



SWN YR AFON CARE
HOME, NEATH

Plant Noise
Assessment

Reference: 11261.RP01.PNA.1
Prepared: 27 September 2021
Revision Number: 1

Vital Energi
Century House
Roman Road
Blackburn
Lancashire
BB1 2LD

Plant Noise Assessment



SWN YR AFON CARE HOME, NEATH

Reference: 11261.RP01.PNA.1

Prepared: 27 September 2021

Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	27 September 2021	Struan Carmichael	David Johnston

Terms of contract:

RBA Acoustics Ltd have prepared this report in accordance with our Scope of Work 11261.SW01.0 dated 18 August 2021. 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.



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

Contents

1. INTRODUCTION..... 1

2. SITE DESCRIPTION 1

3. ENVIRONMENTAL NOISE SURVEY 1

4. PLANT NOISE CRITERIA..... 2

5. PLANT NOISE ASSESSMENT..... 3

6. VIBRATION CONTROL..... 5

7. CONCLUSION 5

APPENDIX A – ACOUSTIC TERMINOLOGY

APPENDIX B – INSTRUMENTATION

APPENDIX C – PLANT CALCULATIONS

APPENDIX D – CDM CONSIDERATIONS

APPENDIX E – GRAPHS AND SITE PLANS

1. INTRODUCTION

It is proposed to locate new items of plant at the Swn Yr Afon Care Home in Neath. As part of the planning application, Neath Port Talbot Council 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 Neath Port Talbot Council's anticipated 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 shown in relation to its surroundings in the site plan in Figure 1 (Appendix E).

The site is located near to Seven Sisters in Neath. There are residential properties nearby to the West, North and East and a forest area to the South. The noise climate consisted of general road traffic from the surrounding road networks (Brynteg to the North and the A4109 to the West).

3. ENVIRONMENTAL NOISE SURVEY

3.1 Survey Methodology

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

18:15 23 August to 14:30 24 August 2021.

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 following location:

Measurement Position 1 – Garden Area: The microphone was attached to a pole and fixed to a fence at the north western boundary at a height of approximately 4m. The measurement position was approximately 20m from the nearest residential property on Brynteg. The noise climate consisted of general road traffic from the surrounding road networks.

The measurement position is also illustrated on the site plan attached in Figure 1 and 2 and photos in Figure 3 (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 1-2 (Appendix E).

The lowest L_{A90} and the period averaged L_{Aeq} noise levels measured are summarised in Table 1.

Table 1 – Measured Levels

Measurement Period	Position 1 – Garden	
	Lowest $L_{A90,15min}$ (dB)	L_{Aeq} (dB)
Daytime (07:00 – 23:00)	40	45
Night-time (23:00 – 07:00)	40	42

4. PLANT NOISE CRITERIA

Receptors Outside of Site

The requirements of Neath Port Talbot Council's Environmental Health Department regarding new building services plant are not currently known. As such, we have assumed that any noise generated by new building services plant should be designed to a level of 5dB below the lowest background L_{A90} 15-minute sample during operational hours, as measured 1m outside the nearest affected residential window.

In line with 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:

- Daytime (07:00 to 23:00) 35 dBA
- Night-time (23:00 to 07:00) 35 dBA

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.

Receptors Within Site

For ward areas within our sites, we are proposing to adopt guidance from Health Technical Memorandum 08:01 which states an internal level of NR 30 for Ward Areas. Therefore, assuming a level of 35dBA internally and an approximate 13dB reduction for a partially open window, we would propose a level of 45-48dB externally.

5. PLANT NOISE ASSESSMENT

This assessment has been based on the information provided to RBA by Vital Energi, the project M&E Consultants and is described in the following sections.

5.1 Proposed Plant Items

The following plant is proposed for the scheme:

Table 2 – Plant Types

Manufacturer/Model/Duty	Plant Type
2No. Mitsubishi CAHV-P500	Air Source Heat Pump

5.2 Plant Locations

The proposed plant is to be installed at the North West boundary of the site within the garden area of the Care Home. The equipment positions are indicated on the site plan in Figure 1 and Figure 2 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 3 – Plant Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Mitsubishi CAHV-P500	L _p at 1m	70	65	60	57	52	47	49	45

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 the nearest noise-sensitive receptors to the proposed plant to be as follows:

Receptor 1 – Brynteg

The worst affected residential window (outside of site) is located on Brynteg which is approximately 25m from the proposed plant area.

