



MACH
ACOUSTICS

THE HEIGHTS PRIMARY SCHOOL

Environmental Noise Assessment

Kier



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Finance

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1.0 INTRODUCTION

An environmental noise assessment at the proposed site of Heights Primary School has been undertaken. The proposed works are the building of a new school.

Such to establish the existing noise levels across the site, a 24-hour noise survey was conducted between 04/11/19 and 05/11/19. This report describes the noise survey, its results, and the outcomes of subsequent noise break out assessment.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Site Description

The proposed development is situated on the outskirts of Caversham next to Reading. The site is located at the upper edge of Mapledurham Playing Fields which itself is surrounded by residential dwellings.

The site in relation to its surroundings is presented below.



Figure 2.1: Proposed Development (Red) and Nearest Noise Sensitive Receivers (Blue)

2.2 Noise Sources

Noise levels varied across the site with the dominant noise source being road traffic along Upper Woodcote Road. A summary of the main noise sources is provided below.

Noise Source	Noise Contribution	Description
Road Traffic along Upper Woodcote Road	Dominant	Woodcote Road (A4074) is situated approximately 90m to the north of the site
Road Traffic along Hewett Avenue	Intermittent	Intermittent road traffic could be heard down Hewett Avenue approximately 55m to the west of the site
Overhead Aircraft noise	Intermittent	Intermittent aircraft noise could be heard overhead from both small propeller aircraft and commercial passenger aircraft.
Mapledurham Playground	Intermittent	Noise from children playing on Mapledurham playground could be heard intermittently. The noise level from the playground would vary depending on the time of day.

Table 2.1: Summary of Main Noise Sources

2.2.1 Non-Representative Noise Sources

During the survey, there were some noise events that were not considered to be representative of normal ambient conditions or are noise activities associated with the development itself. These are noted below.

Noise Source	Times (hh:mm)	Description
On-site generator	08:00 to 18:00	The on-site generator was running between the times shown. However, the microphones were located at a distance where the noise contribution from the generator did not have any observable effect on the measurements.

Table 2.2: Non-Representative Noise Contributions

Where noise from the above affected measurements, this data has been omitted from use in calculations.

2.3 Noise Sensitive Receivers

Noise Sensitive Receiver	Distance from Site Boundary (m)
Residential Dwellings on Hewett Avenue (west)	1
Residential Dwellings on Hewett Close (north)	1
Residential Dwellings on Little Woodcote Close (east)	29
Residential Dwellings on Upper Woodcote Road (east)	57

Table 2.3: Nearest Noise Sensitive Receivers

2.4 Measurement Positions

Measurement positions used throughout the survey are shown below.



Figure 2.2: Measurement Positions

2.5 Measured Noise Levels

2.5.1 Fixed Position

Noise levels were measured at the fixed position between 13:46 (04/11/19) and 14:10 (05/11/19). Measured noise levels are presented in the graph below. A summary of these noise levels is shown in the table.

