



207 HERMITAGE
ROAD, LONDON, N4
1NW

Plant Noise Assessment

Reference: 12405.RP01.PNA.2

Prepared: 15 July 2024

Revision Number: 2

Mr Jakub Miara
207 Hermitage Road
London
N4 1NW

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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.



LONDON
44 Borough Road
London SE1 0AJ
T. +44 (0) 20 7620 1950

MANCHESTER
Bloc, 17 Marble Street
Manchester, M2 3AW
T. +44 (0) 161 661 4504

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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 east 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 @ 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 _{A,r,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 in 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

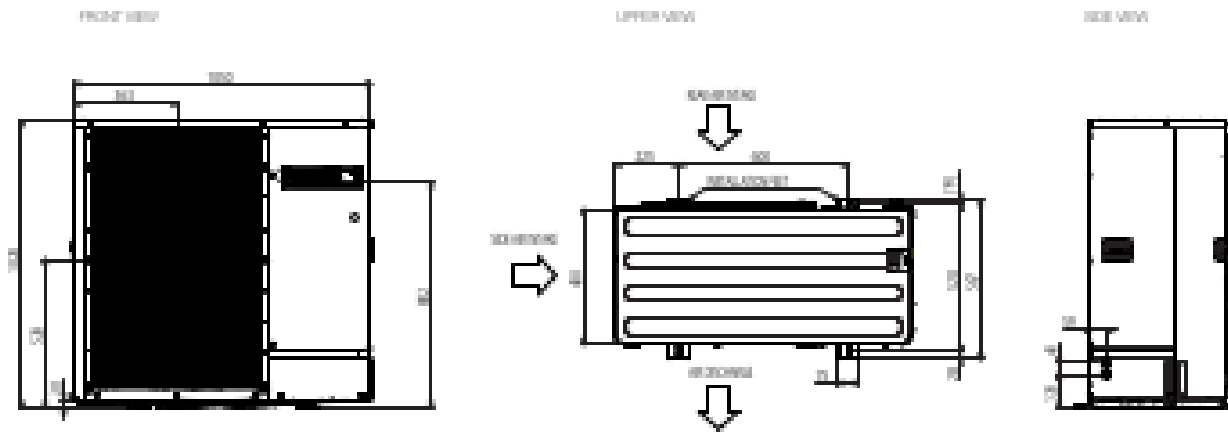
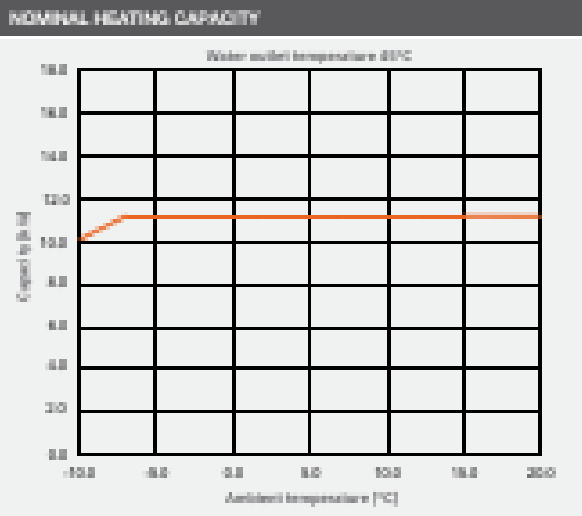
Description	Sound Level (dB) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
SPL at 1m	57	56	55	51	46	42	34	27	52
Reflections	0	0	0	0	0	0	0	0	-
Distance Loss (5 metres)	-7	-7	-7	-7	-7	-7	-7	-7	-
Screening	0	0	0	0	0	0	0	0	-
Acoustic Enclosure	-10	-11	-14	-16	-20	-20	-20	-20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

