ACOUSTIC TECHNICAL NOTE

Reference:	9769.ATN04.PNA.2
Revision:	2
To:	Wates
From:	Toby Walton
Date:	1 June 2021
Project:	Abbey Area Phase 2
Subject:	Plant Noise Assessment Revision

1.0 INTRODUCTION

Following the reselection of roof plant for the Abbey Area Phase 2 development, this Technical Note provides a revision to the assessment previously undertaken and detailed within RBA Acoustics' Acoustic Assessment report 9769.RP01.AAR.4 dated 27 May 2020.

2.0 ENVIRONMENTAL NOISE SURVEY & PROJECT CRITERIA

Full details of the environmental noise survey and associated setting of criteria in line with the London Borough of Camden's requirements can be found within RBA Acoustics' Acoustic Assessment report 9769.RP01.AAR.4 dated 27 May 2020. The project criteria are summarised below:

Table 1 – Plant Noise Emission Limits

Location	L_{Aeq} noise level limit of all operating plant (dB) at 1m from the nearest noise-sensitive façade	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Belsize Road façades	44	28
Goldhurst Terrace rear façades	40	28

3.0 REVISED ASSESSMENT

Our revised assessment has been based upon the following information:

3.1 Proposed Plant Items and Position of Units

Table 11 – Plant Information

Ref	Manufacturer/Model/Duty	Plant Type	Location
HP1	Carrier 30RQS 120B	Air-to-water Heat Pump	Roof
HP2-4	Carrier 61AF 055	Air-to-water Heat Pump	Roof
AHU	Climaciat Airtech 35	Air Handling Unit	Roof
MVHRs	Nuaire XBC45-H-NES	MVHR intake and discharge ducts	Ground Floor (internal)

3.2 Position of Units

The proposed units are all to be located on the roof of the development, with the exception of the MVHR terminations which are located on the south eastern façade of the development, and HP1, which will be located at ground level at the north-eastern corner of the building. The equipment positions are indicated on the site plan in Figure 1.

3.3 Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturers of the units. The associated plant noise levels are detailed as follows:

Table 2 – Plant Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
HP1	L_p at 1 metre	-	-	-	-	-	-	-	-	71*
HP2-4	L_p at 1 metre	-	-	-	-	-	-	-	-	69*
AHU Intake	L_w in-duct	67	71	75	73	66	62	53	49	73
AHU Exhaust	L_w in-duct	74	78	83	81	82	79	75	70	86
MVHR discharge (each unit)	L_w in-duct	82	75	79	65	66	66	60	58	74
MVHR intake (each unit)	L_w in-duct	77	69	69	58	58	56	48	39	65

*Only dBA figures are available for these units.

Review of the octave band data provides no indication of any tonal characteristics associated with the proposed plant.

3.4 Location of Nearest Residential Windows

Receptor 1 - Belsize Road rear façade

The closest residential windows to the plant have been identified as the 1st floor windows on the rear façade of 170 Belsize Road. These windows are at a distance of approximately 35m from the roof plant locations and 5m from the MVHR closest duct termination. HP1 lies approximately 45m from the receptor location.

Receptor 2 - Goldhurst Terrace rear façades

Nearby residential windows to the plant have been identified as the 1st floor windows on the south façade of the nearby residential properties of Goldhurst Terrace. These are at a distance of approximately 50m from the roof plant locations. HP1 lies approximately 30m from the receptor location.

Receptor 3 - Casterbridge House

Nearby residential windows to the plant have been identified as being the 1st floor windows on the east façade of Casterbridge House. These are at a distance of approximately 65m from the roof plant locations. HP1 lies approximately 66m from the receptor location.

3.5 Mitigation

In order to meet with the Local Authority requirements, we recommend that the attenuators are fitted to the atmospheric terminations of both AHUs as close to the fan as possible. These attenuators should be capable of achieving the performance specification outlined below.

Table 14 – Attenuator Specification

Location	Example Configuration		Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
	Length (mm)	Free Area (%)	63	125	250	500	1k	2k	4k	8k
AHU – Intake	600	50	1	2	7	10	11	9	8	7
AHU – Exhaust	900	40	4	7	13	19	23	23	16	13
MVHR discharge	900	20	9	16	24	37	48	50	50	38
MVHR intake	600	25	6	9	13	22	33	33	27	24

3.6 Calculation of Noise Levels at Nearest Residential Window

Our calculation method for predicting noise levels from the proposed plant at the nearest residential windows, based on the information stated above, is summarised below.

