207 HERMITAGE ROAD, LONDON, N4 1NW

Plant Noise Assessment

Reference: 12405.RP01.PNA.2
Prepared: 15 July 2024
Revision Number: 2

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	11 January 2023	Charlotte Maxwell	
1	First issue of report		Charlotte Maxwell	M Raisborough
2	Updated Plant Location	15 July 2024	Charlotte Maxwell	M Raisborough

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The recommendations within this report relate to acoustics performance only and will need to be integrated within the overall design by the lead designer to incorporate all other design disciplines such as fire, structural integrity, setting out, etc. Similarly, any sketches appended to this report illustrate acoustic principles only and will need to be developed into full working drawings by the lead designer to incorporate all other design disciplines.

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Contents

1. INTRODUCTION

It is proposed to install a new condenser unit to the rear of the property at 207 Hermitage Road. As part of the planning application, London Borough of Haringey requires consideration be given to the impact of atmospheric noise emissions from the proposed equipment to the nearest noise-sensitive receptors.

RBA Acoustics has been commissioned to undertake measurements of the prevailing noise conditions at the site and to determine the impact of atmospheric noise emissions in accordance with London Borough of Haringey's requirements. This report presents the results of the noise measurements, associated criteria, and provides the required assessment.

2. SITE DESCRIPTION

The site is shown in relation to its surroundings in the site plan in Figure 2 (Appendix D).

The property at 207 Hermitage Road is a terraced house located in Finsbury Park. There are industrial estates located to the south and eat of the premises with residential properties occupying the north. The noise climate is quiet and typical of a suburban residential area, it being primarily affected by ambient traffic noise from further afield.

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

Monitoring of the prevailing background noise was undertaken over the following 24-hour period:

- 13:45 hours Monday 05 November to 13:45 hours Tuesday 06 November 2022

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period. However, based on observations during the site visits and weather reports for the area, conditions were generally considered suitable for obtaining representative noise measurements, being predominantly dry with little wind.

Measurements were made of the L_{A90}, L_{Amax} and L_{Aeq} noise levels over sample periods of 15 minutes.

3.2 Measurement Location

To determine the existing noise climate around the site measurements were undertaken with the microphone positioned above the rear garden fence that borders the adjacent property (205 Hermitage Road). This position was considered as being representative of the noise climate at the worst affected neighbouring window to the proposed condenser unit.

The measurement position is also illustrated on photos in Figure 1 (Appendix D).

3.3 Instrumentation

For information regarding the equipment used for the measurements please refer to Appendix B.

The sound level meter was calibrated both prior to and on completion of the survey with no significant calibration drift(s) observed.

3.4 Results

The noise levels at the measurement position are shown as time-histories on the attached Graphs 1 & 2.

In order to ensure a worst-case assessment, the lowest background L_{A90} noise levels measured have been used in our analyses. The lowest L_{A90} and the period averaged L_{Aeq} dB noise levels measured are summarised below.

Table 1 – Measured Levels

Measurement Period	Measured Sound Pressure Level (dB)	
	Lowest $L_{A90,15min}$ (dB)	L_{Aeq} (dB)
Daytime (07:00 – 23:00)	36	47
Night-time (23:00 – 07:00)	34	42

4. PLANT NOISE CRITERIA

The requirements of London Borough of Haringey regarding new building services plant are understood to be as follows.

> *Any noise generated by the new building services plant should be designed to a level of 10dB below the lowest background $L_{A90\ 15\ minute}$ sample during operational hours, as measured 1m outside the nearest affected residential window.*
>
> *A less stringent 5dB reduction is permitted where adequate reasons for this are outlined and approved.*

Considering the above guidance, and the measured background (L_{A90}) sound levels during the daytime and night, it can be seen that background sound levels are very low. If the plant were to be designed to achieve sound levels 10dB below the lowest background sound level, the required noise emission limits would be lower than 30dB $L_{Ar,T}$. This is extremely onerous and the methodology in BS 4142 is not considered appropriate for determining noise impact where background sound levels are so low.