Product Information

PUZ-WM112VAA(-B5)
Ecodyn R32
Monobloc Air Source Heat Pump

OUTDOOR UNIT		PUR-WH126AA-E2
HEAT PUMP SPACE	HP Rating	3.1 x
HEATP - 18°C	Q _h	12000
	SEER (A/C)	3.78
HEAT PUMP SPACE	HP Rating	3.1 x
HEATP - 35°C	Q _h	18176
	SEER (A/C)	3.75
HEAT PUMP COMBINATION	HP Rating	4.1
HEATP - Large Profile*	Q _h	12800
HEATP*	Capacity (kW)	17.2
HP - FUR35	Power Input (kW)	3.75
	SEER	3.88
SPRING-NO LABELS TEMPERATURE (°C DB)		-20 ~ +20
SOUND BAW*	Frequency (Hz)	40
	Power Level (dB)	65
POWER LOSS	Frequency (Hz)	30
	Power Level (dB)	72
	Power Frequency (Hz)	20.0
DIMENSIONS (mm)	Width	1000
	Depth	480
	Height	1000
WEIGHT (kg)		119
TECHNICAL DATA	Technical Supply	230-240V, 50Hz
	Phase	Single
	Minimum Starting Current (Amps)*	100 (20)
	Power Rating - Maximum (A)*	32
REFRIGERANT CHARGE (kg)	R22 (GWP=10)	2.8 / 2.80

 η_{ex} is the external square heating energy efficiency, 0.02–0.03 η_{ex} is the waste heating energy efficiency, 0.02–0.03

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020



Telephone: 01703 282880
 email: heatinglineuk.com
heatinglineuk@btinternet.co.uk



Ultra-Low-Emission Living
Environmental Systems, LLC



•Cooling and Heating UK

mlm@princeton.edu

Microsoft's Windows 10
Environmental Systems, Ltd.

<https://doi.org/10.1016/j.sbsbs.2019.01.001>

UNITED-KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Twickenham Lane, Hatfield, Hertfordshire, AL10 9SE, England. Telephone: 01707 262880 Fax: 01707 238881
FINLAND Mitsubishi Electric Europe, Varsinais Suomalais Poh. Edlundin, Oulu 24, Finland. Telephone: (07) 470-8850 Fax: (07) 478-8388. International code: 0035831

