DISCHARGE OF PLANNING CONDITIONS 13 & 14

19-37 HIGHGATE RD, KENTISH TOWN

GM LONDON

NOVEMBER 2024

DISCHARGE OF PLANNING CONDITIONS 13 & 14
19-37 HIGHGATE RD, KENTISH TOWN

Our Ref: **5608_003R_0-1_MG**

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Date:	**15 November 2024**
Project No:	**5608**
Status:	**Issue**

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Approved	**Callum Brewer** MSc MIOA	**15 November 2024**

REVISION HISTORY

Version	Comments	Changes made by	Approved by
1.0	First issued version	MG	CB
2.0	Corrected a typo in the number of ASHPs in Table 6.2	MG	MG

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1 INTRODUCTION

Anderson Acoustics Ltd was commissioned by GM London to undertake a noise assessment to discharge Planning Conditions 13 and 14 for a mixed use development at 19-37 Highgate Road, Kentish Town, London NW5 1JY.

It is understood that the development was granted planning permission in September 2023 subject to conditions, two of which relates to noise; which are addressed within this report in order to be discharged.

This report presents the necessary evidence to discharge Planning Condition 13 of Planning Application reference 2023/1288/P which relates to noise from ventilation units serving residential part of the building, and Planning Condition 14 of the same application which relates to noise from fixed plant associated with the development.

2 ASSESSMENT CRITERIA

2.1 Planning Condition 13

Camden Council imposed Planning Condition 13 to the development's planning application (2023/1288/P), which states the following:

"Technical specification details of the mechanical ventilation units to be installed on the residential building hereby approved, together with an accompanying acoustic report, shall be submitted to and approved by the local planning authority prior to installation of these units. The units shall not be operated other than in complete accordance with such measures as may be approved."

As the condition does not specify set limits for mechanical ventilation noise, relevant guidance on internal ambient noise levels in dwellings, such as BS8233 and CIBSE Guide A, have been utilized to establish these limits.

2.1.1 BS 8233:2014 – Guidance on sound insulation and noise reduction in buildings

Table 4 from the BS 8223:2014 sets desirable indoor ambient noise levels for dwellings as follows:

Table 4 **Indoor ambient noise levels for dwellings**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

2.1.2 CIBSE Guide A – Environmental design

Table 1.5 from CIBSE Guide A sets recommended indoor ambient noise levels for dwellings as follows:

Table 2.1: CIBSE Guide A recommended indoor noise levels

Room type	L_{Aeq} [dB]	NR [dB]
Bedroom	30	25
Living Room	35	30
Kitchen	40	45

2.2 Planning Condition 14

Camden Council imposed Planning Condition 14 to the development's planning application (2023/1288/P), which states the following:

"Noise levels from fixed plant associated with the development 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)."

2.2.1 British Standard 4142

Guidance on the rating of noise from fixed installations and sources of an industrial nature is provided in BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound', which provides a procedure for the measurement and rating of sound levels outside dwellings from such sources. A methodology for predicting the likelihood of adverse impact is also provided in this document; although, the assessment of nuisance explicitly falls outside the scope of this British Standard.

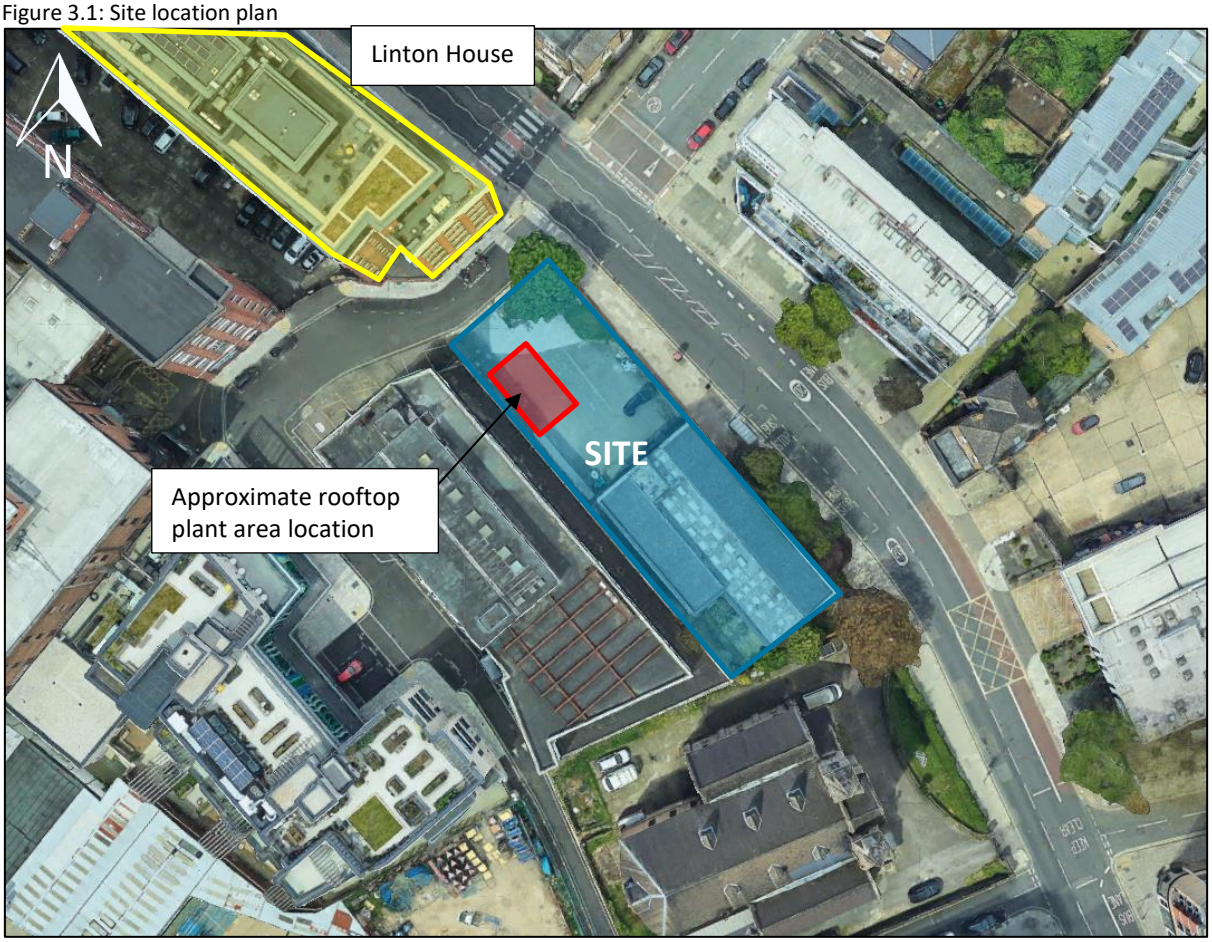
The Standard describes how the rating level ($L_{Ar,Tr}$) of the source(s), should be determined, which is effectively a combination of the sound level of the source(s) in question at the dwelling (known as the specific sound level, $L_{Aeq,T}$) and any adjustment for characteristic features. The 'subject method' for the latter recommends adjustments of between 0 and 6 dB for tonal noise sources and between 0 and 9 dB for impulsive sources. Additionally, corrections of 3 dB can be made for other sound characteristics and intermittency of the noise source. Where no adjustment is necessary, which can be the case, the rating level is equivalent to the specific level.