For example, Section 1 of (the now superseded) BS 4142: 1997, states

"The method is not suitable for assessing the noise measured inside buildings or when the background and rating noise levels are both very low…For the purposes of the standard, background noise levels below about 30dB…are considered to be very low"

Under such circumstances, we propose that, for an urban site such as 207 Hermitage Road, a minimum plant noise emission limit of 30dBA is a realistic target to work to at the nearest residential receptors. Notwithstanding this, all reasonable efforts should be made to reduce noise levels as much as is reasonably practicable.

In line with BS 4142: 2014, should the proposed plant be identified as having intermittent or tonal characteristics, further corrections may need to be added to the specific sound level of the plant to obtain the rating sound level.

Considering the above, we propose the new items of mechanical services be designed so that the following rating noise level from the plant do not exceed 30dBA during both the daytime and the night :

- Daytime (07:00 – 19:00) 30dB $L_{Ar,\ 1\ hour}$
- Night-time (23:00 – 07:00) 30dB $L_{Ar,\ 15\ minutes}$

5. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided to RBA by the project architects RDA Architects and is described in the following sections.

5.1 Plant Item

The following plant is proposed to be installed:

Table 2 – Plant Types

Ref.	Manufacturer/Model/Duty	Plant Type
CU1	DAIKIN 5MXM90-N	Condenser Unit

5.2 Plant Location

The plant is to be installed along the rear façade of the property on the flat roof area at 1st Floor. The equipment position is indicated on the site plan in Figures 1 & 2 in Appendix D.

5.3 Plant Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit (data sheet attached in Appendix C). The associated plant noise levels are detailed as follows:

Table 3 – Plant Noise Levels

Unit	Sound Pressure Level (dB) at 1 metre @at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
CU1	57	56	55	51	46	42	34	27	52

5.4 Location of the Nearest Noise-Sensitive Receptors

Based on observations made on site, the nearest noise-sensitive receptor to the proposed plant to be the 1st floor window of the adjacent and adjoining property, 209 Hermitage Road. This window is approximately 5m from the proposed plant location.

The receptor is shown in the site plan in Figure 2 in Appendix D.

5.5 Calculation of Noise Levels at Nearest Noise-Sensitive Receptors

Our calculation method for predicting noise levels from the proposed plant at the nearest noise-sensitive receptors, based on the information above, is summarised below.

- Source Term SPL
- Reflections
- Distance Attenuation

- Screening

The calculation sheet is attached for further information in Appendix C.

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

Table 4 – Predicted Noise Levels

Operating Period	Noise Level (dB) at Receptor	
	Predicted Rating Sound Level ($L_{Ar,T}$)	Criterion
Daytime (07:00 – 23:00)	42	30
Night-time (23:00 – 07:00)	42	30

Noise from the unmitigated plant installation would be above the target criteria for both daytime and night-time operation.

We therefore recommend the following mitigation measures be included in the design and installation.

5.6 Mitigation

Based on the above assessments, acoustic mitigation will be required to the condenser units in order that the adopted plant noise emission limits may be achieved at the nearby noise sensitive receptor, 209 Hermitage Road. The external unit should be housed within an acoustically louvred enclosure to achieve the necessary 12dB reduction required to meet the night-time operational noise criteria. The acoustic louvred enclosure should provide the following insertion losses.

Table 5 – Acoustic Louvre Insertion Losses

Detail	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Acoustic louvred enclosure	-10	-11	-14	-16	-20	-20	-20	-20

These reductions are able to be achieved by means of accommodating the units within a bespoke acoustic enclosure, within attenuated openings to maintain sufficient airflow and heat rejection from the units, such as that indicated in Figure 1 below.

Figure 1– Typical Condenser Attenuated Enclosure

Suitable suppliers of bespoke condenser acoustic enclosures are:

- Environmental Equipment Corporation
- Acoustic Enclosures Ltd.
- Environ Technologies Ltd.

With the above mitigation measures detailed in Table 5, the resultant predicted noise levels are as follows:

Table 6 – Predicted Noise Levels with Mitigation

Operating Period	Noise Level (dB) at Receptor	
	Prediction	Criterion
Daytime (07:00 – 23:00)	30	30
Night-time (23:00 – 07:00)	30	30

Noise from the proposed relocated plant with the mitigation measures incorporated is within the adopted plant noise emission limits.

