SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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24 Endell Street, London

Planning noise report

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A	27 Aug 21		Serena Joynes	Philip Owen
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C	22 Oct 21		Philip Owen	Steven Wheeler
D	18 Aug 23	Final plant selections	Philip Owen	Edward Farrer

Summary

Sandy Brown has been commissioned by Patrizia UK Limited to provide an assessment of noise in relation to the proposed redevelopment of 24 Endell Street, London.

An environmental noise survey has been carried out at the site. The noise survey was carried out between 9 August 2021 and 16 August 2021.

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 44 dB during the weekday (08:00-18:00) and $L_{A90,15min}$ 41 dB during other periods of the day and the night.

Based on the requirements outlined in planning condition 6 (2021/5347/P) the noise from building services plant is to be at least 10 dB below the lowest existing background sound level when assessed at the most affected noise sensitive premise.

On this basis, all plant noise emissions shall not exceed L_{Aeq} 34 dB during the weekday (08:00-18:00 when plant is scheduled to operate) and L_{Aeq} 31 dB at other times at the windows of nearby noise sensitive premises.

The survey presents the predicted of noise emissions from the selected building services plant, which demonstrates that the requirements of planning condition 6 will be met.

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1 Introduction

Sandy Brown has been commissioned by Patrizia UK Limited to provide an assessment of noise in relation to the proposed redevelopment of 24 Endell Street, London.

An environmental noise survey has been carried out to establish:

- background sound levels around the site and by nearby noise sensitive premises
- ambient and maximum noise levels at the site.

The background sound levels measured during the survey are used as the basis for setting limits for noise emission from proposed building services plant. These limits are set in accordance with the requirements of planning condition 6.

This report provides details of the noise survey, including measurement results, and provides an assessment of noise emissions demonstrating compliance with planning condition 6.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1, with the site highlighted in white. The green highlighted buildings contain residential dwellings, with those highlighted red containing office/retail uses.

The 24 Endell Street includes facades on three streets, namely Short's Gardens (north-west), Endell Street (west) and Betterton Street (south-east).

Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The premises adjacent to the development are a mixture of residential, retail and offices. The properties highlighted with green in Figure 1 are predominately residential, which are more sensitive to noise.

The closest property to the proposal location of the roof top plant is Dudley Court, approximately 20 m to the north west of the building, along Short's Garden.

3 Development proposals

The development proposal comprises the change of use of ground and upper floors of the building from members club (sui generis) to use as offices (Class E), enlargement of existing cycle and shower facilities, replacement and reconfiguration of rooftop plant to accommodate additional office space (Class E) and the retention and refurbishment of the basement to allow for continued studio use (sui generis).

The proposed development will require the addition of new building services plant, which in accordance with London Borough of Camden planning policy requires assessing.

3.1 Hours of operation

The proposed office accommodation will be operational during typical working hours (08:00 to 18:00) and occasionally outside these times. The basement studio has the potential to operate 24 hours a day and 7 days a week.

3.2 Potential noise sources

The potential noise sources associated with the scheme can be broadly divided into two categories:

- Building services plant
- Internal activity in commercial units.

The potential impact of these sources is to be assessed once detailed proposed are known in order to minimise impact on existing noise sensitive premises around the development.

4 Planning condition 6

Planning condition 6 of 2021/5347/P is presented below:

> *Prior to use of the plant equipment, further details shall be submitted to and approved in writing by the Council, of the external noise level emitted from the installation including specified mitigation measures as appropriate. The measures shall ensure that the external noise level emitted from plant, machinery/equipment will be lower than the lowest existing background noise level by at least 10 dBA, by 15 dBA where the source is tonal as assessed according to BS 4142:2014 at the nearest and/or most affected noise sensitive premise, with all machinery operating together at maximum capacity.*
>
> *Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained.*

5 Survey method

5.1 Noise survey method

The survey included unattended and attended noise measurements.

5.1.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 7 days.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 15 minute periods between 12:40 on 9 August 2021 and 00:10 on 16 August 2021. The equipment was installed by Matthew Elliott and Serena Joynes and collected by Serena Joynes.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2. This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

The measurements were made between 1-2 m from the adjacent facade and are facade noise levels.