Reference time intervals, 'Tr', of 1 hour and 15 minutes are specified for the determination of specific/rating levels during the day and night, respectively. Where the operation of source is less than these periods, a time correction is made. If longer, then no correction is necessary.

3 SITE DETAILS

The site is located at 19-37 Highgate Road, Kentish Town, London NW5 1JY. The site is bound by the mixed-use development Linton House to the north, AA Self Storage to the west, Christ Apostolic Church to the south, and residential properties at the other side of B518 Highgate Road to the east.

Figure 3.1: Site location plan



The building will consist of a basement, a social enterprise space on the ground floor, and residential apartments spanning from the ground to the sixth floor. Each apartment will be equipped with mechanical ventilation, with a separate Mechanical Ventilation with Heat Recovery (MVHR) unit serving each flat. All external fixed plant equipment will be situated within the designated screened area on the rooftop level.

Detailed drawings can be found in Appendix C.

4 NOISE MEASUREMENTS

The prevailing noise conditions in the area were determined by a detailed environmental noise survey undertaken over a 7-day period at two measurement locations, between Tuesday 2nd and Tuesday 9th November 2021. Full details of the survey can be found in Appendix A.

Monitoring locations are presented in Figure 4.1 below, results of the survey are presented in Table 4.1.

Figure 4.1: Monitoring Locations

Table 4.1: Measured background noise levels (free-field)

Location	Period, metric [dB]	
	Day, $L_{A90,15min}$	Night, $L_{A90,15min}$
NM1	49	35
NM2	47	41

Note: $L_{A90,15}$ min represents a typical (modal) value from the whole measurement period

5 NOISE IMPACT ASSESSMENT – PLANNING CONDITION 13

5.1 Design Criteria

Considering both BS8233 and CIBSE Guide A, as explained in Section 2.1, the following noise limits for mechanical ventilation units serving the residential building have been adopted as criteria for Planning Condition 13. Since the proposed development does not incorporate self-contained kitchens, only limits for bedroom and living rooms are applicable.

Table 5.1: Adopted indoor noise level limits for Planning Condition 13

Room type	L_{Aeq} [dB]	NR [dB]
Bedroom	30	25
Living Room	35	30

5.2 Mechanical Ventilation Plant – MVHR Units

Each apartment will be equipped with a single MVHR unit, with either the Titon HRV 1.35 or Titon HRV 1.6 models, depending on the size of the apartment. These units will operate continuously under standard conditions, maintaining a typical fan speed of 40%, as advised by the M&E contractor. As noise limits apply to averaged values over the course of the year, assessments have been conducted under typical conditions. The in-duct sound power levels of the proposed units are summarized in Table 6.2.

Table 5.2: In-duct noise data for MVHR units

Model	Inlet / Outlet	Sound Power Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Titon 1.35Q Plus Eco	Outlet	68	55	50	45	33	19	19	25	47
	Inlet	53	52	39	32	18	14	18	25	38
Titon 1.6Q Plus Eco	Outlet	64	75	57	51	45	37	26	24	60
	Inlet	55	65	53	43	33	27	19	23	51

All units will be fitted with a semi-flexible 500 mm, Ø125 mm attenuator at each inlet and outlet, specifically the Titon 89720 model. The attenuator offers the following Insertion Loss performance:

Table 5.3: Attenuators' Insertion Loss performance

Model	Length (mm)	Diameter (mm)	Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	8k
Titon 89720	500	125	6	7	15	20	20	26	17	13

5.3 Calculation of Internal Noise Levels

The sound power levels given in Table 6.2 were utilised to calculate the internal noise levels within the apartments, using in-duct sound attenuation calculation outline in both *CIBSE Guide B4 Noise and vibration control for building services systems* and *Noise Control in Building Services* by Sound Research Laboratories.