1.1 Uncertainty

Uncertainty is an unavoidable feature of measurements in the field, which can be subject to many factors; the weather typically being the most significant of which with respect to the measurement of sound. Uncertainty is also unavoidable in the prediction of sound levels, where naturally, before the scenario being considered becomes a reality, a number of assumptions need to be relied upon. There is also the uncertainty of people's reactions, which can be influenced by a number of factors, not just the magnitude or character of the sound in question.

In keeping with the scale of each project, therefore, it is the aim of RBA Acoustics to minimise uncertainty at each stage as far as reasonably practicable. With this is mind, RBA Acoustics follow the best practise methodologies based on the guidance within BS 4142:2014 and our experience in undertaking assessments of these nature.

Crucially, it has been determined that environmental noise measurements have been undertaken by suitably qualified acousticians, using in calibration equipment, and avoiding adverse weather conditions.

The predictions have also been undertaken by suitably qualified staff, whilst using the best available information, an industry standard calculation method, and the most applicable calculation procedures.

Notwithstanding this, naturally some uncertainty remains. Given the sheer number of factors involved, however, it is not feasible to place a value on the level of uncertainty, without resulting in an unhelpful range of possible outcomes. It is the professional position of RBA Acoustics that uncertainty has been kept to a realistic minimum and that the outcome of this assessment is sufficiently representative.

6. VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that condensing units be isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures the mounts should ideally be caged and be of the restrained type.

It is important the isolation is not "short-circuited" by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the condenser and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

7. CONCLUSION

RBA Acoustics have undertaken noise monitoring at 207 Hermitage Road, London. The measured noise levels are presented within this report. The resultant noise levels have been used to determine the required criteria for atmospheric noise emissions from the proposed relocated plant installation (CU1).

The following mitigation measures are proposed within this report:

- Condenser units should be enclosed in acoustic louvres/enclosure capable of achieving the specification detailed in Table 5

Provided the above mitigation measures are included in the design and installation, the results of the assessment indicate atmospheric noise emissions from the proposed plant are within the criteria required by London Borough of Haringey and, as such, can be considered acceptable in terms of noise.

Appendix A – Acoustic Terminology

A-weighting (e.g. dB(A))	A correction applied across the frequency bands to take into account the response of the human ear, and therefore considered to be more representative of the sound levels people hear.
DeciBel (dB)	Unit used for many different acoustic parameters. It is the logarithmic ratio of the level being assessed to a standard reference level.
L_{eq}	The level of a notional steady sound which, over a stated period of time, T, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
$L_{Aeq,T}$	The A-weighted level of a notional steady sound which, over a stated period of time, T, would have the same acoustic energy as the fluctuating noise measured over that period. Typically used to represent the average or ambient noise level.
L_{An} (e.g. L_{A10}, L_{A90})	The sound level exceeded for n% of the time. E.g. L_{A10} is the A-weighted level exceeded for 10% of the time and as such can be used to represent a typical maximum level. Similarly, L_{A90} is the level exceeded for 90% of the measurement period, and is often used to describe the underlying background noise.
$L_{Amax,T}$	The instantaneous maximum A-weighted sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, e.g. sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the ambient level.
NR	Noise Rating – A single figure term to describe a measured noise level which considers the frequency content of the noise, generally used for internal noise level measurements (particularly mechanical services plant).

Appendix B – Instrumentation

The following equipment was used for the measurements.

Table B1– Equipment Calibration Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Valid Until
Norsonic Type 1 Sound Level Meter	Nor140	1406262	U37578	8 April 2023
Norsonic Pre Amplifier	1209	20487		
Norsonic ½" Microphone	1225	225566	37577	7 April 2023
Norsonic Sound Calibrator	1251	34429	U37576	7 April 2023