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For the GMP-MS, ISO 9001:2015, ISO 13485:2015, IATF 16949:2016, ISO 14001:2015, ISO 45001:2018, ISO 27001:2017, ISO 22301:2017, ISO 22313:2017, ISO 22316:2017, ISO 22317:2017, ISO 22318:2017, ISO 22319:2017, ISO 22320:2017, ISO 22321:2017, ISO 22322:2017, ISO 22323:2017, ISO 22324:2017, ISO 22325:2017, ISO 22326:2017, ISO 22327:2017, ISO 22328:2017, ISO 22329:2017, ISO 22330:2017, ISO 22331:2017, ISO 22332:2017, ISO 22333:2017, ISO 22334:2017, ISO 22335:2017, ISO 22336:2017, ISO 22337:2017, ISO 22338:2017, ISO 22339:2017, ISO 22340:2017, ISO 22341:2017, ISO 22342:2017, ISO 22343:2017, ISO 22344:2017, ISO 22345:2017, ISO 22346:2017, ISO 22347:2017, ISO 22348:2017, ISO 22349:2017, ISO 22350:2017, ISO 22351:2017, ISO 22352:2017, ISO 22353:2017, ISO 22354:2017, ISO 22355:2017, ISO 22356:2017, ISO 22357:2017, ISO 22358:2017, ISO 22359:2017, ISO 22360:2017, ISO 22361:2017, ISO 22362:2017, ISO 22363:2017, ISO 22364:2017, ISO 22365:2017, ISO 22366:2017, ISO 22367:2017, ISO 22368:2017, ISO 22369:2017, ISO 22370:2017, ISO 22371:2017, ISO 22372:2017, ISO 22373:2017, ISO 22374:2017, ISO 22375:2017, ISO 22376:2017, ISO 22377:2017, ISO 22378:2017, ISO 22379:2017, ISO 22380:2017, ISO 22381:2017, ISO 22382:2017, ISO 22383:2017, ISO 22384:2017, ISO 22385:2017, ISO 22386:2017, ISO 22387:2017, ISO 22388:2017, ISO 22389:2017, ISO 22390:2017, ISO 22391:2017, ISO 22392:2017, ISO 22393:2017, ISO 22394:2017, ISO 22395:2017, ISO 22396:2017, ISO 22397:2017, ISO 22398:2017, ISO 22399:2017, ISO 22400:2017, ISO 22401:2017, ISO 22402:2017, ISO 22403:2017, ISO 22404:2017, ISO 22405:2017, ISO 22406:2017, ISO 22407:2017, ISO 22408:2017, ISO 22409:2017, ISO 22410:2017, ISO 22411:2017, ISO 22412:2017, ISO 22413:2017, ISO 22414:2017, ISO 22415:2017, ISO 22416:2017, ISO 22417:2017, ISO 22418:2017, ISO 22419:2017, ISO 22420:2017, ISO 22421:2017, ISO 22422:2017, ISO 22423:2017, ISO 22424:2017, ISO 22425:2017, ISO 22426:2017, ISO 22427:2017, ISO 22428:2017, ISO 22429:2017, ISO 22430:2017, ISO 22431:2017, ISO 22432:2017, ISO 22433:2017, ISO 22434:2017, ISO 22435:2017, ISO 22436:2017, ISO 22437:2017, ISO 22438:2017, ISO 22439:2017, ISO 22440:2017, ISO 22441:2017, ISO 22442:2017, ISO 22443:2017, ISO 22444:2017, ISO 22445:2017, ISO 22446:2017, ISO 22447:2017, ISO 22448:2017, ISO 22449:2017, ISO 22450:2017, ISO 22451:2017, ISO 22452:2017, ISO 22453:2017, ISO 22454:2017, ISO 22455:2017, ISO 22456:2017, ISO 22457:2017, ISO 22458:2017, ISO 22459:2017, ISO 22460:2017, ISO 22461:2017, ISO 22462:2017, ISO 22463:2017, ISO 22464:2017, ISO 22465:2017, ISO 22466:2017, ISO 22467:2017, ISO 22468:2017, ISO 22469:2017, ISO 22470:2017, ISO 22471:2017, ISO 22472:2017, ISO 22473:2017, ISO 22474:2017, ISO 22475:2017, ISO 22476:2017, ISO 22477:2017, ISO 22478:2017, ISO 22479:2017, ISO 22480:2017, ISO 22481:2017, ISO 22482:2017, ISO 22483:2017, ISO 22484:2017, ISO 22485:2017, ISO 22486:2017, ISO 22487:2017, ISO 22488:2017, ISO 22489:2017, ISO 22490:2017, ISO 22491:2017, ISO 22492:2017, ISO 22493:2017, ISO 22494:2017, ISO 22495:2017, ISO 22496:2017, ISO 22497:2017, ISO 22498:2017, ISO 22499:2017, ISO 22500:2017, ISO 22501:2017, ISO 22502:2017, ISO 22503:2017, ISO 22504:2017, ISO 22505:2017, ISO 22506:2017, ISO 22507:2017, ISO 22508:2017, ISO 22509:2017, ISO 22510:2017, ISO 22511:2017, ISO 22512:2017, ISO 22513:2017, ISO 22514:2017, ISO 22515:2017, ISO 22516:2017, ISO 22517:2017, ISO 22518:2017, ISO 22519:2017, ISO 22520:2017, ISO 22521:2017, ISO 22522:2017, ISO 22523:2017, ISO 22524:2017, ISO 22525:2017, ISO 22526:2017, ISO 22527:2017, ISO 22528:2017, ISO 22529:2017, ISO 22530:2017, ISO 22531:2017, ISO 22532:2017, ISO 22533:2017, ISO 22534:2017, ISO 22535:2017, ISO 22536:2017, ISO 22537:2017, ISO 22538:2017, ISO 22539:2017, ISO 22540:2017, ISO 22541:2017, ISO 22542:2017, ISO 22543:2017, ISO 22544:2017, ISO 22545:2017, ISO 22546:2017, ISO 22547:2017, ISO 22548:2017, ISO 22549:2017, ISO 22550:2017, ISO 22551:2017, ISO 22552:2017, ISO 22553:2017, ISO 22554:2017, ISO 22555:2017, ISO 22556:2017, ISO 22557:2017, ISO 22558:2017, ISO 22559:2017, ISO 22560:2017, ISO 22561:2017, ISO 22562:2017, ISO 22563:2017, ISO 22564:2017, ISO 22565:2017, ISO 22566:2017, ISO 22567:2017, ISO 22568:2017, ISO 22569:2017, ISO 22570:2017, ISO 22571:2017, ISO 22572:2017, ISO 22573:2017, ISO 22574:2017, ISO 22575:2017, ISO 22576:2017, ISO 22577:2017, ISO 22578:2017, ISO 22579:2017, ISO 22580:2017, ISO 22581:2017, ISO 22582:2017, ISO 22583:2017, ISO 22584:2017, ISO 22585:2017, ISO 22586:2017, ISO 22587:2017, ISO 22588:2017, ISO 22589:2017, ISO 22590:2017, ISO 22591:2017, ISO 22592:2017, ISO 22593:2017, ISO 22594:2017, ISO 22595:2017, ISO 22596:2017, ISO 22597:2017, ISO 22598:2017, ISO 22599:2017, ISO 22600:2017, ISO 22601:2017, ISO 22602:2017, ISO 22603:2017, ISO 22604:2017, ISO 22605:2017, ISO 22606:2017, ISO 22607:2017, ISO 22608:2017, ISO 22609:2017, ISO 22610:2017, ISO 22611:2017, ISO 22612:2017, ISO 22613:2017, ISO 226

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¹⁰ <http://www.gutenberg.org/files/10000/10000-h/10000-h.htm>, para. 1, 18.