To analyse the potentially highest noise levels resulting from the operation of the MVHRs, the worst-case scenario was selected, involving the outlet of the loudest MVHR model (Titon 1.6Q Plus Eco) and the simplest duct run between the MVHR and the duct termination point providing the least sound reduction. The medium-sized bedroom from apartment AT14 on the 6th floor was considered the worst-case scenario. The calculated noise levels amounted to 21 dBA L_{Aeq} and NR 16 dB, which stands 9 dB below the adopted limit.

It is anticipated that noise from all other duct termination points would be lower than the worst-case scenario due to lower noise emission levels for inlets and smaller MVHR units. Additionally, greater noise reduction is expected from more complicated and longer duct runs for other extract/supply termination points.

The analysed worst-case scenario is shown in Figure C.1 in Appendix C.

5.4 Fan Coil Units

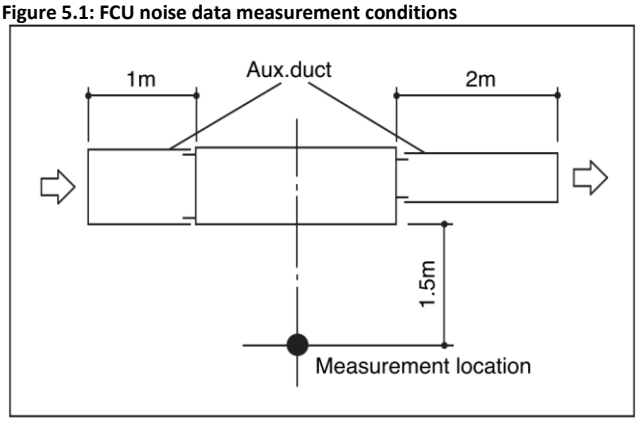
Three apartments located on the 5th and 6th floors will incorporate Fan Coil Units (FCU) in addition to the MVHRs. Noise emission data for the proposed units is presented in Table 5.4.

Table 5.4: Noise emission data for MVHR units

Model	Speed	Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA	NR
		63	125	250	500	1k	2k	4k	8k		
PEFY-P25VMS1-E	Low	40	25	24	19	18	15	14	14	24	22
	Medium	41	31	30	25	22	16	15	15	28	23
PEFY-P50VMS1-E	Low	35	42	34	24	25	16	14	15	31	25
PEFY-P63VMS1-E	Low	36	42	34	25	27	16	13	14	31	27

The above Sound Pressure Levels were measured in an anechoic room, with the microphone positioned 1.5 m beneath the FCU, featuring a 1-meter duct at the inlet and a 2-meter duct at the outlet, as illustrated in Figure 5.1. In such conditions, breakout noise from the FCU casing is likely the dominant factor. Given that the FCUs will be situated within the ceiling void, breakout noise is anticipated to be significantly diminished. However, estimating noise levels from the inlets and outlets at the ventilation grilles proves challenging due to the lack of available in-duct noise emission data. To mitigate noise levels at the grilles, 600 mm long attenuators are proposed for both the inlet and outlet of the FCUs, with the expectation of reducing the noise level below acceptable limits.

Figure 5.1: FCU noise data measurement conditions



6 NOISE IMPACT ASSESSMENT – PLANNING CONDITION 14

Our assessment has been based on the following information.

6.1 Noise Sensitive Receptors

Noise generated by the proposed plant installation has been assessed at the worst-affected NSR, which is the neighbouring residential property Linton House.

6.2 Design Criteria

Planning Condition 14 stipulates that the maximum noise emission level of the proposed plant at the nearest sensitive receptor must be at least 5 dB lower than the existing background noise level. The lower of the measured baseline noise levels at both locations has been deemed representative for Linton House, considering it as a worst-case scenario. The proposed criteria for daytime and nighttime periods are outlined in Table 6.1.

Table 6.1: Proposed plant noise emission criteria

Daytime (07:00 – 23:00)		Night-time (23:00 – 07:00)	
Measured Background Sound level, dB ($L_{A90,15min}$)	PC 14 condition criterion, dB	Measured Background Sound level, dB ($L_{A90,15min}$)	PC 14 condition criterion, dB
50	45	35	30

6.3 Items of Noise Generating Plant

Information on the proposed plant installation has been provided by GM London. The list of equipment, along with their locations and proposed operating hours, is presented in Table 6.2. Location of the equipment is shown in Figure C.2 in Appendix C.

Table 6.2: Proposed plant installations

Reference	Type of Plant	Manufacturer/ model	Location	Operating Hours
ASHP	Air Source Heat Pumps (3 no.)	Aerotop L65	Rooftop plant area	24-hours
Cond-1	Condensers (2 no.)	Mitsubishi PUZ-ZM50VKA	Rooftop plant area	24-hours
Cond-2	Condensers (3 no.)	Mitsubishi PUMY-SP112VKMR2	Rooftop plant area	24-hours

6.4 Plant Noise Data

Noise data for the proposed equipment have been sourced from the technical books from the manufacturers. Noise emission data is listed in Table 6.3.

