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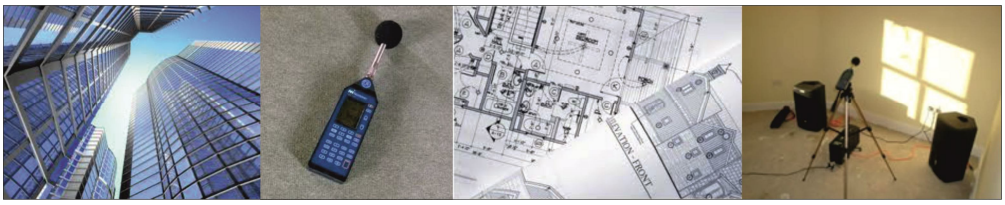

KINGS COLLEGE COURT
PRIMROSE HILL ROAD
LONDON
NW3 3EA

ENVIRONMENTAL NOISE ASSESSMENT
v.1

Client:
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1 December 2015
Ref: M3413

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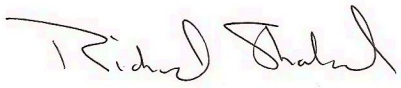
Signature	
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Date	1 December 2015

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CONTENTS

1. SUMMARY

1.1 An assessment of environmental noise has been carried out at Kings College Court, Primrose Hill Road, London, to consider the impact of noise arising from the proposed installation of new mechanical services plant.

1.2 Ambient noise levels have been measured at the site, and this exercise indicates the following typical background noise levels, $L_{A90,\ 15mins}$;

Typical Daytime LA90, 15mins (07.00 – 23.00 hrs)	Typical Night-time LA90, 15mins (23.00 – 07.00 hrs)
45 dB(A)	36 dB(A)

1.3 These values been used to set design limits for the new plant, in line with Condition 10 of the Planning Consent.

1.4 The table below confirms these limits, alongside the predicted noise levels for the plant proposed.

Location	Predicted Noise Level, $L_{Aeq,\ t}$ dB(A)	
	Day Time 0700 - 2300	Night Time 2300 - 0700
Target for General Noise	***40***	***31***
Hampstead Britannia Hotel	27	22
Dorney Tower Block	32	29
Kings College Court	30	26

1.5 Section 6 details the acoustic measures required to achieve this levels. These include the programming of the condensing units to run on standard night time 'set-back', and the provision of attenuating ductwork on the atmospheric side of the MVHR units.

1.6 It can be seen that the predicted noise levels all fall within the target values.

1.7 Section 7 of this report then provides detailed guidance on the installation of the proposed plant, in order to limit the transmission of vibration through the structure.

1.8 With these measures in place, it is confirmed that the requirements of hte Planning Consent conditions will be met.

2. INTRODUCTION

2.1 An assessment of environmental noise has been undertaken at Kings College Court, Primrose Hill Road, London on behalf of Jim Garland Architects.

2.2 Kings College Court is situated on the junction of Primrose Hill Road and Adelaide Road, in a largely residential area (see Figure 1 – Site Location).

2.3 It is proposed that existing 9-storey building be extended vertically, with the addition of three new floors.

2.4 The development will include the addition of new items of building services plant, both on the roof and within the building (the latter items being ducted to atmosphere). Given the proximity of neighbouring residential properties, there is a need to demonstrate that noise from the units will not have an adverse impact the adjacent occupiers, including those of the existing building.

2.5 This requirement has been confirmed in Conditions 9 and 10 of the Planning Consent, which state:

> *9. Prior to commencement of development, a full acoustic report including acoustic isolation, sound attenuation and anti-vibration measures for the plant at 11th floor shall be provided in accordance with a scheme to be approved in writing by the local planning authority. All such measures shall thereafter be retained and maintained in accordance with the manufacturers' recommendations.*
>
> *10. Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A).*

2.6 Ian Sharland Limited has been instructed to conduct a formal review of the proposals, the objectives of the exercise being summarised as follows:

(i) To determine the existing ambient noise climate in the vicinity of the site;
(ii) To propose a design criterion for limiting noise emission from the proposed unit;
(iii) To predict the noise likely to be generated by the unit, and to assess these levels against the design criterion;
(iv) As necessary, to describe means to attenuate noise emanating from the unit.