Appendix D – Graphs and Site Plans

207 Hermitage Road

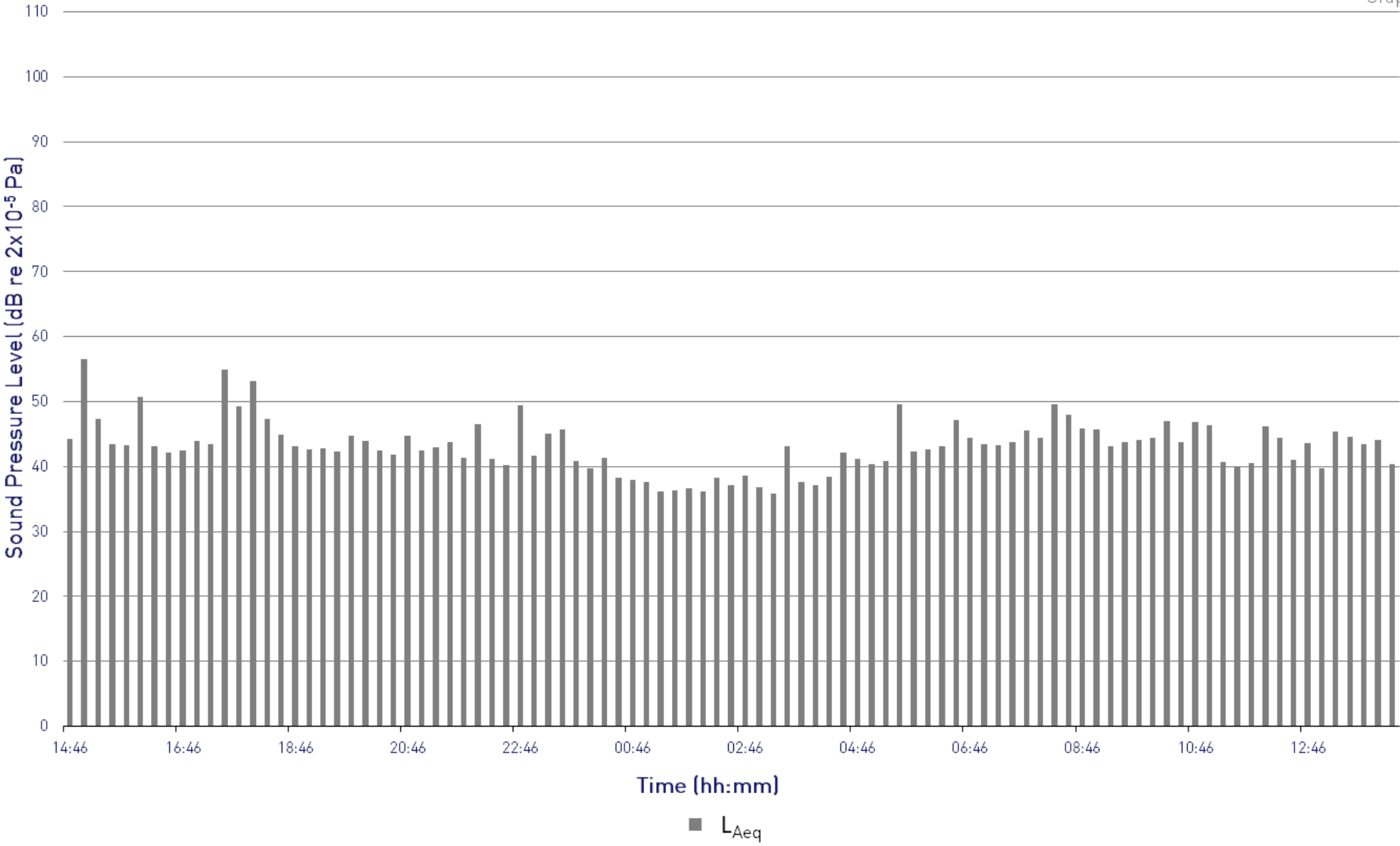
L_{Aeq} Time History

Pos 1 (Rear Garden)



