REPORT

NOISE IMPACT ASSESSMENT

SITE ADDRESS

52 SAVERNAKE ROAD, LONDON NW3 2LA

REFERENCE

HA/AD409/V1.1

HEALTHY ABODE ACOUSTICS
BUILDING ACOUSTICIANS & ENVIRONMENTAL NOISE CONSULTANTS

Our Ref	HA/AD409/V1.1
Site Address	52 Savernake Road, London NW3 2LA
For	Daisy Straker
Client Address	52 Savernake Road, London NW3 2LA
Date of Report	23 September 2021
Author	Mr Leo Hawkins PGdip (IOA) BSC (Hons) AMIOA
Checked by	Miss Josie Nixon MSc BA (Hons) MIOA

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EXECUTIVE SUMMARY

- Daisy Straker instructed Healthy Abode Ltd t/a as HA Acoustics to undertake a noise impact assessment for the proposed installation of a 1x Mitsubishi MXZ-5F102VF residential Air Conditioning Condenser Unit (ACU) at 52 Savernake Road, London NW3 2LA.

- HA Acoustics has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive receptors (NSR). The nearest NSR to the proposed ACU is a window in the rear façade of a residential property at second floor level of the adjacent property No.54 Savernake Road, located approximately 6 metres from the proposed ACU location.

- A baseline noise survey and assessment has been undertaken in line with the guidance contained in BS 4142: 2014 +A1: 2019, measurements being taken over continuous 15-minute periods.

- The unattended survey was conducted on Thursday 8th July 2021 – Monday 12th July 2021, at a fixed monitoring point, located at the rear of the site.

- Due to the nature of air conditioning units, the plant could be in operation at any time of the day or night. The nighttime typical background noise level has been calculated at 28dB $L_{A90,15mins.}$ The noise criteria has been set **10dB below the typical night-time background at 18dB $L_{Ar,Tr}$ in line with the local authority's requirements**.

- Noise calculations of the proposed plant have been undertaken using all available details and plans provided by the client and obtaining manufacturers' specifications. **The resultant rating noise level with mitigation has been calculated at the NSR at 18dB $L_{Ar,Tr}$.**

- In accordance with BS 4142:2014 +A1: 2019 guidance, the noise impact from the operation of the Air Conditioning Condenser Unit "***is an indication of the specific sound source having no impact***" at the NSR.

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Appendices

1. INTRODUCTION

1.1. Daisy Straker instructed Healthy Abode Ltd t/a HA Acoustics to undertake a noise impact assessment at 52 Savernake Road, London NW3 2LA for submission as part of documentation to be provided to the Local Authority, London Borough of Camden Council.

1.2. 52 Savernake Road, London is proposing to install a new air conditioning system with an external condenser unit (1x Mitsubishi MXZ-5F102VF) mounted on the east façade of the premises, the noise from which could have the potential to affect existing noise sensitive properties nearby.

1.3. The purposes of this report are:

1.3.1. To determine prevailing environmental noise levels affecting surrounding properties due to nearby noise sources (e.g. nearby train line, sports arena etc.);

1.3.2. Based on the above, to present noise emission limits in accordance with the requirements of BS 4142: 2014 +A1: 2019, and

1.3.3. To undertake an assessment to demonstrate compliance with the Local Authority noise requirements.

2. SITE DESCRIPTION

2.1. 52 Savernake Road, London NW3 2LA (hereafter referred to as 'the site') is a three-storey residential premises located close to Parliament Hill.

2.2. The local area is predominantly residential, with other residential premises located directly on either side. The rear garden of the site backs onto the overground railway line which runs between Gospel Oak and Hampstead Heath stations. Parliament Hill Athletics Track is located approximately 45m to the north of the site on the other side of the railway line. A site plan (SP1) can be seen in appendix A.

2.3. The plant is proposed to be located to the side façade of the residential dwelling at first floor height. The proposed location of the plant can be seen in Appendix E

2.4. The nearest noise sensitive receptor (NSR) is noted to be a window in the rear façade of No.54 Savernake Road, at approximately 6 metres from the proposed plant location, with no line of sight. It can be confidently assumed that if the noise impact assessment indicates that the specific sound source has a low impact at this premises then it can be safely assumed it will be met at other properties of equal distance and/or those further away.