Appendix C – Plant Calculations

Table C1 – Calculation

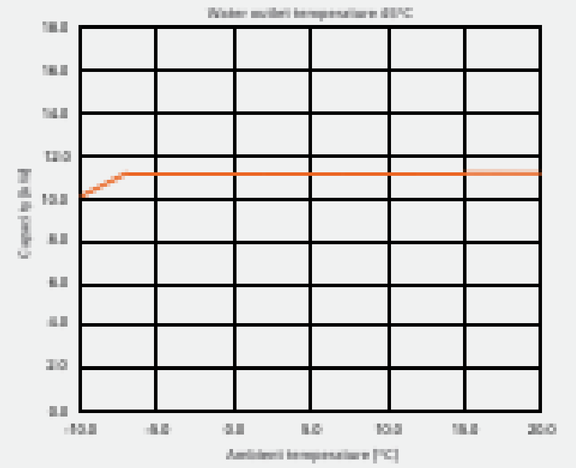
Description	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
SPL at 1m	57	56	55	51	46	42	34	27	52
Reflections	0	0	0	0	0	0	0	0	-
Distance Loss (5 metres)	-7	-7	-7	-7	-7	-7	-7	-7	-
Screening	0	0	0	0	0	0	0	0	-
Acoustic Enclosure	-10	-11	-14	-16	-20	-20	-20	-20	-
Rating Corrections *	0	0	0	0	0	0	0	0	-
Total Noise Level at Receptor	-10	-11	-14	-16	-20	-20	-20	-20	30

* Plant does not contain any tonal content and is not impulsive. The units are inverter driven such that the fans speed up and slow down gradually with duty, such that there is no distinguishable intermittency or other noise characteristics.

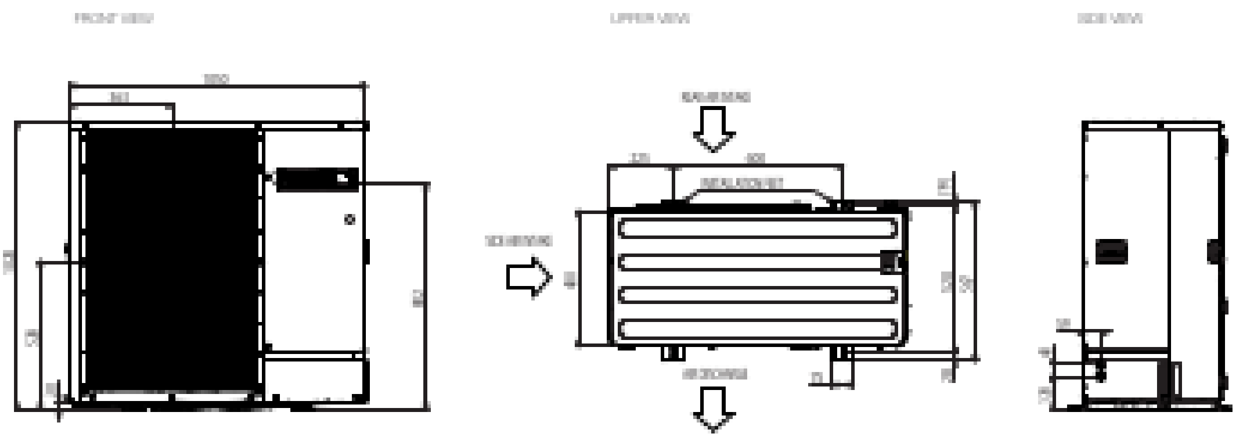
OUTDOOR UNIT		PUZ-WM112VAA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_s	130%
	SCOP (MCS)	3.33
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_s	187%
	SCOP (MCS)	4.78
HEAT PUMP COMBINATION HEATER - Large Profile*1	ErP Rating	A+
	η_{wh}	128%
HEATING*2 (A-7/W35)	Capacity (kW)	11.2
	Power Input (kW)	3.73
	COP	3.00
OPERATING AMBIENT TEMPERATURE (°C DB)		-25 ~ +35
SOUND DATA*3	Pressure Level at 1m (dBA)	41
	Power Level (dBA)*4	60
WATER DATA	Pipework Size (mm)	28
	Flow Rate (l/min)	32
	Water Pressure Drop (kPa)	24.0
DIMENSIONS (mm)	Width	1050
	Depth	480
	Height	1020
WEIGHT (kg)		116
ELECTRICAL DATA	Electrical Supply	220-230V, 50Hz
	Phase	Single
	Nominal Running Current [MAX](A)*5	10.0 [26]
	Fuse Rating - BS EN 60898-2 (A)*6	32
REFRIGERANT CHARGE (kg) / CO_2 EQUIVALENT (t)	R32 (GWP 675)	3.0 / 2.03