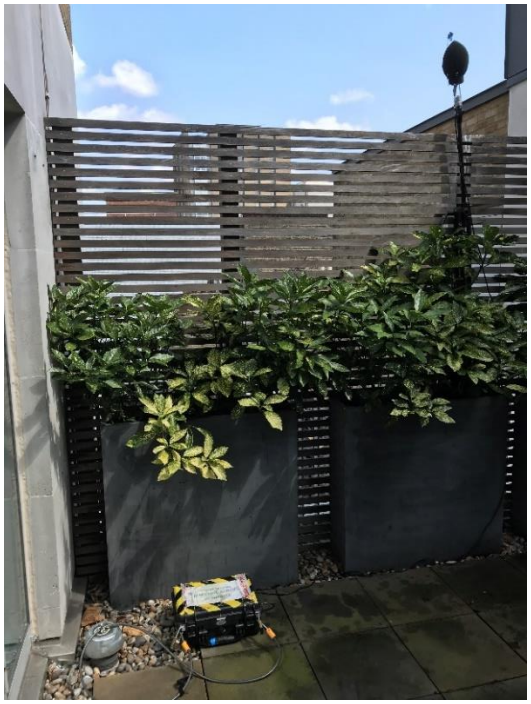


Figure 2 Photo of monitoring position 'L'

5.1.2 Attended measurements

Attended sample measurements were taken by Matthew Elliott and Serena Joynes at one location around the site. This is indicated in Figure 1 as position '1'. The attended measurements were carried out on 9 August 2021, over 15 minute periods.

At each position the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 1 m from any other reflective surface. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.

Figure 3 Photo of measurement position '1'

5.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

6 Measurement results

6.1 Observations

6.1.1 Noise

The dominant noise sources observed at the site during the survey were from construction in the distance.

Less significant noise sources included background noise from traffic and an occasional plane flying overhead.

6.2 Noise measurement results

6.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Monday 9 August 2021	-	45
Tuesday 10 August 2021	49	46
Wednesday 11 August 2021	50	45
Thursday 12 August 2021	50	45
Friday 13 August 2021	50	45
Saturday 14 August 2021	49	45
Sunday 15 August 2021	48	-
Average	49	45

Table 2 Minimum background sound levels measured during the unattended survey

Date	Day (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{A90,15min}$ (dB)	$L_{A90,15min}$ (dB)
Monday 9 August 2021	43	41
Tuesday 10 August 2021	43	41
Wednesday 11 August 2021	42	41
Thursday 12 August 2021	43	42
Friday 13 August 2021	43	42
Saturday 14 August 2021	42	41
Sunday 15 August 2021	41	42

[1] Measurement not made over full period due to monitoring start and end time.

The lowest day and night background noise level was $L_{A90,15min}$ 41 dB.

The lowest background noise level between 08:00 and 18:00, Monday to Friday was $L_{A90,15min}$ 44 dB. This is when all the building services plant will be operating simultaneously.

6.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 3. All measurements are facade noise levels.

Table 3 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	13:09	57	75	51	Cars and pedestrians Plant noise
1	13:24	58	77	51	Motorcycle

The attended measurements indicate that daytime background noise levels at ground floor level can be significantly higher than those measured on the roof top.

7 Plant noise limits – noise egress

Based on the requirements of planning condition 6 and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 4.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits apply at the facade of Dudley Court.

Table 4 Plant noise limits at 1 m from the nearest noise sensitive premises

Plant operating	Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
All plant	Weekday (08:00-18:00)	34
Basement plant	Day and night	31

[1] The limits set out in Table 4 do not include any attention catching features. The penalty corrections for attention catching features is 5 dB

8 Assessment

8.1 Description of building services plant

Figure 4 illustrates the location of the proposed building services plant associated with the building. The relevant plant includes:

- 3 x extract fans (EF1, EF2 and EF3)
- 1 x office AHU (AHU)
- 2 x Mitsubishi condensers serving basement (B1 and B2)
- 4 x Dakin condensers (AHU heat pump condensing units)
- 1 x Samsung condenser.

Other building services plant associated with the fit-out of the building has not been included in the assessment.