Receptor 2 – Syn Yr Afon Care Home

The worst affected residential window (within site) is located on the West Façade of the building which is approximately 5m from the proposed plant area.

The receptors are shown in the site plan in Figure 1 in Appendix E.

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 / SWL
- Distance Attenuation

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 4 – Predicted Noise Levels

Operating Period	Noise Level (dB) at Receptor 1 – Brynteg		Noise Level (dB) at Receptor 2 – Swn Yr Afon Care Home	
	Prediction	Criterion	Prediction	Criterion
Daytime (07:00 – 23:00)	38	35	47	45-48
Night-time (23:00 – 07:00)	38	35	47	45-48

Noise from the proposed plant installations is within the assumed Local Authority criterion but towards the upper end of the HTM 08-01 criterion. We therefore recommend the following mitigation measures be applied.

5.6 Mitigation

We recommend that the ASHPs be fitted with attenuator kits capable of achieving the following minimum insertion losses:

Table 5 – Minimum insertion loss requirements

Unit	Minimum insertion loss required (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Attenuator kit	3	4	6	7	10	10	8	7

The resultant predicted noise levels at the nearest affected residential windows are shown in Table 6.

Table 6 – Predicted Noise Levels

Operating Period	Noise Level (dB) at Receptor 1 – Brynteg		Noise Level (dB) at Receptor 2 – Swn Yr Afon Care Home	
	Prediction	Criterion	Prediction	Criterion
Daytime (07:00 – 23:00)	31	35	40	45-48
Night-time (23:00 – 07:00)	31	35	40	45-48

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 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 Swn Yr Afon, Neath. 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 we expect is required by Neath Port Talbot Council provided the recommended mitigation is employed. The mitigation recommended is:

- Heat pumps should be fitted with attenuators capable of achieving the minimum insertion losses provided in Table 6.

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	1406116	U36615	17 December 2022
Norsonic Pre Amplifier	1209	20295		
Norsonic ½" Microphone	1225	344468	36614	17 December 2022
Norsonic Sound Calibrator	1251	34307	U36613	17 December 2022

Appendix C – Plant Calculations

Table C1 – Example Calculation, (To external receptors)

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
L_p at 1m	70	65	60	57	52	46	49	45	59
2No. of Units	+3	+3	+3	+3	+3	+3	+3	+3	-
Distance losses @ 17m	-25	-25	-25	-25	-25	-25	-25	-25	-
									-
Noise level at receiver	48	43	38	35	30	24	27	23	38

Table C2 – Example Calculation, (To internal receptors)

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
L_p at 1m	70	65	60	57	52	46	49	45	59
2No. of Units	+3	+3	+3	+3	+3	+3	+3	+3	-
Distance losses @ 6m	-16	-16	-16	-16	-16	-16	-16	-16	-
									-
Noise level at receiver	57	52	47	44	39	33	36	32	47

Table C3 – Example Calculation with Mitigation, (To external receptors)

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
L_p at 1m	70	65	60	57	52	46	49	45	59
2No. of Units	+3	+3	+3	+3	+3	+3	+3	+3	-
Distance losses @ 17m	-25	-25	-25	-25	-25	-25	-25	-25	-
Attenuator	3	4	6	7	10	10	8	7	-
Noise level at receiver	45	39	32	28	20	14	19	16	31

Table C4 – Example Calculation with Mitigation, (To internal receptors)

Parameter	Octave-band Noise Levels (dB) at Octave-band Centre Frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
L_p at 1m	70	65	60	57	52	46	49	45	59
2No. of Units	+3	+3	+3	+3	+3	+3	+3	+3	-
Distance losses @ 11m	-21	-21	-21	-21	-21	-21	-21	-21	-
Attenuator	3	4	6	7	10	10	8	7	-
Noise level at receiver	54	48	41	37	29	23	28	25	40