2.5. At the time of installation and collection of the monitoring equipment, the dominant noise sources emanated from the nearby train line, activity at Parliament Hill Athletics track, as well as some nearby road traffic and residential activity noise. These noise sources are considered normal to the site location. No significant abnormal noise sources were identifiable. It is considered that the measured noise levels are reasonable given the location of the measurement position.

3. ENVIRONMENTAL NOISE SURVEY METHODOLOGY

3.1. An unmanned environmental noise survey was undertaken at a single measurement location at the rear of the site. The survey was undertaken between 11:30 hours on Thursday 8th July 2021 and 11:30 hours on Monday 12th July 2021.

3.2. The sound level meter (SLM) was mounted onto a tripod approximately 1.5 metres above ground level and positioned more than 3.5m from the rear façade of the property and other walls/fences. The position is considered to be 'free-field' therefore acoustic corrections of -3dB have not been applied to the measurements. The position is considered to be representative of background noise levels at the nearest identified NSR. The monitoring position is identified in Appendix A.

3.3. The equipment used for the noise survey is summarised in Table 3.1.

Equipment	Description	Quantity	Serial Number
Larson Davis LxT SE	Class 1 automated logging sound level meter	1	0004960
377BO2 microphone	Class 1 ½" microphone	1	168839
Svantek SV33A	Class 1 Calibrator	1	73297

Table 3.1 Description of Equipment used for Noise Survey

3.4. Ambient, background and maximum noise levels (L_{Aeq}, L_{A10}, L_{A90} and L_{AmaxF} respectively) were measured throughout the noise survey in consecutive 15-minute periods.

3.5. The noise survey and measurements were conducted, wherever possible, in accordance with BS7445-1:2003 *'Description and measurement of environmental noise. Guide to quantities and procedures'*. Measurements were made generally in accordance with ISO 1996-2:2007 *'Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels'*.

3.6. The noise monitoring equipment was calibrated before and after the noise survey period. No significant drift was recorded. Equipment calibration certificates can be provided upon request.

3.7. Weather conditions were noted to be:

3.7.1. During installation - warm (approximately 20° Celsius), generally dry*, with cloudy skies (approximately 100% cloud cover) and a light wind (<5m/s).

**There was some light rainfall during installation of the equipment, however this cleared up prior to leaving site and was not deemed to impact the results of the survey.*

3.7.2. During collection - warm (approximately 18° Celsius), dry, with mostly cloudy skies (approximately 50-60% cloud cover) and a light wind (<5m/s).

3.7.3. Throughout the entire noise survey period – mild to warm (approximately 13-24° Celsius), generally dry, with mostly cloudy skies (approximately 40-100% cloud cover) and a light wind (<5m/s).

3.8. These weather conditions were checked against and confirmed by the use of the Met Office mobile application available on smart phone technology. These conditions were maintained throughout the whole survey period and are considered reasonable for undertaking environmental noise measurements.

4. EXTERNAL NOISE EMISSION CRITERIA

4.1. Local Authority Criteria

4.2. The proposed site lies within the jurisdiction of the Local Authority, London Borough of Camden Council. An acoustic report is required to support a planning application. The criteria for London Borough of Camden Council, is understood to be as below (obtained from the Camden Local Plan: 2017):

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dB L_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dB L_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room

(based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

4.3. Due to the nature of air conditioning, it is possible that the plant could be operational at any time. The plant is not deemed to be tonal, therefore the criteria will be set at 10dB below typical nighttime background noise levels. In this case the criteria to be met is a maximum rating noise level of 18dB $L_{Ar,Tr}$ when measured at the NSR.

4.4. **National Planning Policy Framework**

4.5. In March 2012, the National Planning Policy Framework (NPPF) came into force and was revised in February 2019. This document replaces a great many planning guidance documents, which previously informed the planning system in England.

4.6. The NPPF (2019) sets out the Government's economic, environmental and social planning policies for England and these policies articulate the Government's vision of sustainable development.

