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STANSTY CHAIN ROAD, WREXHAM – PHASE 1
OUTLINE APPROVED RESIDENTIAL DEVELOPMENT

NOISE MITIGATION SCHEME

On behalf of:
Castle Green Homes Ltd

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NOISE MITIGATON SCHEME

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Version	Date	Author	Checked by	Notes
1	30.06.25	J Shaw BSc MIOA Senior Consultant	T D Bailess MEng MIOA Principal Consultant	Initial issue
2	15.01.26	J Shaw BSc MIOA Senior Consultant	T D Bailess MEng MIOA Principal Consultant	Minor Amendment

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1. INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Castle Green Homes to carry out a noise assessment to inform the extent of noise mitigation measures that will be necessary, for the outline approved development at Stantsy Chain Road in Wrexham. The site location is shown in Figure 1.

1.2 Outline planning permission was granted for the development in 2019. The approval is for the construction of up to 455 dwellings on the site. The development is to be brought forward in two phases. This report focuses on Phase 1 of the development, which comprises 186 dwellings.

1.3 Conditions 15 and 25 of the outline approval state:

> *15) Development shall not commence on any phase until a scheme of noise mitigation for that particular phase has been submitted to and approved in writing by the Local Planning Authority. The scheme as approved shall be implemented in full prior to the first occupation of any dwelling in that phase and all measures for noise mitigation shall be retained thereafter.*
>
> *25) No dwelling shall be occupied until a fence has been erected along the full length of the boundary with the A483 trunk road in accordance with details that shall first have been submitted to and approved in writing by the Local Planning Authority. The fence shall thereafter be permanently retained.*

1.4 Therefore, the principle of residential development on the site is firmly established. At the reserved matters stage, Conditions 15 and 25 require the submission of a noise mitigation scheme that reflects the detailed housing layout. This report addresses that requirement and includes recommendations for appropriate acoustic mitigation measures, including the specification of suitable acoustic fence and/or bund heights where necessary.

1.5 While the wording of Condition 25 is somewhat ambiguous, it is understood that the requirement for a fence along the A483 is intended primarily for boundary definition and security purposes. As such, the fence referenced in Condition 25 has not been assumed to contribute to acoustic mitigation.

1.6 Thus, planning application is now to be made based on a detailed housing layout (*'Stanchrd-SL.01 - 01 Rev C'*) shown in Figure 2. The noise mitigation scheme has therefore been reviewed and detailed in this report for the actual housing layout.

1.7 The layout shows the nearest dwellings to the A483 are those to the eastern part of the site some 50 metres from the carriageway. The houses on the western part of the site are as much as 250 metres from the A483 and 25 metres from Mold Road.

1.8 Due to the length of time since the noise assessment was carried out on site by REC in 2016 and E3P in 2012 in connection with the outline application, it is necessary to carry out an updated noise survey as part of the reserved matters application. Therefore, additional noise measurements have been carried out to inform the detailed noise mitigation scheme.

1.9 The proposed development site is located in Wrexham, bounded by Stansty Lodge Lane to the north, Stansty Chain Road to the east, Mold Road (B5101) to the west, and the A483 dual carriageway to the south. The site is irregular in shape and comprises predominantly open land characterised by undulating topography.

1.10 The land is currently in agricultural use and largely consists of open fields with sections of hedgerows and intermittent tree coverage along some of the site boundaries. There are a number of existing residential dwellings located adjacent to and within the broader site boundary, particularly near Stansty Chain Road and Stansty Lodge Lane.

1.11 Both Stansty Chain Road and Mold Road run broadly at grade with the development site. In contrast, while the A483 is also at grade with the southernmost part of the site near the roundabout, the site topography slopes downwards towards the centre. Simultaneously, the A483 rises in elevation such that, at the south-eastern corner of the Phase 1 land, the site lies approximately 7 to 8 metres below the carriageway level.

1.12 The surrounding road network presents a mix of traffic conditions: the A483 is a major route with high traffic volumes, while Mold Road also carries moderate levels of traffic. In contrast, Stansty Lodge Lane and Stansty Chain Road are quieter roads with low traffic volumes.

1.13 The noise assessment has included:

- An inspection of the site and surrounding area;
- Measurement of road traffic noise levels;
- Computerised noise modelling of the site; and
- Recommendation of appropriate mitigation measures.

1.14 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2. ROAD TRAFFIC NOISE SURVEY

2.1 Road traffic noise measurements were conducted at a number of different locations to measure levels from the A483, Mold Road and Stansty Chain Road.

2.2 The noise measurement locations are indicated on Figure 1 and described below.

- Location 1: 3m from Boundary with A483 close to slip road
- Location 2: 5m from Boundary with A483 in centre of site
- Location 3: 50m from Boundary with A483 at eastern part of site
- Location 4: 150m from Boundary with A483 on Phase 2 land
- Location 5: 7m from Boundary with Mold Road
- Location 6: 5m from Boundary with Stansty Chain Road

2.3 Noise measurements were carried out in consecutive 2 minute periods over a series of 24-hour periods at different locations across the site between approximately 09:45 on Monday 9th June and 09:00 on Thursday 12th June 2025.

2.4 The noise surveys were carried out using two sound level meters: an NTi Audio XL2 'Class 1' (serial no: A2A-20361-E0) and an NTi Audio XL3 'Class 1' (serial no: A3A-01451-F0), both complying with BS EN 60804:2001, and both independently calibrated within the preceding 24 months.