Table 6.3: Noise data for proposed equipment

Unit Reference	Noise Data Type	Duty	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
			63	125	250	500	1k	2k	4k	8k	
ASHP	Sound Power Level (L_w)	Standard	65	66	69	73	80	73	65	51	82
ASHP	Sound Power Level (L_w)	Super Silenced (for night-time)	73	62	63	70	66	63	55	44	71

Unit Reference	Noise Data Type	Duty	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
			63	125	250	500	1k	2k	4k	8k	
Cond-1	Sound Power Level (L_w)	Heating (worst case)	74	66	60	59	55	52	48	46	61
Cond-2	Sound Power Level (L_w)	Heating (worst case)	72	70	69	66	64	59	53	47	69

6.5 Calculation of Noise Levels

To assess noise levels at the nearby noise sensitive receptors, a 3D acoustic model has been built using the noise-modelling suite CadnaA 2023 MR1. The predictions have been carried out in accordance with 'ISO 9613-2:1996. *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation*' prediction methodologies, which allow consideration of the effects of surface absorption, atmospheric absorption, acoustic reflections and acoustic screening provided by the existing and future structures of the proposed development.

Following drawings were used to inform the 3D model on the existing and proposed structures and the ASHP location:

- HR-AHR-B1-ZZ-DR-A-20-311 Rev C2 – Section A-A
- 312164-HAH-B1-RF-M2-ME-00050 – Proposed layout of the rooftop plant area
- HR_PLANT ENCLOSURE – Proposed layout and sections through the rooftop plant area

6.5.1 Acoustic Louvres

The screen surrounding the rooftop plant area will require louvres at the lower level for ventilation. It has been proposed to install acoustic louvres to restrict noise emissions from the plant, safeguarding both the proposed development and neighbouring properties. At this stage, a specific louvre model has not been selected. The McKenzie 100 mm acoustic louvre has been utilized in modelling, with its sound reduction performance detailed in Table 6.4.

Table 6.4: Acoustic louvre sound reduction performance

Example Unit Reference	Sound Reduction performance (R) at Octave Band Centre Frequency (Hz)								R_w (C_{tr})
	63	125	250	500	1k	2k	4k	8k	
McKenzie 100 mm acoustic louvre	-1	5	4	6	9	17	16	13	11 (-3)

6.6 Noise Impact Assessment (Proposed Installation)

The table below provides the calculated rating levels at the worst-affected noise sensitive receptor for the proposed plant installation, with acoustic louvre installed.

Table 6.5: BS4142 assessment outcome for Linton House, with acoustic louvre installed

Description	Noise level, dBA	
	Daytime	Night-time
Combined sound pressure level (specific sound level)	37	30
Character correction	0	0
Rating level	**37**	**30**
Typical background sound level	50	35

Description	Noise level, dBA	
	Daytime	Night-time
Difference between rating level and typical background sound level	**-13**	**-5**

6.6.1 Acoustic Feature Correction

Following a review of the octave-band spectral noise data, there does not appear to be tonal characteristics. It is considered that the equipment, when appropriately installed and maintained, will be free of tonal, impulsive or otherwise distinct acoustic character that might result in annoyance beyond that associated with its numeric noise level. Therefore, no character corrections have been applied.

6.7 Uncertainty

The following steps have been taken to reduce uncertainty in the assessment:

- Surveys were planned to ensure that weather conditions did not have any significant effect on the measured levels.
- Measurements were carried out using a calibrated Class 1 sound level meter and calibrator.
- Calculations assume that all plant will operate at full power 24/7, thus representing a worst-case scenario.

7 CONCLUSIONS

Anderson Acoustics has completed a noise impact assessment for the mixed-use development at 19-37 Highgate Road, Kentish Town, London NW5 1JY. The assessment was made to address two planning conditions.

Planning Condition 13

An assessment of indoor ambient noise levels generated by mechanical ventilation systems serving the apartments was conducted in accordance with the guidelines outlined in BS8233 and CIBSE Guide A. The worst-case noise levels emanating from the MVHR units were calculated and are expected to remain below the recommended limits under typical operational conditions in all apartments. Additionally, noise from FCUs installed in some flats was analysed. Given the limited availability of noise emission data for the FCUs, it is proposed that attenuators be installed for both the inlets and outlets of all FCUs. This measure aims to safeguard the apartments containing FCUs from potentially high noise levels.

Condition 13 is to be discharged, provided that acoustic attenuators are installed for both the MVHRs and FCUs, as detailed in Sections 5 and 6.

Planning Condition 14

An unattended noise survey was carried out at two locations, establishing the existing typical background daytime and night-time noise levels to be 50 dB $L_{A90,15min}$ and 35 dB $L_{A90,15min}$, respectively.

An assessment of the noise impact from the operation of the proposed plant has been conducted in accordance with Planning Condition 14, which requires that the noise level from the plant must be at least 5 dB below the existing background noise level at the nearest noise sensitive premises during operation.

Our assessment has concluded that the noise generated by the proposed installation is expected adhere to the established criteria for all periods and windows of the nearest neighbouring property, Linton House.

Condition 14 should be discharged, providing an acoustic louvre with sound reduction performance of no less than 11 (-3) R_w (C_{tr}) is installed within the north-west and north-east parts of the plant area screen. In addition, the ASHPs should be set to operate in Super silenced mode during nights.

