RBA ACOUSTICS

33 BEDFORD ROW, LONDON WC1R 4JH

Plant Noise Assessment

Reference: 11526.RP01.PNA.0
Prepared: 9 March 2022
Revision Number: 0

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Plant Noise Assessment

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	9 March 2022	Josh Evans	Torben Andersen

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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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1. INTRODUCTION

It is proposed to locate new items of plant at 33 Bedford Row, London WC1R 4JH. As part of the planning application, London Borough of Camden requires consideration be given to atmospheric noise emissions from the proposed equipment to the nearest noise-sensitive receptors.

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

A summary of acoustic terminology is included in Appendix A.

2. ENVIRONMENTAL NOISE SURVEY

2.1 General

In accordance with the requirements of the Local Authority, monitoring of the prevailing background noise was undertaken over the following period:

Wednesday 8 December to Thursday 9 December 2021

As the survey was unattended it is not possible to comment with certainty regarding meteorological conditions throughout the entire survey period, however the weather was generally considered satisfactory it being predominantly dry with light winds.

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

2.2 Measurement Location

To determine the existing noise climate around the site measurements were undertaken at the following location.

Measurements were taken on the third-floor roof at 33 Bedford Row. The microphone was positioned on a tripod and elevated to a height of 1.7m above roof level. The measurement position is also illustrated on the Site Plan in Figure 1.

The prevailing noise climate was noted to mainly consist of traffic noise from the surrounding road network which, although relatively quiet, are considered the dominant noise source. In addition to this construction noise and noise from nearby building services plant emissions were also audible from the microphone position.

RBA Acoustics would regard the measurement position of being representative of the noise climate at the nearest residential receptors.

2.3 Instrumentation

Details of the instrumentation used to undertake the survey are provided in Appendix B.

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

3. RESULTS

The noise levels measured are shown as time-histories on the attached Graphs 1 and 2 in Appendix C.

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	L_{90} (dBA)	L_{eq} (dBA)
Daytime (07:00 – 23:00)	47	57
Night-time (23:00 – 07:00)	44	50

4. PLANT NOISE CRITERIA

Policy A4 of Camden Local Plan 2017 provides the following information regarding the required noise levels for proposed plant items:

> *A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS4142) will be used. For such cases a 'Rating Level' of 10dB below background (15dB if tonal components are present) should be considered as the design criterion.*

In line with the above and the noise levels measured on site we would propose the following limits are targeted:

- Daytime 37 dB
- Night-time 34 dB

In line with BS 4142: 2014, should the proposed plant be identified as having intermittent or tonal characteristics, a further penalty should be subtracted from any of the above proposed noise emission limits.

5. IDENTIFIED RECEPTORS

The following noise sensitive receptor has been identified by RBA Acoustics. RBA Acoustics have identified a single residential receptor which sit near the installation on the first-floor roof with a direct view to the plant. This are as follows:

- First floor windows of The Old School Building (to the rear of the site overlooking the courtyard between The Old School and 33 Bedford Row)

A photo of this receptor is also shown in Figure 3.

6. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided to RBA by the Anslow Partnership and is described in the following sections.

6.1 Proposed Plant Items

The following plant is proposed for the scheme:

Table 1 – Plant Types

Manufacturer/Model/Duty	Plant Type
Mitsubishi PUZ-ZM50VKA	Condensing Unit
Puma – Fa 200/200 CT/DD-DSK	Supply Fan

6.2 Plant Locations

Both items of plant are to be located on a first-floor roof to the rear of the development. The Puma Supply Fan is to be placed within an enclosure with an open grille for air intake. The manufacturer have provided an SWL for the unit in this enclosure for use in this assessment. The equipment positions are indicated on the site plan in Figure 4 in Appendix E.