4.7. The Noise Policy Statement for England (NPSE) published 2010 applies to *'all forms of noise, including environmental noise, neighbour noise and neighbourhood noise'.*

4.8. **Paragraph 180 of the NPPF (2019) considers noise, stating:**

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- *c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

4.9. National Planning Policy is guided by the NPPF. With regard to noise, the terms 'significant adverse impact' and 'other adverse impacts' are defined in the explanatory notes of the 'Noise Policy Statement for England' (NPSE). These state that there are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

- 'NOEL – No Observed Effect Level, this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise, and
- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.

4.10. Extending these concepts for the purpose of this NPSE leads to the concept of SOAEL - significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur'. However, no specific noise limits for LOAEL and SOAEL have been defined. Therefore, guidance from other acoustic standards must be employed to determine suitable levels within the overall principal of the National Planning Policy Framework; such as BS 4142:2014.

4.11. **BS 4142: 2014 +A1: 2019**

4.12. BS 4142: 2014 +A1: 2019 "Methods for Rating and Assessing Industrial and Commercial Sound" presents a method for assessing the significance and possible adverse impact due to an industrial or commercial noise source, based on a comparison of the source noise levels and the background noise levels, both of which are measured or predicted at a noise sensitive receiver e.g. a residential property.

4.13. The specific noise level due to the source is determined, with a series of corrections for tonality, impulsivity, intermittency or any other unusual characteristic. This can result in a maximum total correction of +21dB being added if the new noise source demonstrates all the above characteristics. The background noise level is then subtracted from the rating level and a comparison made.

4.14. The significance of the new noise source and the likelihood of any adverse impact is determined in accordance with the following advice:

"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is*

that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

5. NOISE SURVEY RESULTS

5.1. The ambient and background noise levels at the measurement position as seen in Appendix A are provided below and have been based on an analysis of the monitoring data.

5.2. A summary of the data results is provided in Table 5.1 and the time history can be seen in Appendix B (TH1).

	Ambient Noise Level $L_{Aeq, 15min}$	Typical Background Noise Level $L_{A90, 15min}$
Day (07:00 – 23:00)	59dB	37dB
Night (23:00 – 07:00)	55dB	28dB

Table 5.1 Summary of typical noise measurement data

5.3. These noise levels are considered normal to the site location. No significant abnormal noise sources were identifiable during installation or collection of the equipment. It is considered that the measured noise levels are reasonable given the location of the measurement position.

6. NOISE IMPACT ASSESSMENT

6.1. It is proposed to install a single air conditioning condenser unit (Mitsubishi MXZ-5F102VF) on the external facade at first floor level. Calculations have been undertaken to gain the specific noise level of the plant using information provided by the client and from manufacturer specifications.

6.2. Table 6.1 lists the proposed plant to be installed and its operational maximum sound pressure level for heating and cooling periods at 1m.

Plant Make/Model	Reference Sound Pressure Level at 1m*
Mitsubishi MXZ-5F102VF (cooling)	52dB(A)
Mitsubishi MXZ-5F102VF (heating)	56dB(A)

* Manufacturer's specifications are provided in Appendix C.

Table 6.1 Proposed plant

6.3. Table 6.2 lists the sound pressure spectral data for the plant in heating and cooling modes.

	Frequency Spectral Data (Hz) at 1m								
	LZFeq 63	LZFeq 125	LZFeq 250	LZFeq 500	LZFeq 1000	LZFeq 2000	LZFeq 4000	LZFeq 8000	dB(A)
Mitsubishi MXZ-5f102VF (cooling)	54	51	49	52	45	42	39	31	52
Mitsubishi MXZ-5F102VF (heating)	62	60	57	55	49	45	44	34	56

Table 6.2 Spectral sound data

6.4. Detailed calculations to predict the noise level of the plant at 1metre from the NSR are given in Appendix D. The following factors have been taken into account during the assessment and within the calculations.

6.4.1. Although the proposal is for the plant to provide cooling, it also has the ability to heat the residential property, therefore for robustness, the calculations have been undertaken utilising the highest operating level, which is for heating.

6.4.2. A point source calculation has been undertaken to take into account the 5m distance between source and receptor.

6.4.3. There is no line of sight between the plant and the NSR. This screening is conservatively estimated to provide 10dB noise attenuation. This will be accounted for in the calculations.