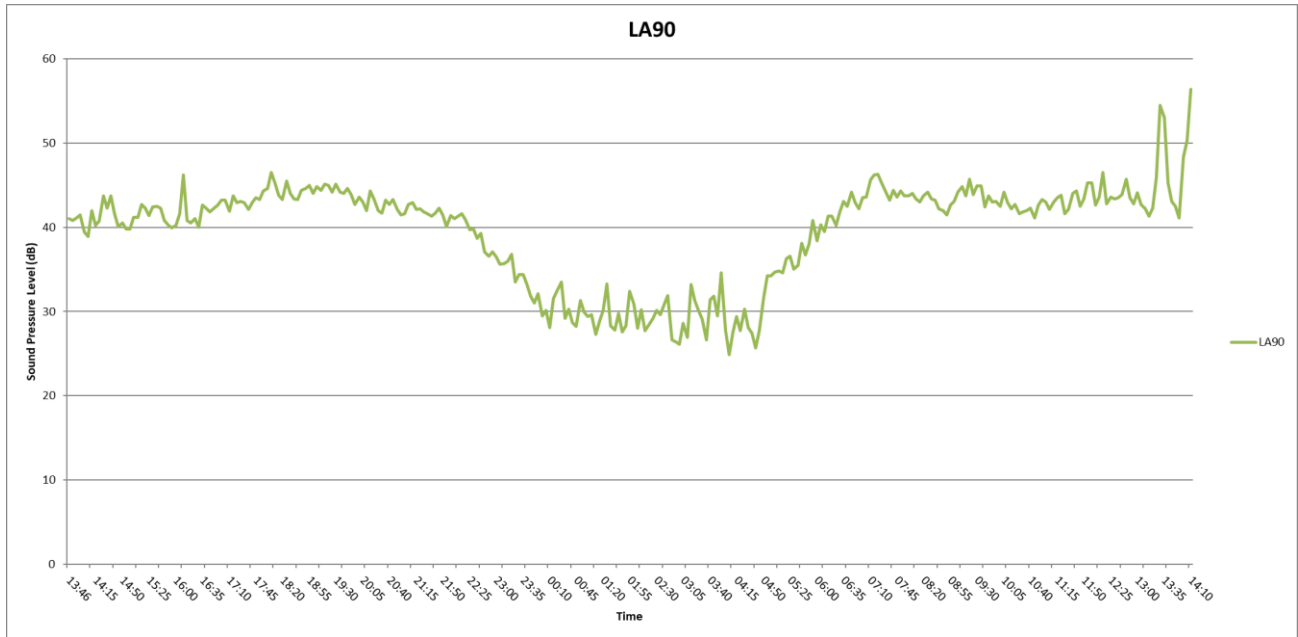


Table 2.4: Summary of Fixed Position Measurements

		Measured Noise Levels (dB)	
		Mode	Minimum
L _{A90}	Daytime (07:00 – 23:00)	42	37
	Night-time (23:00 – 07:00)	28	25

Table 2.5: Summary of Fixed Position Measurements

2.5.2 Spot Positions

Additional spot measurements were taken between 14:15 and 14:52 such to assess variations across site, it is seen that the fixed microphone position is representative of noise levels across site.

Spot Position	Times (hh:mm)	Measured Noise Levels (dB)			
		L _{Aeq,15min}	L _{A90}	L _{Amax}	L _{A1}
1	14:15 – 14:30	49	42	66	59
2	14:35 – 14:50	49	42	61	58

Table 2.6: Summary of Spot Measurements

3.0 NOISE BREAK-OUT ASSESSMENT

3.1 Criteria

BS 4142:2014 "Methods for rating and assessing industrial and commercial sound" describes a method of determining the level of noise of an industrial nature, together with the procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. As such, an assessment to BS 4142 is typically called for within planning conditions. The likelihood of complaints in response to a noise depends on various factors. BS 4142 assesses the likelihood of complaints by considering the margin by which the noise in question exceeds the background noise level. Additional information on BS 4142 methodology is provided within Appendix A.

The following planning conditions have been specified:

Condition 16:

No development shall take place above slab level for the School building as shown in the approved plans in Condition 2 above until details of the means of ventilation for the extraction and dispersal of cooking smells/fumes, including details of its method of construction, odour control measures, noise levels, its appearance and running specifications have been submitted to and been approved in writing by the Local Planning Authority. The approved scheme shall be installed before the School use hereby permitted commences and thereafter shall be permanently retained and maintained in accordance with the approved specifications.

Reason: These details need careful consideration and formal approval and to safeguard the amenity of adjoining properties and to protect the general environment in accordance with Policy DM4.

Condition 23:

No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted to and approved in writing by the Local Planning Authority. The assessment shall be carried out in accordance with the relevant recommendations of appropriate British Standards or other recognised Codes of Good Practice. The predicted rating level, $L_{A,T,r}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level, $L_{A90,T}$ when all plant/ equipment (or any part of it) is in operation. The plant shall only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard. Reason: To safeguard the amenities of the adjoining premises and the area generally, in accordance with policies CS34 and DM4.

3.2 Design Target

Based on the noise climate of the site, plant noise limits have been set at 10dB below background noise levels at the nearest noise sensitive receivers.

Noise rating levels are to be assessed against the existing background noise levels, L_{A90} . For the purposes of assessment, MACH Acoustics has used the typical L_{A90} that occurred during the survey. Plant noise break out should not adversely impact nearby residents but should also ensure that it does not impact the development itself. Therefore, plant noise break-out must meet both these requirements.