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APPENDIX A

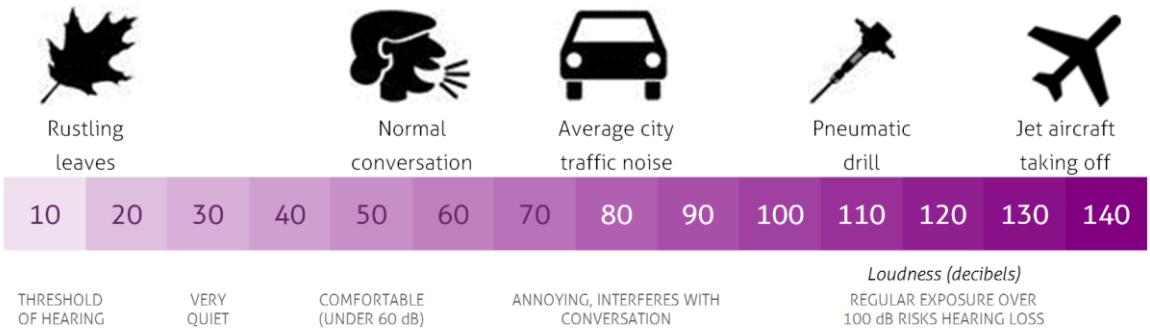
NOISE UNITS AND ACOUSTIC TERMINOLOGY

There is a ten million to one ratio between the threshold of hearing and the highest tolerable sound pressure. Noise is therefore measured using a logarithmic scale, to account for this wide range, called the decibel (dB). Noise is defined as unwanted sound and the range of audible sound varies from around 0 dB to 140 dB.

The human ear is capable of detecting sound over a range of frequencies from around 20 Hz to 20 kHz, however its response varies depending on the frequency and is most sensitive to sounds in the mid frequency range of 1 kHz to 5 kHz. Instrumentation used to measure noise is therefore weighted across the frequency bands to represent the sensitivity of the ear. This is called 'A weighting' and is represented as dBA.

It is generally accepted that under normal conditions humans are capable of detecting changes in steady noise levels of 3 dB, whilst a change of 10 dB is perceived as a doubling or halving of the noise level. An indication of the range of noise levels commonly found in the environment is given below.

Figure A.1: Typical noise levels



A number of different indices are used to describe the fluctuations in noise level over certain time periods. The main indices include:

$L_{A90,T}$ This is the noise level exceeded for 90% of the measurement period and provides a measurement of the quieter 'lull' periods in between noise events. It is often referred to as the background noise level.

Reference is often made to acoustic measurements being undertaken in 'free-field' or 'façade' locations. Free-field measurements represent a location away from vertical reflecting surfaces, normally by at least 3.5 metres. A façade measurement is undertaken or calculated to a position 1 metre from an external façade and a correction of up to 3 dB can be applied to account for the sound reflected from the façade. This latter position is often used when assessing the impact of external noise affecting residents inside properties.

Regarding sound insulation metrics, the following metrics are relevant to this report:

R_w Weighted sound reduction index. This is a single-number quantity which characterises the laboratory airborne sound insulation performance of a separating building element (such as walls, floors, doors and windows) over a range of frequencies. There is no flanking (indirect) transmission loss, so only the element under test needs is considered.

C / C_{tr} A-weighted spectrum adaptation term, taking account of pink noise or road traffic, respectively. This is term is added to single-number ratings (i.e. R_w or $D_{nT,w}$) to take account of characteristics of a particular sound spectra (C for pink, C_{tr} for traffic noise).

APPENDIX B

NOISE SURVEY RESULTS

B.1 - Instrumentation

All noise measurements were undertaken by a consultant certified as competent in noise monitoring. All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672 [8]. A full inventory of this equipment is shown in Table A.1 below. All equipment calibration certificates are available on request.

Table B.1 Inventory of Measurement Equipment

Equipment ID	Item	Make and Model	Serial Number	Calibration	
				Certificate number	Expiry Date
1 (NM1)	Sound Level Meter	01 dB DUO	10667	1500295-1	30/04/2023
	Preamplifier	Integrated	-		
	Microphone	01 dB MCE212	39854		
2 (NM2)	Sound Level Meter	01 dB DUO	10927	1500966-2	29/09/2023
	Preamplifier	Integrated	-		
	Microphone	GRAS 40CD	136961		
3	Calibrator	Rion NC-74	34304643	1500367-1	24/05/2022
4	Calibrator	Rion NC-74	34625646	UCRT21/1138	29/01/2022

The noise measurement equipment used during the survey was calibrated at the start and end of each measurement, using a Rion NC-74 sound calibrator to generate a calibration level of 94.0 dB at 1 kHz. No significant drift in calibration was found to have occurred.

The calibrators used have themself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements.

B.2 - Unattended Noise Survey NM1

Measurements were obtained using the 'F' time weighting and A-weighting frequency network. Consecutive 125 ms measurements of $L_{Aeq,T}$, $L_{Amax,F}$ and $L_{A90,T}$ noise levels were obtained between 12:15 hrs on Tuesday 2nd November and 10:20 hrs on Tuesday 9th November 2021.

A microphone fitted with a protective windshield was mounted on a pole attached to a tree, 2 m above ground level and approximately 1.5 metres from the façade of the existing building, on the Highgate Road side. Noise levels monitored at this position were façade levels. The location of the measurement position is identified in Figure 4.1 in the report.

B.3 - Unattended Noise Survey MP2

Measurements were obtained using the 'F' time weighting and A-weighting frequency network. Consecutive 125 ms measurements of $L_{Aeq,T}$, $L_{Amax,F}$ and $L_{A90,T}$ noise levels were obtained between 13:00 hrs on Tuesday 2nd November and 10:35 hrs on Tuesday 9th November 2021.