2.7 This report details the investigations carried out in respect of each of these objectives and summarises the conclusions which have been reached.

3. SURVEY OF AMBIENT NOISE LEVELS

3.1 The first step in the assessment of potential noise impact is to measure and describe the existing noise levels affecting the existing residential properties nearby.

3.2 A noise survey was undertaken over the period from Monday 9th November until Thursday 12th November 2015.

3.3 A Rion NL-52 sound level meter was set up on the roof of the existing building, with a microphone set onto a tripod 1.5m above roof level. Details of the equipment used for the survey is shown in the following table.

Type	Manufacturer	Description	Serial number	Last Calibration Date	Calibration Certificate No:
NL-52	Rion	Sound Level Meter	00620953	13 / 12 / 2013	TCRT13/1391
1251	Norsonic	Calibrator	32602	29 / 07 / 2015	1507433

3.4 The equipment was configured to measure 15 minute samples of the following acoustic parameters:

L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

L_{A90} A statistical parameter, representing the A-weighted noise level exceeded for 90% of each sample period. This gives a measure of the underlying noise, and is commonly used to describe the ambient background noise.

3.5 The sound level meter was calibrated before and after the survey and showed no significant variance. Weather conditions throughout the survey period are summarized in the following table:

Date	Ave Temp °C	Rainfall mm	Ave Wind Speed m/s	Prevailing Wind Direction
Monday 9th	12	0	7	SW
Tuesday 10th	15	0	6	SW
Wednesday 11th	14	0	5	SW
Thursday 12th	13	0.2	4	SW

3.6 Figure 2 shows the variation in noise levels measured during the survey period, and the table below summarizes the typical noise levels[1].

Typical Minimum Background $L_{A90, 15mins}$	
Daytime 0700 - 2300	**Night-time 2300 - 0700**
45 dB(A)	36 dB(A)

[1] Where noise levels are stated as 'typical', these are the noise levels that are deemed to provide a fair representation of the background noise measured.

5. DESIGN TARGET FOR NEW PLANT NOISE

5.1 Taking the survey data confirmed in Section 3.6, and the Local Authority design guidelines from Condition 10 of the Planning Consent , the following design target should be adopted on this project:

Noise emitted from any mechanical plant should be limited to the following levels at 1m from the nearest noise sensitive dwellings:

Maximum Allowable Noise Level at 1m from nearest noise sensitive receptors		
Time Period	**General Noise**	**Tonal or Intermittent Noise**
07.00 – 23.00	40 dB(A) $L_{Aeq,1hr}$	35 dB(A) $L_{Aeq,1hr}$
23.00 – 07.00	31 dB(A) $L_{Aeq,15mins}$	26 dB(A) $L_{Aeq,15mins}$

6. PREDICTION OF NEW PLANT NOISE

6.1 The proposed plant to be installed (see Figure 3) comprises:

2 No. Mitsubishi PURY-P200 YJM-A
1 No. Mitsubishi PURY-P300 YJM-A
1 No. Mitsubishi PURY-P400 YJM-A
3 No. Vent Axia Sentnal Kinteic Plus MVHR units
1 No. Vent Axia Totus D-ERV MVHR unit

6.2 The Mitsubishi units will be located on the roof at 11th floor level, and the MVHR units will be ducted (supply and extract) to roof cowls on the same level.

6.3 It is noted that the 4 condensing units will be programmed to function on the 'night-mode' set back during the period 2300 - 0700, which will reduce noise emissions from each unit by some 10 dB.

6.4 It is further noted that the atmospheric side ducting to the Sentinel Kinetic Plus units (fresh air inlet and exhaust air duct) should include a 500mm length of attenuated flexible ducting (200 diameter Lindab Tecsonic 400S), or a rigid silencer of similar performance.