Position	Time Period	Assessed Background Noise Level (dB L_{A90})	Plant Noise Limit, $L_{Aeq,T}$ (dB)	
			At Nearest Sensitive Receivers	At Nearest Teaching Window
Fixed	Daytime (07:00 – 23:00)	42	32	48
	Night-time (23:00 – 07:00)	28	18	NA

Table 3.1: Plant Noise Limits

Note, this target is subject to agreement with the local authority.

3.3 Proposed Equipment

It is understood that the new plant will be installed on the roof of the buildings as shown in the following drawings:

- FS0280-NOV-V1_RL-DR_A_03003
- FS0280-NOV-V1-ZZ-DR_A_04000

3.3.1 Proposed Mechanical Plant

A list of the proposed plant equipment is provided in Table 3.2 below. This indicates the sound pressure level (SPL) or sound power level (SWL) for each unit. Locations of the proposed equipment are shown in Appendix E – Plant Locations whilst plant data is given in Appendix F – Plant Data.

Model		Reference	SPL/SWL	Frequency (Hz)								dBA
				63	125	250	500	1k	2k	4k	8k	
AHU-1 HALL Supply & Exhaust	Intake	AHU1	SWL	72	69	72	40	20	17	22	21	63
	Exhaust		SWL	67	72	61	39	25	26	36	38	58
	Casing Breakout		SPL @ 3m	50	67	43	18	10	13	6	7	51
AHU 02 Kitchen	Intake	AHU1	SWL	74	73	85	76	66	64	58	51	78
	Exhaust		SWL	86	84	86	85	85	82	75	69	89
	Casing Breakout		SPL @ 3m	53	54	38	26	26	24	15	14	39
PUZ-ZM60VHA	Casing Breakout	Condenser 1	SPL @ 1m	65	62	61	60	58	52	48	42	62
PUHZ-ZRP250YKA3	Casing Breakout	Condenser 2	SPL @ 1m	53	52	53	44	42	39	33	27	46
PUHZ-ZRP250YKA3	Casing Breakout	Condenser 3	SPL @ 1m	65	62	61	60	58	52	48	42	62
PUHZ-ZRP250YKA3	Casing Breakout	Condenser 4	SPL @ 1m	65	62	61	60	58	52	48	42	62
New XBOXER - With Ecosmart Adapt with Trend Control	Intake	MVHR01	SWL	81	80	79	82	75	69	63	59	81
	Exhaust		SWL	85	84	79	87	86	78	71	67	89
	Casing Breakout		SWL	75	67	64	62	53	45	46	38	62
New XBOXER - Constant Pressure, Right Hand With Ecosmart Adapt with Trend Control	Intake	MVHR01	SWL	81	80	79	82	75	69	63	59	81
	Exhaust		SWL	85	84	79	87	86	78	71	67	89
	Casing Breakout		SWL	75	67	64	62	53	45	46	38	62
DE - DAVE Extract Fan with Ecosmart Control	Exhaust	EF01	SWL	91	88	76	88	67	62	58	51	85
	Casing Breakout		SWL	75	88	67	53	54	43	38	32	72

Table 3.2: Proposed Plant Equipment

All the above sound power levels are taken from manufacturer data. Manufacturer data does not provide sound power or pressure levels in 3rd octaves. Therefore, it is not possible to assess the tonality of the plant units. It is also considered that the plant will operate continuously and therefore no correction for acoustic features has been applied.

3.3.2 Proposed Attenuation

A list of the insertion losses of the proposed attenuators is provided in below, the attenuator schedule is provided within Appendix G.

Equipment		Octave Band Centre Frequencies, Hz							
		63	125	250	500	1k	2k	4k	8k
Kitchen AHU	Intake	8	16	27	42	55	49	45	29
	Exhaust	9	17	23	38	44	37	32	22
MVHR01	Intake	12	20	30	40	47	40	33	22
	Exhaust	12	20	30	40	47	40	33	22
MVHR02	Intake	12	20	30	40	47	40	33	22
	Exhaust	12	20	30	40	47	40	33	22

Table 3.3: Attenuator specification

3.4 Operational Hours

The table below presents the operational hours of the proposed plant.