2.5 The meters were repositioned each day to capture data at different representative locations across the site. Acoustic calibration of the sound level meters was carried out before and after each noise measurement period using an acoustic calibrator that had been independently calibrated within the preceding 12 months. No significant variation in the calibrated noise levels was noted.

2.6 The noise measurements were carried out in compliance with BS 7445: 2003. The noise measurements were taken in 'free-field' conditions and at a microphone height of approximately 1.4 metres above the ground.

2.7 Full details of the instrumentation used and weather conditions are stated in Appendix B.

2.8 The measured daytime L_{Aeq} and night-time L_{Aeq} values have been logarithmically averaged to obtain the $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ values.

2.9 The full results of the traffic noise survey are shown in Appendix B. A summary of the results is provided in Table 1:

Table 1: Road Traffic Noise Exposure Levels (dB)

Description	Daytime (07:00-23:00) $L_{Aeq,16hr}$	Night (23:00-07:00) $L_{Aeq,8hr}$	Night (23:00-07:00) $L_{Amax\ 10th\ Highest}$
Location 1	70	66	79
Location 2	57	54	65
Location 3	59	57	70
Location 4	57	51	62
Location 5	66	58	77
Location 6	56	50	69

2.10 The implications of the road traffic noise exposure values discussed in Section 5.0.

3. CALIBRATION OF NOISE MODEL

3.1 Noise calculations have been carried out using the CadnaA noise prediction software for daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods. The technique uses a 3-dimensional computer model of the topography of the site and the surrounding area as a basis for undertaking automated noise calculations.

3.2 The noise propagation model was calculated using the ISO 9613 *'Acoustics - Attenuation of sound during propagation outdoors'* procedure.

3.3 The following relevant CadnaA settings and standards were used in the noise model:

- Software Version: 2017 MR 1 (build: 159.4707).
- Standards: ISO 9613.
- Orders of reflection: 2.
- Search radius: 2km.
- Ground absorption: Varies between 0 and 1 with land type. (i.e. 0 = reflective for hard surface areas and 1 = absorbative for tree/grass covered areas).
- Temperature: 10°C.
- Humidity: 70%.

3.4 No site and off-site topography were available to us, so we have adopted OS Terrain 5 data to determine ground heights.

3.5 Iterations of the noise propagation model incorporating the proposed layout have been generated to provide predicted $L_{Aeq,16hr}$ daytime noise levels at 1.5 metres and $L_{Aeq,8hr}$ night-time noise levels at 4.5 metres above local ground height across the site, representative of ground floor and first floor levels respectively.

3.6 The noise contour plans are presented in Figure 3 for the daytime and in Figure 4 for the night-time, at the respective heights in each case.

3.7 It is understood that, as required by Condition 25 of the outline planning permission, a fence is to be erected along the full length of the boundary with the A483. It is assumed that this requirement is primarily for security and boundary treatment purposes, rather than for acoustic control. Accordingly, the fence has not been included in the noise modelling undertaken for Phase 1.

3.8 The results of the calculations described above have been used to assess the level of sound insulation required for windows and ventilation of habitable rooms within the proposed dwellings and form the basis of the noise control recommendations set out in Section 5.0.

4. GUIDANCE AND ACOUSTIC DESIGN CRITERIA

BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

4.1 The planning conditions do not specify any particular acoustic design criteria. Therefore, the relevant guidance outlined below has been used to inform the acoustic design of the development.

4.2 Guidance on acceptable noise levels in habitable rooms and private gardens is set out in British Standard 8233: 2014, *'Guidance on sound insulation and noise reduction for buildings'*, (referred to hereafter as BS 8233) which carries the full weight of an adopted British Standard.

4.3 BS 8233 recommends that it is desirable that noise from external sources does not exceed the guidelines values that are shown in Table 2 inside habitable rooms for daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods.

Table 2: BS 8233:2014 recommended acoustic design criteria (dB $L_{Aeq,T}$)

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hr}$	
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

4.4 BS 8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of $L_{Amax,F}$ values and these can be highly variable and unpredictable such that for design purposes it is usual to take into account the findings of research described in WHO *Community Noise Guidelines* that states "for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night.

Acoustic Design Criteria

4.5 For this development we therefore recommend the following noise criteria be adopted in respect of road traffic noise with windows closed and trickle ventilation provided:

- Daytime noise below 35 dB $L_{Aeq,16hr}$ inside living rooms and bedrooms ,and
- Night-time noise levels not exceeding 30 dB $L_{Aeq,8hr}$ and generally not exceeding 45 dB L_{AmaxF} in bedrooms (i.e. no more than 10 times per night).

4.6 For private outdoor amenity spaces of the new houses (e.g. rear gardens) BS8233 states that '*it is desirable that the external noise level does not exceed 50 dB L_{Aeq}, with an upper guideline value of 55 dB L_{Aeq}, which would be acceptable in noisier environments'*.

4.7 In our experience, most local planning authorities have traditionally adopted, or accepted, the 55 dB L_{Aeq} guideline value for rear gardens of proposed new residential developments. The 2014 version of the standard also recognises that these guideline values are not achievable in all circumstances

where development might be desirable and, in such cases, for sites near the '*strategic transport network'* higher noise levels than 55 dB L_{Aeq} in gardens may be acceptable.

4.8 In this instance, the site is influenced by road traffic and railway noise from the adjacent highway and rail networks and therefore represents a "noisy environment" in the context of BS 8233.

