PROJECT TECHNICAL MEMORANDUM

JOB TITLE	:	Grays Inn Road/Panther House
PROJECT NO	:	22233
DATE	:	06 January 2017
FROM	:	Adam Kershaw
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RE: 156-164 GRAYS INN ROAD/PANTHER HOUSE

1.0 INTRODUCTION

Items of building services plant are proposed as part of the development. There are three separate plant areas proposed, one on the residential roof adjacent to Grays Inn Road, one at roof level in the centre of the development adjacent to Brain Yard and one at roof level on Panther House at the rear of the site.

The nearest residential noise sensitive receptors are located in adjacent residential buildings to the north and east of site.

Hann Tucker Associates have previously undertaken an environmental noise survey and provided a preliminary combined building service report. In addition, this report reviews the atmospheric airborne plant noise emissions with comparison to Local Authority criteria. Preliminary roomside attenuators have also been proposed to control ductborne noise into the building. The design of all aspects of plant noise intrusion will require reviewing as drawings are developed at later design stages.

2.0 PLANT NOISE EMISSION CRITERIA

We understand the requirements of Camden Council are as follows:

''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 are in operation. Where it is anticipated that any plant/equipment 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) special attention should be given to reducing the noise levels from that piece of plant/equipment at any sensitive façade to at least 10dB(A) below the LA90, expressed in dB(A).''

On the basis of the above and the environmental noise survey results, we propose the following plant noise emissions limit to be achieved at 1m from the façades of the nearest neighbouring noise sensitive buildings:

Position	Plant Noise Emission Criteria (dBA re $2x10^{-5}$ Pa)		
	Daytime (07:00 – 23:00 hours)	Night-Time (23:00 – 07:00 hours)	24 Hours
1 - (Front building)	49	36	36
2 - (Rear building)	37	34	34

It should be noted that the above plant noise emission limits are subject to planning condition approval by Camden Borough Council.

3.0 PLANT NOISE ASSESSMENT

3.1 Grays Inn Road Residential Building Roof

We understand the proposed roof level plant comprises of the following:

Plant Description	Location	Qty	Plant Make	Model Number
Condenser Unit	Residential roof level	2	Mitsubishi	PUHY-EP750

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Description	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
EP750 (Standard Mode)	80	72.5	67.5	62	56	51	46.5	40	64.5
EP750 (Low Noise Mode)	64.5	62	56	51	46.5	42	42	38	54

We understand that the proposed units could be operational during daytime and night-time hours. There may be provision to operate at night-time in the low noise mode.

The following table summarises our predictions of atmospheric noise emissions in the absence of an acoustic enclosure.

Description	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
EP750 (Standard Mode)	80	72.5	67.5	62	56	51	46.5	40	64.5
Correction for 2 units	3	3	3	3	3	3	3	3	
Distance correction of at least 15 metres	-24	-24	-24	-24	-24	-24	-24	-24	
Calculated Noise Level at Receptor	59	51.5	46.5	41	35	30	25.5	19	43.5

The above calculations indicate that plant noise emissions in the absence of acoustic enclosure and relative to Position 1, are likely to comply during daytime operation, however, not likely to comply during the night-time unless 'low noise mode' is activated. The resultant noise level in low noise mode would be 33dBA thus would comply 24 hours a day.

If it is not possible to operate in low noise mode during the night-time, then acoustic mitigation measures would be required. An acoustic enclosure is already propose; the design of which would need to attenuate the plant noise levels by at least 8dBA. This should be comfortably achievable during detailed design phase. A list of suitable enclosure manufacturers are as follows.

IAC Acoustics IAC House Moorside Road Winchester SO23 7US	Allaway Acoustics Ltd 1 Queens Road Hertford SG14 1EN
Acoustic Engineering Services (UK) Ltd The Redwood Suite Guardian House Borough Road Godalming Surrey GU7 2AE	Environ Technologies Ltd Regus House 1010 Cambourne Business Park Cambourne CB3 6DP

3.2 Brain Yard Building

We understand the proposed roof level plant comprises of the following:

Plant Description	Location	Qty	Plant Make	Model Number
Condenser Unit	Brain Yard roof level	1	Mitsubishi	PUHY-EP550
Condenser Unit	Brain Yard roof level	2	Mitsubishi	PUHY-EP650
Condenser Unit	Brain Yard roof level	1	Mitsubishi	PUHY-EP700
Condenser Unit	Brain Yard roof level	2	Mitsubishi	PUHY-EP750
Condenser Unit	Brain Yard roof level	2	Mitsubishi	PUHY-EP850
Condenser Unit	Brain Yard roof level	2	Mitsubishi	PUHY-EP900