6.5 Appendix provides calculations from the new roof plant to three critical receptors (see Figure 1):

(i) Hotel bedrooms on the 6th (top) floor of the Hampstead Britannia Hotel, facing Kings College Court across Primrose Hill Road. Whilst close to the building, the view of the equipment from these rooms will be obstructed by the roof edge.
(ii) Apartments in the Dorney House tower block, to the west, which will have a clear line of sight to the new roof plant
(iii) Apartments on the 8th (top) floor of the existing Kings College Court Building.

6.6 The table below summarises the predicted noise levels at each receptor:

Location	**Predicted Noise Level, $L_{Aeq,\ t}$ dB(A)**	
	Day Time 0700 - 2300	**Night Time 2300 - 0700**
Target for General Noise	***40***	***31***
Hampstead Britannia Hotel	27	22
Dorney Tower Block	32	29
Kings College Court	30	26

6.7 The noise from the Mitsubishi units and the MVHR units is not expected to be tonal or intermittent in character (as indicated by the frequency spectra included in the calculations). Therefore it is concluded that the plant may be installed and operated within the requirements of the Planning Conditions.

7. ANTIVIBRATION TREATMENT

7.1 Condition 9 of the Planning Consent indicates the all plant must be suitably isolated, to ensure no risk of vibration transfer to other occupants of Kings College Court. The equipment proposed here is relatively modest in size and nature, and the means of vibration isolation will be relatively simple:

Condensers — Sit all condensers on neoprene isolation pads, which will provide a static deflection of some 3mm under the load of the units (e.g. Eurovib RR2 ribbed isolation pads).

Ensure that all refrigeration pipe work is not rigidly clamped, by specifying resiliently lined clamps. If the pipes are thermally insulated, it is acceptable to use rigid clamps to the outside of the insulation, providing the insulation is not fully compressed.

MVHR Units — It is understood that the three MVHR units will be supported from the roof structure. It is recommended that each unit is installed on a supporting framework with rubber turret mounts at each corner. These should be specified with a 5mm static deflection (e.g. Eurovib VT/2 mounts).

Flexible connectors should then be fitted on either side of the units, to isolate the fan from the ductwork running through the building. For the three Sentinel Plus units, this could give rise to a risk of noise breaking out through lightweight flexible connections.[2]

Where the Tecsonic 400S attenuated flexible ducting has been recommended (see Para 6.4), this will act as the flexible connection, and its construction will be sufficient to prevent break-out. On the room side, the flexible breaks would naturally be located after the proposed silencers (AE1 & AS1). However, these are shown some distance from the MVHR unit and it would therefore be necessary to support the connecting duct and silencer on isolated brackets. Alternatively, it may be possible to replace a short section of the connecting duct with an insulated flexible duct, such as either the Tecsonic 400S, or a Tecsonic 400 (which does not have the absorptive characteristics of the 400S, but which is double skinned to restrict break-out noise).

[2] This is not perceived to be an issue with the Totus D-ERV unit, which is located within a separate plant room.