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

Swn Yr Afon Care Home, Neath

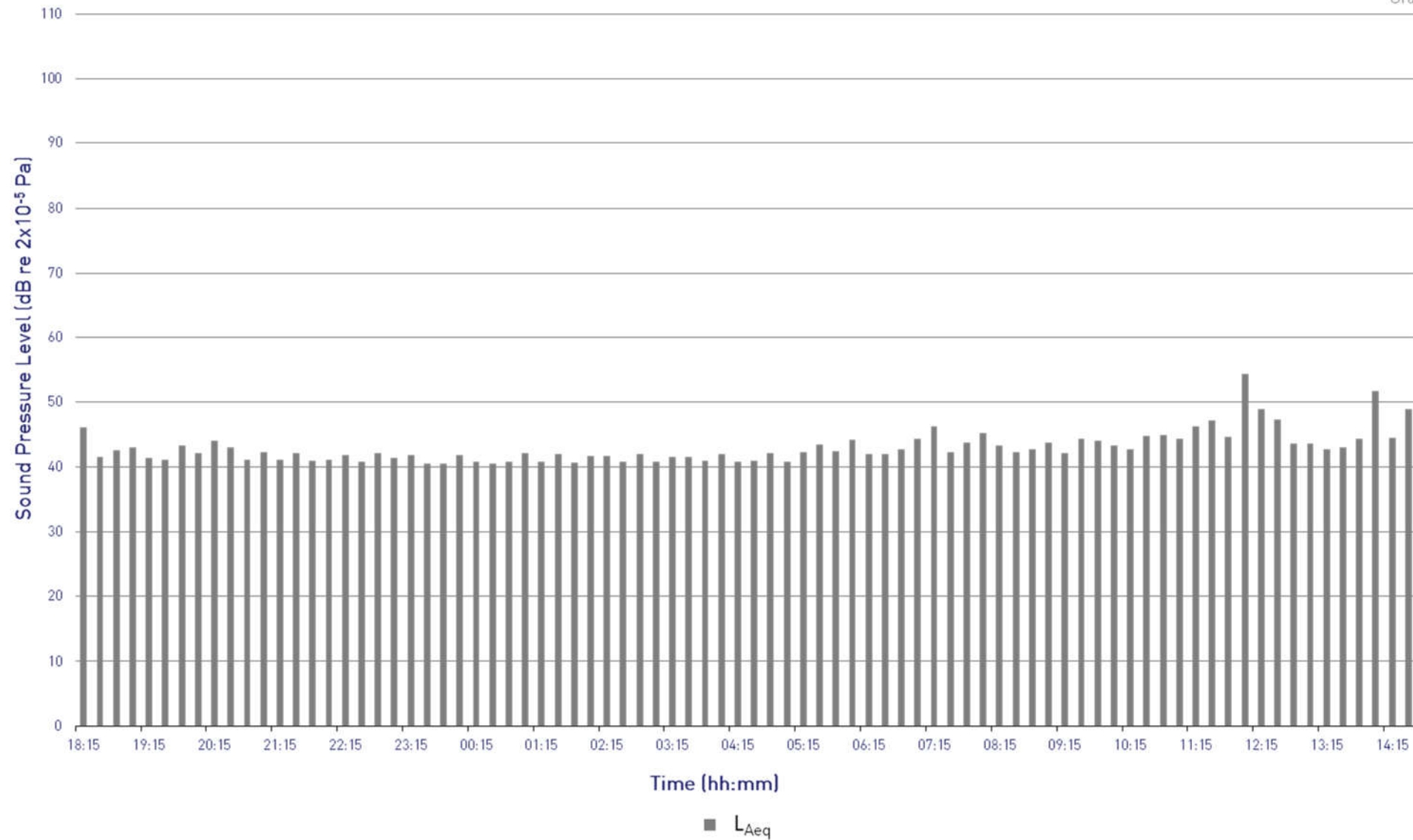
L_{Aeq} Time History