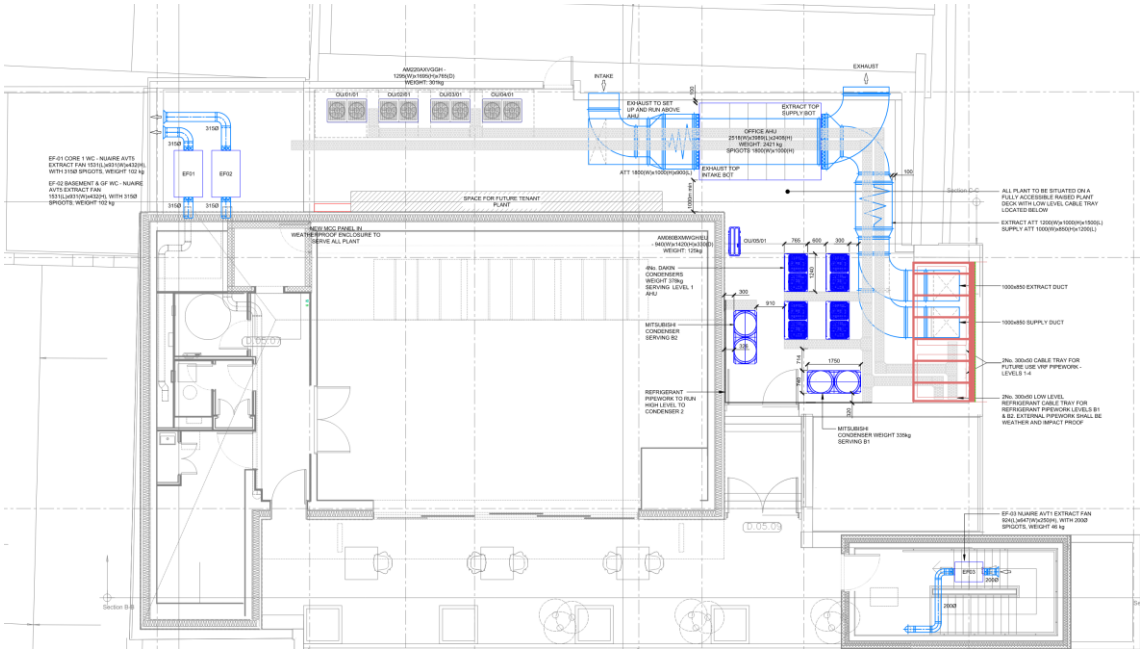


Figure 4 Proposed location of roof top building services plant

8.2 Selection of building services plant

The assessment of the noise emissions from the selected building services plant has been based on the manufacturer's noise data summarised in Table 5 (AHU and extract fans) and Table 6 (condensing units and heat pumps)

Table 5 Manufacturer's plant sound power level data for AHU and extract fans

Item	Description	Sound power levels (dB) at Octave band centre frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	dBA
AHU	Fresh air inlet	79	71	67	45	22	26	29	42	61
	Exhaust	79	68	64	54	34	40	44	54	60
EF1	Exhaust	73	69	66	65	61	56	52	46	67
EF2	Exhaust	73	70	66	66	62	57	53	47	66
EF3	Exhaust	72	68	58	57	54	50	44	42	60

Table 6 Manufacturer's sound pressure levels at 1 m data for condensing units and heat pumps

Item	Manufacturer ID	Sound pressure levels (dB) at Octave band centre frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	dBA
B1 condensing unit	Mitsubishi - PURY-P500 YNW [1]	73	66	62	53	51	48	45	40	59
B1 condensing unit	Mitsubishi - PURY-P500 YNW [1]	72	65	63	56	53	49	46	40	60
AHU Heat pump condensing units	Dakkin RYYQ20U [2]	60	57	57	55	49	45	42	38	58
Samsung unit	AM060NXMDGR/EU	65	59	55	56	53	48	44	33	58

[1] Extrapolated from Low Noise Mode to operating at 70% fan speed on heating

[2] Quiet Mode Level 1

8.3 Assessment of building services plant

This section provides detailed calculations of the plant noise emissions at the nearest/most affected noise sensitive window, which is identified in Figure 5 relative to the building.