A microphone fitted with a protective windshield was mounted on a pole attached to a tree, approximately 4 m above ground level attached to a site fence, in the south-east corner of the site. Noise levels monitored at this position were free-field levels. The location of the measurement position is identified in Figure 4.1 in the report.

B.4 - Weather Conditions

Weather conditions during the survey period were obtained from internet sources www.wunderground.com (weather station at Holloway, ID ILONDO328), which indicated that the weather conditions for the measurement period were mostly dry and with moderate winds, no greater than 5 m/s. It is then considered that weather conditions have not significantly affected the noise survey.

Figure B.1: Photograph of Location NM1

Figure B.2: Photograph of Location NM2

Figure B.3: Measurement Time History – NM1

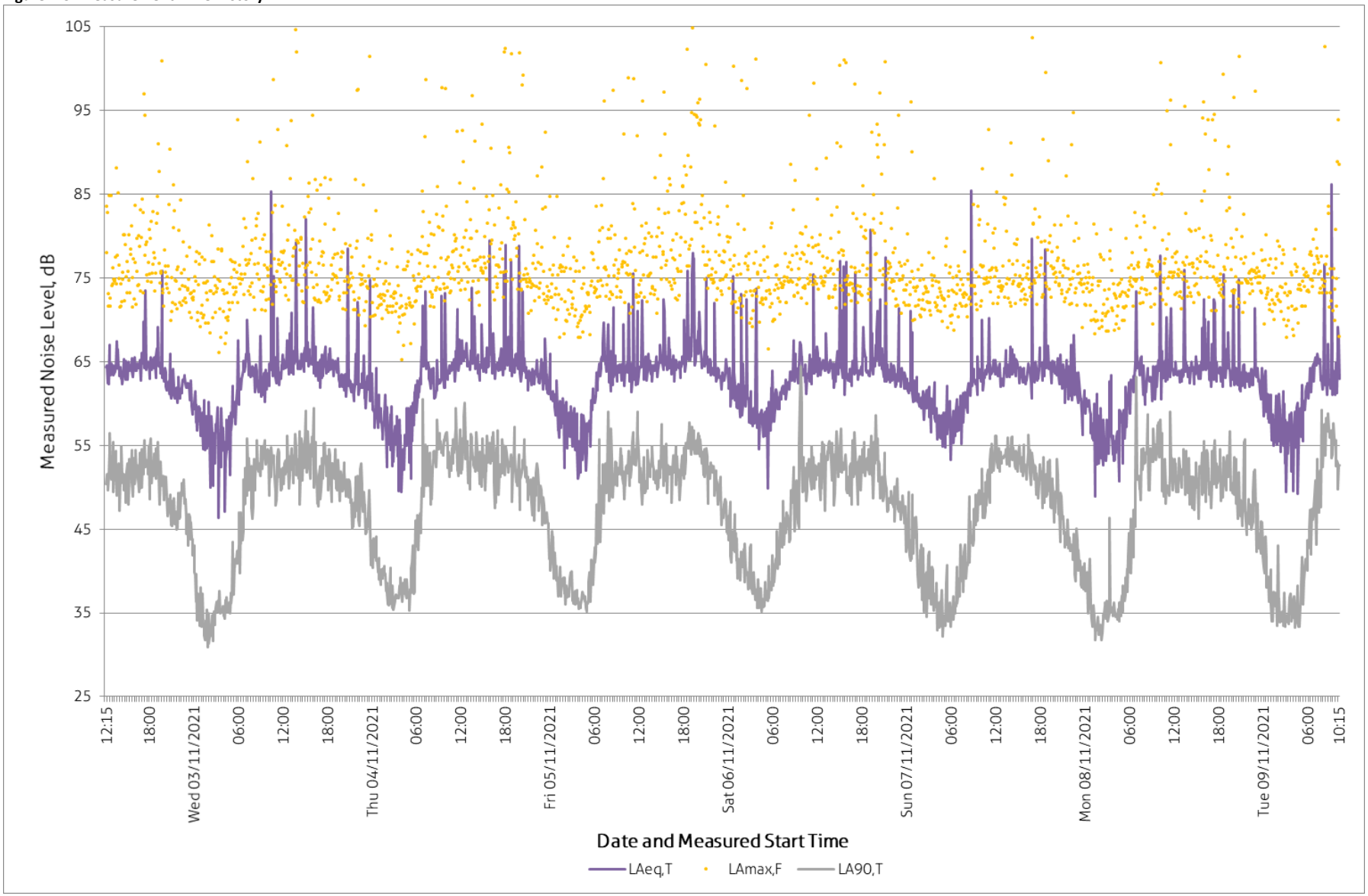
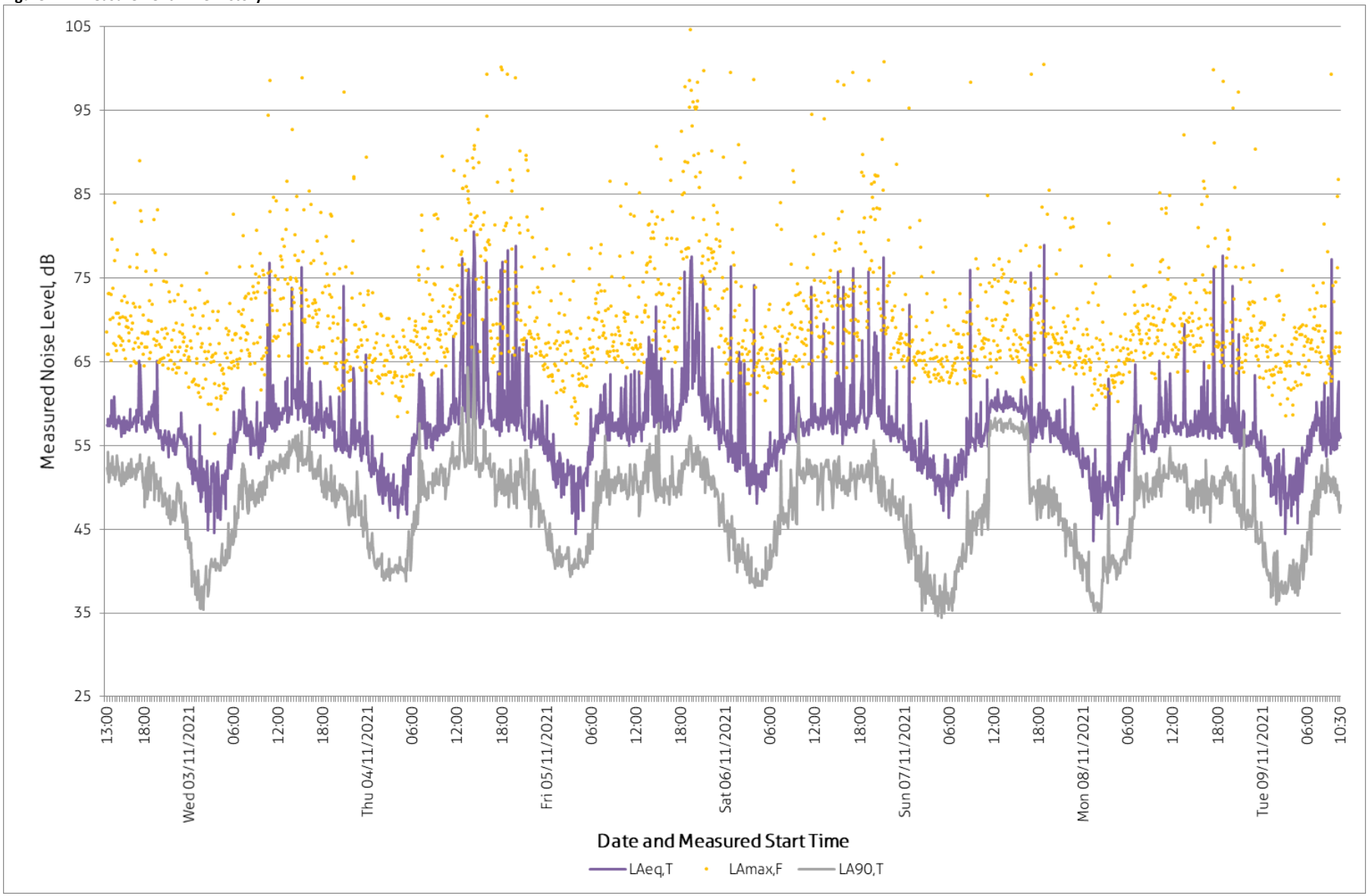