6.3 Plant Noise Levels

Information regarding the noise levels of the proposed plant has been provided by the manufacturer of the unit. The associated plant noise levels are detailed as follows:

Table 2 – Plant Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Mitsubishi PUZ-ZM50VKA	SPL at 1m	58	50	45	44	40	37	32	31
Puma – (Casing Breakout)	SWL	54	46	46	44	49	41	36	26

Review of the octave band data provides no indication of any tonal characteristics associated with the proposed plant.

6.4 Location of the Nearest Noise-Sensitive Receptors

As stated above the nearest residential receptor is the first-floor windows belonging to the Old School Building, these are located at a distance of 5m from the proposed building services plant.

6.5 Mitigation

It is proposed to enclosure the condensing unit with an Environ ELV1.1.25AC Acoustic Enclosure. The manufacturer data details that this enclosure will achieve the following transmission losses:

Table 4 – Enclosure Transmission Loss

Transmission Loss (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
14	16	23	30	37	39	38	39

6.6 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 / SWL
- Mitigation
- Distance Attenuation
- Screening

Calculation sheets are attached for further information in Appendix C.

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

Table 5 – Predicted Noise Levels

Operating Period	Noise Level (dB) at Receptor 1 – Name	
	Prediction	Criterion
Daytime (07:00 – 23:00)	24	37
Night-time (23:00 – 07:00)	24	34

Noise from the proposed plant installations is within the target criteria. Therefore, the proposals should be considered acceptable.

7. 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 / fans / 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.

8. CONCLUSION

RBA Acoustics have undertaken noise monitoring at 33 Bedford Row. 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 plant installations.

The results of the assessment indicate atmospheric noise emissions from the proposed plant are within the criteria required by the London Borough of Camden provided the proposed mitigation measures are included in the installation. As such, the proposed plant installations should 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.
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.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1406971	U38866	2 September 2023
Norsonic Pre Amplifier	1209	21571		
GRAS ½" Microphone	40AF	207393	38865	2 September 2023
Norsonic Sound Calibrator	1251	35016	U38864	1 September 2023

Appendix C – Plant Calculations

Table C1 – Example Calculation, Condensing Unit

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
SPL at 1m	58	50	45	44	40	37	32	31	46
Distance losses @ 5m	-14	-14	-14	-14	-14	-14	-14	-14	-
Screening	-5	-5	-5	-5	-5	-5	-5	-5	-
Acoustic Enclosure	-14	-16	-23	-30	-37	-39	-38	-39	-
Noise level at receiver	25	15	3	-5	-16	-21	-25	-27	3

Table C2 – Summary Noise Levels

Unit	Received noise level (dB) at 1m from Receptor 1
Condensing Unit	3
Supply Fan	24
Total Received Level	24

Appendix D – CDM Considerations

The likelihood the harm will occur can be assessed by applying an indicative score (from 1 to 5) as follows:

1 – Remote (almost never)
2 – Unlikely (occurs rarely)
3 – Possible (could occur, but uncommon)
4 – Likely (recurrent but not frequent)
5 – Very likely (occurs frequently)

The severity of harm can be assessed by applying an indicative score (from 1 to 5) as follows:

1 – Trivial (e.g. discomfort, slight bruising, self-help recovery)
2 – Minor (e.g. small cut, abrasion, basic first aid need)
3 – Moderate (e.g. strain, sprain, incapacitation for more than 3 days)
4 – Serious (e.g. fracture, hospitalisation for more than 24 hours, incapacitation for more than 4 weeks)
5 – Fatal (single or multiple)

The rating value is obtained by multiplying the two scores and is then used to determine the course of action.