6.4.4. A correction of +3dB has been added for reflections, due to the proposed plant location between two houses. An increase in sound pressure can be caused through reflections.

6.4.5. A 'penalty' addition has been added to the fans for intermittency as the operation is considered to be such that it has defined on/off conditions which could attract attention at the NSR. A penalty has not been applied for tonality as fans of this type are generally designed to be broadband in nature. Penalty additions have not been applied for impulsiveness or any other unusual characteristics as plant of this type generally do not generate such features.

6.5. In order to meet the noise criteria of 18dB $L_{Ar,Tr}$ at the NSR, the proposed plant requires mitigation. It is recommended that an acoustic enclosure is installed around the plant. The enclosure should provide sufficient attenuation to achieve a maximum sound pressure level of 36dB when measured at 1m in all directions. Table 6.3 gives recommendations of an enclosure that should be suitable to achieve this.

	Insertion Loss (Hz)							
	LZFeq 63	**LZFeq 125**	**LZFeq 250**	**LZFeq 500**	**LZFeq 1000**	**LZFeq 2000**	**LZFeq 4000**	**LZFeq 8000**
Acoustic enclosure	9	11	18	25	32	34	33	34

Table 6.3 Proposed Mitigation

6.6. The proposed plant installation with acoustic enclosure would be expected to meet the requirements of the proposed criteria.

6.7. Detailed calculations to predict the noise level of the plant at 1metre from the NSR are given in Appendix D. The rating noise level at 1m from the NSR is **18dB $L_{Ar,Tr}$** and **10dB(A) below** the assessed background noise level (28dB $L_{A90,15min}$). In accordance with BS 4142:2014 guidance, the rating noise **"is an indication of the specific sound source having no impact"**. The lower the rating level is relative

to the measured background level, the less likely it is that the specific sound source will have an adverse impact.

6.8. Vibration from plant is not expected. However, as a precaution, all plant should be installed with anti-vibration isolators. Anti-vibration mounts are widely available from system suppliers/installers and shall need to be installed in accordance with the type, make and model of the mechanical plant specified. Anti-vibration mounts are often in pedestal rubber mountings. Examples of these are MPO and MP1, and ISL Maxi pedestal vibration mounts. These types of anti-vibration and shock isolators are industry standard and commonplace on air conditioning and ventilation systems. They are designed to provide medium to high frequency isolation from vibration and noise via high resilience rubber. Once type, location, manufacturer make and model of proposed mechanical plant is known, the M+E contractor shall be able to advise upon the specific anti-vibration isolators required to ensure no adverse impact occurs.

6.9. As BS 4142:2014 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

6.9.1. The assessment is undertaken at the most affected existing residential windows. The impact on all other nearby residential windows will be lower due to screening and distance attenuation.

6.9.2. It should be noted that the above assessment is based on the plant operating at maximum duty. Given that the plant will not operate at maximum capacity all of the time, the above assessment is considered to be representative of the worst case.

6.10. British Standard 8233:2014 'Sound insulation and noise reduction for buildings – Code of Practice' gives recommendations for acceptable internal noise levels in residential properties. Assuming worst case conditions, of the closest window being for a bedroom, BS8233:2014 recommends 30dB(A) as being acceptable internal resting/sleeping conditions during night-time. According to BS8233:2014, the façade of a residential dwelling; with a window partially open for ventilation offers 15 dB attenuation. Therefore, taking into account this reduction for a partially open window the internal noise level with the plant operating would be 3dB(A) which is lower than the acceptable internal noise level as seen under BS 8233: 2014; and significantly lower than the background.

7. UNCERTAINTY

7.1. The levels of uncertainty in the data and calculations are considered to be low given the robust exercise undertaken in noise monitoring and the confidence in the statistical analysis.

7.2. All measurements taken on-site by instrumentation are subject to a margin of uncertainty. This is relatively small, with a sound level meter manufacturer's margin of uncertainty at +/-1.1dB. It is due to the tolerances associated with the Class 1 sound level meter and calibrator equipment used to measure background.

7.3. The meter and calibrator used have a traceable laboratory calibration and were field calibrated before and after the measurements.

7.4. Manufacturers' data for the plant is likely to be robust. Detailed calculations and resultant noise levels at the residential location are considered to be confidently predicted.

