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PHASE 2B - 4, MANOR GARDENS, WREXHAM ROAD, RHOSTYLLEN APPROVED RESIDENTIAL DEVELOPMENT

NOISE MITIGATION SCHEME

On behalf of:
SG Estates

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NOISE MITIGATION SCHEME

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1. INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by SG Estates to carry out an assessment of noise for an outline approved residential development on land off Wrexham Road in Rhostyllen and advise on any necessary noise mitigation measures for the development.

1.2 The application for the development was originally granted in 2004 as part of the wider Manor Garden development (Ref: P2004/0940) which had the following noise related Condition attached:

> *"15. No part of the development shall be commenced until a noise survey has been undertaken to determine noise levels for both day and night having regard to Planning Policy Guidance (Wales) Technical Advice Note 11 - Noise. The detailed report to be submitted and approved by the Local Planning Authority shall include:*
>
> *a. noise levels arising from day/night activities arising from the A5152 and the railway line in the vicinity to the proposed development site and the impact on the proposed accommodation.*
>
> *b. a detailed scheme on noise insulation and/or attenuation measures so designed to safeguard the amenity of the future occupants of the proposed accommodation hereby approved*
>
> *c. an assessment and proposed mitigation measures of likely noise impacts associated with the construction phase upon existing noise receptors on both sides of the A5152."*

1.3 A further reserved matters application was submitted (Ref: P/2007/0686) and was supported with a noise survey prepared by SRL (ref: C/05/6W/1578/R01/PVCS/jsc) which concluded:

> *'Any development to take place within 46m from the rail line will require higher specification glazing and ventilation to achieve the night-time L_{Amax} requirements, as set out in BS 8233: Sound Insulation and Noise Reduction for Buildings' of 45 dB.*
>
> *The following specifications will produce the attenuation needed:*
>
> *• 10mm float glass/12mm air gap/6.4mm float glass*
>
> *• Mechanical ventilation'*

1.4 For the Phase 2B - 4 land, due to the length of time since the 2007 noise assessment, the Local Authority have requested an updated noise assessment be supposed.

1.5 The development location is shown in Figure 1 and is situated in a primarily residential area. Figure 1 shows that the development land is a grassed field located to the north side of the Shrewsbury to Chester railway line. The line is a passenger line used by two to three carriage services with light freight usage. The topography of the site is such that the line passes the site at grade. The site is designed such that the nearest dwellings to the railway line are around 10m from the site boundary and 20m from the edge of the nearside track.

1.6 The site is bounded to the north by Wrexham Road (A5152) a lightly trafficked road. To the south west are dwellings that are under construction as part of the wider Manor Gardens development.

1.7 The proposals are for the construction of 137 dwellings consisting of a range of one bed apartments to five bed detached houses.

1.8 The noise assessment has therefore included:

- An inspection of the site;
- Measurement of railway noise levels in the Southern area of the site;
- Measurement of road traffic noise levels in the Northern area of the site;
- Assessment of railway and road traffic noise impact on the development; and
- Recommendation of appropriate noise mitigation measures where necessary.

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

2. RAILWAY NOISE SURVEY

2.1 A railway noise survey has been carried out at a location 5 metres back from the south boundary of the site and 15m from the track. The measurement position is indicated on Figure 1 as Location 1.

2.2 The survey was carried out between 13:50 and 00:00 on Thursday 28th August 2025 in consecutive five second periods, using a Rion NA-28 'Type 1' integrating sound level meter (S/N: 00960036), independently calibrated within the preceding 24 months. The survey was curtailed due to an power failure; however, a sufficient number of train pass-bys were measured to enable a robust assessment.

2.3 The noise measurements have been carried out in compliance with BS 7445: 2003. The noise monitoring was carried out at a microphone height of approximately 1.5 metres above the ground. Calibration checks of the sound level meter were carried out before and after the noise survey with no significant variance in levels observed. Details of the instrumentation used, weather conditions, etc. are stated in Appendix B.

2.4 Based upon timetable information, we understand that the total daytime (07:00-23:00) two-way flow of passing trains is up to 33 (approximately two per hour).

2.5 During the whole of the night-time period (23:00-07:00) there is typically a total of only five passenger trains, the majority of which are between 06:00 and 07:00.

2.6 The number of trains running on the line has significantly reduced from the timetable at the time of the original application in 2006.

2.7 We understand that there are up to 13 freight trains during the daytime and two during the night time, but these run according to demand and often do not run. A single timetabled freight train passed during the noise survey.