Figure 1: Site Location

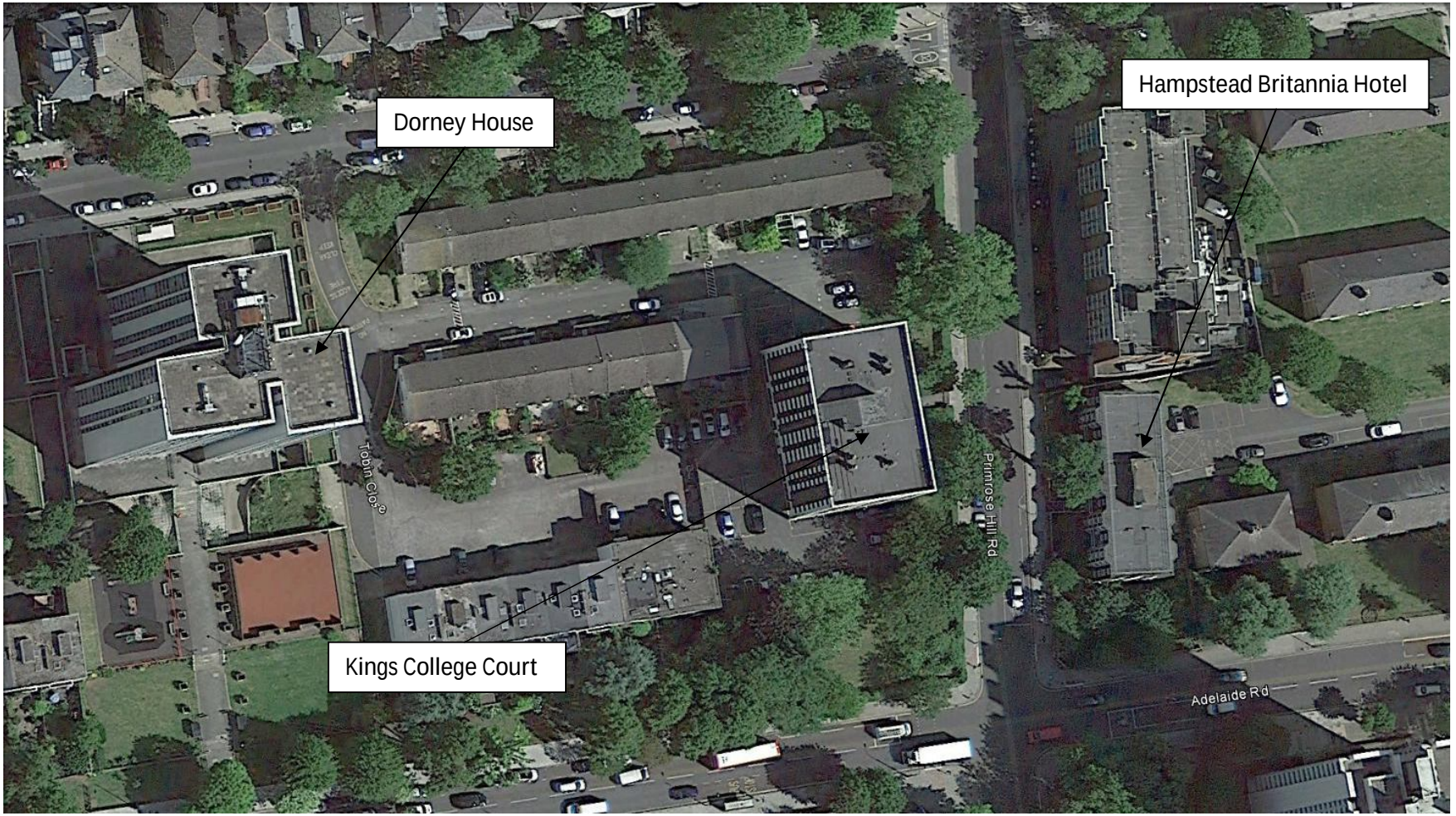


Figure 2: Measured Noise Levels