7.5. Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.

8. CONCLUSION

8.1. A noise impact assessment has been undertaken at 52 Savernake Road, London NW3 2LA for the proposed plant installation. The noise survey was undertaken at a fixed monitoring point, representative of the nearest noise sensitive receptor.

8.2. Following on-site measurement of pre-existing noise levels, calculations have been made of the noise rating level of the proposed plant at the NSR. From this assessment, together with information from the plant manufacturer, the potential noise impact has been determined.

8.3. The Rating Noise level from the plant at 1m from the NSR are predicted to be **18dB $L_{Ar,Tr}$**.

8.4. BS 4142: 2014 +A1: 2019 assessment methodology shows that the rating noise level from the ACU following mitigation is predicted to be **10dB(A) below** the typical night-time background of **28dB $L_{A90,15min}$** at the NSR. In accordance with BS 4142:2014, noise levels from the plant "***is an indication of the specific sound source having no impact"***.

8.5. Considering the results of the noise survey, the illustrative layouts and the calculations, the predicted resultant noise levels from the proposed plant are predicted to meet appropriate and reasonable guidance and the relevant noise criteria. Therefore, an adequate level of protection against noise for occupants of the nearest noise sensitive receptor is afforded; including when factoring in potential uncertainty.

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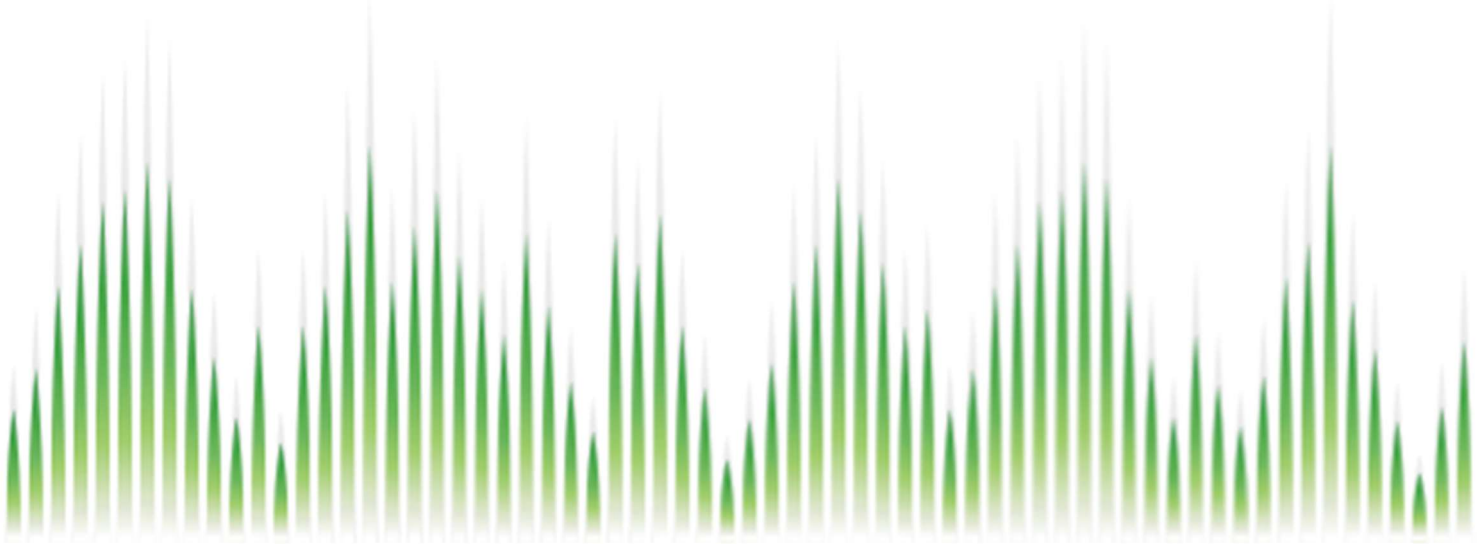
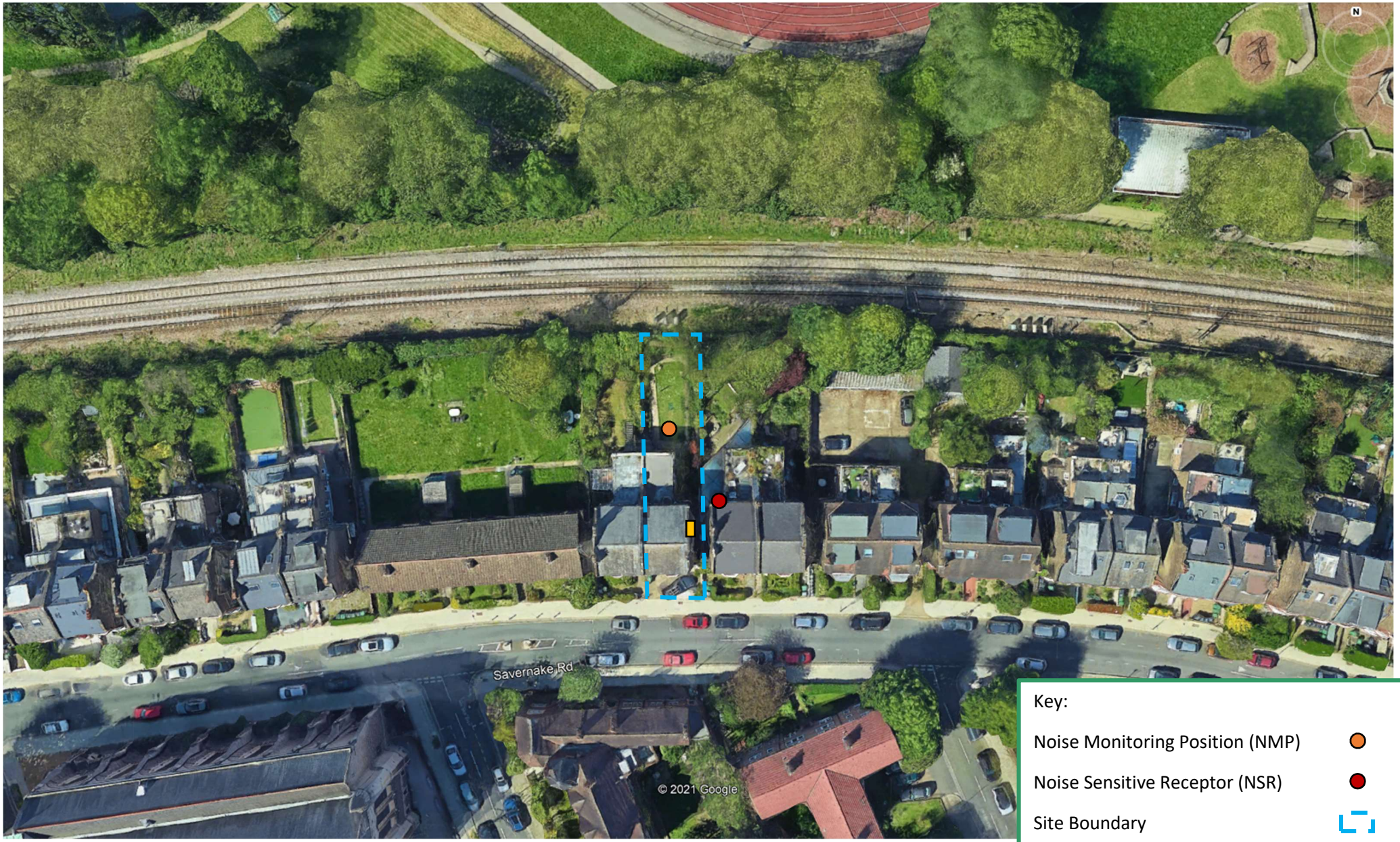