Figure B.4: Measurement Time History – NM2



APPENDIX C

DRAWINGS

Figure C.1: Ventilation Layout – 5th Floor

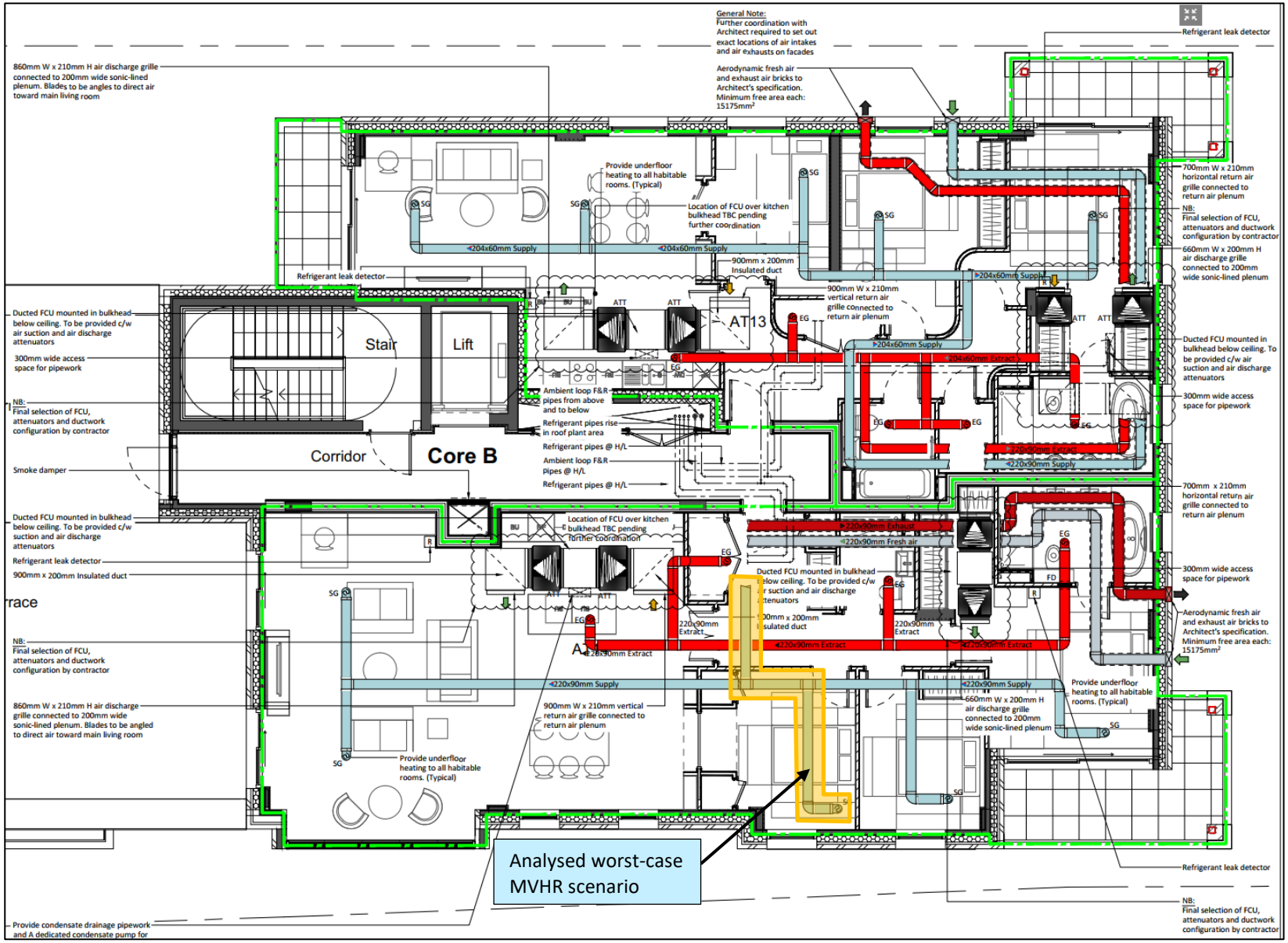


Figure C.2: Rooftop plant area layout

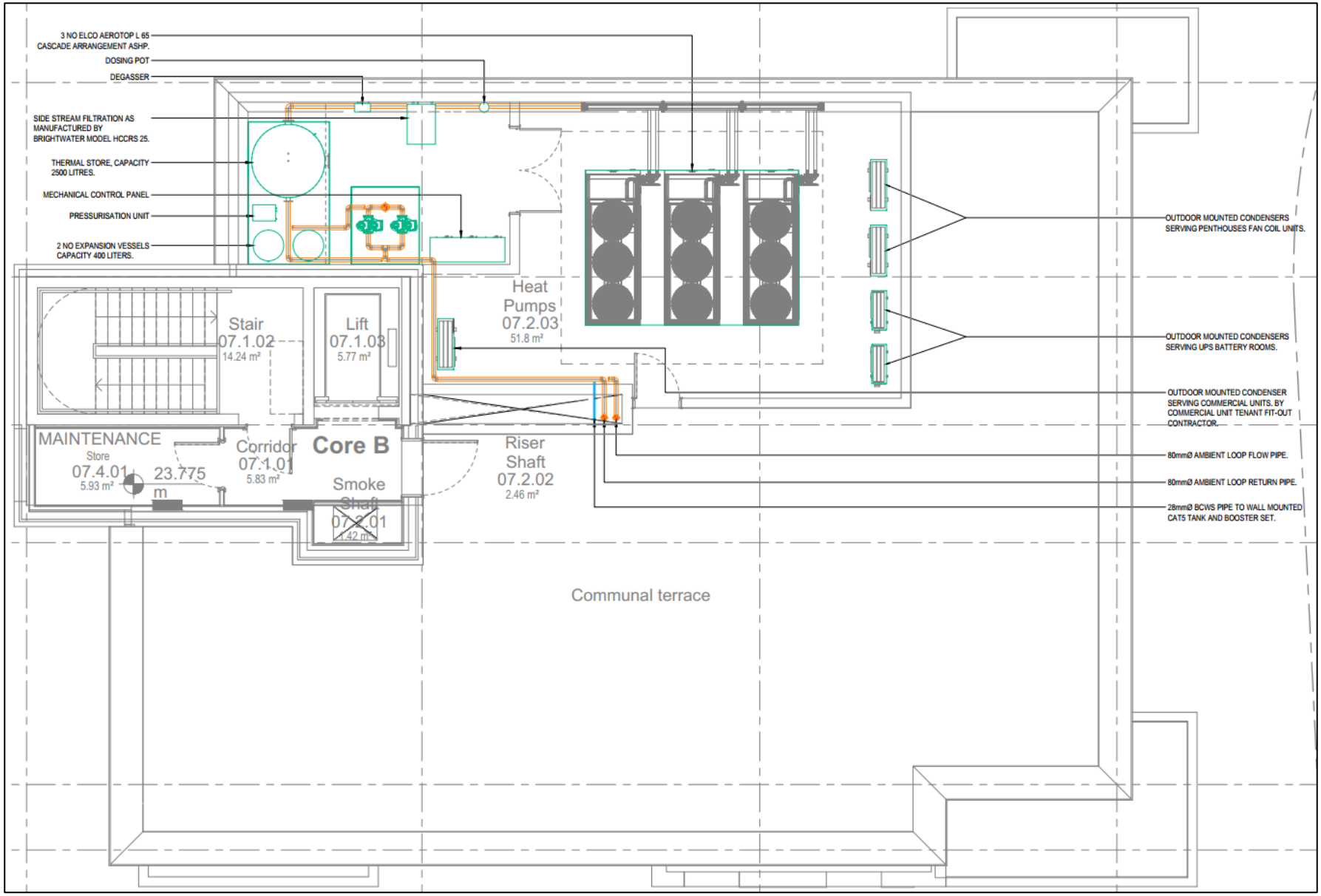


Figure C.3: Rooftop plant area layout and sections