- Source Term SPL / SWL
- Attenuator losses
- 20LogR Distance Attenuation
- Directivity

The results of the calculations indicate the following noise levels at the nearest affected residential windows:

Table 15 – Predicted Noise Levels

Operating Period	Receptor 1		Receptor 2		Receptor 3	
	Prediction	Criterion	Prediction	Criterion	Prediction	Criterion
Daytime (07:00 – 23:00)	40	40	35	40	37	40
Night-time (23:00 – 07:00)*	<25	28	<25	28	<25	28

*Plant night operation is negligible at night due to the daytime use of the building

Noise from the proposed units is within the target criteria. Therefore, the proposals should be considered acoustically acceptable.

4.0 PLANT NOISE CALCULATIONS FOR REAR OF BELSIZE ROAD (RECEPTOR 1)

Below we include detailed plant noise calculations at the worst-affected receptor, i.e. Receptor 1 (Rear of Belsize Road) for which the applicable criteria is 40dBA (daytime use only).

HP1

Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
HP1 (Lp at 1m)	-	-	-	-	-	-	-	-	71
Directivity	-	-	-	-	-	-	-	-	-4
Distance losses at 45m (Rear of Belsize Road)	-	-	-	-	-	-	-	-	-33
Barrier Loss	-	-	-	-	-	-	-	-	-16
Noise level at receiver	-	-	-	-	-	-	-	-	18

HP2

Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
HP2 (L_p at 1m)	-	-	-	-	-	-	-	-	69
Directivity	-	-	-	-	-	-	-	-	-4
Distance losses at 35m (Rear of Belsize Road)	-	-	-	-	-	-	-	-	-31
Noise level at receiver	-	-	-	-	-	-	-	-	34

HP3

Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
HP3 (L_p at 1m)	-	-	-	-	-	-	-	-	69
Directivity	-	-	-	-	-	-	-	-	-4
Distance losses at 43m (Rear of Belsize Road)	-	-	-	-	-	-	-	-	-31
Noise level at receiver	-	-	-	-	-	-	-	-	34

HP4

Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
HP4 (L_p at 1m)	-	-	-	-	-	-	-	-	69
Directivity	-	-	-	-	-	-	-	-	-4
Distance losses at 44m (Rear of Belsize Road)	-	-	-	-	-	-	-	-	-31
Noise level at receiver	-	-	-	-	-	-	-	-	34

AHU Intake

Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
AHU – Intake in duct L_w	67	71	75	73	66	62	53	49	73
Duct Attenuation	7	6	7	6	6	6	6	6	--
Attenuator	-1	-2	-7	-10	-11	-9	-8	-7	--
End Reflection	-5	-2	0	0	0	0	0	0	--
L_w at grille	51	65	63	56	49	47	42	38	--
Directivity (90deg)	0	0	0	-4	-7	-7	-7	-7	--
Divergence (46m hemispherical)	-41	-41	-41	-41	-41	-41	-41	-41	--
Noise level at receiver	13	20	21	11	0	-2	-10	-13	14

AHU Discharge

Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
AHU – Discharge in duct L_w	74	78	83	81	82	79	75	70	86
Duct Attenuation	7	6	7	6	6	6	6	6	--
Attenuator	-4	-7	-13	-19	-23	-23	-16	-13	--
End Reflection	-5	-2	0	0	0	0	0	0	--
L_w at grille	57	68	65	57	50	45	50	49	--
Directivity (90deg)	0	0	0	-4	-7	-7	-7	-7	--
Divergence (46m hemispherical)	-41	-41	-41	-41	-41	-41	-41	-41	--
Noise level at receiver	17	22	23	10	4	1	4	2	16

MVHR Discharge

Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
MVHR – Discharge in duct L_w	82	75	79	65	66	66	60	58	74
Attenuator	-9	-16	-24	-37	-48	-50	-50	-38	--
End Reflection	-12	-8	-4	-1	0	0	0	0	--
L_w at grille	56	46	46	22	13	11	5	15	--
Directivity (45deg)	0	1	2	2	3	3	4	4	--
Screening (Building)	-5	-5	-5	-5	-5	-5	-5	-5	--
Divergence (5m hemispherical)	-22	-22	-22	-22	-22	-22	-22	-22	--
Noise level at receiver	34	25	26	2	-6	-8	-13	-3	18

