RBA ACOUSTICS

42 STRADELLA ROAD, LONDON SE24 9HA

Plant Noise Assessment

Reference: 13140.RP01.PNA.1
Prepared: 14 November 2023
Revision Number: 1

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Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	14 November 2023	Struan Carmichael	Robert Barlow
1	Revised to include updated site description	14 November 2023	Struan Carmichael	Robert Barlow

Terms of contract:

RBA Acoustics Ltd have prepared this report in accordance with our Scope of Work 13140.SW01.0 dated 20 October 2023. RBA Acoustics Ltd shall not be responsible for any use of the report or its contents for any purpose other than that for which it was provided. Should the Client require the distribution of the report to other parties for information, the full report should be copied. No professional liability or warranty shall be extended to other parties by RBA Acoustics Ltd without written agreement from RBA Acoustics Ltd.

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 42 Stradella Road, London. As part of the planning application, London Borough of Southwark 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 London Borough of Southwark'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. SITE DESCRIPTION

The site is an existing 3 storey building with a driveway and a lawn at the front, and at the rear of the site is a garden. Adjacent properties are residential dwellings. The current noise climate consists primarily of traffic noise from Stradella Road and noise from a nearby railway line. Noise from construction works at a neighbouring property were also noted whilst on site. The site is shown in relation to its surroundings in the site plan in Figure 1 (Appendix E).

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

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

- 11:15 hours Tuesday 7th November to 10:30 hours Wednesday 8th November 2023.

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 at the rear of the site, in the garden. The microphone was installed on a tripod approximately 2 meters off the ground and in free-field conditions.

The measurement position is also illustrated on the site plan attached in Figure 1 and photo in Figure 2 (Appendix E).

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 observed.

3.4 Results

The noise levels measured are shown as time-histories on the attached Graphs 1 and 2 (Appendix E). The typical lowest L_{A90} and the period averaged L_{Aeq} noise levels measured are summarised below. The typical lowest $L_{A90,15min}$ is based on a level which represents approximately the lowest 10th percentile of measured $L_{A90,15min}$ measurements during that period.

Table 1 – Measured Baseline Noise Levels

Measurement Period	Position – Rear Garden Area	
	Typical Lowest Background Noise Level $L_{A90,15min}$ (dB)	Period-Averaged Noise Level $L_{Aeq,T}$ (dB)
Daytime (07:00 – 23:00)	36	52
Night-time (23:00 – 07:00)	30	44

4. PLANT NOISE CRITERIA

The requirements of London Borough of Southwark's Environmental Health Department regarding new building services plant are understood to be as follows.

> *"In order for planning permission to be recommended it is required that the assessment Rating sound level does not exceed the typical minimum L_{A90} (15 minute) background sound level at any time. Furthermore in order to prevent gradually creeping background levels over time it is required that the unrated Specific sound level does not exceed 10dB below the typical minimum L_{A90} (15 minute) background sound level at any time. The 'Specific', 'Rating' and 'Background' sound levels shall be calculated fully in accordance with the methodology of BS4142:2014."*

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.

Following the above requirements, we would propose items of mechanical services be designed so that noise emissions from the plant do not exceed the following levels when assessed at the nearest noise sensitive location:

Table 2 – Plant Noise Limits

Assessment Period	Plant Noise Criteria to be achieved at 1m outside the window of the nearest Noise-Sensitive Receptor (NSR)
Daytime (07:00 – 23:00)	26
Night-time (23:00 – 07:00)	20

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. It should be noted that the above requirements are applied at the nearest residential adjacencies and alternative criteria should be incorporated if there are also commercial properties affected by the proposed plant installations.

5. PLANT NOISE ASSESSMENT

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

5.1 Proposed Plant Items

The following plant is proposed for the scheme:

Table 3 – Plant Types

Ref.	Plant Location	Manufacturer/Model/Duty	Plant Type
ASHP1	Rear Garden Area	Vaillant aroTHERM plus air-to-water heat pump 12kW (VWL 125/6 A 230V S2)	Air Source Heat Pump

5.2 Plant Locations

The item of plant is proposed to be installed in the rear garden area. The plant location is illustrated in Figure 1 in Appendix E.