Table D1 – Risk Ratings

Rating Bands (Severity x Likelihood)		
Low Risk (1 – 8)	Medium Risk (9 -12)	High Risk (15 – 25)
May be ignored but ensure controls remain effective	Continue, but implement additional reasonable practicable controls where possible	Avoidance action is required; therefore alternative design solutions must be examined. Activity must not proceed until risks are reduced to a low or medium level

The following hazards pertinent to our design input have been identified and control measures suggested:

Table D2 – Risk Assessment

Hazard	Risk Of	At Risk	Rating			Control Measures	Controlled		
			L	S	R		L	S	R
Vibration Isolators	Injury to hands	Contractors	3	3	9	Care needs to be taken during adjustment. Follow manufacturers guidance	1	3	3

L: Likelihood S: Severity R: Rating

Appendix E – Graphs and Site Plans

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L_{Aeq} Time History

Measurement Position 1, Wednesday 8 December to Thursday 9 December 2021

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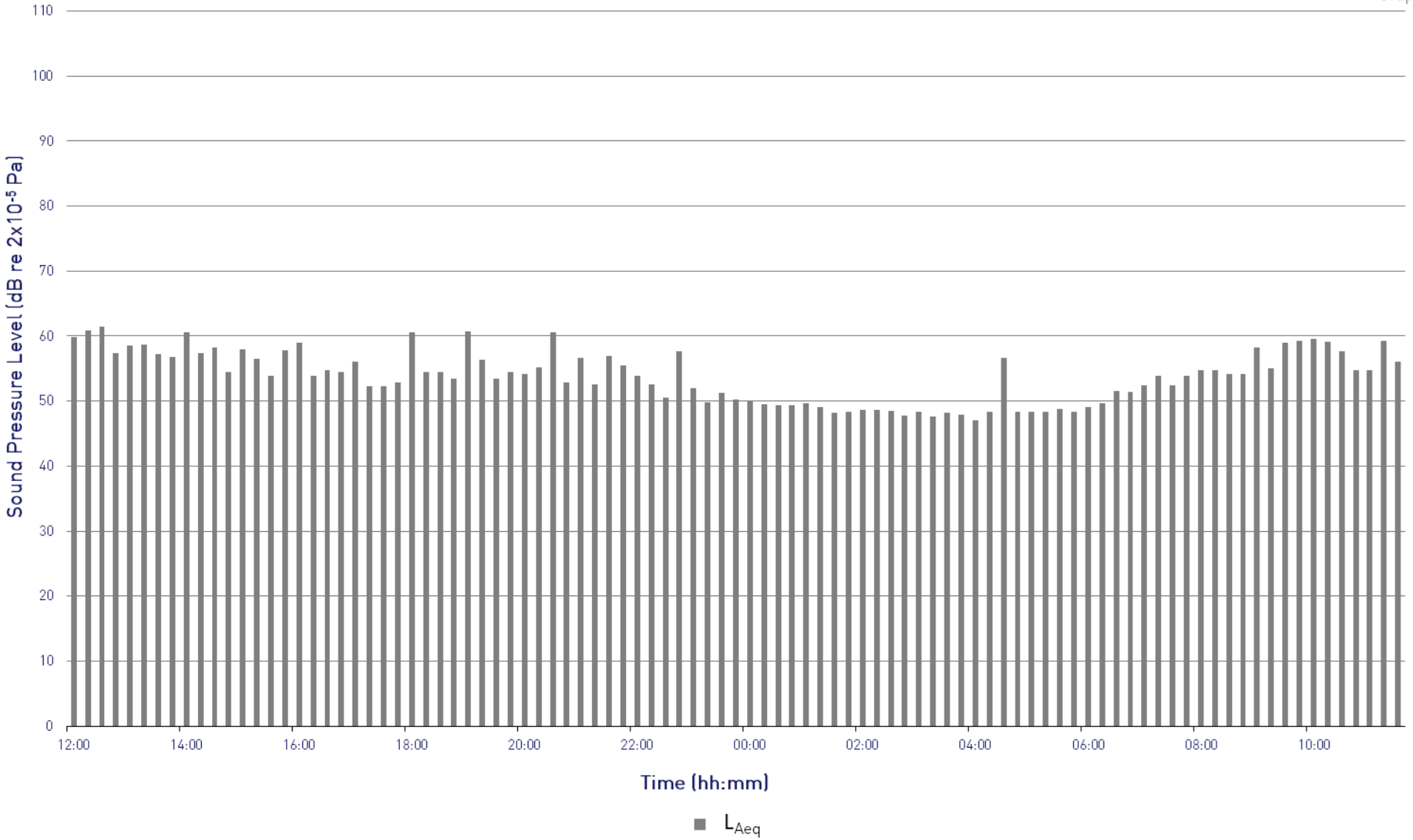
Graph 1