4.9 However, for this development, the vast majority of plots are predicted to achieve the desirable 50 dB L_{Aeq} criterion. Where this is not achieved, exceedances are minor and localised, with predicted levels remaining within the range of 50–55 dB L_{Aeq}. In all cases, noise levels are calculated to be below the BS8233 upper guideline value of 55 dB L_{Aeq} with the maximum exceedance above the desirable criterion being no more than 3 dB. Such a small difference is typically considered just perceptible and would not be expected to result in a noticeable change in perceived quality of the external amenity areas.

4.10 The acoustic design criteria detailed above is also consistent with the recommended design criteria made by E3P in their noise assessment submitted as part of the outline planning application.

4.11 In particular, the adoption of the BS8233 upper guideline value of 55 dB L_{Aeq} for external amenity spaces reflects the approach previously accepted by the Local Planning Authority at outline stage, recognising the influence of the surrounding strategic road network and the practical limitations of achieving the desirable 50 dB L_{Aeq} criterion across all plots. The use of the 55 dB L_{Aeq} criterion therefore represents a continuation of the accepted design framework established at outline, rather than a change in assessment approach or standards.

5. NOISE MITIGATION SCHEME

5.1 Windows of standard thermal double glazing (4mm glass – 4mm glass) have a typical sound reduction performance of 25 dB $R_w + C_{tr}$. Therefore, where external noise levels (including façade reflection effects) exceed values of 60 dB $L_{Aeq,16hr}$ during the daytime and/or 55 dB $L_{Aeq,8hr}$ and/or 70 dB L_{Amax} at night, higher specification glazing will be necessary.

5.2 The site layout shown in Figure 2 indicates that the nearest dwellings to the A483 are located in the eastern part of the site, approximately 50 metres from the carriageway. In contrast, dwellings on the western part of the site are situated up to 250 metres from the A483 and are set back at least 25 metres from Mold Road. As such internal noise levels will be significantly lower than those measured close to the boundary.

Glazing & Ventilation

5.3 Our calculations show that for a number of the dwellings as shown in blue on Figure 2, to ensure the criteria for the control of noise are achieved, we recommend double glazed windows for **living rooms** having a minimum sound insulation performance of 27 dB $R_w + C_{tr}$.

5.4 Typically, this would be achieved with a double-glazing specification of:

- 6mm glass - nominal (12-20mm) cavity – 6.0mm glass.

5.5 For **bedrooms** of the above dwellings (marked in blue on Figure 2), to ensure the criteria for the control of noise are achieved, we recommend double glazed windows for living rooms having a minimum sound insulation performance of 29 dB $R_w + C_{tr}$.

5.6 Typically, this would be achieved with a double-glazing specification of:

- 6mm glass - nominal (12-20mm) cavity –4mm glass.

Ventilation

5.7 For bedrooms that require upgraded glazing (i.e. those shown in blue in Figure 2) we recommend that, instead of standard window frame slot trickle vents, specialist acoustic vents are fitted having an acoustic rating of at least 42 dB $D_{n,e,w}$.

5.8 Examples of suitable products would be:

- Aereco EHA_2 '3-part' Acoustic Trickle Ventilators with internal acoustic humidity control, external acoustic canopy and acoustic sleeve. (42 dB $D_{n,e,w}$): or,
- Wall mounted Rytons AAC125HP Super Acoustic Controllable LookRyt AirCore Ventilators. (43 dB $D_{n,e,w}$).

5.9 Standard window frame trickle vents would be adequate for all other houses on the development.

Gardens

5.10 The majority of rear gardens on the proposed development will be located away from the roads and will be screened adequately from traffic noise by the houses themselves.

5.11 However, as the daytime traffic noise exposure level was found to be above 55 dB $L_{Aeq,16hr}$ in order to achieve traffic noise levels within 55 dB $L_{Aeq,16hr}$ in all gardens we recommend that a 2.2 metre high proprietary acoustic fence is installed for the boundaries of gardens of the plots indicated in green on Figure 2.

5.12 The acoustic fencing must be imperforate (i.e. have no holes or gaps), have a surface mass no less than 10 kg/m^2 and be at least 20 mm thick. Gates, where necessary, in the fencing would be acceptable as long as they are built to the same standard as the acoustic fencing.

5.13 Suppliers of proprietary acoustic fences include Jacksons Fencing (jacksons-fencing.co.uk), Guardian Fencing (guardianfencing.com) and Ransford's (ransfords.co.uk).

6. SUMMARY

6.1 The impact of noise has been assessed for Phase 1 of an outline approved residential development on land at Stansty Chain Road in Wrexham.

6.2 The assessment has included the measurement of road traffic noise levels on the site at a number of locations during representative periods of the daytime and at night.

6.3 We have recommended that an appropriate scheme of sound insulation is implemented for the new houses that will be most exposed to traffic noise in order to protect the amenity of the new residents.

6.4 The noise mitigation scheme has been designed to comply with the requirements of Condition 15 of the planning consent for the development.



Do not scale from this figure

Key:

x - Noise Measurement Position

Project: P25-165

Ref: **Figure 1**

Title: Site Location & Noise Measurement Positions

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Do not scale from this figure

Key:

- Upgraded Glazing & Ventilation
- 2.2m Acoustic Fencing

Project: P25-165

Ref: **Figure 1**

Title: Proposed Site Layout and Noise Mitigation Scheme

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Key:

- > 35.0 dB
- > 40.0 dB
- > 45.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB
- > 85.0 dB

Do not scale from this figure

Project: P25-165

Ref: **Figure 3**

Title: Noise Contour Plot – Daytime $L_{Aeq,16hr}$ at 1.5m above ground

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Key:
- > 35.0 dB
- > 40.0 dB
- > 45.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB
- > 85.0 dB

Do not scale from this figure

Project: P25-165

Ref: **Figure 4**

Title: Noise Contour Plot – Night $L_{Aeq,8hr}$ at 4.5m above ground

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APPENDIX A: ACOUSTICS UNITS & INDICES

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. There are also a number of ways to describe sound insulation performance.