5.3 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 4 – Plant Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)								
		63	125	250	500	1k	2k	4k	8k	dBA
ASHP1	L_w	-	50	52	53	57	53	47	42	52

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

5.4 Location of the Nearest Noise-Sensitive Receptors

Based on observations made on site and discussions with the design team we understand that the nearest noise-sensitive receptors to the proposed plant are the adjacent residential dwelling on 40 Stradella Road.

Figure 1, Appendix E, outlines the nearest noise receptors to the proposed plant items.

5.5 Calculation of Noise Levels at Nearest Noise-Sensitive Receptors

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

- Source Term SPL / SWL
- Hemispherical Radiation
- Distance Attenuation
- Reflections

Calculation sheets are attached for further information in Appendix C.

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

Table 5 – Predicted Plant Noise Levels

Operating Period	Noise Level (dB) at Receptor 1 – 40 Stradella Road	
	Prediction	Criterion
24 Hours	34	20

Noise from the proposed plant installations have shown to exceed the criterion. We therefore recommend the following mitigation measures be included in the design and installation.

5.6 Mitigation

Mitigation measures are recommended to be adopted into the design and installation of the ASHP unit. Suitable mitigation for these plant items may take form of an acoustic enclosure, or bespoke enclosure from acoustic louvres. The following table provides the minimum performance for the enclosure / louvres.

Table 6 – Minimum Performance Requirement for Acoustic Enclosure / Louvre

Units	Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
ASHP1	4	5	7	12	16	16	16	18

With the above mitigation measures included, the resultant predicted noise levels are as follows:

Table 7 – Predicted Noise Levels with Mitigation

Operating Period	Noise Level (dB) at Receptor 1 – 40 Stradella Road	
	Prediction	Criterion
24 Hours	19	20

Noise from the proposed plant with the mitigation measures incorporated is within the Local Authority criteria.

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 ASHP units to 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 London Borough of Southwark. 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 not within the criteria required by London Borough of Southwark. As such, the following mitigation measures are proposed within this report:

Proposed air source heat pump should be enclosed in an acoustic enclosure which meets the acoustic specifications outlined in Section 5.6

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 Southwark 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	1403127	U43500	28 February 2025
Norsonic Pre Amplifier	1209A	12071		
Norsonic ½“ Microphone	1225	41473	43499	28 February 2025
Norsonic Sound Calibrator	1251	31986	U43498	28 February 2025

Appendix C – Plant Calculations

Table C1 – Example Calculation, Plant Item

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
ASHP1 L_w	50	50	52	53	57	53	47	42	60
Conversion to Lp at 1m (Hemispherical Radiation)	42	42	44	45	49	45	39	34	52
Distance losses	-18	-18	-18	-18	-18	-18	-18	-18	
Mitigation	-4	-5	-7	-12	-16	-16	-16	-18	
Resultant Noise Level at receive	20	19	19	15	15	11	5	0	19

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
Attenuators/ Acoustic Lagging	Strain of neck, limbs or back.	Contractors	3	4	12	Provide sufficient manpower/ lifting gear	1	4	4
Attenuators/ Acoustic Lagging	Skin & respiratory irritation	Contractors	4	3	12	Wear gloves and mask	1	3	3

L: Likelihood S: Severity R: Rating

Appendix E – Graphs and Site Plans

42 Stradella Road, London

L_{Aeq} Time History

Measurement Position 1 - Rear Garden Area, Tuesday 7th to Wednesday 8th November 2023