Notes:
*1 Combination with EHPT20X Cylinder
*2 Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.
*3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.
*4 Sound power level tested to BS EN12102.
*5 Under nominal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.
*6 MCB Sizes BS EN60898-2 & BS EN60947-2.
η_s is the seasonal space heating energy efficiency (SEHEE) η_{wh} is the water heating energy efficiency

NOMINAL HEATING CAPACITY



PUZ-WM112VAA(-BS) DIMENSIONS



All dimensions (mm)

Telephone: 01707 282880
email: heating@meuk.mee.com
heating.mitsubishielectric.co.uk

UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Note: The fuse rating is for guidance only. Please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. [illegible]

Effective as of August 2020

Appendix D – Graphs and Site Plans

207 Hermitage Road

L_{Aeq} Time History

Pos 1 (Rear Garden)

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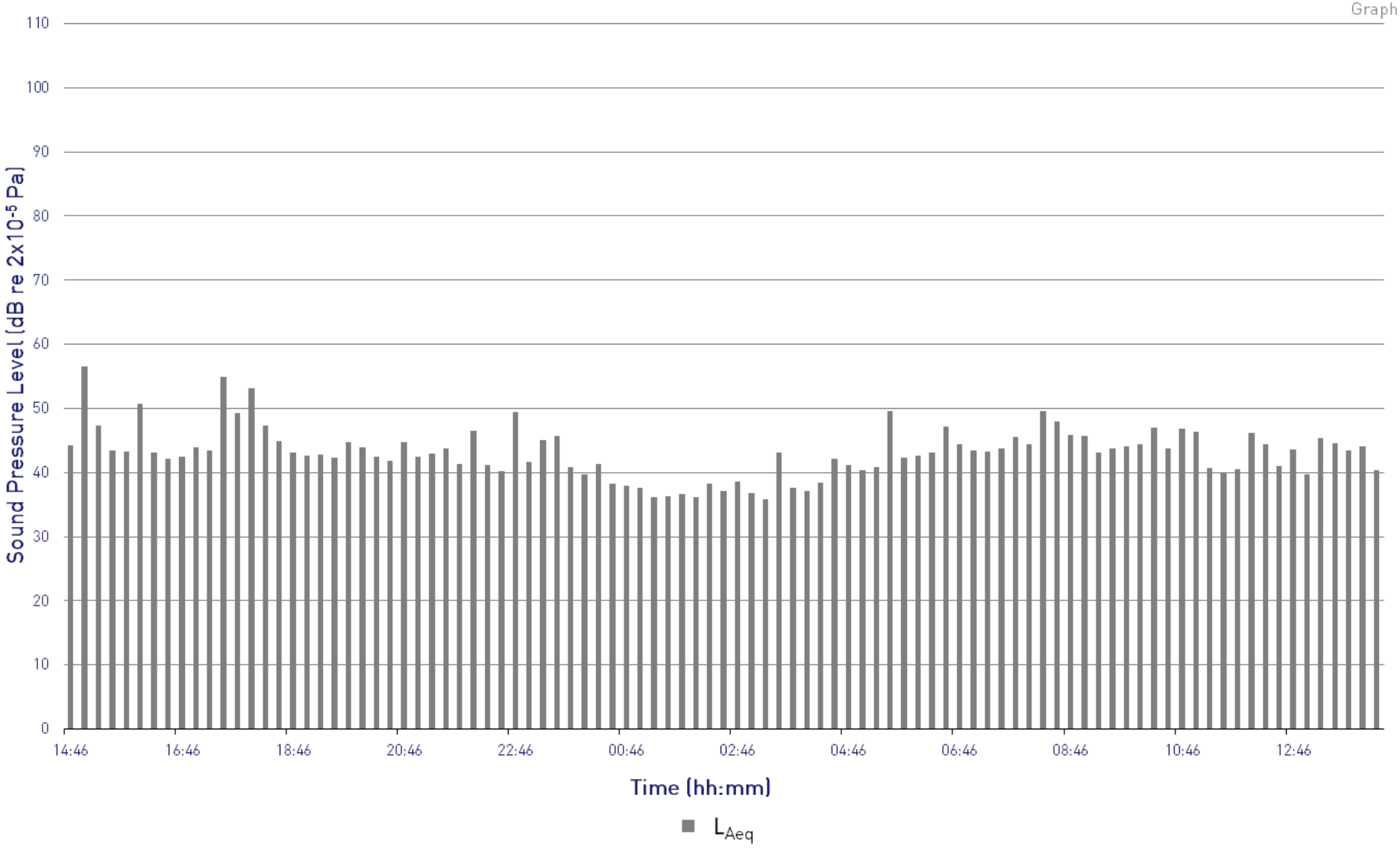
Graph 1