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

Measurement Position 1, Wednesday 8 December to Thursday 9 December 2021

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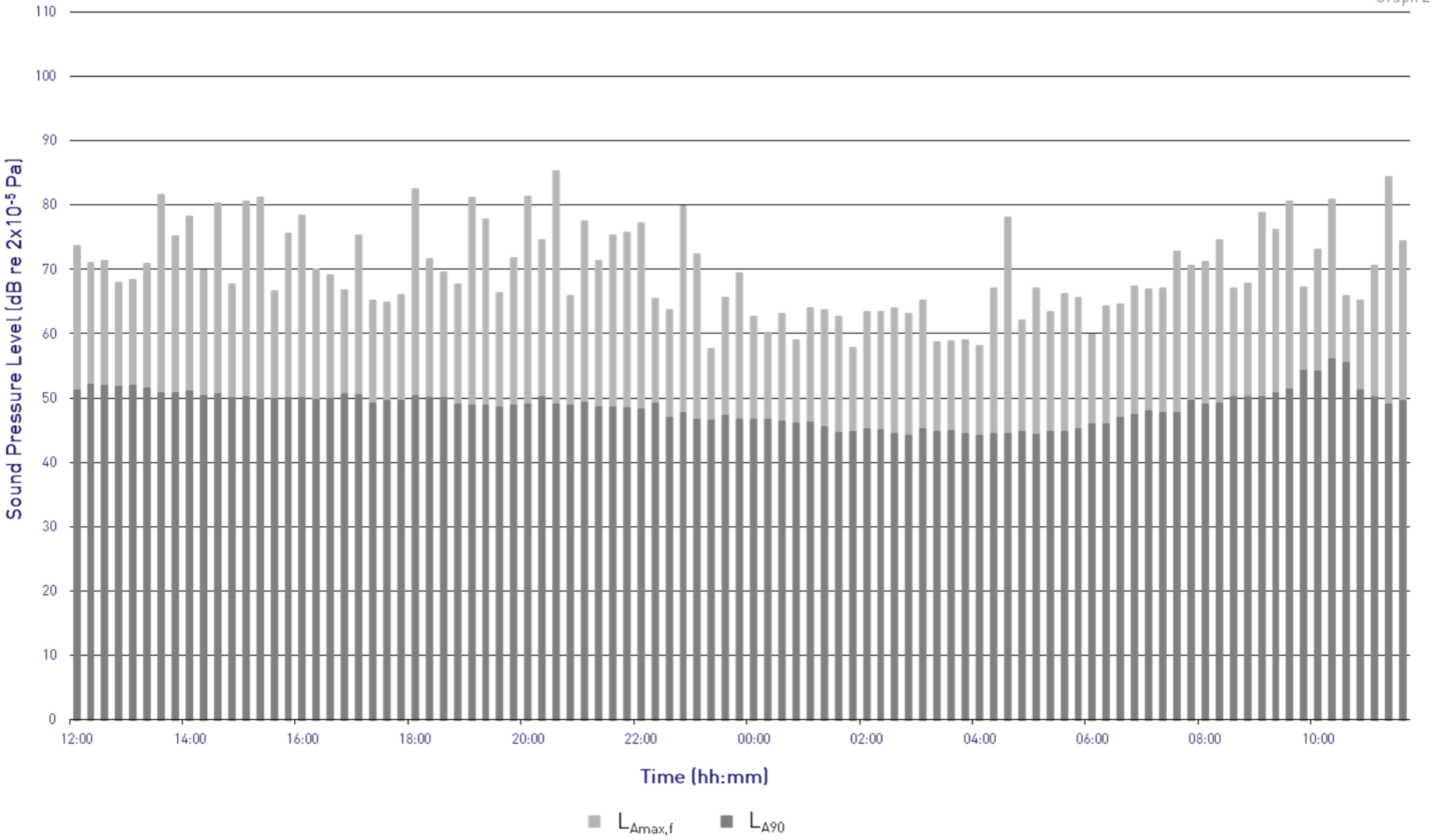
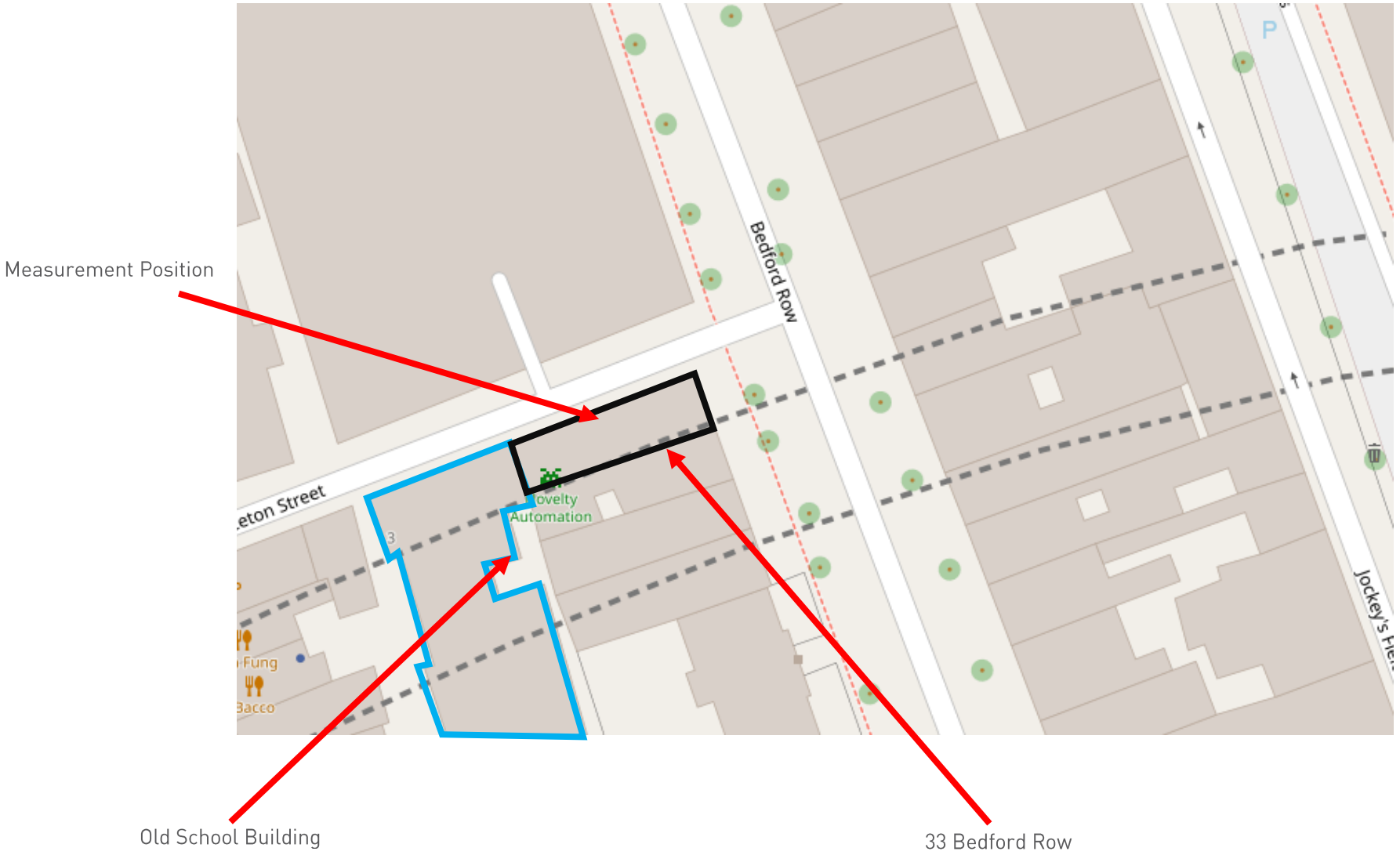
Graph 2