Model	Reference	Maximum Operational Hours
AHU-1 HALL Supply & Exhaust	AHU1	Daytime (07:00 – 23:00) Night-time (23:00 – 00:00)
AHU 02 Kitchen	AHU2	Daytime (07:00 – 23:00)
PUZ_ZM60VHA	Condenser 1	Daytime (07:00 – 23:00)
PUHZ-ZRP250YKA3	Condenser 2	Daytime (07:00 – 23:00)
PUHZ-ZRP250YKA3	Condenser 3	Daytime (07:00 – 23:00)
PUHZ-ZRP250YKA3	Condenser 4	Daytime (07:00 – 23:00)
New XBOXER - With Ecosmart Adapt with Trend Control	MVHR01	Daytime (07:00 – 23:00)
New XBOXER - Constant Pressure, Right Hand with Ecosmart Adapt with Trend Control	MVHR01	Daytime (07:00 – 23:00)
DE - DAVE Extract Fan with Ecosmart Control	EF01	Daytime (07:00 – 23:00)

Table 3.4: Operational Hours of Plant

3.5 Assessment

3.5.1 Noise Mapping

The manufacturers data has been used to calibrate a detailed model using CadnaA noise prediction software; such to more accurately understand and assess the propagation of noise across the site during the day time and night time.



Figure 3.5: Noise Mapping of Proposed Plant Noise Breakout at Daytime



Figure 3.6: Noise Mapping of Proposed Plant Noise Breakout at night-time

3.5.2 Assessment Result

The table below compares the calculated levels with criteria presented within Table 3.1.

Time Period	Position	Plant Noise Rating limit L _{Ar,Tr} (dB)	Specific Noise Level (dB L _{Aeq,T})	Acoustic Correction (dB L _{Aeq,T})	Rating Level (dB L _{Ar,Tr})
Daytime (07:00-23:00)	Hewett Avenue	32	32	0	32
	Hewett Close		36		36
	Little Woodcote Close		34		34
	Development itself	48	44	0	44
Night-Time (07:00-23:00)	Hewett Avenue	18	3	0	3
	Hewett Close		3		3
	Little Woodcote Close		-		-

Table 3.7: BS4142 assessment outcome

As above shows, the specific noise levels at the Hewett Close and Little Woodcote Close are marginally exceeding the plant noise rating level limit during the daytime, mitigation measures are therefore required.

3.5.3 Attenuation Requirement

It can be seen from Table 3.7 that the plant noise rating limit is exceeded. Therefore, in order to meet the required rating level target, the following attenuation will be required for the extract fan unit. The attenuation values in Table 3.8 are calculated minimum values in each frequency band for the required attenuators.

Equipment		Octave Band Centre Frequencies, Hz							
		63	125	250	500	1k	2k	4k	8k
EF01	Exhaust	3.0	4.0	4.0	6.0	6.0	5.0	3.0	1.0

Table 3.8: Attenuator specification

As an alternative If an attenuator is not taken forward, then a quieter unit would be needed, and a review of this product would be required.

4.0 CONCLUSION

An environmental noise survey, noise break in assessment and noise break out assessment have been conducted. The following points can be concluded:

- An environmental noise survey was conducted between 04/11/2019 and 05/11/2019.
- Road traffic along Upper Woodcote Road was found to be the dominant noise source with some additional noise contribution from Hewett Avenue and air traffic overhead.
- Modal noise levels were found to be 42 dB L_{A90} during the day, and 28 dB L_{A90} during the night.
- Minimum background noise levels on site were measured to be 37 dB L_{A90} during the day and 25 dB L_{A90} during the night.
- Plant noise limits have been set at 10 dB below the existing background noise levels, meaning plant noise contributions should not exceed 32 and 18 dB $L_{Aeq,T}$ at the nearest noise sensitive receiver during the day and night respectively.
- Additionally, plant noise should not exceed 48 dB $L_{Aeq,T}$ at the nearest openable window to a teaching space to ensure that BB93 indoor ambient noise level targets are not compromised.
- Specific noise levels at the Hewett Close and Little Woodcote Close are marginally exceeding the plant noise rating level limit during the daytime, mitigation measures presented in Section 3.5.3 should be implemented such to achieve the targets

APPENDIX A – METHODOLOGY

BS 7445:2003

Environmental noise measurements were conducted in accordance with BS 7445 “Description and measurement of environmental noise”.