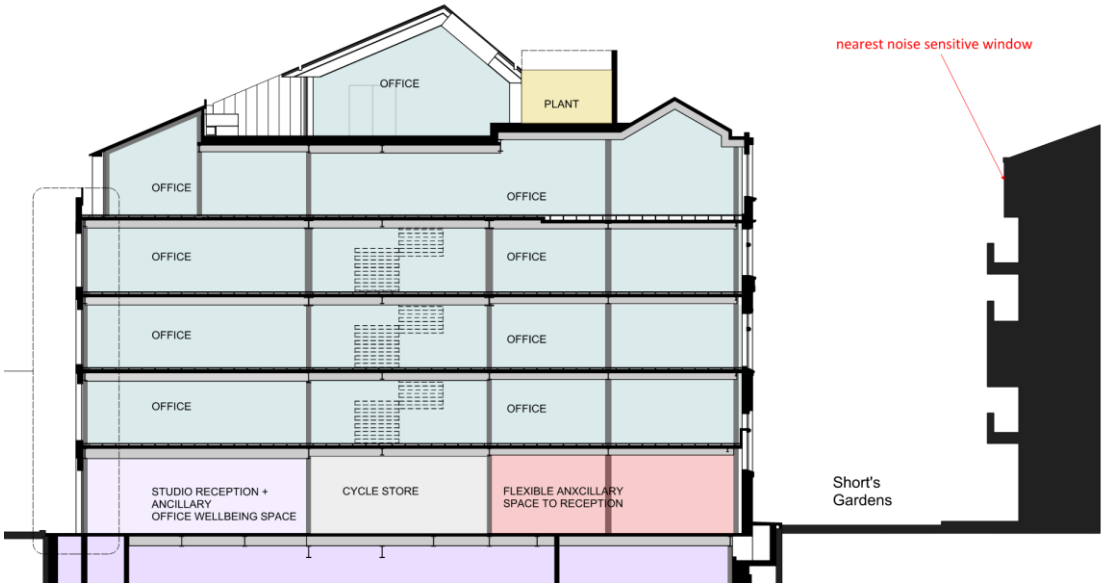


Figure 5 Section of 24 Endell Street and location of nearest noise sensitive window

Appendix C contains the detailed calculations for each item of building services plant on the roof top.

Table 7 includes the combined assessment of building services plant noise.

Table 7 Combined assessment of noise contributions from all roof top building services plant

	Sound pressure levels (dB) at nearest affected receptor at Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
AHU 1 intake	35	29	24	1	-24	-23	-23	-13	18
AHU 1 exhaust	41	32	28	19	-1	5	9	19	24
EF1	26	25	23	21	16	8	1	-8	22
EF2	26	26	23	22	17	9	2	-7	22
EF3	20	19	11	9	4	-3	-12	-17	10
B1 condensing unit	37	29	22	11	6	0	-6	-12	18
B2 condensing unit	36	28	23	14	8	1	-5	-12	19
AHU heat pump condensing units	30	26	23	19	10	3	-3	-8	20
Samsung unit	29	22	15	14	8	0	-7	-19	15
Combined	44	37	33	27	21	14	11	19	30

The assessment of all roof top plant indicates that the sound pressure level at the most affected residential window will be L_{Aeq} 30 dB with all plant operating at their design conditions.

The noise emissions are suitably low that they would comply with all day and night criteria.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-52 sound level meter and a B&K 2250 sound level meter, respectively.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00264531	Rion	23 Jun 22	TCRT20/1331
Microphone	UC-59/09678	Rion	23 Jun 22	TCRT20/1331
Pre-amp	NH-25/64656	Rion	23 Jun 22	TCRT20/1331
Calibrator	NC-74/34367630	Rion	23 Jun 22	TCRT20/1328
Sound level meter	2250/3009283	Brüel & Kjær	24 Jun 22	UCRT20/1539 UCRT20/1542
Microphone	4189/3005042	Brüel & Kjær	24 Jun 22	UCRT20/1539 UCRT20/1542
Pre-amp	ZC0032/23792	Brüel & Kjær	24 Jun 22	UCRT20/1539 UCRT20/1542
Calibrator	4231/3016124	Brüel & Kjær	23 Jun 22	UCRT20/1526