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Description	Sound Pressure Level (dB re 2x10^{-5} Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
PUHY-EP550 (Standard)	79.5	72	66	61	55	50	45.5	39	63.5
PUHY-EP550 (Low)	64	61.5	55.5	50.5	46	42	41.5	37	53.5
PUHY-EP650 (Standard)	77	70.5	66.5	60.5	54.5	49	44.5	39	63
PUHY-EP650 (Low)	63	58.5	55	50.5	40	39.5	41	36	52
PUHY-EP700 (Standard)	80	71	66	61	55	50.5	45.5	39	63.5
PUHY-EP700 (Low)	62.5	60.5	54	49	46	41	40	36	52.5
EP750 (Standard Mode)	80	72.5	67.5	62	56	51	46.5	40	64.5
EP750 (Low)	64.5	62	56	51	46.5	42	42	38	54
PUHY-EP850 (Standard)	82	74	67.5	63	57	52.5	47.5	41	65.5
PUHY-EP850(Low)	65	64	57	52	49	44	43	39	55.5
PUHY-EP900 (Standard)	83.5	74.5	67.5	63.5	57.5	53.5	48	41.5	66
PUHY-EP900 (Low)	66	65	57	51.5	50.5	44.5	42.5	39	56

The following table summarises our predictions of atmospheric noise emissions in the absence of an acoustic enclosure.

Description	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
PUHY-EP550 (Standard)	79.5	72	66	61	55	50	45.5	39	63.5
PUHY-EP650 (Standard)	77	70.5	66.5	60.5	54.5	49	44.5	39	63
PUHY-EP650 (Standard)	77	70.5	66.5	60.5	54.5	49	44.5	39	63
PUHY-EP700 (Standard)	80	71	66	61	55	50.5	45.5	39	63.5
PUHY-EP750 (Standard)	80	72.5	67.5	62	56	51	46.5	40	64.5
PUHY-EP750 (Standard)	80	72.5	67.5	62	56	51	46.5	40	64.5
PUHY-EP850 (Standard)	82	74	67.5	63	57	52.5	47.5	41	65.5
PUHY-EP850 (Standard)	82	74	67.5	63	57	52.5	47.5	41	65.5
PUHY-EP900 (Standard)	83.5	74.5	67.5	63.5	57.5	53.5	48	41.5	66
PUHY-EP900 (Standard)	83.5	74.5	67.5	63.5	57.5	53.5	48	41.5	66
Cumulative total of above at 1m	91	83	77	72	66	62	57	50	75
Distance correction of at least 10 metres	-20	-20	-20	-20	-20	-20	-20	-20	
Calculated Noise Level at Receptor	71	63	57	52	46	42	37	30	55

The above calculations are for standard mode and the resultant noise levels in low noise mode are typically 11dBA lower. The above calculations indicate that plant noise emissions relative to Position 2,

are not likely to comply with the proposed daytime or night-time criteria even if low noise mode was activated.

An acoustic enclosure is already proposed for this plant and the design of which would need to attenuate the plant noise levels by at least 18dBA. This should be achievable at detailed design phase and a list of suitable enclosure manufacturers is listed in the section above.

3.3 Panther House Rear Roof Level

We understand the proposed roof level plant comprises the following:

Plant Description	Location	Qty	Plant Make	Model Number
Air Handling Unit (AHU)	Panther House Rear Roof	1	Flakt Woods	ACON-01992594
Toilet Extract Fan (TEF)	Panther House Rear Roof	1	Nuaire	SQFTA64ES

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Item	Description	Sound Power Level at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
AHU	Atmospheric Fresh Air	82	89	81	76	76	76	71	66
	Roomside Supply Air	76	91	94	93	89	87	82	79
	Roomside Extract	72	79	71	66	66	66	61	56
	Atmospheric Exhaust	66	81	84	83	79	77	2	69
	Breakout	74	86	69	58	61	62	57	51
TEF	Nuaire - Inlet	90	105	89	80	76	74	74	71
	Nuaire - Outlet	87	106	84	78	80	79	75	73
	Nuaire - Breakout	84	99	80	72	67	65	59	50

We understand that the proposed units could be operational during daytime and night-time hours.

We have processed the data for the air moving plant using our in house ventilation systems software. Our calculations indicate that atmospheric and roomside attenuators would be needed for the AHU and TEF. The following table details the minimum insertion losses for the attenuators which should be directly bolted to the fans before any flexible connections.

Description	Minimum Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
AHU Atmospheric Exhaust	8	16	28	43	47	47	39	22
AHU Roomside Supply	11	22	40	50	50	50	50	39
AHU Atmospheric Fresh Air	8	16	28	43	47	47	39	22
AHU Roomside Extract	6	13	23	37	43	44	35	20
TEF Atmospheric	6	13	23	37	43	44	35	20
TEF Roomside	11	22	40	50	50	50	50	39

The exact acoustic performance of the attenuators will likely need reviewing again when the ductwork drawings are advanced further during later design stages, including the dimensions and airflow requirements.

In addition to the attenuator, the TEF will likely require an acoustic enclosure to control breakout noise. We would recommend the attenuators are directly bolted to the fan and an imperforate acoustic panel based enclosure (typically 50mm thick) should be installed. This would need to enclose the fan and extend to include at least 50% of the length of the attenuators. The exact design of such can be reviewed at a more detailed design stage.

4.0 CONCLUSIONS

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels around site.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to our understanding of the Local Authority requirements condition.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive windows. The assessment indicates that the proposed plant, in conjunction with the proposed attenuation and acoustic mitigation measures, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive windows.

Yours sincerely

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for HANN TUCKER ASSOCIATES