Measurement Position 1 (Garden), Monday 23rd August to Tuesday 24th Augst 2021



Project: 11261

Graph 1



Swn Yr Afon Care Home, Neath

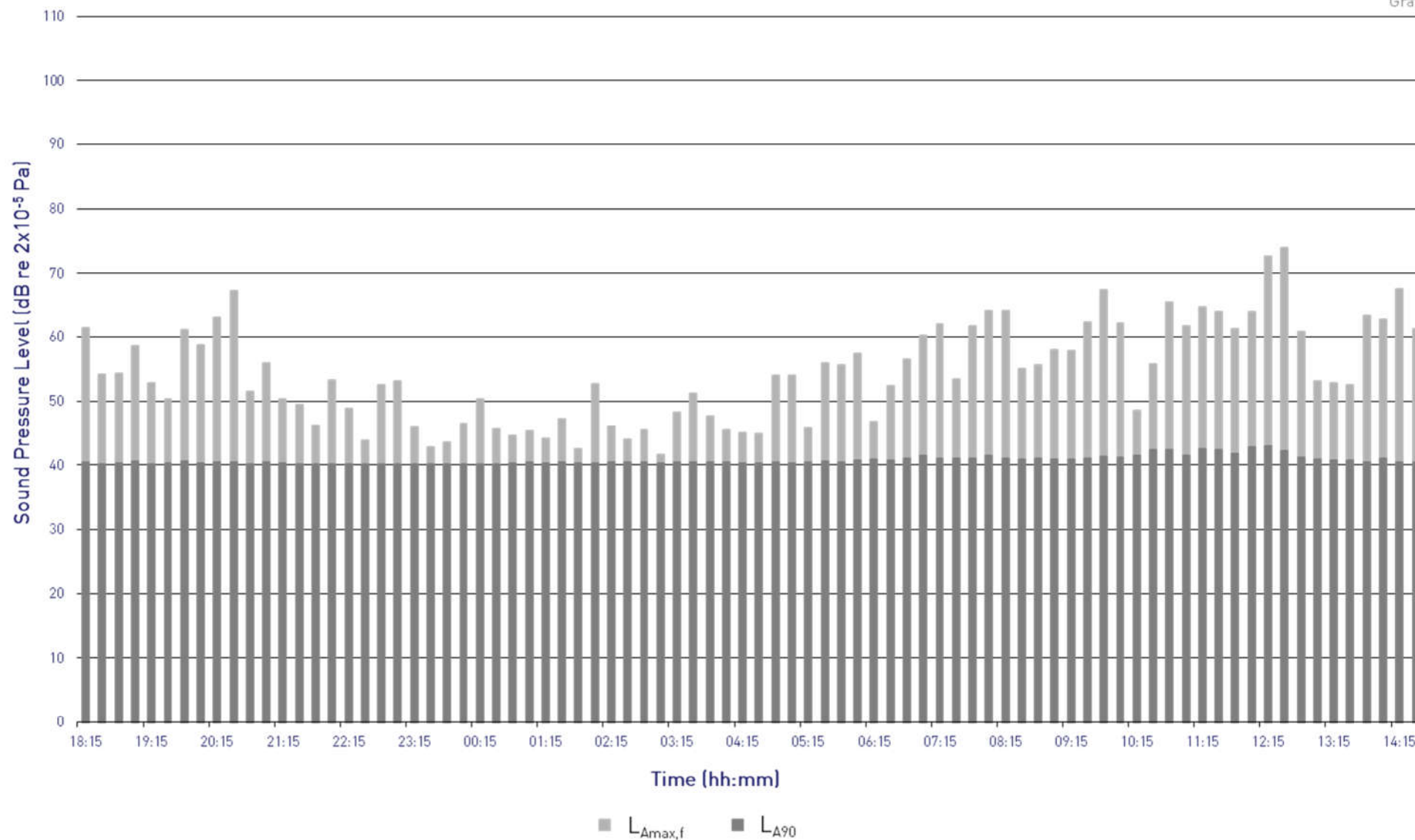