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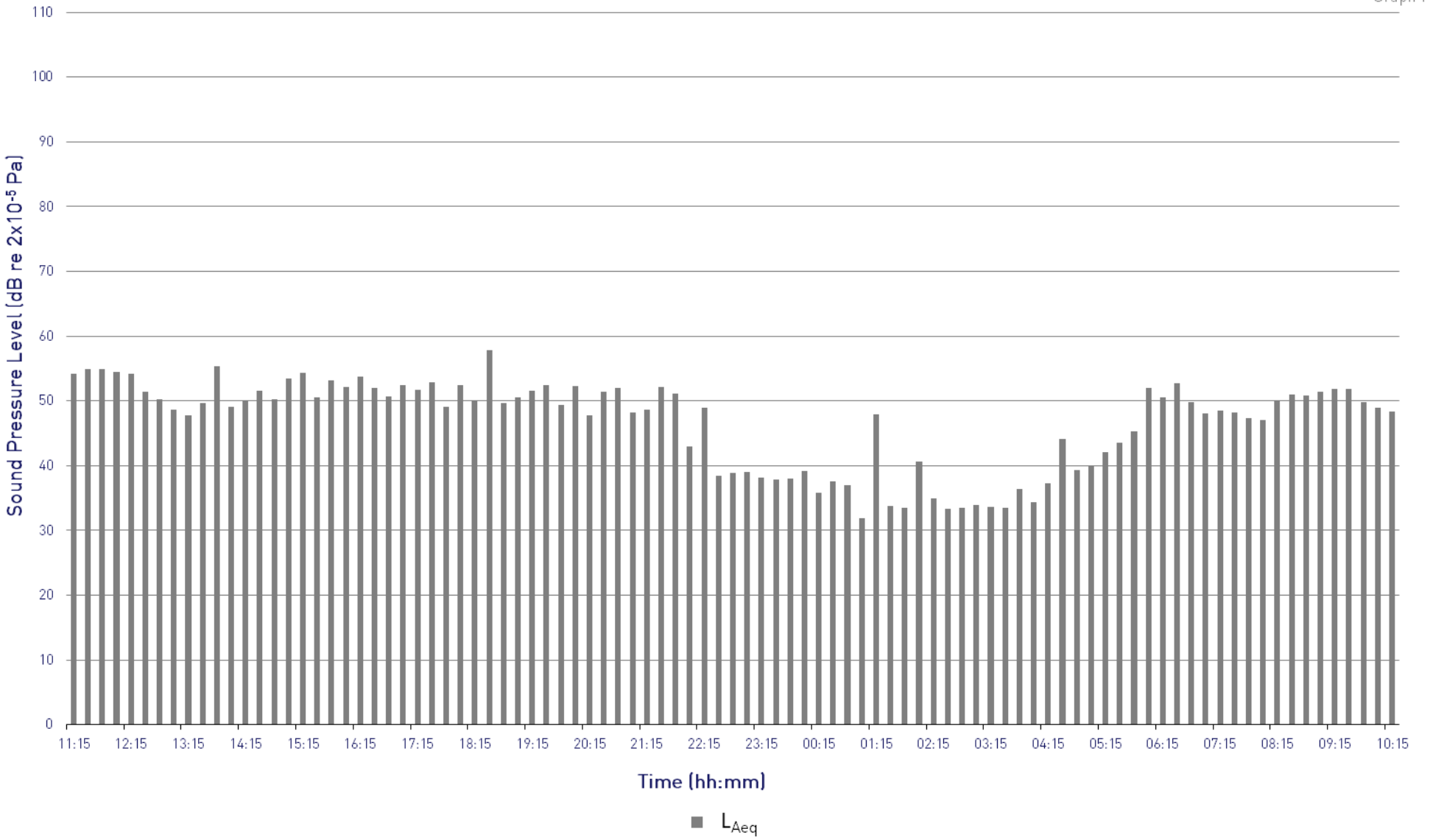
Graph 1



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

Measurement Position 1 - Rear Garden Area, Tuesday 7th to Wednesday 8th November 2023