The indices used in this report are described below:

L_{Amax} **Maximum A-weighted Sound Level with Fast Time-weighting:** The maximum A-weighted sound pressure level during the measurement period, using the Fast time-weighting of 125ms. L_{Amax} used in this report refers throughout to L_{AFmax} with the Fast time weighting, denoted L_{AFmax} or $L_{Amax,f}$ in other documents but L_{Amax} in BS 8233:2014 standard notation.

$L_{A90,T}$ **A-weighted 90 Percentile Level:** The A-weighted sound level exceeded for 90% of a measurement time period (T). $L_{A90,T}$ is generally used as a measure of Background Sound Level.

C_{tr} **Transport Noise Spectral Adaptation Term:** A term used with single figure broadband sound insulation metrics (e.g. $R_{w,}$ $D_{n,e,w}$ or $D_{nT,w}$) to account for the spectral composition of typical transport noise sources.

$D_{n,e,w}$ **Weighted Element Normalised Level Difference:** A frequency weighted single figure laboratory value quantifying the sound insulation performance of a building element,

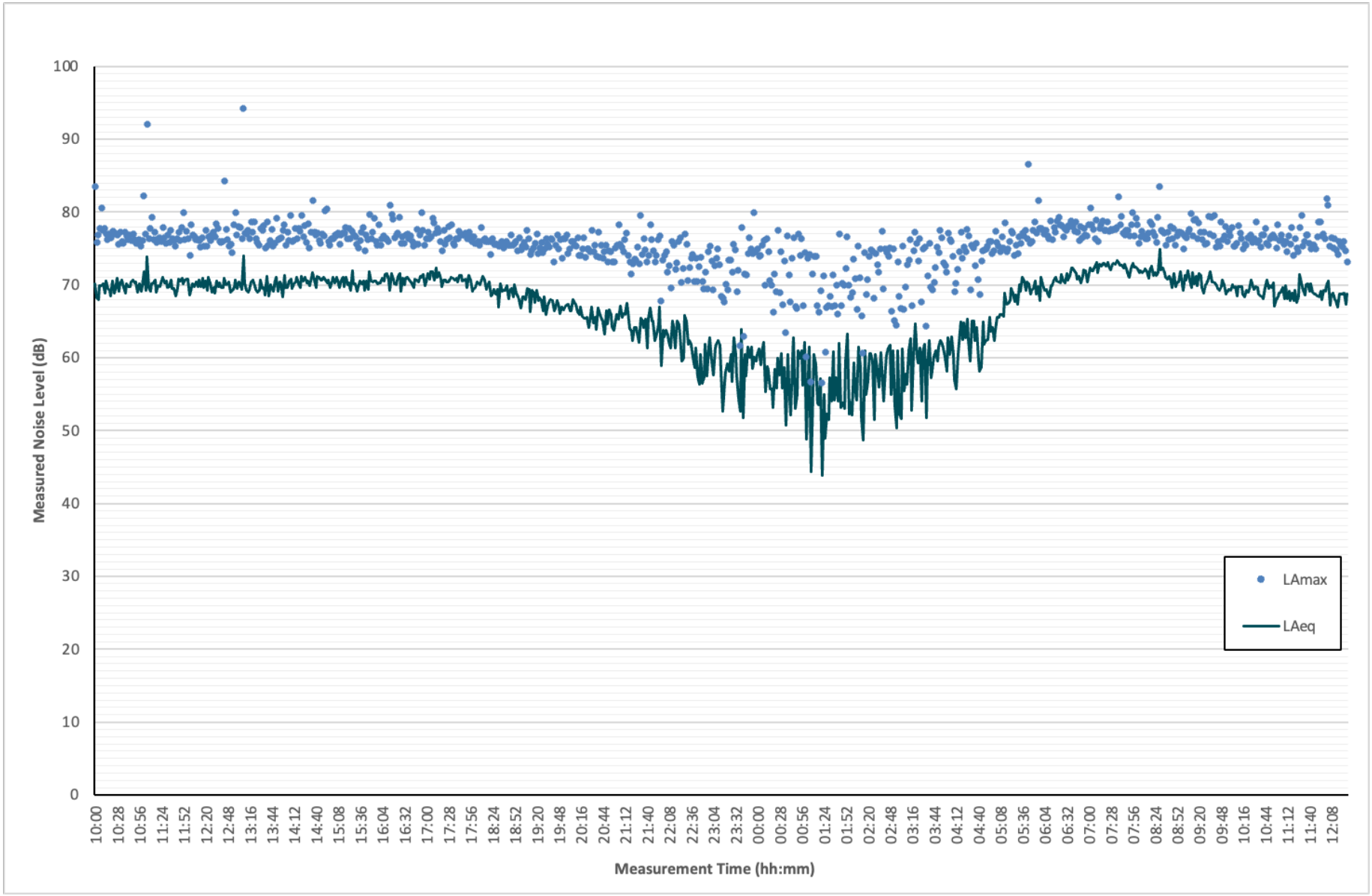
R_w **Weighted Sound Reduction Index:** A single figure frequency weighted laboratory sound insulation performance metric of a building element or construction arrangement (e.g. a wall).