$L_{Amax,f}$ and L_{A90} Time History

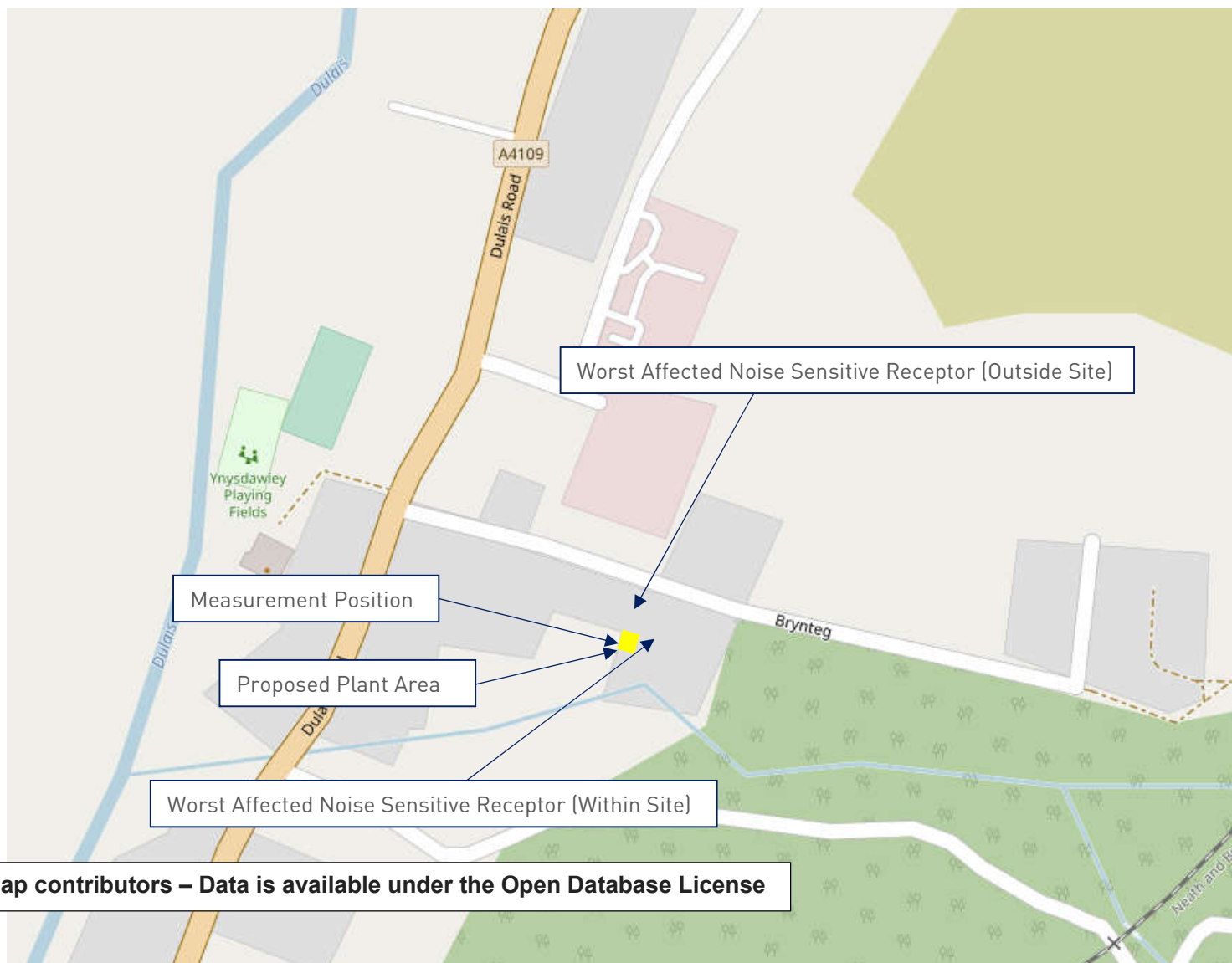
Measurement Position 1 (Garden), Monday 23rd August to Tuesday 24th Aug 2021