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

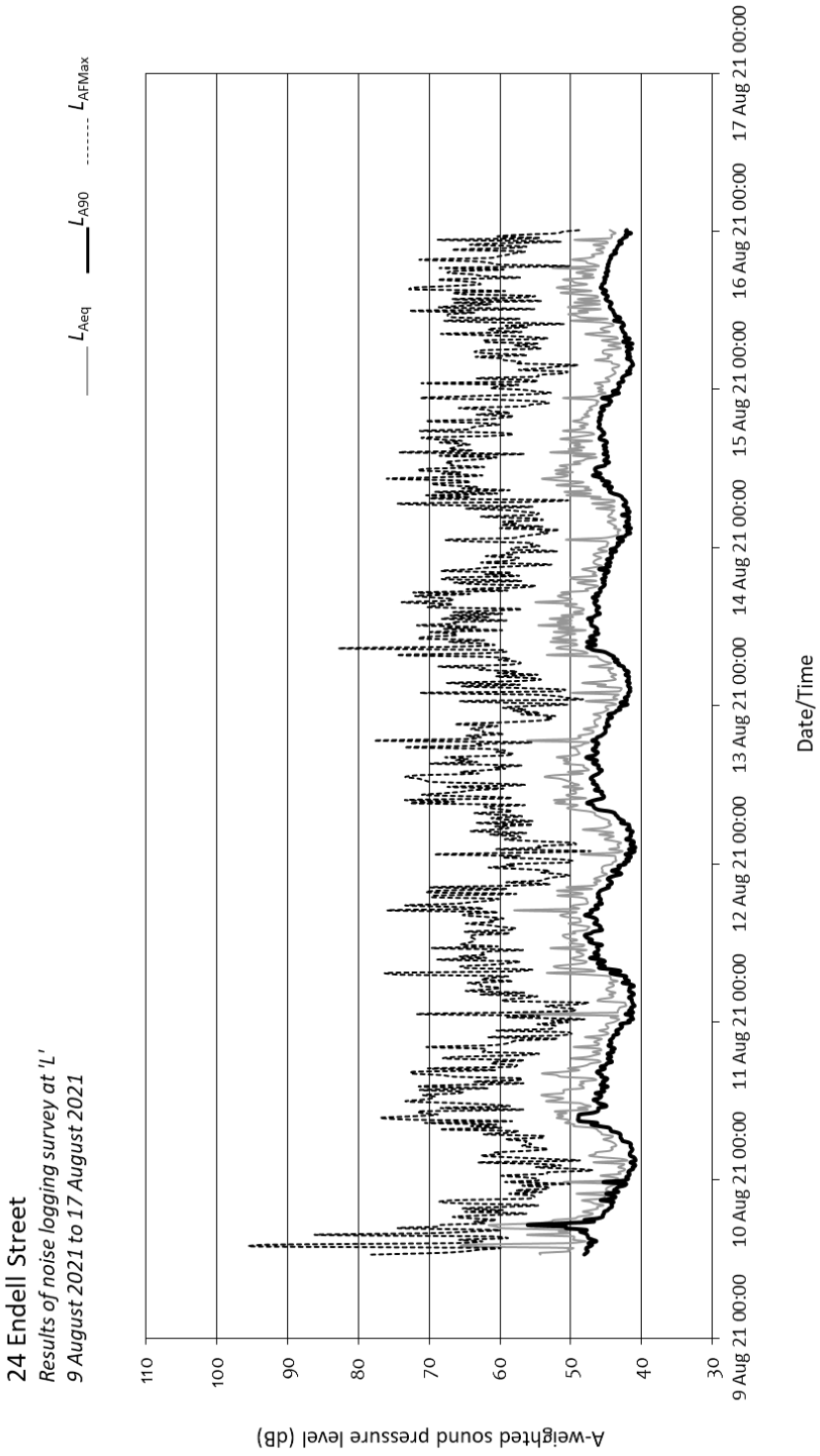
During the attended noise measurements, the weather was generally clear and dry and no rain occurred.