APPENDIX B: NOISE SURVEY RESULTS

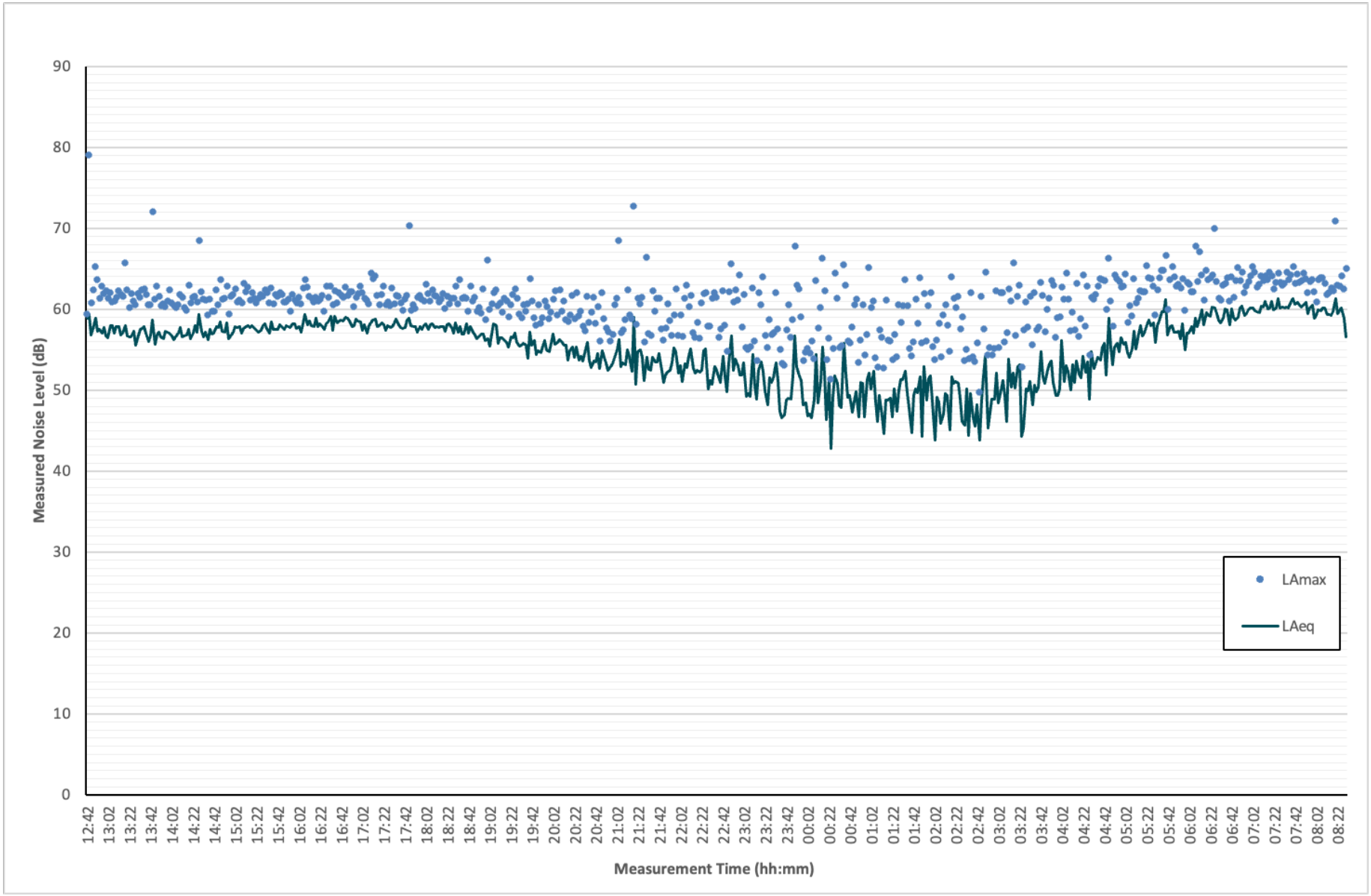
Date(s)	Location 1 & 5: Monday 9 June – Tuesday 10 June 2025 Location 2 & 3: Tuesday 10 June – Wednesday 11 June 2025 Location 4 & 6: Wednesday 11 June – Thursday 12 June 2025
Equipment	NTi Audio XL2-TA 'Class 1' sound analyser (s/n: A2A-20361-E0) NTi Audio XL3-TA 'Class 1' sound analyser (s/n: A3A-01451-F0) with associated calibrator(s) and tripod(s)/environmental outdoor monitoring kit(s)
Weather	**Monday 9 June 2025** Daytime: 12 – 17 °C, dry, partly cloudy, SW wind ~4 m/s Night-time: 12 °C, dry, partly cloudy, SW wind ~4 m/s **Tuesday 10 June 2025** Daytime: 11 – 18 °C, dry, partly cloudy, WNW wind ~4 m/s Night-time: 11 °C, dry, partly cloudy, WNW wind ~4 m/s **Wednesday 11 June 2025** Daytime: 9 – 28 °C, dry, partly cloudy, SE wind ~3 m/s Night-time: 9 °C, dry, partly cloudy, SE wind ~3 m/s **Thursday 12 June 2025** Daytime: 13 – 24 °C, dry, partly cloudy, SE wind ~4 m/s