207 Hermitage Road

$L_{Amax,f}$ and L_{A90} Time History

Pos 1 (Rear Garden)

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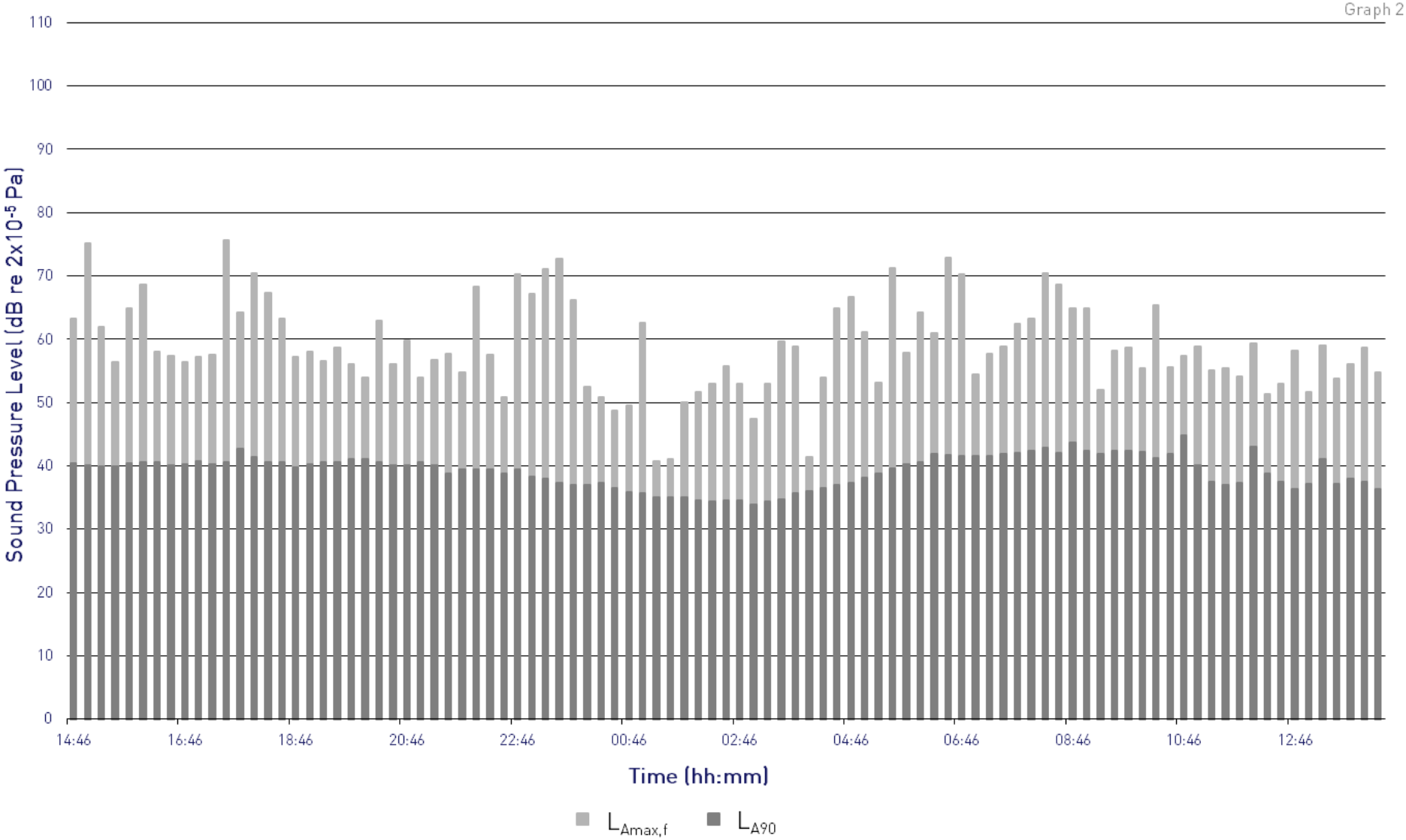
Graph 2