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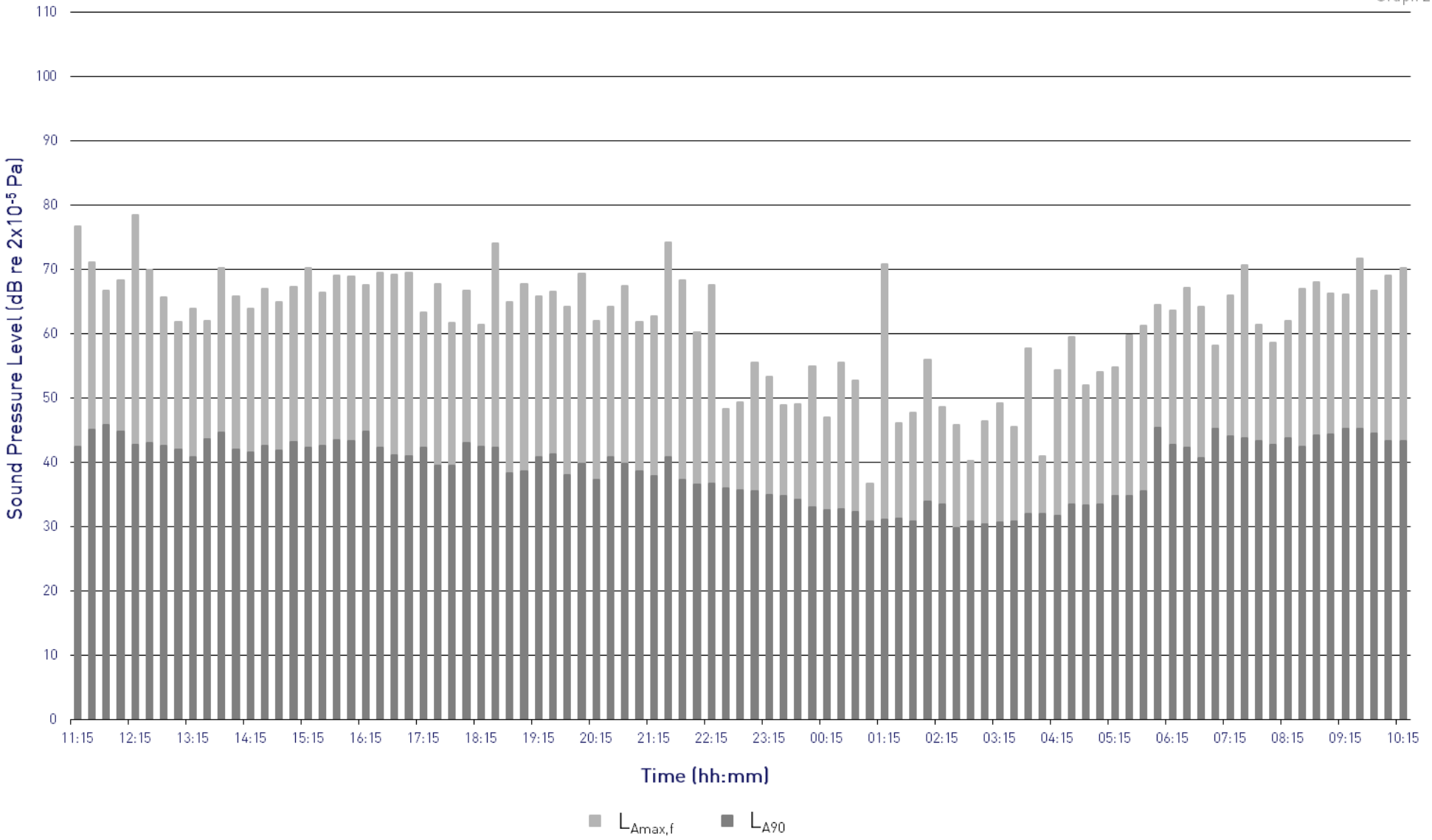
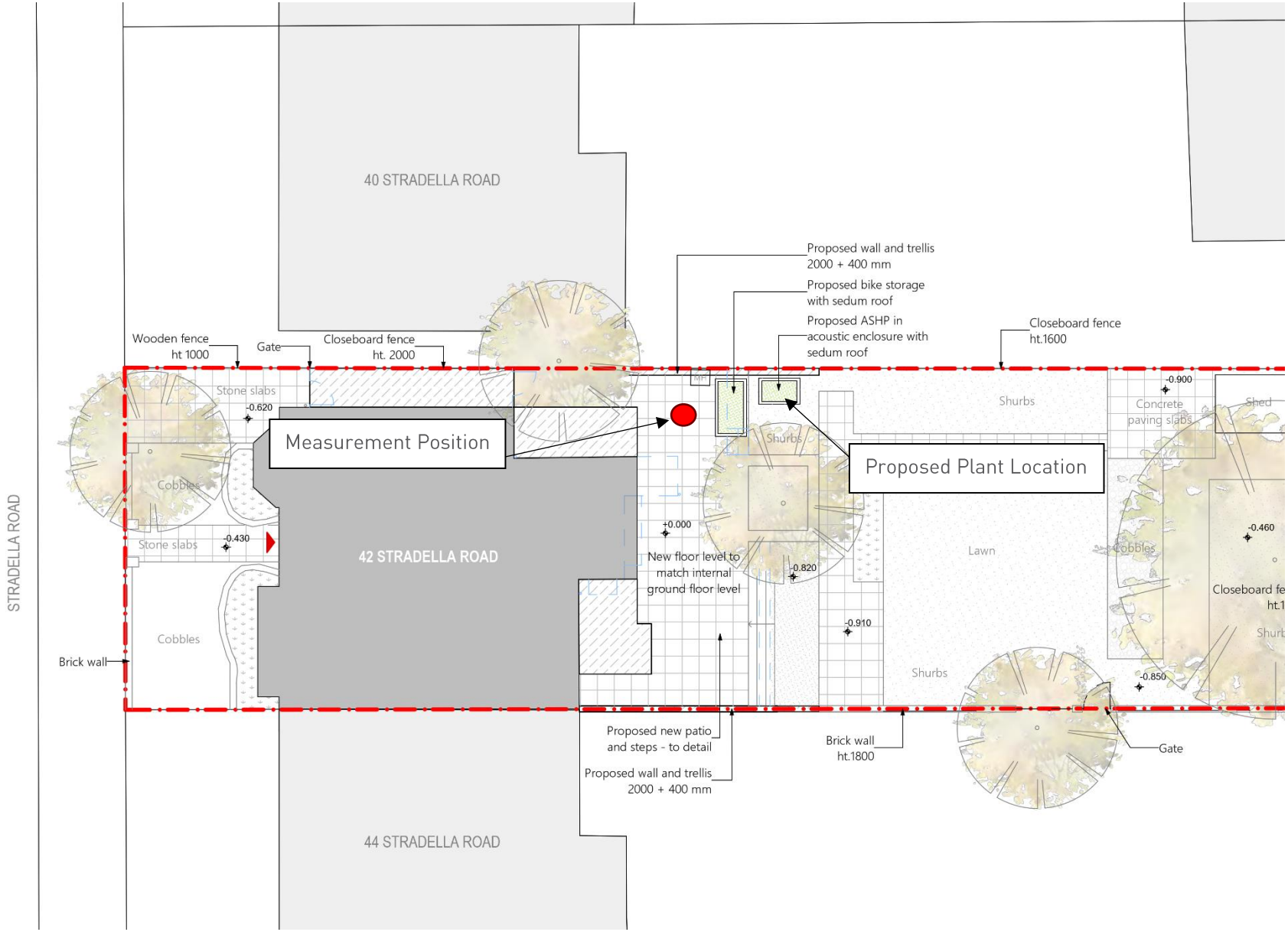
Graph 2





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Site Plan Detailing Measurement Position and Noise Sensitive Receptor

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Figure 1

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Not to Scale

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Photos Showing Measurement Position and Noise Sensitive Receptor

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Figure 2

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Not to Scale

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