Appendix A – Site Plan

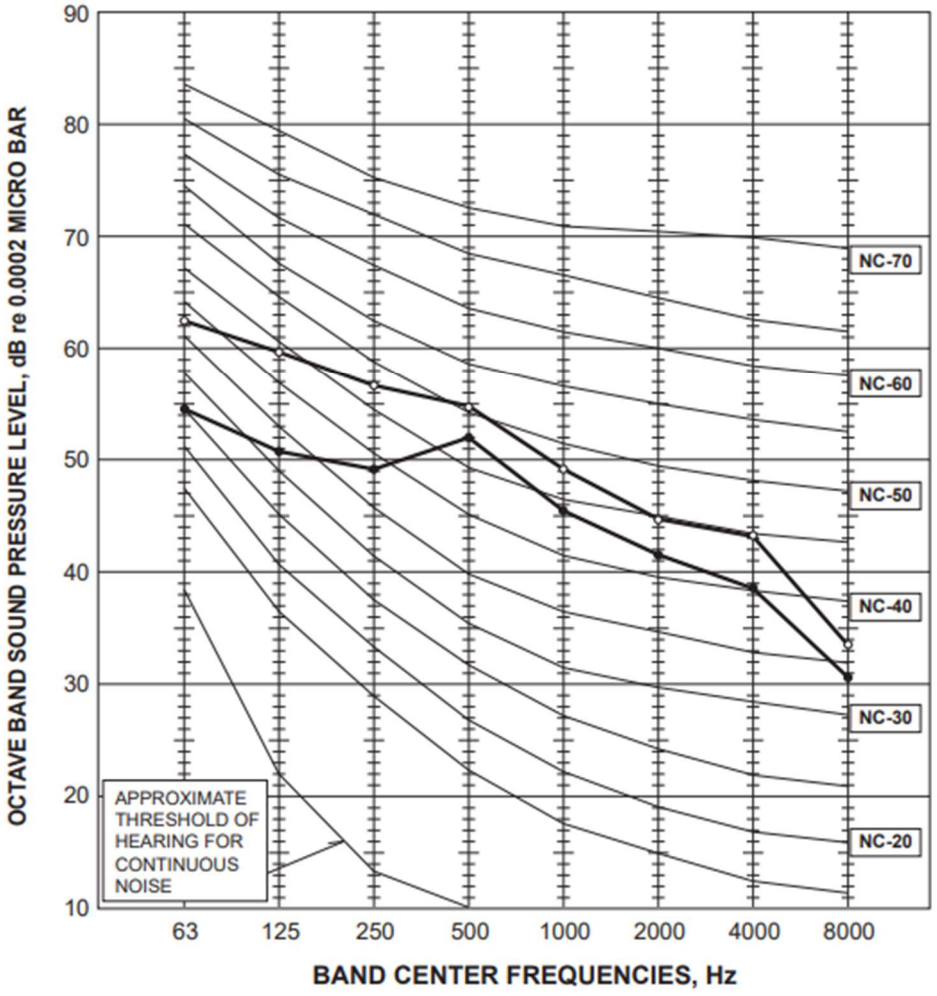


Appendix B - Time History 1 (TH1)

52 Savernake Road, London
Thursday 8th July 2021 - Monday 12th July 2021

MXZ-5F102VF

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	Cooling	52	●——●
High	Heating	56	○——○



Noise Sensitive Receiver 1

Mitsubishi MXZ-5F102VF									
	Frequency Spectral Data (Hz)								
	63	125	250	500	1000	2000	4000	8000	dB(A)
Plant Sound Pressure Level at 1m	62	60	57	55	49	45	44	34	56
BS4142 Penalty for Intermittancy	3	3	3	3	3	3	3	3	
Reflections	3	3	3	3	3	3	3	3	
Distance mitigation (5m)	-14	-14	-14	-14	-14	-14	-14	-14	
No Line of Sight	-10	-10	-10	-10	-10	-10	-10	-10	
Enclosure Mitigation	-9	-11	-18	-25	-32	-34	-33	-34	
Calculated level at 1m from Receiver 1	**35**	**31**	**21**	**12**	**0**	**0**	**0**	**0**	**18**