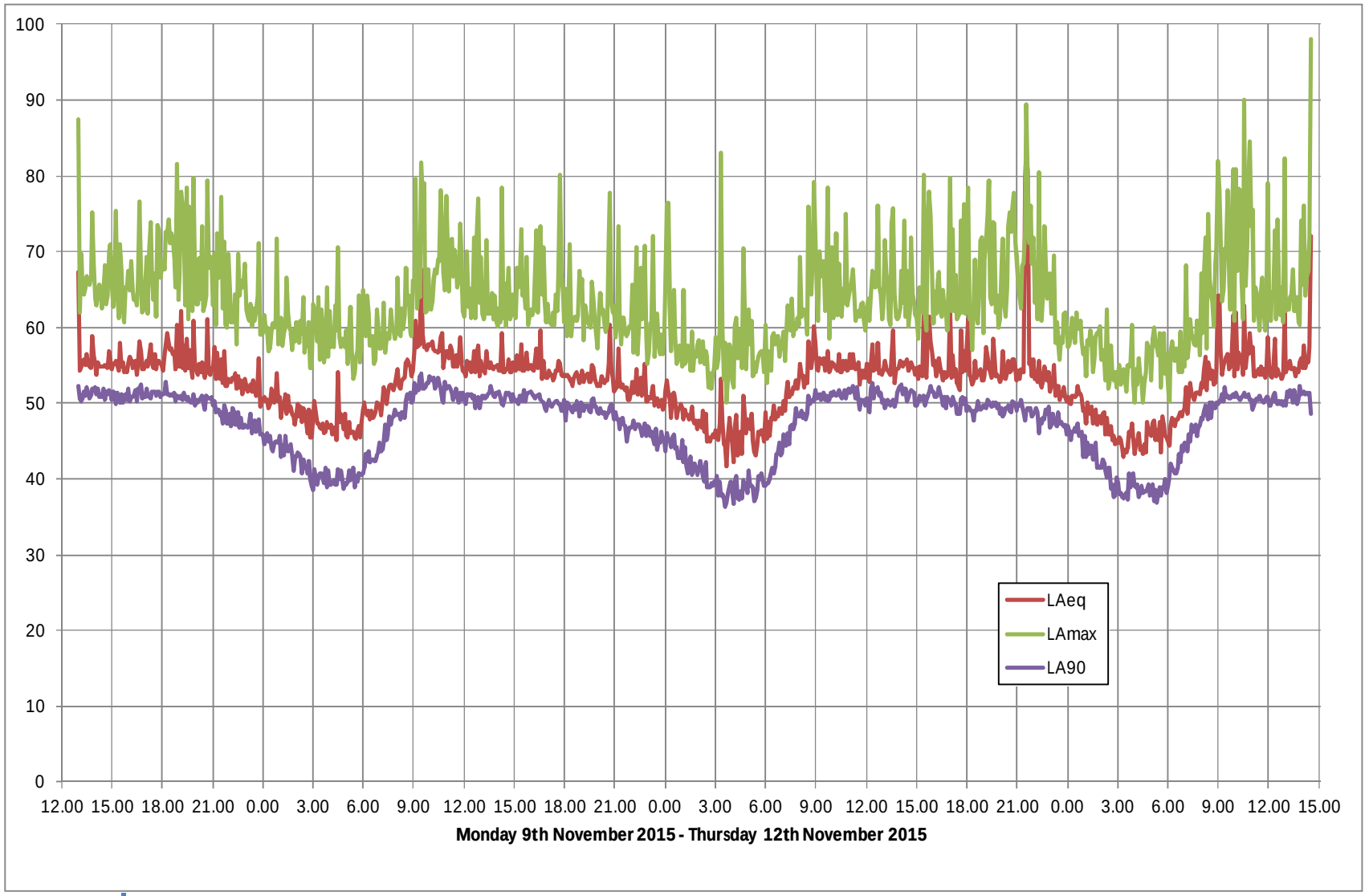
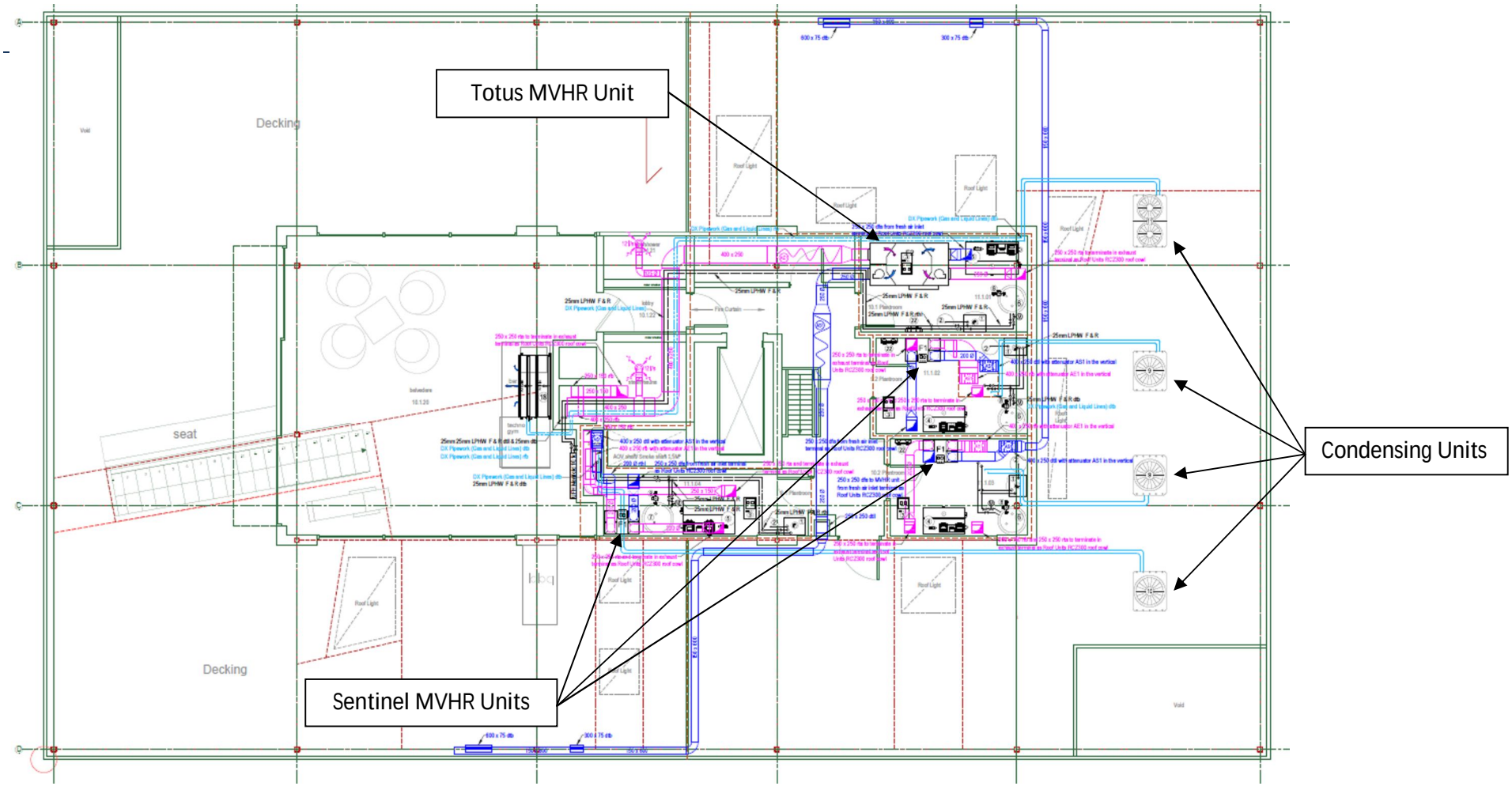