2.8 The noise levels were measured during the passage of a sample of trains in terms of the 'sound exposure level' (L_{AE}) and the maximum sound pressure level, L_{Amax}.

2.9 The daytime (07:00-23:00) 16-hour noise exposure value and night-time (23:00-07:00) 8-hour noise exposure value has been calculated from the results as described below.

2.10 The measured sound exposure levels (L_{AE}) were between 80–91 dB $L_{AE.}$ The measured short-term peaks of noise from passing trains were found to be within the range of 80–90 dB L_{Amax}.

2.11 The results of the railway noise survey are detailed in Appendix B and the data has been used in the analysis below.

Railway Noise Exposure Values

2.12 Railway noise is evaluated in terms of the '*equivalent continuous noise level*', L_{Aeq}. The daytime and night-time L_{Aeq} values have been calculated from the results of the noise survey using the standard formula:

$$L_{Aeq(T)} = L_{AE} \text{ Average} + 10 \log N - 10 \log T$$

where: $L_{Aeq(T)} = L_{Aeq}$ over time period T
L_{AE} Average = Average 'Sound Exposure Level'
N = Number of train passes in time period T
T = Time period in seconds

2.13 The daytime and night-time railway noise exposure values are shown in Table 1 below.

Table 1: Railway noise exposure values (dB) at 20m from boundary

Daytime $L_{Aeq,16hr}$ (07:00-23:00)	Night-time $L_{Aeq,8hr}$ (23:00-07:00)
48 dB $L_{Aeq,16hr}$	41 $L_{Aeq,8hr}$

2.14 The values in Table 1 are modest levels of railway noise. This is due to there being a relatively low number of passing trains averaged over the 16-hour daytime period and 8-hour night-time period.

2.15 The equivalent peaks of noise (L_{Amax}) at a distance of 20m from the railway line are in excess of 70 dB. The implications of the railway noise exposure values are discussed in sections.

Comments on Railway Noise Exposure Levels

2.16 The results of the railway noise survey have been assessed in accordance with the guidance in 'Technical Advice Note (Wales) 11 – Noise', 1997 (TAN 11) and CL-01-15 updates. The TAN 11 Noise Exposure Categories (NECs) for railway noise are shown in Table 2.

2.17 TAN 11 sets out Noise Exposure Categories (NECs) for proposed residential development land that is exposed to different types of noise, and their suitability for residential use. The NECs for land exposed to railway noise (which are 'free field' values) are shown in Table 2.

Table 2: TAN 11 Railway Noise Exposure Categories

	Noise Exposure Category (NEC)			
	A	B	C	D
Daytime (07:00-23:00)	<55	55-66	66-74	>74
Night-time (23:00-07:00)	<45*	45-59*	59-66	>66

* Sites where noise events regularly exceed 82 dB L_{Amax} several times in any hour at night should be treated as being in Category C

Category A - Noise need not be considered as a determining factor in granting planning permission.

Category B - Noise should be taken into account and steps taken to ensure an adequate level of protection against noise.

Category C - Planning permission should not normally be granted. Where development is permitted, steps should be taken to ensure a commensurate level of protection against noise.

Category D - Planning permission should normally be refused.

2.18 Thus, the daytime railway noise exposure level at the southern site boundary at this site (shown in Table 1) falls into NEC A of TAN 11. The night-time railway noise exposure level also falls into NEC A of TAN 11.

2.19 The railway noise exposure levels at the proposed location of the dwellings are therefore suitable for residential development levels and noise need not be considered as a determining factor.

2.20 Appropriate acoustic design goals for the dwellings are discussed in Section 4.0 and our recommendations for noise mitigation are set out in Section 5.0.

3. ROAD TRAFFIC NOISE SURVEY

3.1 The monitoring equipment used for the road traffic noise measurements was deployed at a location where it could be secured and left unattended, rather than at the proposed frontage of the dwellings closest to Wrexham Road.

3.2 The noise survey location is indicated in Figure 1 and is described below:

- Location 2: 3 metres from Wrexham Road

3.3 Noise measurements were taken at between approximately 13:50 on Thursday 28th and 13:30 on Friday 29th August 2025 in consecutive two-minute sampling periods

3.4 The noise survey was carried out using a NTi Audio XL2 'Type 1' integrating sound level meter (S/N: A2A-20361-E0), independently calibrated within the preceding 24 months.