BS 4142:2014

BS 4142 states that one should ‘*obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level and consider the following:*

- a) Typically, the greater this difference, the greater the magnitude of the impact.*
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context.*
- d) 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. 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 aforementioned rating level is based upon the specific noise level of the noise source in question. A correction should be applied to the specific noise level to obtain an increased rating level if ‘*a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.*’ To summarise, BS4142 section 9.2 advises the following in regard to corrections for acoustic characteristics:

- **Tonality** – *for sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.*
- **Impulsivity** – *A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level., Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.*
- **Other sound characteristics** – *Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied*
- **Intermittency** – *When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.*

BB93 – Normal Ventilation

BB93 states that;

“The “normal condition” for a natural or hybrid ventilation mode is defined as when the system is operating to limit the daily average carbon dioxide concentration to no more than 1,500ppm with the maximum concentration not exceeding 2,000ppm for more than 20 consecutive minutes on any day. This would normally equate to a minimum ventilation rate of approximately 5l/s per person. The mid-season design condition can be used in simple ventilation calculations and is defined as an outside temperature of 11 °C and an internal air temperature of 20 °C with no external wind effect...

... Where there is a hybrid system, any mechanical system components should meet the IANL limits from table 1. The total noise level including external noise ingress may exceed the IANL limit from table 1 by up to 5 dB.”

APPENDIX B – MEASUREMENT EQUIPMENT

Name	Serial Number	Last Calibrated	Certificate Number	Calibration Due
Norsonic Precision Sound Analyser Type 131	1313109	Mar-18	32423	Mar-20
Norsonic Type 1207 Pre-amplifier	12303	Jul-19	15588	Jul-21
Norsonic Type 1227 Microphone	251277	Jul-19	32422	Jul-21
Norsonic Sound Calibrator Type 1251	31313	Jul-19	U30899	Jul-21

The measurement equipment listed above was used during the survey, where all equipment complies with BS EN 60942:2003 i.e. a class 1 device