Chart(s) overleaf

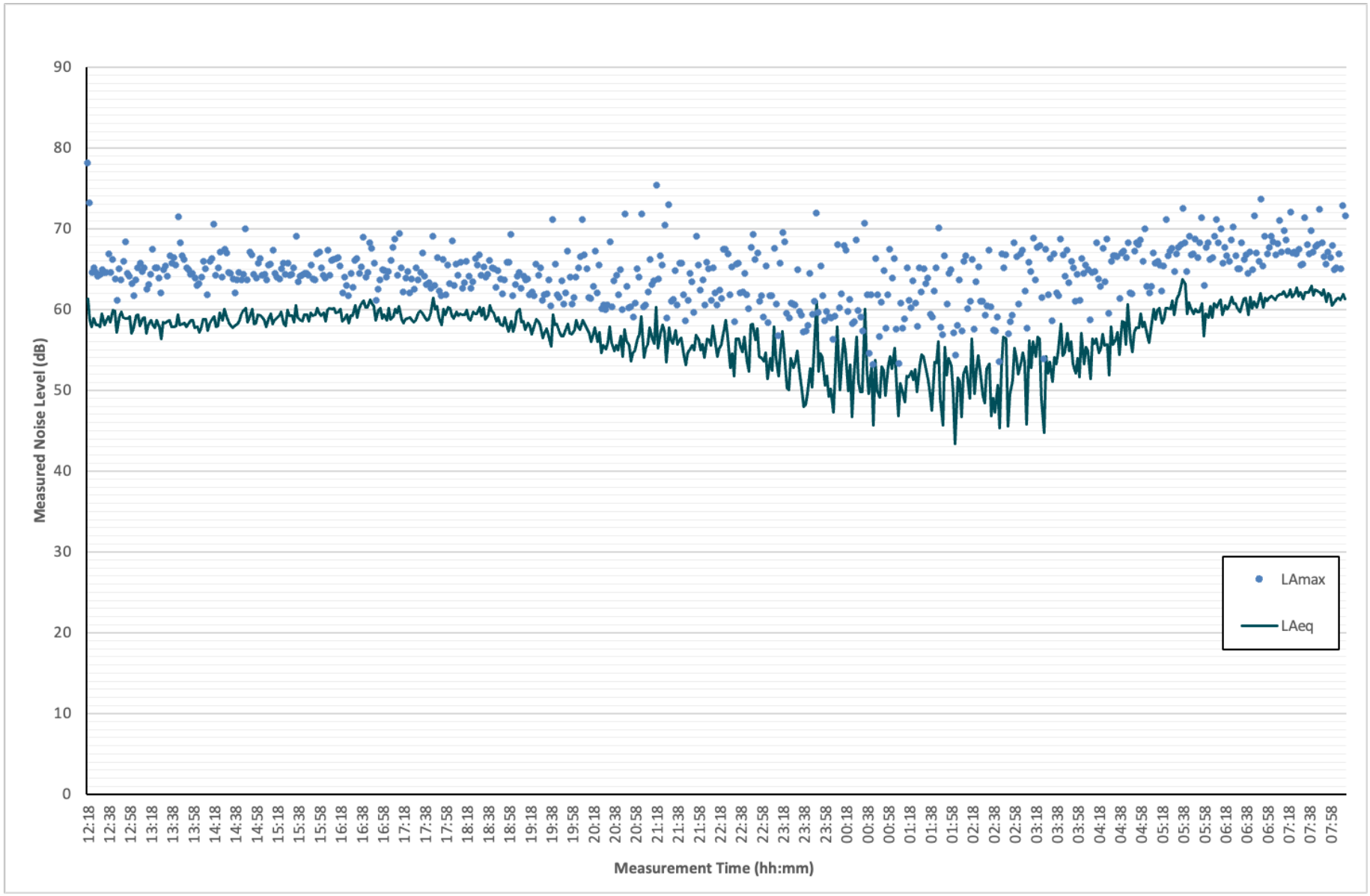
Location 1: 3m from Boundary with A483 close to slip road