3.5 Acoustic calibration of the sound level meter was carried out before and after the noise measurements using an acoustic calibrator that had been independently calibrated within the preceding 12 months. No significant variation in the calibrated noise level was noted. Details of the instrumentation used, weather conditions, etc. are stated in Appendix B.

3.6 The noise measurements have been carried out in compliance with BS 7445: 2003. The noise measurements were taken in *'free-field'* conditions and at a microphone height of approximately 1.5m above the ground.

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

3.8 The full results of the traffic noise survey are shown in Appendix B. A summary of the results is provided in Table 3 below.

Table 3: Road Traffic Noise Exposure Levels (dB)

Location	Daytime $L_{Aeq,16hr}$ (07:00-23:00)	Night-time $L_{Aeq,8hr}$ (23:00-07:00)
Wrexham Road	63	57

3.9 Corresponding peaks of noise at Location 1 during the night were up to 80 dB L_{Amax} due to passing vehicles, with the 10th highest measured night-time value being 77 dB L_{Amax}.

Comments on Road Traffic Noise Exposure Levels

3.10 The results of the traffic noise survey have been assessed in accordance with the guidance in 'Technical Advice Note (Wales) 11 – Noise', 1997 (TAN 11) and CL-01-15 updates. The NECs for land exposed to road traffic noise are shown in Table 4.

Table 4: TAN 11 Road Traffic Noise Exposure Categories

	Noise Exposure Category			
	A	**B**	**C**	**D**
Daytime (07:00-23:00)	<55	55-63	63-72	>72
Night-time (23:00-07:00)	<45*	45-57*	57-66	>66

* Sites where noise events regularly exceed 82 dB L_{Amax} several times in any hour at night should be treated as being in Category C

Category A - Noise need not be considered as a determining factor in granting planning permission.

Category B - Noise should be taken into account and steps taken to ensure an adequate level of protection against noise.

Category C - Planning permission should not normally be granted. Where development is permitted, steps should be taken to ensure a commensurate level of protection against noise.

Category D - Planning permission should normally be refused.

3.11 The results of the traffic noise measurements demonstrate that the part of the site closest to the Wrexham Road falls into the boundaries of Categories B and C of TAN 11 in both daytime and at night.

3.12 Therefore, we conclude that, subject to an adequate scheme of noise mitigation measures to provide a commensurate level of noise protection for plots in the area near to Wrexham Road.

3.13 Appropriate acoustic design criteria are discussed in Section 4 and our recommendations for noise mitigation are set out in Section 5.

4. ACOUSTIC DESIGN CRITERIA

4.1 The most relevant national guidance on appropriate acoustic design goals for residential development is set out in BS 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. The design criteria recommended in BS 8233 for daytime periods (07:00 – 23:00) and night-time periods (23:00 – 07:00) are summarised in Table 5:

Table 5: BS 8233 Recommended Acoustic Design Criteria

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

4.2 BS 8233 states that if there is a reliance on closed windows to meet the guide values, "*there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level*".

4.3 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} 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*".

4.4 Therefore, for this development we recommend the following noise criteria be adopted with windows closed and trickle ventilation provided:

- Daytime noise below 35 dB L_{Aeq} inside living rooms and bedrooms; and
- Night-time noise levels not exceeding 30 dB L_{Aeq} and generally not exceeding 45 dB L_{Amax} in bedrooms i.e. not more than 10-15 times per night.

4.5 Meeting the above adopted noise criteria will provide a good standard of protection of residential amenity for future residents of the proposed development.

4.6 For outdoor amenity spaces such as private gardens and patios, BS 8233 states that "*it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments*".

4.7 However, the standard also recognises that these guideline values are not achievable in all circumstances where development might be desirable, particularly for development sites adjoining the 'strategic transport network'. In such cases (i.e. where noise levels would be above 55 dB L_{Aeq}),

BS 8233 states that the development should be designed to minimise noise levels as far as is practicable 'but should not be prohibited'.

4.8 On this basis, our recommendations for noise mitigation are described in Section 5.

5. NOISE MITIGATION SCHEME

Gardens

5.1 For dwellings close to the railway the daytime railway noise exposure level at 20 metres from the site boundary (i.e. in the rear gardens of the proposed houses) was found to be 48 dB $L_{Aeq,16hr}$ which is below the lower limit of 50 dB(A) that is recommended for gardens in BS 8233. Therefore, no specialist noise mitigation measures in respect to external noise need to be installed for these dwellings.