Figure 3: 11th Floor Plant Layout



Appendix 1 - Calculation of Noise Emissions to Hampstead Britannia Hotel

Day Time

	Frequency	Hz	63	125	250	500	1000	2000	4000	8000	dB(A)
Condensers											
PURY-P200-YJMA	SPL @ 1m	dB	63	61	59	53	50	46	39	36	56
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	30	26	22	13	7	0	-10	-16	17
PURY-P300-YJMA	SPL @ 1m	dB	65	64	61	56	56	49	45	43	60
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	35	32	27	19	16	6	-1	-6	23
PURY-P400-YJMA	SPL @ 1m	dB	73	66	63	58	55	51	48	41	61
	2No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	43	34	29	21	15	8	2	-8	25
MVHR Units											
Vent Axia Sentinel Kinetic Plus MVHR											
	Extract SWL	dB	54	55	66	58	47	41	34	40	60
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	13	11	20	7	-7	-14	-22	-19	12
	Supply SWL	dB	55	62	71	70	63	58	42	38	70
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	14	18	25	19	9	3	-14	-21	19
Vent Axia Totus DERV MVHR											
	Extract SWL	dB	58	65	69	54	53	54	48	46	63
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	17	22	24	6	2	0	-9	-14	16
	Supply SWL	dB	56	59	55	50	46	53	37	36	56
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	15	16	10	2	-5	-1	-20	-24	6
Cumulative Level		**dB**	**44**	**35**	**32**	**24**	**17**	**10**	**3**	**-6**	**27**