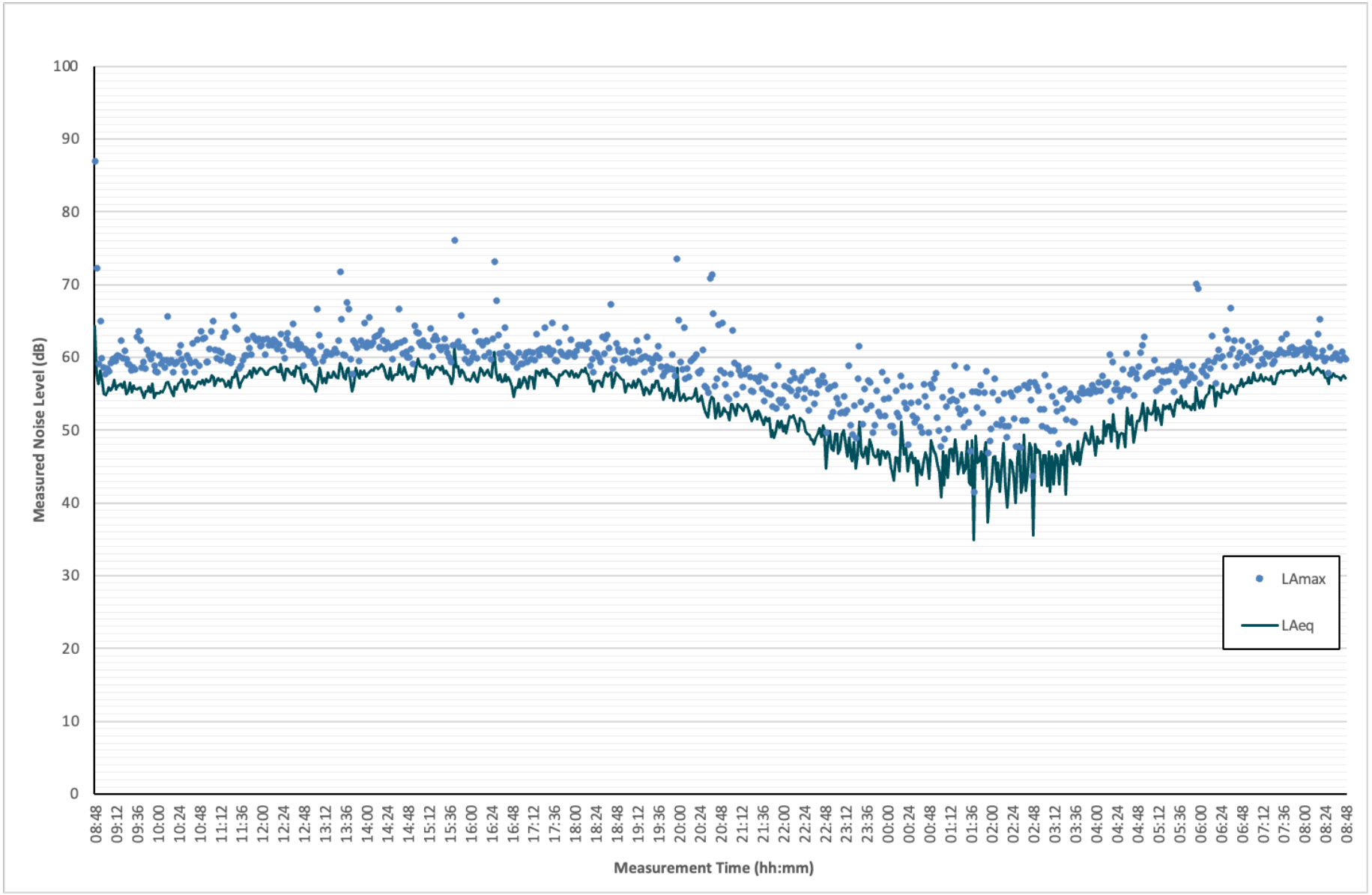
Location 2: 5m from Boundary with A483 in centre of site



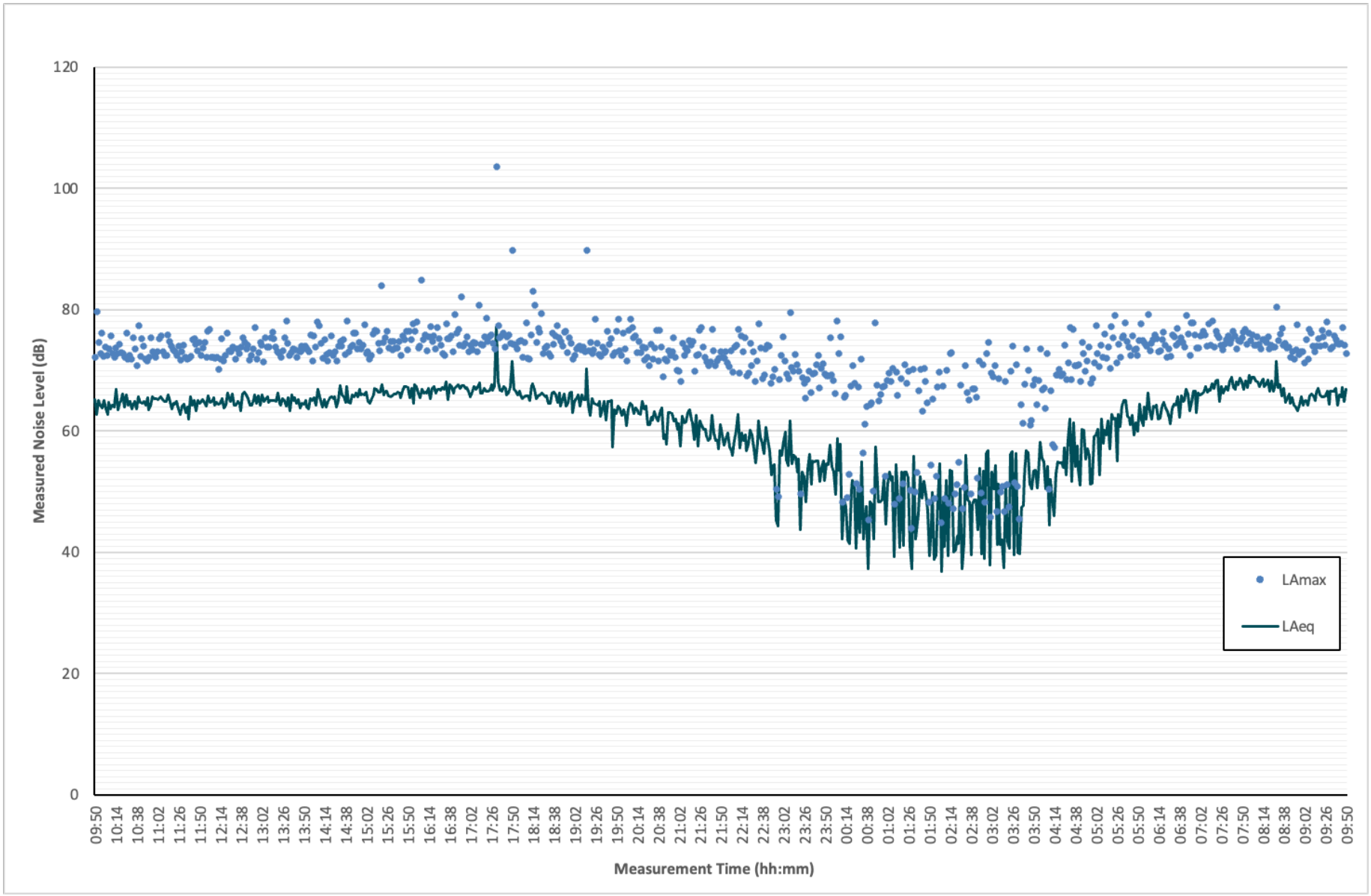
Location 3: 50m from Boundary with A483 at eastern part of site