Project: 12405

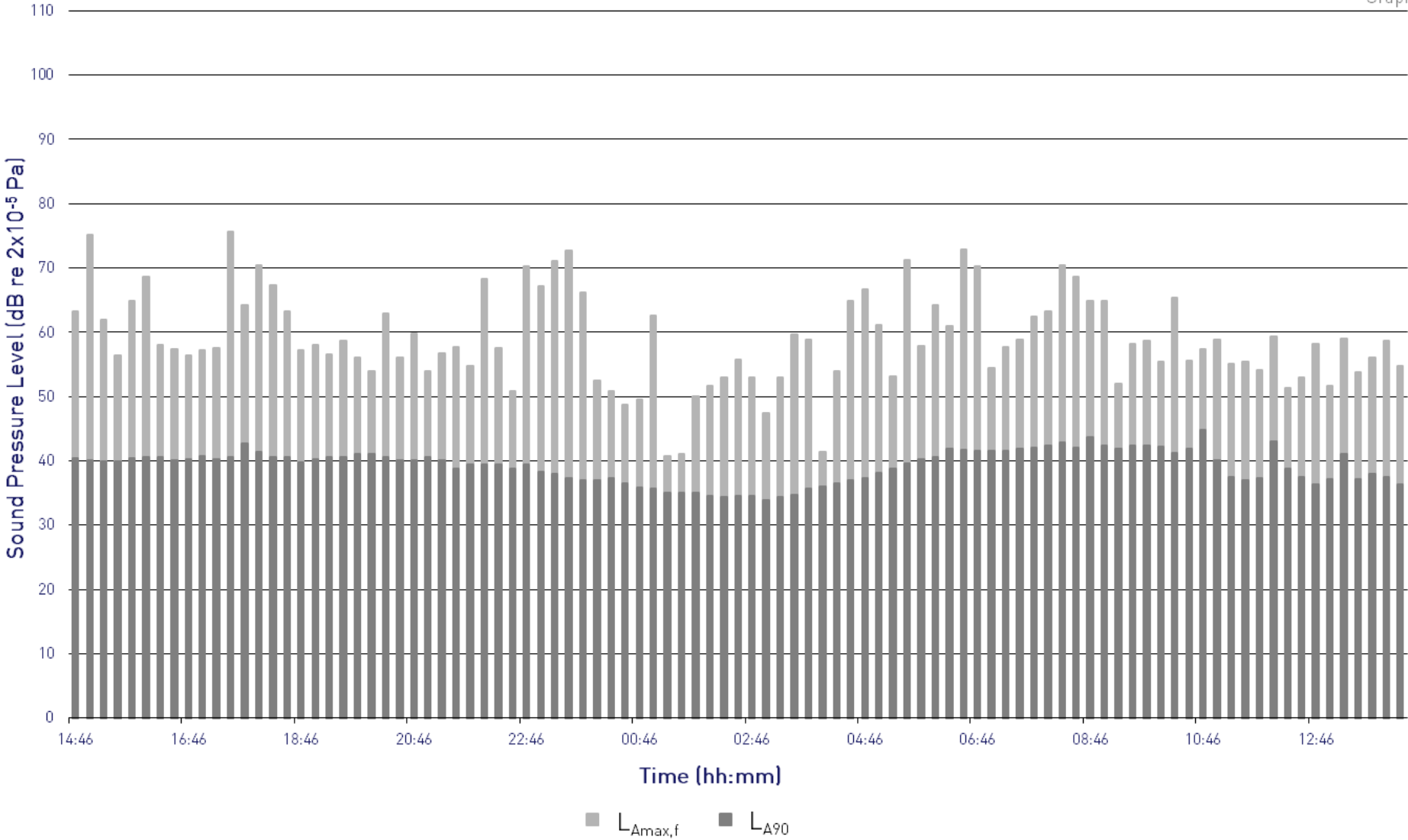
Graph 1



207 Hermitage Road
 $L_{Amax,f}$ and L_{A90} Time History
Pos 1 (Rear Garden)



Project: 12405
Graph 2





207 Hermitage Road, London, N4 1NW

Photograph showing Measurement, Receptor and Unit Locations

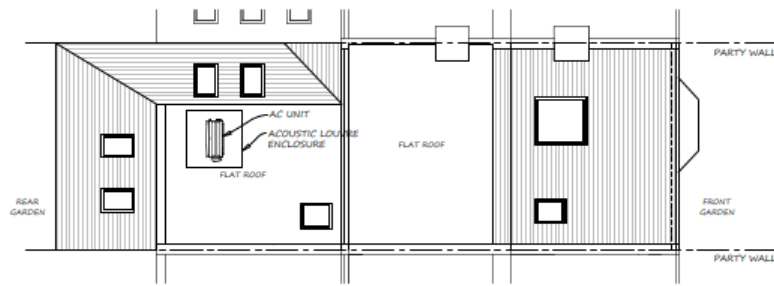
Project 12405

Figure 1

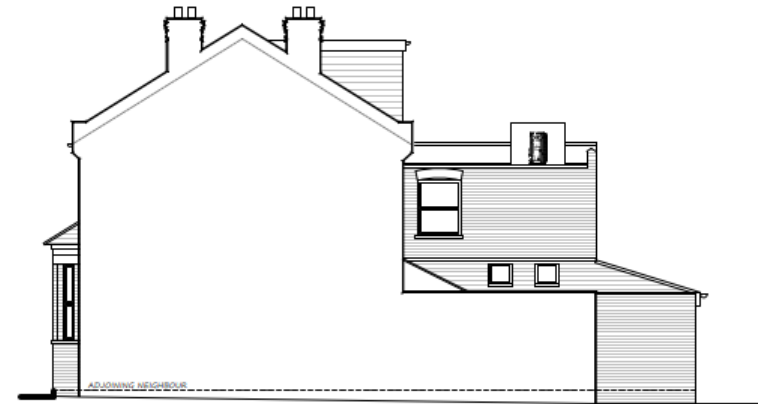
15 July 2024

Not to Scale

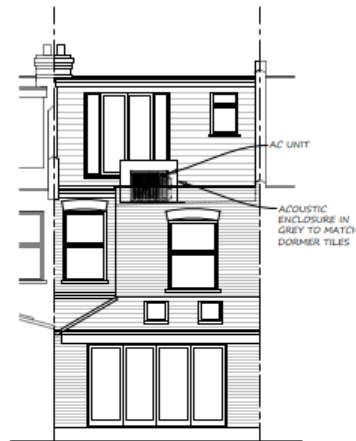




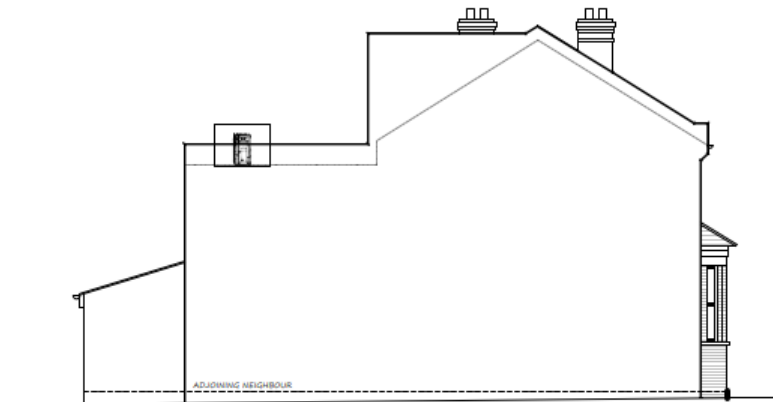
PROPOSED ROOF PLAN 1:100



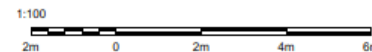
PROPOSED SIDE ELEVATION 1:100



PROPOSED REAR ELEVATION 1:100



PROPOSED SIDE ELEVATION 1:100



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Chiswick, W4 2HA

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office@mzaplanning.com

Title: **PROPOSED FLOOR PLAN & ELEVATIONS**

Dwg.No: 465-PROP-02

REV B: 15/07/2024

Project: 207 Hermitage Road
London
N4 1NW

Date: 24-11-22
Scale: 1:100 @ A3

207 Hermitage Road, London, N4 1NW

Architects Plans showing Proposed Unit Location

Project 12405

Figure 2

15 July 2024

Not to Scale



RBA ACOUSTICS

W. www.rba-acoustics.co.uk

E. info@rba-acoustics.co.uk

London:

44 Borough Road

London SE1 0AJ

T. +44 (0) 20 7620 1950

Manchester:

Bloc, 17 Marble Street

Manchester M2 3AW

T. +44 (0) 161 661 4504