APPENDIX C – METEOROLOGICAL CONDITIONS

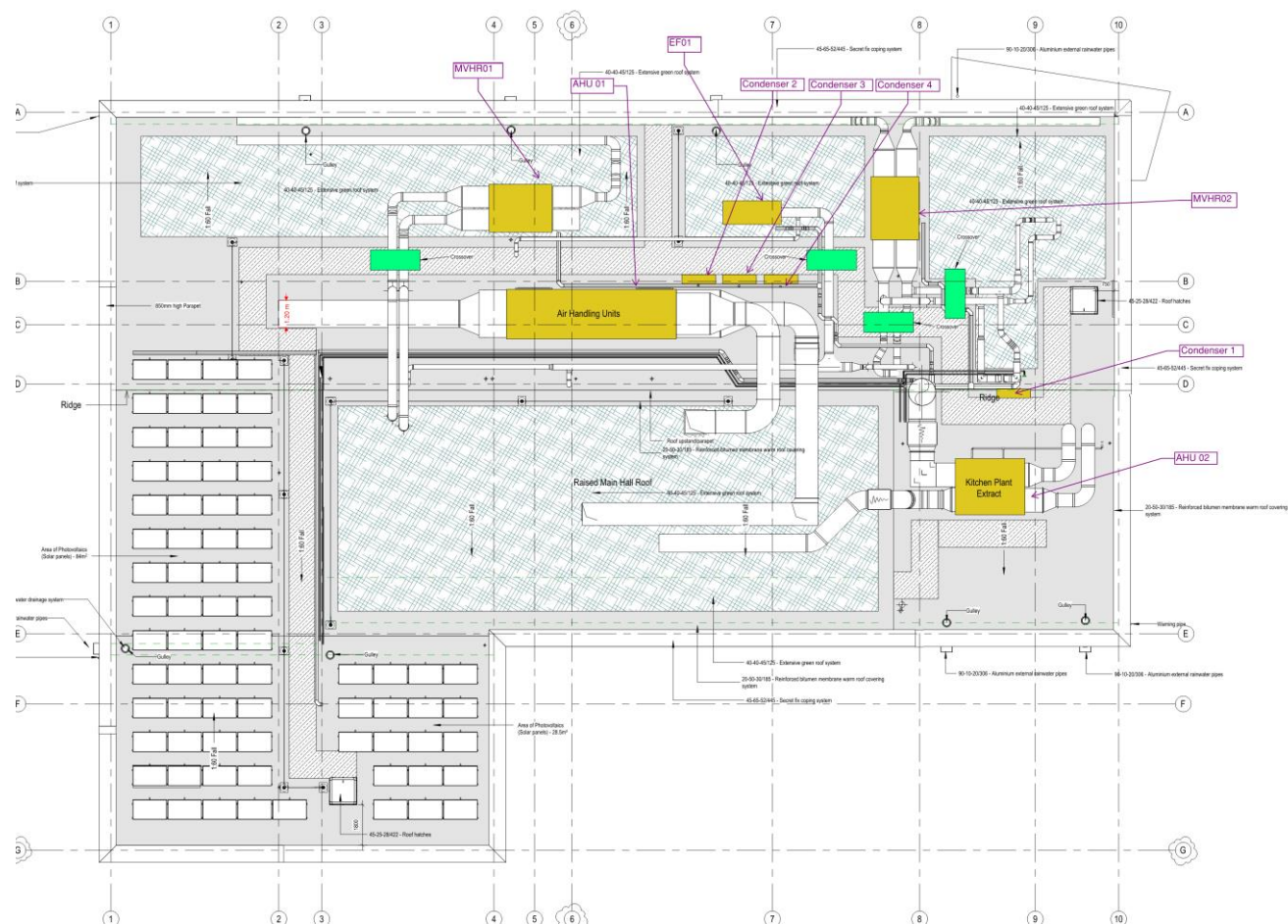
Date	Time (hh:mm)	Temperature (°C) (High/Low)	Humidity (%)	Pressure (mBar)	Wind Speed (mph)	Wind Direction	Conditions
04/11/19	12:00	11/8	88	983	6.9	SSE	Overcast
	18:00	8/5	98	986	5.6	NNE	Quite cool
05/11/19	00:00	8/7	98	990	9.3	N	Cool
	06:00	11/8	95	996	7.5	NNW	Light rain, low clouds
	12:00	12/10	89	1000	11.2	NNW	Sprinkles, overcast

APPENDIX D – SITE PHOTOGRAPHS

Location	Image
Fixed Position	
Spot 1	

Location	Image
Spot 2	

APPENDIX E – PLANT LOCATIONS



APPENDIX F – PLANT DATA

EF01

Technical Data

DE - DAVE Extract Fan with Ecosmart Control

Inline Centrifugal Extract Fan

Fan Code: **DE6-ES**

Installation Manual Links: 611280

Required Duty: 0.314 m³/s @ 200 Pa

Actual Duty: 0.47 m³/s @ 447 Pa

Actual at Required Flow: 0.314 m³/s @ 535 Pa

Velocity at Actual Duty: 3.737 m/s

Motor Efficiency: 0 %

Motor Input Power: 0.512 kW

Specific Fan Power: 1.1 W/(l/s)

Nominal Fan Speed: 1,710 RPM

Electrical Supply: 230 V 1 Phase 50 Hz

Motor Rating: 0.45 kW

Motor Current: flc: 2.9 A

Motor Current: sc: 2.9 A

Max. Operating Temp.: 40°C

Acoustic performance to ISO 13347 and AMCA 300.

Sound Power Levels re 1 pWatts (Hz):

	63	125	250	500	1k	2k	4k	8k	dBA
Induct Inlet	91	88	76	68	67	63	61	54	
Induct Outlet	91	88	76	68	67	62	58	51	
Breakout	75	68	67	53	54	43	38	32	43

dBA is hemi-spherical at 3 metres. For spherical deduct 3 dBA.

Values shown are for inlet Lw, outlet Lw sound power & breakout levels for: Installation Type D: ducted inlet, ducted outlet. Ratings include the effects of duct end correction.

Please note that the noise data stated on this data sheet for the unit and/or silencer is tested in accordance with UK, European and International industry laboratory standards. However onsite conditions may vary and we would recommend that this information is verified by an acoustic specialist in order to ensure its suitability for the intended application.