MVHR Intake

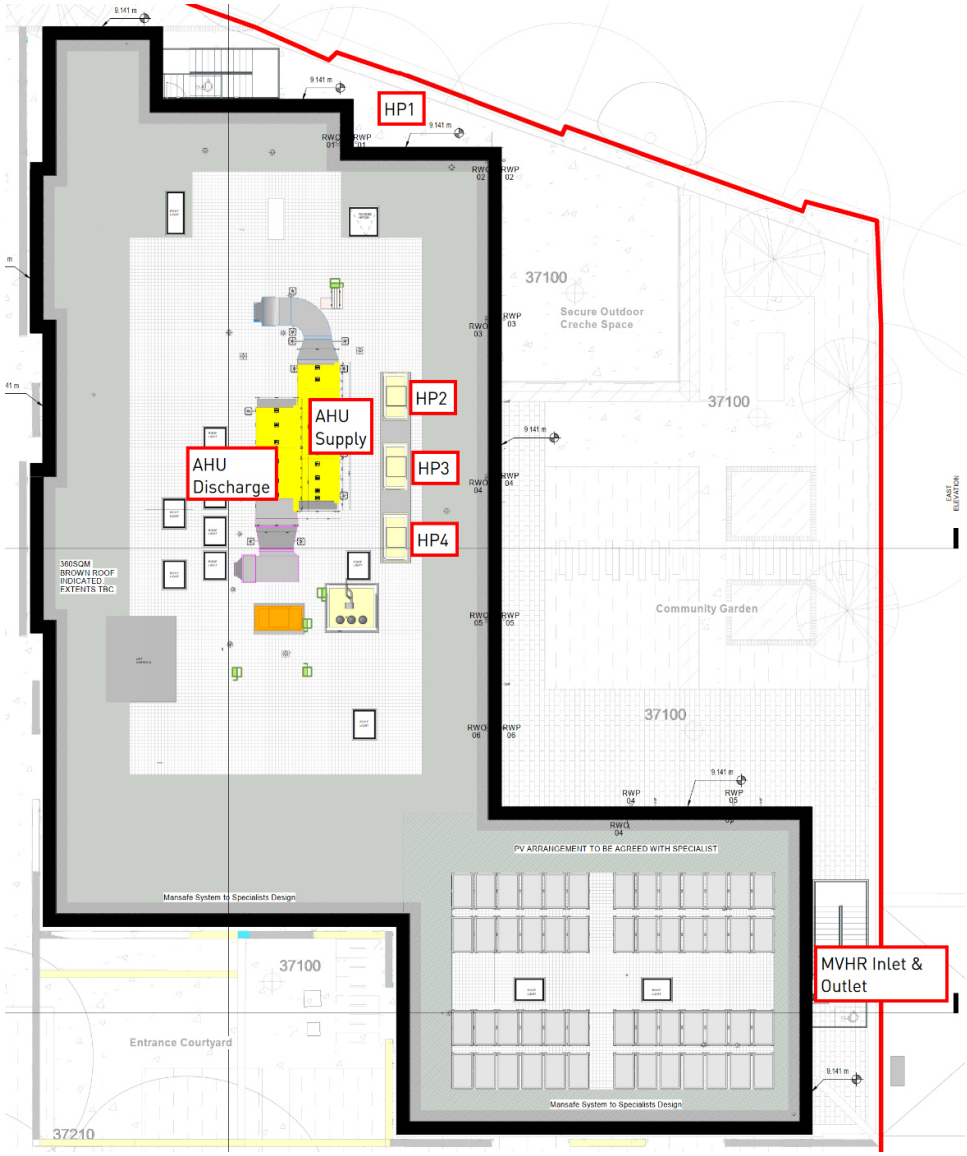
Element	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
AHU 01 – Intake in duct L_w	77	69	69	58	58	56	48	39	65
Attenuator	-6	-9	-13	-22	-33	-33	-27	-24	--
End Reflection	-12	-8	-4	-1	0	0	0	0	--
L_w at grille	54	47	47	30	20	18	16	10	--
Directivity (45deg)	0	1	2	2	3	3	4	4	--
Screening (Building)	-5	-5	-5	-5	-5	-5	-5	-5	--
Divergence (5m hemispherical)	-22	-22	-22	-22	-22	-22	-22	-22	--
Noise level at receiver	32	26	27	10	1	-1	-2	-8	19

Cumulative Noise Level

Element	dBA
HP1	18
HP2	34
HP3	34
HP4	34
AHU1 Intake	14
AHU1 Exhaust	16
MVHR Discharge	18
MVHR Intake	19
Total	**40**

5.0 CONCLUSIONS

The worst-case cumulative noise level is 40dBA. This meets the target criterion and therefore satisfies the planning requirements.



Abbey Area Phase 2

Position of Rooftop Plant

Project 9769

Figure 1

1 June 2021

Not to Scale

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