Noise Criteria	**18**
No Observed Affect Level	

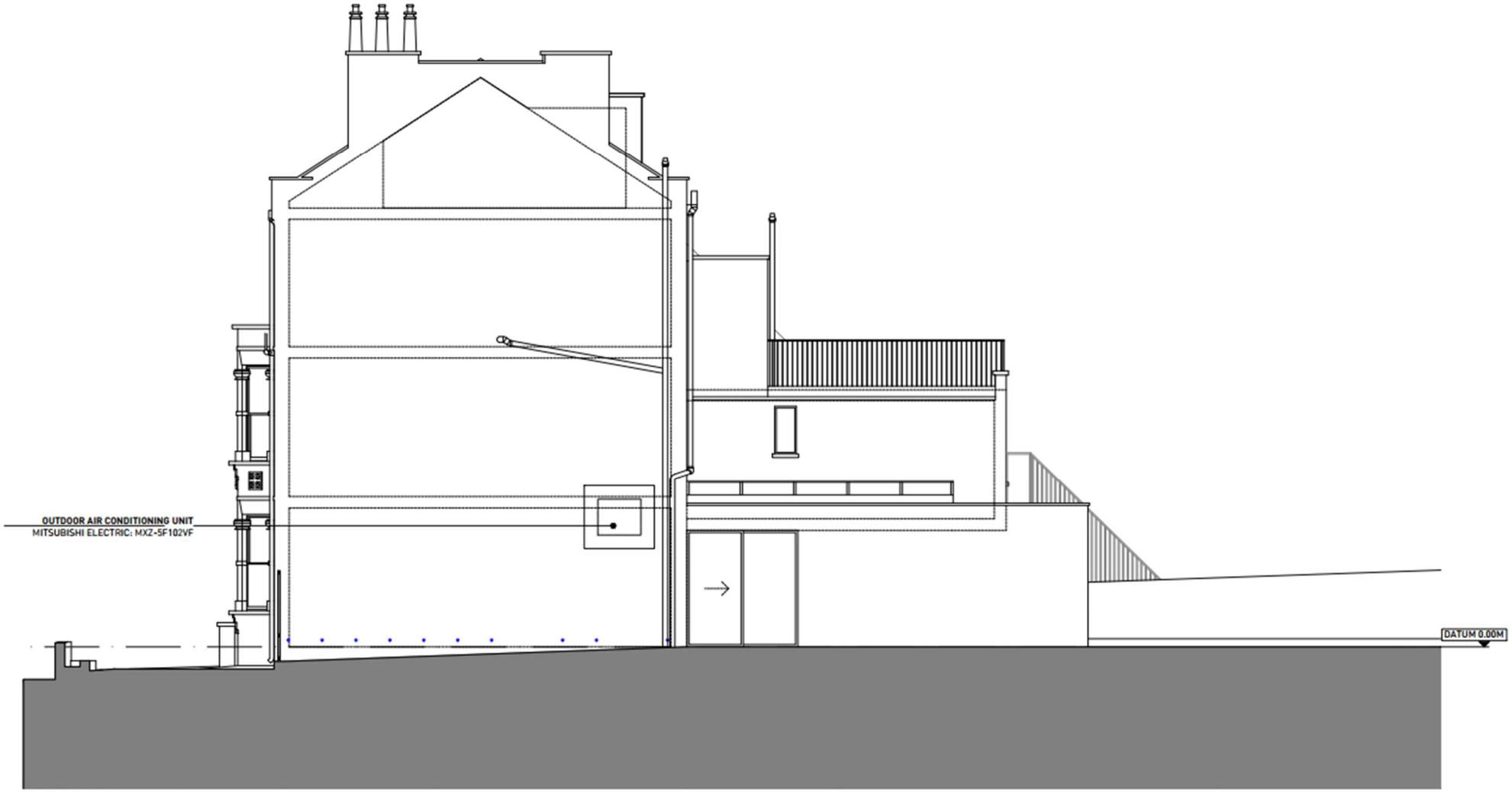
BS8233: Internal Night Time Levels

	Frequency Spectral Data (Hz)								
	63	125	250	500	1000	2000	4000	8000	dB(A)
Calculated level at NSR	35	31	21	12	0	0	0	0	18
Partially Open Window Attenuation	-15	-15	-15	-15	-15	-15	-15	-15	
Calculated level in Internal Receiver	20	16	6	0	0	0	0	0	3

BS8233 Night Time Criteria	**30**


OUTDOOR AIR CONDITIONING UNIT
MITSUBISHI ELECTRIC: MXZ-5F102VF
DATUM 0.00M

Appendix E – Architectural Plans



Appendix E – Architectural Plans