Project: 11261

Graph 2

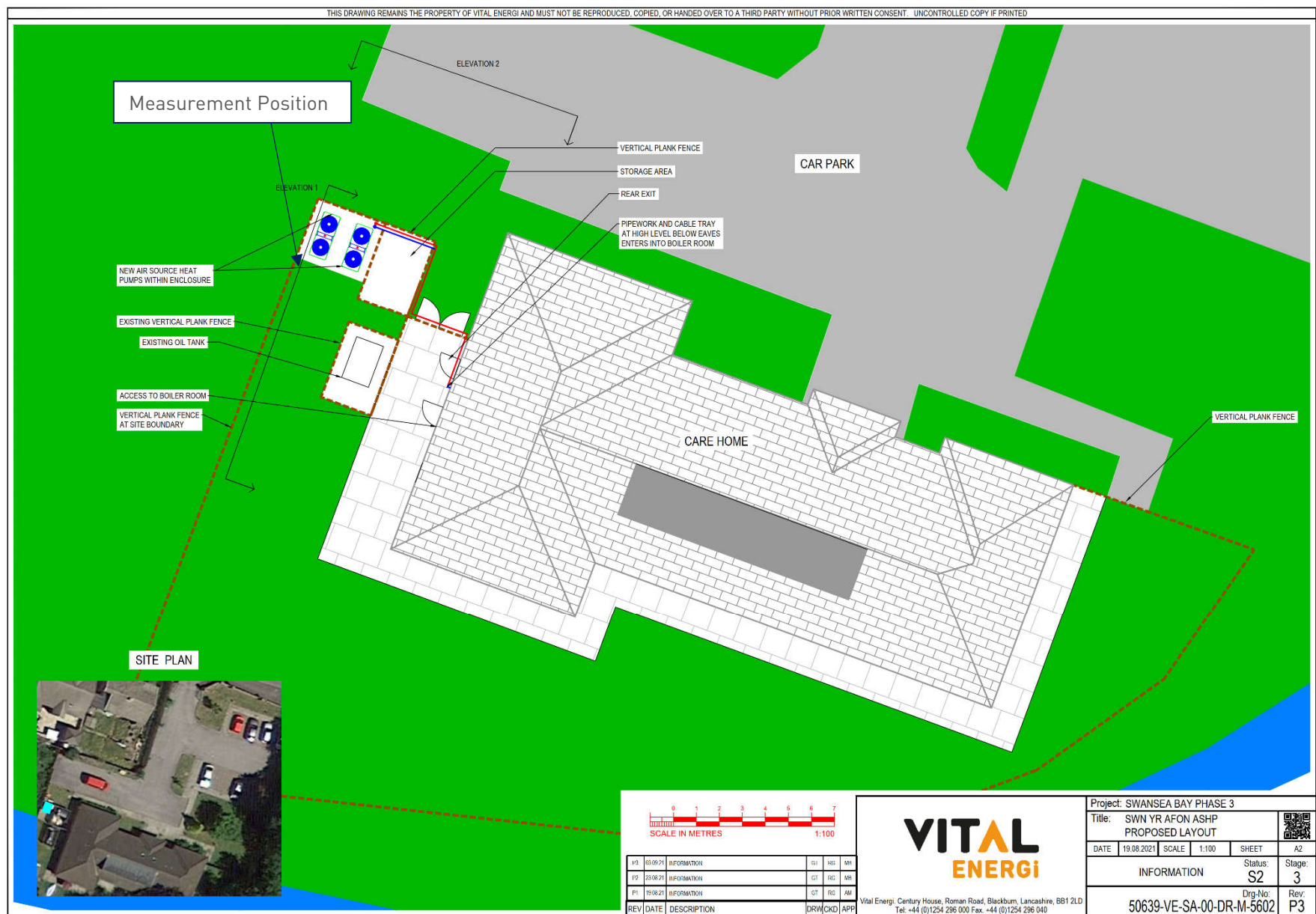




Swn Yr Afon Care Home, Neath
 Site Plan showing Measurement Position and Plant Location
 Project 11261

Figure 1
 27 September 2021
 Not to Scale





Swn Yr Afon Care Home, Neath
Drawing showing Plant Location
Project 11261

Figure 2
27 September 2021
Not to Scale





Swn Yr Afon Care Home, Neath
Photographs of Measurement Position
Project 11261

Figure 3
27 September 2021
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