5.2 For the gardens of any dwellings close to or with a view of the A5152, we recommend that a 2.0 m high proprietary acoustic fence is installed for the boundaries of gardens of the plots indicated in Green on Figure 2.

5.3 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.

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

Sound Insulation of Dwellings

5.5 Windows of standard well-sealed thermal double glazing (4mm glass – 4mm glass) have a typical sound reduction performance of 25 dB $R_w + C_{tr}$. Therefore, where railway noise levels exceed 60 dB $L_{Aeq,16hr}$ during the daytime and/or 55 dB $L_{Aeq,8hr}$ at night, and/or 70 dB L_{Amax} for more than 10 times a night, higher specification glazing will be necessary.

5.6 For dwellings close to the railway line the calculated noise levels are below the criteria set out above, and as there are no more than seven trains timetabled during the entire night, we consider that for all living rooms & bedrooms the criteria set out in paragraph 4.4 will be achieved without the need for specialist acoustic double glazing or ventilation.

Noise Mitigation Scheme 1

5.7 For the small number of dwellings within 8m of the A5152 (marked in Blue on Figure) we recommend double glazed windows are fitted to living rooms with a minimum sound insulation performance of 29 dB $R_w + C_{tr}$.

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

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

5.9 For bedrooms of the above dwellings (marked in Blue on Figure 2), we recommend double glazed windows are installed with a minimum sound insulation performance of 32 dB $R_w + C_{tr}$.

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

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

Noise Mitigation Scheme 2

5.11 For dwellings further from the A5152 (marked in Yellow on Figure) we recommend double glazed windows are fitted to living rooms with a minimum sound insulation performance of 29 dB $R_{w+}C_{tr}$.

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

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

5.13 For bedrooms of the above dwellings (marked in Yellow on Figure 2), we recommend double glazed windows are installed with a minimum sound insulation performance of 32 dB $R_{w+}C_{tr}$.

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

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

5.15 Other dwellings on the site will be further away from the Wrexham Road and/or screened by those houses nearer to the road, such that no specialist sound insulation measures are necessary for these dwellings and standard double-glazing and standard window frame slot vents will suffice.

Ventilation

5.16 For living rooms and bedrooms that require upgraded glazing (i.e. those shown in Blue and Yellow 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 $D_{n,e,w}$. 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 $D_{n,e,w}$).

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

6. SUMMARY AND CONCLUSION

6.1 The impact of noise has been assessed for the proposed Phase 2B - 4 residential development at land off Wrexham Road in Rhostyllen.

6.2 The assessment has included the measurement railway and road traffic noise at appropriate locations on the site and calculation of the daytime and night-time noise exposure levels.

6.3 Railway noise levels are low, and as such no specialist noise mitigation measures for the control of external and internal noise levels will be necessary.

6.4 Road traffic noise levels are such that some modest noise mitigation measures will be required to ensure appropriate control of external and internal noise levels.

6.5 An appropriate sound insulation scheme for the development has been described in this report.



Do not scale from this figure

Key:

x - Noise Measurement Location

N

Project: P24-018

Ref: **Figure 1**

Title: Site Location & Noise Measurement Position

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Do not scale from this figure

Key:

- 2.0m Acoustic Barrier
- Noise Mitigation Scheme 1
- Noise Mitigation Scheme 2

Project: P24-018

Ref: **Figure 2**

Title: Proposed Layout & Noise Mitigation Scheme

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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 120dB (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:

$L_{Aeq,T}$ **A-weighted Equivalent Continuous Sound Level:** An average of the total sound pressure measured over a specified time period (T). In other words, $L_{Aeq,T}$ is the level of a steady sound which has the same total A-weighted sound pressure as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for most forms of environmental noise.

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.

L_{AE} **A-weighted Sound Exposure Level:** A metric used for measuring discrete noise events. Essentially it is a measure of the sound energy of the whole noise event normalised to a period of 1 second. The L_{AE} value can be used to calculate the actual $L_{Aeq,T}$ value for a given time period if the number of noise events is known.

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.

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).