MVHR01

Technical Data

New XBOXER - Constant Pressure, Right Hand With Ecosmart Adapt with Trend Control

Sound Data

Sound Power Levels re 1 pWatts (Hz):

	63	125	250	500	1k	2k	4k	8k	dBA
Breakout	67	59	56	54	45	37	38	30	34
Induct Intake	73	72	71	74	67	61	55	51	
Induct Supply	74	70	64	71	68	58	42	42	
Induct Discharge	77	76	71	79	78	70	63	59	
Induct Extract	71	65	63	65	60	55	51	50	

The above spectrums running speed controlled to required duty (71.4%). When running at full speed:

	63	125	250	500	1k	2k	4k	8k	dBA
Breakout	75	67	64	62	53	45	46	38	41
Induct Intake	81	80	79	82	75	69	63	59	
Induct Supply	82	78	72	79	76	66	50	50	
Induct Discharge	85	84	79	87	86	78	71	67	
Induct Extract	79	73	71	73	68	63	59	58	

dBA is spherical at 3 metres. For hemi-spherical add 3 dBA.

Please note that the noise data stated on this data sheet for the unit and/or silencer is tested in accordance with UK, European and International industry laboratory standards. However onsite conditions may vary and we would recommend that this information is verified by an acoustic specialist in order to ensure its suitability for the intended application.

MVHR02

Technical Data

New XBOXER - With Ecosmart Adapt with Trend Control
Heat Recovery Fan

Sound Data

Sound Power Levels re 1 pWatts (Hz):

	63	125	250	500	1k	2k	4k	8k	dBA
Breakout	66	58	55	53	44	36	37	29	32
Induct Intake	72	71	70	73	66	60	54	50	
Induct Supply	73	69	63	70	67	57	41	41	
Induct Discharge	76	75	70	78	77	69	62	58	
Induct Extract	70	64	62	64	59	54	50	49	

The above spectrums running speed controlled to required duty (66.5%). When running at full speed:

Breakout	75	67	64	62	53	45	46	38	41
Induct Intake	81	80	79	82	75	69	63	59	
Induct Supply	82	78	72	79	76	66	50	50	
Induct Discharge	85	84	79	87	86	78	71	67	
Induct Extract	79	73	71	73	68	63	59	58	

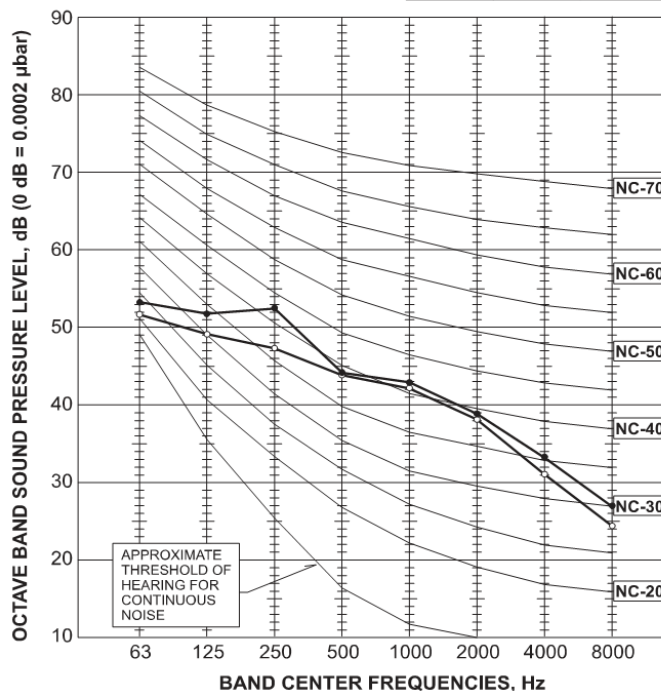
dBA is spherical at 3 metres. For hemi-spherical add 3 dBA.

Please note that the noise data stated on this data sheet for the unit and/or silencer is tested in accordance with UK, European and International industry laboratory standards. However onsite conditions may vary and we would recommend that this information is verified by an acoustic specialist in order to ensure its suitability for the intended application.