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Site Plan from Open StreetMap

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Figure 1

9 March 2022

Not to Scale

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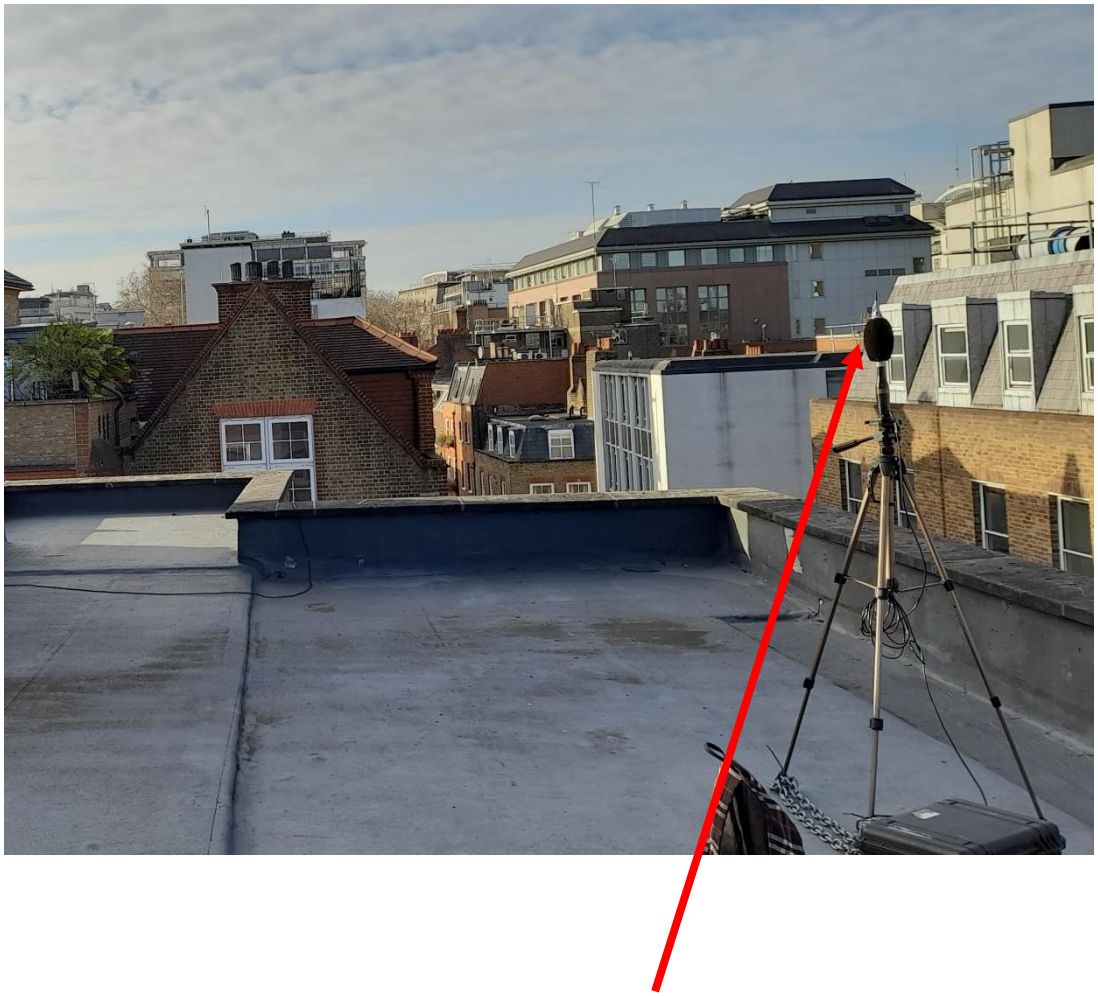