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 12 °C at night and 24°C during the day, and the wind speed was less than 6 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location 'L'


24 Endell Street
Results of noise logging survey at 'L'
9 August 2021 to 17 August 2021
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
110
100
90
80
70
60
50
40
30
9 Aug 21 00:00
10 Aug 21 00:00
11 Aug 21 00:00
12 Aug 21 00:00
13 Aug 21 00:00
14 Aug 21 00:00
15 Aug 21 00:00
16 Aug 21 00:00
17 Aug 21 00:00
Date/Time

Appendix C

Detailed calculations for individual building services plant items

Table 8 AHU intake noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Intake L_w (dB)	79	71	67	45	22	26	29	42	
Duct losses (dB)	-2	-2	-3	-3	-3	-3	-3	-3	
End reflection loss (dB)	-4	-2	-1	0	0	0	0	0	
Distance attenuation (dB)	-35	-35	-35	-35	-35	-35	-35	-35	
Screening attenuation (dB)	-6	-6	-7	-9	-11	-14	-17	-20	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	35	29	24	1	-24	-23	-23	-13	18

Table 9 AHU exhaust noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Exhaust L_w (dB)	79	68	64	54	34	40	44	54	
Duct losses (dB)	-2	-2	-3	-3	-3	-3	-3	-3	
End reflection loss (dB)	-4	-2	-1	0	0	0	0	0	
Distance attenuation (dB)	-35	-35	-35	-35	-35	-35	-35	-35	
Screening attenuation (dB)	0	0	0	0	0	0	0	0	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	41	32	28	19	-1	5	9	19	24

Table 10 EF1 exhaust noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Exhaust L_w (dB)	73	69	66	65	61	56	52	46	
Duct losses (dB)	0	-1	-2	-3	-3	-3	-3	-3	
End reflection loss (dB)	-9	-5	-2	-1	0	0	0	0	
Distance attenuation (dB)	-35	-35	-35	-35	-35	-35	-35	-35	
Screening attenuation (dB)	-6	-6	-7	-8	-10	-13	-16	-19	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	26	25	23	21	16	8	1	-8	22

Table 11 EF2 exhaust noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Exhaust L_w (dB)	73	70	66	66	62	57	53	47	
Duct losses (dB)	0	-1	-2	-3	-3	-3	-3	-3	
End reflection loss (dB)	-9	-5	-2	-1	0	0	0	0	
Distance attenuation (dB)	-35	-35	-35	-35	-35	-35	-35	-35	
Screening attenuation (dB)	-6	-6	-7	-8	-10	-13	-16	-19	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	26	26	23	22	17	9	2	-7	22

Table 12 EF3 exhaust noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
Exhaust L_w (dB)	72	68	58	57	54	50	44	42	
Duct losses (dB)	0	0	0	0	0	0	0	0	
End reflection loss (dB)	-9	-5	-2	-1	0	0	0	0	
Distance attenuation (dB)	-40	-40	-40	-40	-40	-40	-40	-40	
Screening attenuation (dB)	-6	-7	-8	-10	-13	-16	-19	-22	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	20	19	11	9	4	-3	-12	-17	10

Table 13 B1 condensing unit noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
L_{eq} at 1 m (dB)	72	68	58	57	54	50	44	42	
Distance attenuation (dB)	-40	-40	-40	-40	-40	-40	-40	-40	
Screening attenuation (dB)	-6	-7	-8	-10	-13	-16	-19	-22	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	20	19	11	9	4	-3	-12	-17	10

Table 14 B2 condensing unit noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
L_{eq} at 1 m (dB)	72	65	63	56	53	49	46	40	60
Distance attenuation (dB)	-31	-31	-31	-31	-31	-31	-31	-31	
Screening attenuation (dB)	-8	-9	-12	-14	-17	-20	-23	-24	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	36	28	23	14	8	1	-5	-12	19

Table 15 AHU heat pump condensing unit calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
L_{eq} at 1 m (dB)	60	57	57	55	49	45	42	38	56
No. 4 units (dB)	+6	+6	+6	+6	+6	+6	+6	+6	
Distance attenuation (dB)	-31	-31	-31	-31	-31	-31	-31	-31	
Screening attenuation (dB)	-8	-9	-12	-14	-17	-20	-23	-24	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	30	26	23	19	10	3	-3	-8	20

Table 16 Samsung condensing unit noise calculation

	Octave band centre frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	dBA
L_{eq} at 1 m (dB)	65	59	55	56	53	48	44	33	58
Distance attenuation (dB)	-31	-31	-31	-31	-31	-31	-31	-31	
Screening attenuation (dB)	-8	-9	-12	-14	-17	-20	-23	-24	
Facade reflection (dB)	+3	+3	+3	+3	+3	+3	+3	+3	
L_{eq} at receptor (dB)	29	22	15	14	8	0	-7	-19	15