Night Time

	Frequency	Hz	63	125	250	500	1000	2000	4000	8000	dB(A)
Condensers											
PURY-P200-YJMA	SPL @ 1m Night Mode	dB	57	49	46	39	39	33	33	26	44
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	24	14	9	-1	-4	-13	-16	-26	5
PURY-P300-YJMA	SPL @ 1m	dB	61	60	49	45	42	39	40	38	50
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	31	28	15	8	2	-4	-6	-11	15
PURY-P400-YJMA	SPL @ 1m	dB	54	55	50	46	46	47	45	41	53
	2No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	24	23	16	9	6	4	-1	-8	14
MVHR Units											
Vent Axia Sentinel Kinetic Plus MVHR											
	Extract SWL	dB	54	55	66	58	47	41	34	40	60
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	13	11	20	7	-7	-14	-22	-19	12
	Supply SWL	dB	55	62	71	70	63	58	42	38	70
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	14	18	25	19	9	3	-14	-21	19
Vent Axia Totus DERV MVHR											
	Extract SWL	dB	58	65	69	54	53	54	48	46	63
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	17	22	24	6	2	0	-9	-14	16
	Supply SWL	dB	56	59	56	50	46	53	37	36	56
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-10	-12	-14	-17	-20	-23	-26	-29	
	Distance Correction to 20m	dB	-26	-26	-26	-26	-26	-26	-26	-26	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	18	19	14	5	-2	2	-17	-21	10
CUMULATIVE FACADE LEVEL		**dB**	**29**	**27**	**28**	**20**	**12**	**9**	**0**	**-6**	**22**

Appendix 2 - Calculation of Noise Emissions to Dorney House

Day Time

	Frequency	Hz	63	125	250	500	1000	2000	4000	8000	dB(A)
Condensers											
PURY-P200-YJMA	SPL @ 1m	dB	63	61	59	53	50	46	39	36	56
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	29	27	25	19	16	12	5	2	22
PURY-P300-YJMA	SPL @ 1m	dB	65	64	61	56	56	49	45	43	60
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	34	33	30	25	25	18	14	12	29
PURY-P400-YJMA	SPL @ 1m	dB	73	66	63	58	55	51	48	41	61
	2No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	42	35	32	27	24	20	17	10	30
MVHR Units											
Vent Axia Sentinel Kinetic Plus MVHR											
	Extract SWL	dB	54	55	66	58	47	41	34	40	60
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	12	12	23	13	2	-2	-7	-1	16
	Supply SWL	dB	55	62	71	70	63	58	42	38	70
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	13	19	28	25	18	15	1	-3	29
Vent Axia Totus DERV MVHR											
	Extract SWL	dB	58	65	69	54	53	54	48	46	63
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	16	23	27	12	11	12	6	4	21
	Supply SWL	dB	56	59	56	50	46	53	37	36	56
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	14	17	14	8	4	11	-5	-6	14
Cumulative Level		**dB**	**42**	**36**	**35**	**30**	**26**	**23**	**18**	**12**	**32**

Night Time

	Frequency	Hz	63	125	250	500	1000	2000	4000	8000	dB(A)
Condensers											
PURY-P200-YJMA	SPL @ 1m	dB	57	49	46	39	39	33	33	26	44
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	23	15	12	5	5	-1	-1	-8	10
PURY-P300-YJMA	SPL @ 1m	dB	61	60	49	45	42	39	40	38	50
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	30	29	18	14	11	8	9	7	19
PURY-P400-YJMA	SPL @ 1m	dB	54	55	50	46	46	47	45	41	53
	2No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	23	24	19	15	15	16	14	10	22
MVHR Units											
Vent Axia Sentinel Kinetic Plus MVHR											
	Extract SWL	dB	54	55	66	58	47	41	34	40	60
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	12	12	23	13	2	-2	-7	-1	16
	Supply SWL	dB	55	62	71	70	63	58	42	38	70
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	13	19	28	25	18	15	1	-3	25
Vent Axia Totus DERV MVHR											
	Extract SWL	dB	58	65	69	54	53	54	48	46	63
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	16	23	27	12	11	12	6	4	21
	Supply SWL	dB	56	59	56	50	46	53	37	36	56
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	0	0	0	0	0	0	0	0	
	Distance Correction to 70m	dB	-37	-37	-37	-37	-37	-37	-37	-37	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	17	20	17	11	7	14	-2	-3	17
CUMULATIVE FACADE LEVEL		**dB**	**27**	**28**	**32**	**26**	**21**	**21**	**15**	**12**	**29**

