fan	Type		-	Propeller/BLDC	Propeller/BLDC	Propeller/BLDC
	Discharge direction		-	Horizontal	Horizontal	Horizontal
	Motor (Output)		kW × n	125.0 x 2	125.0 x 2	125.0 x 2
	Airflow Rate	(H/M/L)	m^3/min	100	100	100
		(H/M/L)	L/s	1,666.70	1,666.70	1,666.70
	External Static Pressure	(Min/Std/Max)	mmAq	3	3	3
Piping Connections	Liquid Pipe		ø, mm	9.52	9.52	9.52
			ø, inch	3/8	3/8	3/8
	Gas Pipe		ø, mm	15.88	15.88	19.05
			ø, inch	5/8	5/8	3/4
	Discharge Gas Pipe		ø, mm	15.88	15.88	15.88
			ø, inch	5/8	5/8	5/8
	Installation Max. Length		m	150	150	150
	Installation Max. Height		m	50	50	50
Field Wiring	Transmission Cable		m	0.75~1.50	0.75~1.50	0.75~1.50
Refrigerant	Type		-	R410A(Fluorinated greenhouse gas, GWP=2,088)		
	Factory Charging		kg	3.2	3.2	3.3
			kg / tCO_2e	6.7	6.7	6.9
Sound[1]	Sound Pressure		dB(A)	52	52	53
	Sound Power		dB(A)	67	68	70
External Dimensions	Net Weight		kg	97.0	97.0	100.0
	Net Dimensions (W x H x D)		mm	940 x 1,210 x 330	940 x 1,210 x 330	940 x 1,210 x 330
Operating Temperature Range	Cooling		°C	-5.0~48.0	-5.0~48.0	-5.0~48.0
	Heating		°C	-25.0~26.0	-25.0~26.0	-25.0~26.0

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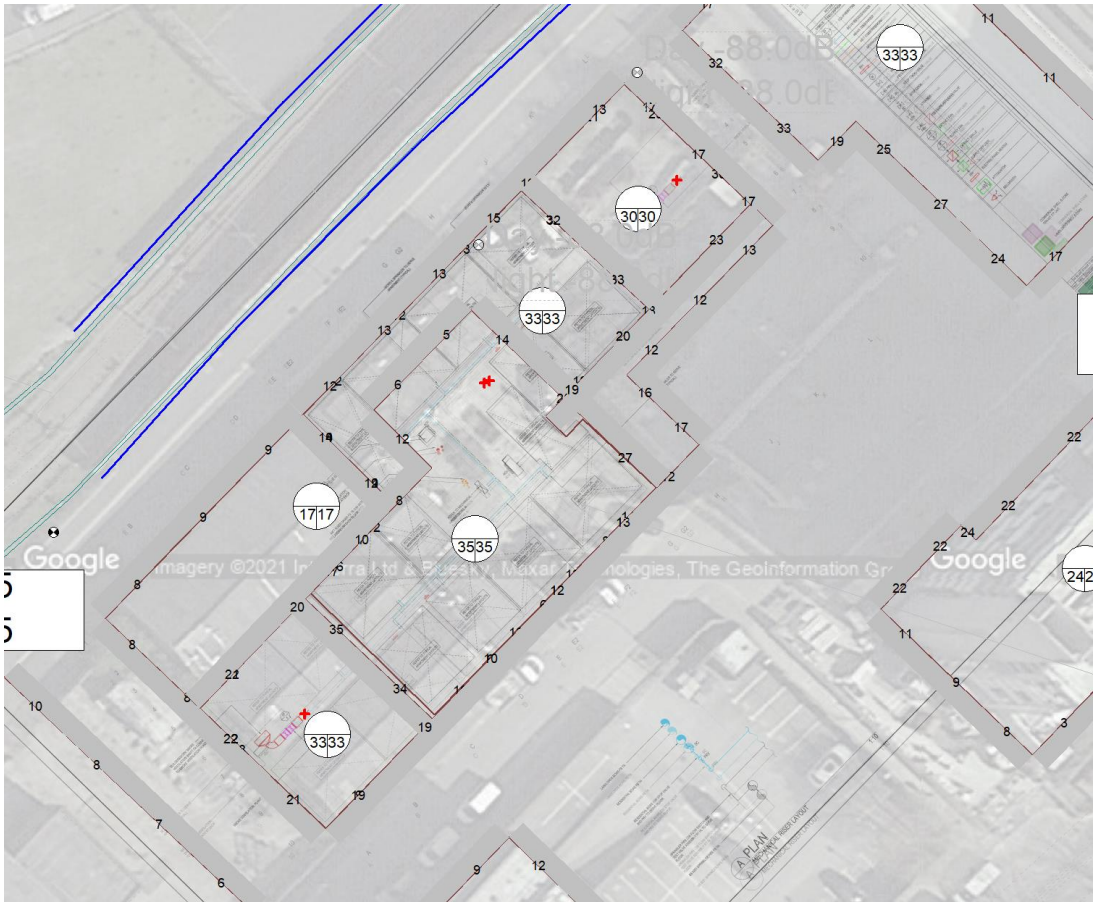
Appendix 4 Modelling Results

Modelling Software:	CADNA/A Version 2021
Modelled Scenarios	Day and night-time average noise levels across the site
Data inputs:	• Noise survey results • Topographical data for the site • Development layout • Mechanical Plant details
Calculation Algorithms Used:	• ISO 9613-1:1993 Acoustics-Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere • ISO 9613-2:1996 Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation

Modelling Printout:

Scenario	Daytime and night time noise levels across the site



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