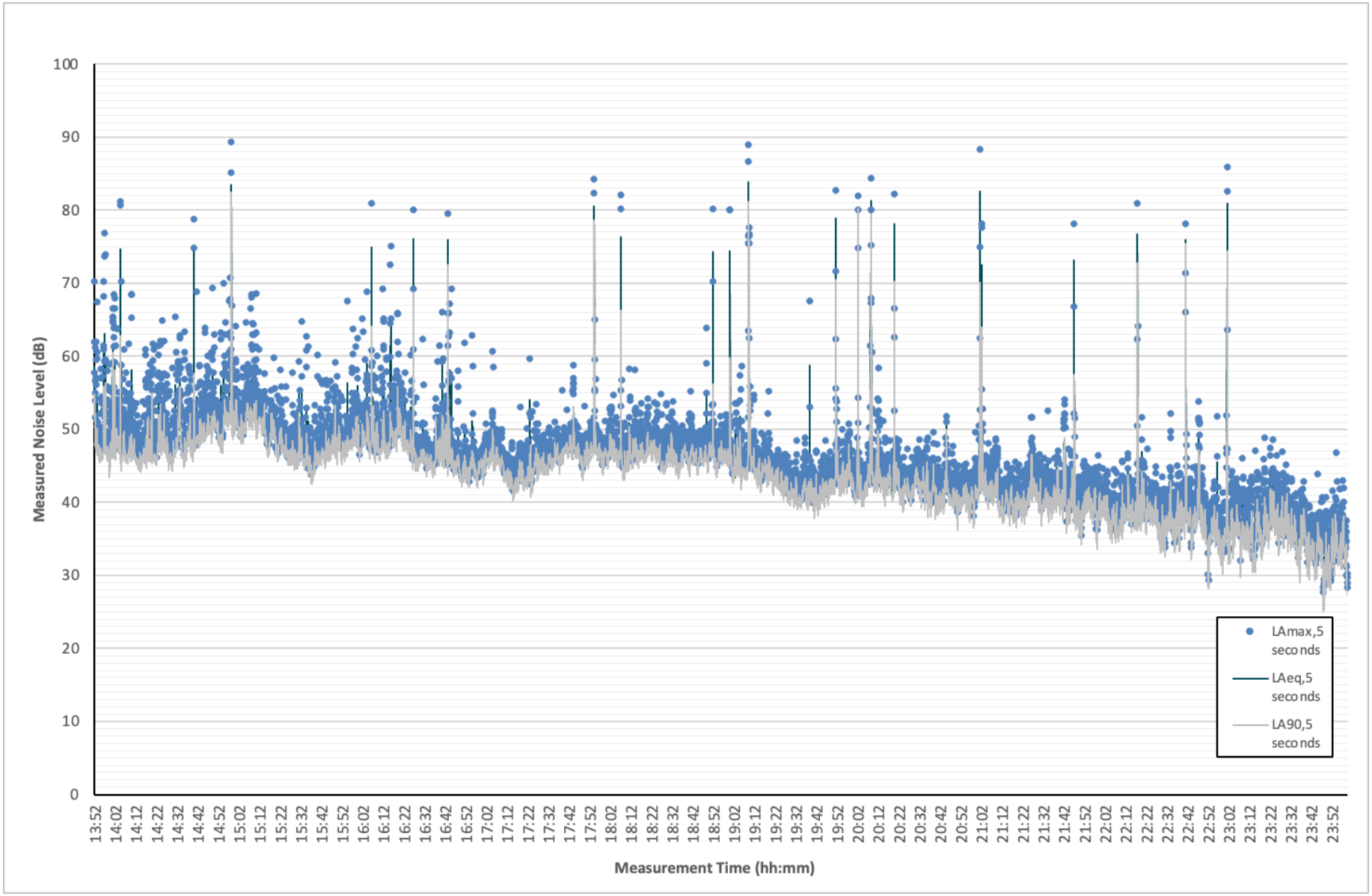
$D_{n,e,w}$ **Weighted Element Normalised Level Difference:** A frequency weighted single figure laboratory value quantifying the sound insulation performance of a building element, such as an air vent.

APPENDIX B: NOISE SURVEY RESULTS

Date(s)	Thursday 28 August – Friday 29 August 2025
Equipment	NTi Audio XL2-TA 'Class 1' sound analyser (s/n: A2A-20361-E0) Rion NA-28 Class 1' sound analyser (s/n: 00960036) with associated calibrator(s) and tripod(s)/environmental outdoor monitoring kit(s)
Weather	Daytime: 14 – 19 °C, partially overcast, dry, South Westerly / Southerly wind 3-4 m/s Night-time: 10 – 13 °C, overcast, dry, Southerly wind 3 m/s

Chart(s) overleaf

Location 1: Southern boundary of the site



Location 2: Northern boundary of the site