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Photo of Measurement Position

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Figure 2

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Not to Scale

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33 Bedford Row, London WC1R 4JH

Photo of Nearest Receptor and Plant Location

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Figure 3

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Not to Scale

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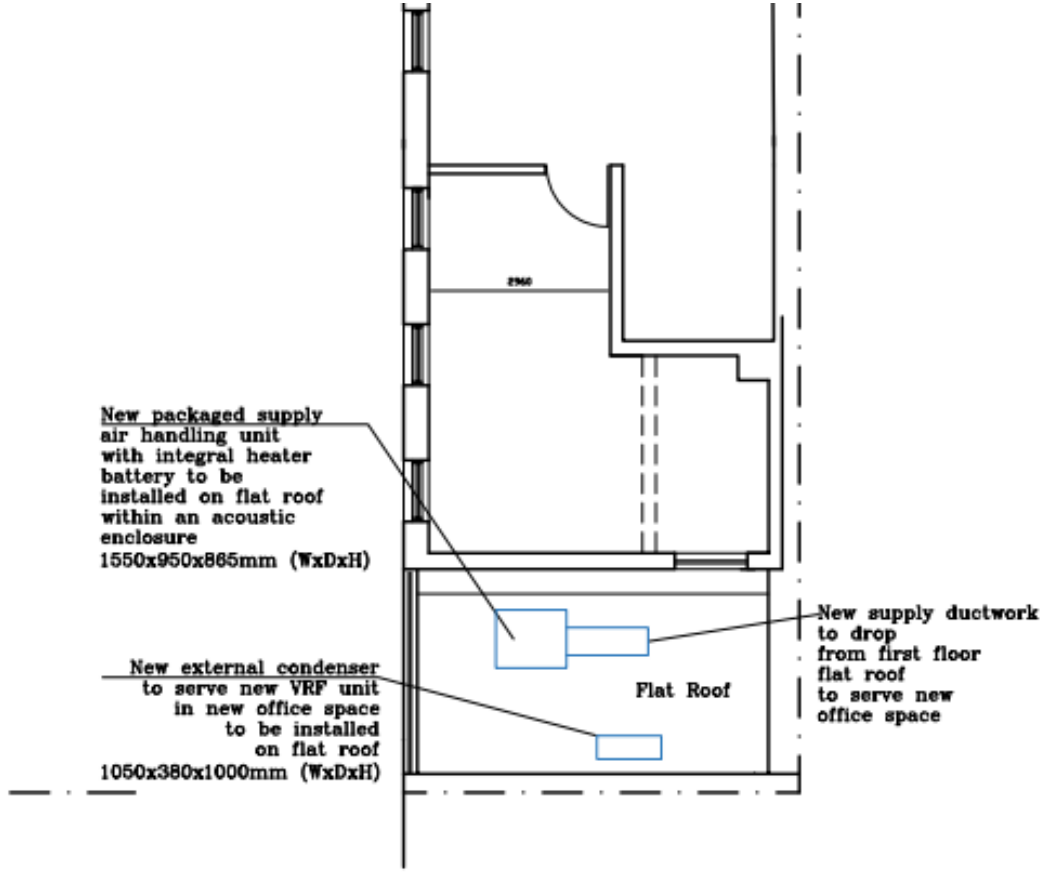

FIRST FLOOR PLAN

33 Bedford Row, London WC1R 4JH

Drawing of Proposed Plant

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Figure 4

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Not to Scale

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