Condensers 1

PUZ-ZM60VHA PUZ-ZM71VHA

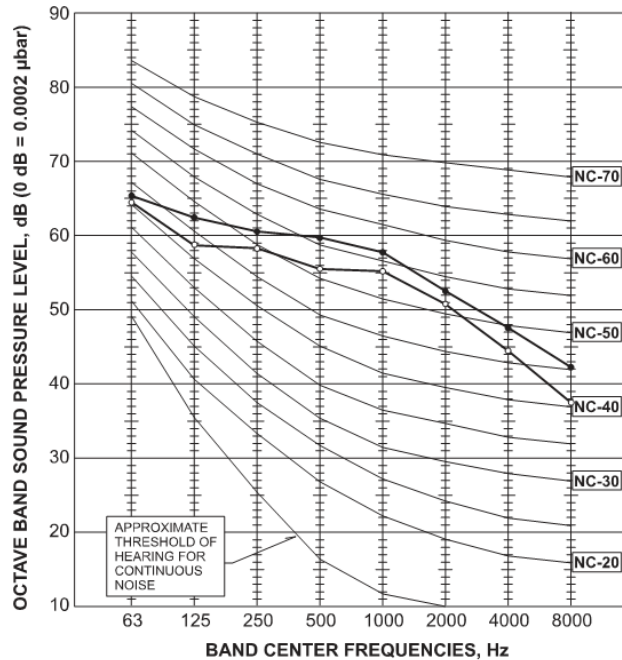
MODE	SPL(dB)	LINE
COOLING	47	○—○
HEATING	49	●—●



Condensers 2 - 4

PUHZ-ZRP250YKA3

MODE	SPL(dB)	LINE
COOLING	59	○—○
HEATING	62	●—●



AHU 01

SUPPLY IN DUCT AHU INLET AND OUTLET NOISE

Frequency	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
Inlet SWL (dB)	54	48	52	28	19	13	21	27	44
Outlet SWL (dB)	60	56	52	38	28	26	34	38	46

EXTRACT IN DUCT AHU INLET AND OUTLET NOISE

Frequency	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
Inlet SWL (dB)	58	58	50	27	18	17	26	28	45
Outlet SWL (dB)	60	62	52	39	26	28	37	41	49

AHU CASING BREAKOUT FREE FIELD

Frequency	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
SPL at 3m (dB)	36	45	28	20	17	18	10	11	31

AHU02

SUPPLY IN DUCT AHU INLET AND OUTLET NOISE

Frequency	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
Inlet SWL (dB)	61	68	68	60	60	56	53	48	65
Outlet SWL (dB)	67	71	72	72	71	69	65	58	75

EXTRACT IN DUCT AHU INLET AND OUTLET NOISE

Frequency	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
Inlet SWL (dB)	87	89	89	90	90	86	80	73	94
Outlet SWL (dB)	99	93	91	92	92	88	83	76	96

AHU CASING BREAKOUT FREE FIELD

Frequency	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall dB(A)
SPL at 3m (dB)	55	60	42	32	32	29	21	19	44

APPENDIX G – ATTENUATOR SCHEDULE

Attenuators highlighted red have been used within the calculations

Revision	Description	Date	Initials
T01	Stage 4	26.04.19	CF
T02	Details added	02.05.19	cf

ATTENUATOR REF	FAN SERVED	PERFORMANCE, Db							
		63	125	250	500	1k	2K	4K	8K
ATT01	Kitchen AHU intake	8	16	27	42	55	49	45	29
ATT02	Kitchen AHU supply	6	12	20	31	31	29	26	19
ATT03	Kitchen AHU return	6	13	17	24	23	20	20	16
ATT04	Kitchen AHU exhaust	9	17	23	38	44	37	32	22
ATT05	MVHR01 intake	12	20	30	40	47	40	33	22
ATT06	MVHR01 supply	5	13	21	33	35	35	34	27
ATT07	MVHR01 return	5	13	21	33	35	35	34	27
ATT08	MVHR01 exhaust	12	20	30	40	47	47	33	22
ATT09	MVHR02 intake	12	20	30	40	47	47	33	22
ATT10	MVHR02 supply	6	12	20	32	33	33	32	24
ATT11	MVHR02 return	6	12	20	32	33	33	32	24
ATT12	MVHR02 Exhaust	12	20	30	40	47	40	33	22

Datasheet of Condensers