Appendix 3 - Calculation of Noise Emissions to Existing Kings College Court

Day Time

	Frequency	Hz	63	125	250	500	1000	2000	4000	8000	dB(A)
Condensers											
PURY-P200-YJMA	SPL @ 1m	dB	63	61	59	53	50	46	39	36	56
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	34	30	25	16	10	3	-7	-13	20
PURY-P300-YJMA	SPL @ 1m	dB	65	64	61	56	56	49	45	43	60
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	39	36	30	22	19	9	2	-3	26
PURY-P400-YJMA	SPL @ 1m	dB	73	66	63	58	55	51	48	41	61
	2No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	47	38	32	24	18	11	5	-5	28
MVHR Units											
Vent Axia Sentinel Kinetic Plus MVHR											
	Extract SWL	dB	54	55	66	58	47	41	34	40	60
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	17	15	23	10	-4	-11	-19	-16	15
	Supply SWL	dB	55	62	71	70	63	58	42	38	70
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	18	22	28	22	12	6	-11	-18	23
Vent Axia Totus DERV MVHR											
	Extract SWL	dB	58	65	69	54	53	54	48	46	63
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	21	26	27	9	5	3	-6	-11	19
	Supply SWL	dB	56	59	56	50	46	53	37	36	56
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	19	20	14	5	-2	2	-17	-21	10
Cumulative Level		**dB**	**47**	**39**	**35**	**27**	**20**	**13**	**6**	**-3**	**30**

Night Time

	Frequency	Hz	63	125	250	500	1000	2000	4000	8000	dB(A)
Condensers											
PURY-P200-YJMA	SPL @ 1m	dB	57	49	46	39	39	33	33	26	44
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	28	18	12	2	-1	-10	-13	-23	8
PURY-P300-YJMA	SPL @ 1m	dB	61	60	49	45	42	39	40	38	50
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	35	32	18	11	5	-1	-3	-8	18
PURY-P400-YJMA	SPL @ 1m	dB	54	55	50	46	46	47	45	41	53
	2No. Units	dB	3	3	3	3	3	3	3	3	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	28	27	19	12	9	7	2	-5	17
MVHR Units											
Vent Axia Sentinel Kinetic Plus MVHR											
	Extract SWL	dB	54	55	66	58	47	41	34	40	60
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	17	15	23	10	-4	-11	-19	-16	15
	Supply SWL	dB	55	62	71	70	63	58	42	38	70
	3 No. Units	dB	5	5	5	5	5	5	5	5	
	500mm Tecsonic Ducting	dB	-5	-6	-6	-8	-8	-6	-4	-4	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	18	22	28	22	12	6	-11	-18	23
Vent Axia Totus DERV MVHR											
	Extract SWL	dB	58	65	69	54	53	54	48	46	63
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	21	26	27	9	5	3	-6	-11	19
	Supply SWL	dB	56	59	56	50	46	53	37	36	56
	2 No. Units	dB	3	3	3	3	3	3	3	3	
	Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
	Roof Edge Screening	dB	-12	-14	-17	-20	-23	-26	-29	-32	
	Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
	Facade Reflection	dB	3	3	3	3	3	3	3	3	
	Net SPL	dB	22	23	17	8	1	5	-14	-18	13
CUMULATIVE FACADE LEVEL		**dB**	**32**	**31**	**31**	**23**	**15**	**12**	**3**	**-3**	**26**

Appendix 4 - Terminology Relating To Noise

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10-6 Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
Leq,T	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
Lmax,T	A noise level index defined as the maximum noise level during the period T. Lmax is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L90,T	A noise level index. The noise level exceeded for 90% of the time over the period T. L90 can be considered to be the "average minimum" noise level and is often used to describe the background noise.
L10,T	A noise level index. The noise level exceeded for 10% of the time over the period T. L10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field to	Far from the presence of sound reflecting objects (except the ground), usually taken mean at least 3.5m.
Façade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast/Slow Time Weighting	Averaging times used in sound level meters.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.