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Photograph showing Measurement, Receptor and Unit Locations

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Figure 1

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Not to Scale

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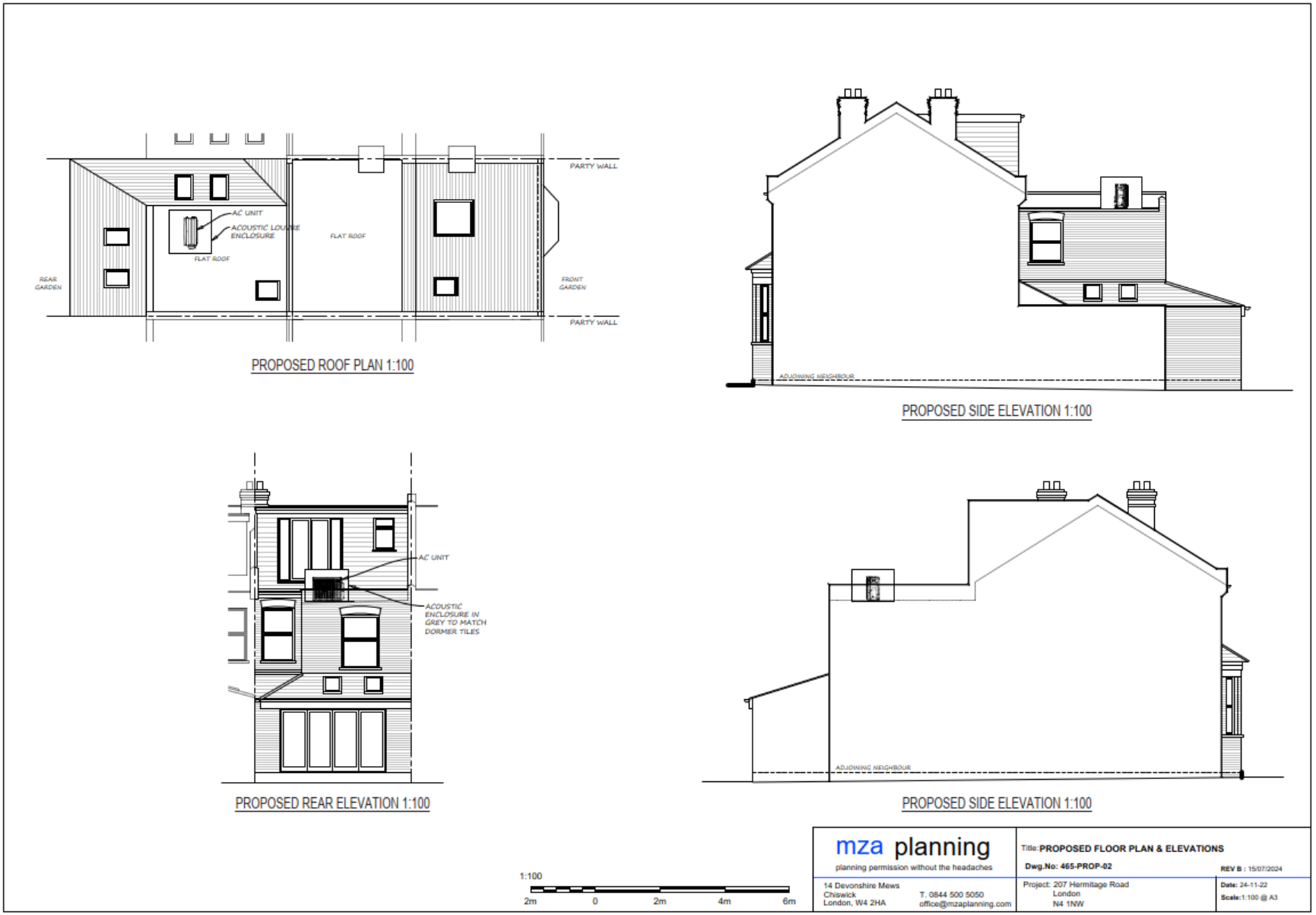

207 Hermitage Road, London, N4 1NW

Architects Plans showing Proposed Unit Location

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Figure 2

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Not to Scale

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