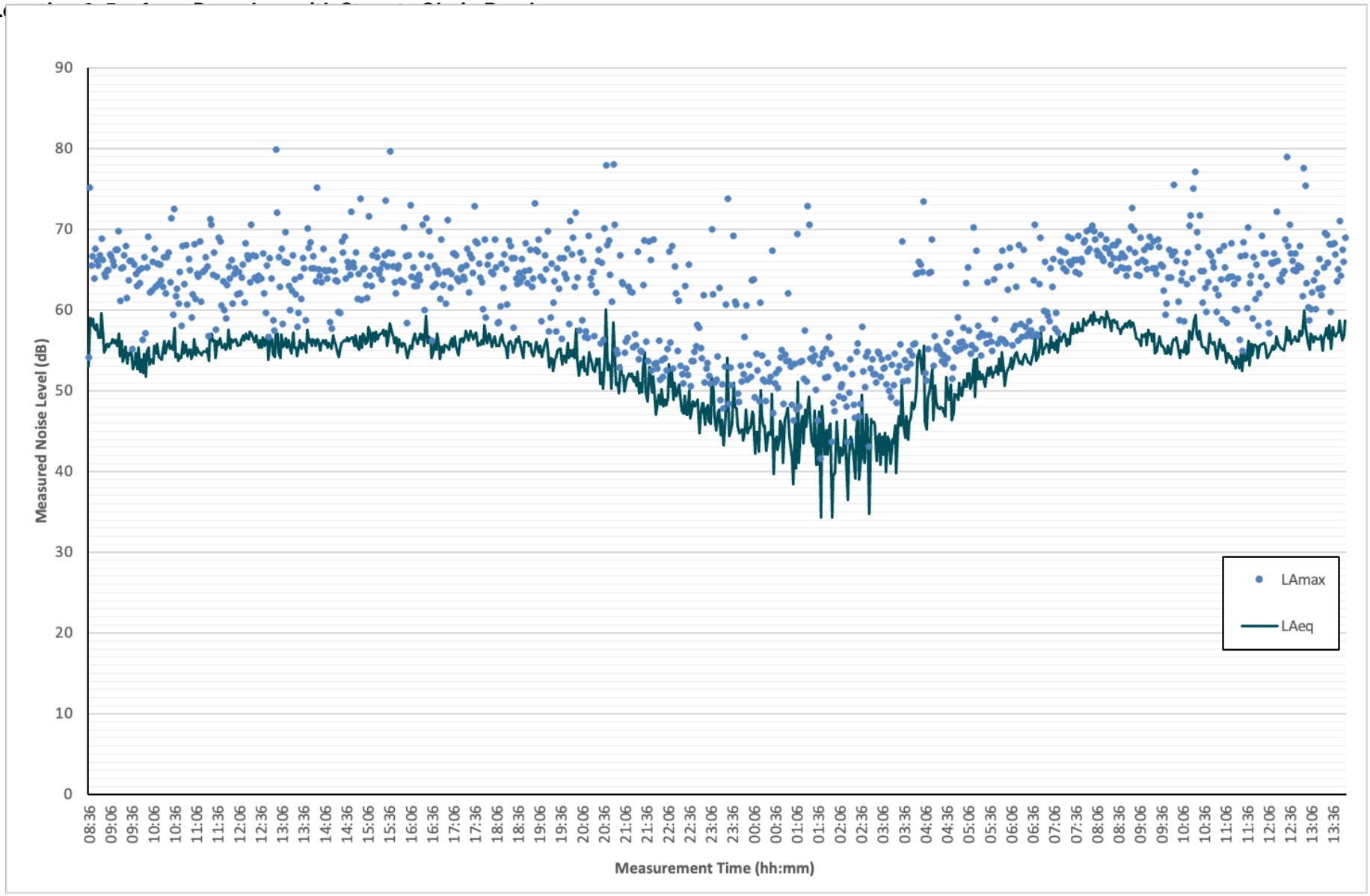


Location 4: 150m from Boundary with A483 on Phase 2 land



Location 5: 7m from Boundary with Mold Road




Measured Noise Level (dB)
90
80
70
60
50
40
30
20
10
0
08:36
09:06
09:36
10:06
10:36
11:06
11:36
12:06
12:36
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14:06
14:36
15:06
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11:06
11:36
12:06
12:36
13:06
13:36
Measurement Time (hh:mm)
LAmax
LAeq