



Caulmert Ltd

Berse Road, Wrexham

Noise Assessment

22734752/01 – July 2024

Move Forward with Confidence



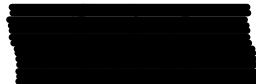
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Executive Summary

Bureau Veritas was instructed by Caulmert Ltd to conduct an environmental noise assessment to support the planning application for a residential development site at Berse Road, Caego, Wrexham.

The proposed development comprises 47 no. dwellings with a mix of cottage apartments and houses with associated gardens and car parking spaces. Access to the site would be provided from Berse Road.

Baseline noise surveys and a CRTN measurement were conducted at the site between 19th-20th June 2024. The results were used to calibrate an environmental noise model of the site in order to determine the predicted sound levels at facades and within gardens of dwellings.

For the habitable rooms, a glazing and ventilation strategy has been proposed which provides suitable internal sound levels. In summary, the following mitigation measures are proposed:

- Glazing to be minimum 4-12-4/6-12-6; and
- Window vents with sound reduction of 33 dB $D_{n,e,w} + C_{tr}$ for all the habitable rooms with the façades overlooking the Berse Road of the Plot 1, Plot 3-6, and Plot 34-45.

As the assessment indicates the site is of low to negligible noise risk in terms of road traffic noise, windows can be openable for mitigating the overheating condition.

The assessment of garden sound levels indicates that all spaces would be below the lower recommended value of 50 dB $L_{Aeq,16h}$ with the inclusion of standard 1.8m close boarded timber fencing and the 2.1m anti climb fences that are included within the masterplan. It is therefore concluded that garden noise levels across the development can achieve the guideline value with the current site layout.

All adverse impacts are therefore shown to be mitigated and minimised, in line with the current planning policy and guidance.

1 Introduction

- 1.1 Bureau Veritas was instructed by Caulmert Ltd to conduct an environmental noise assessment to support the planning application for a residential development site at Berse Road, Caego, Wrexham.
- 1.2 An environmental noise model was created and calibrated using noise levels measured at the site. This was used to predict noise levels at the facades and within gardens of proposed plots at the development.
- 1.3 The results of the assessment were used to identify any constraints with regards to noise. Details of the required mitigation measures in the form of site layout design, glazing and ventilation specifications are provided such that suitable external and internal sound levels can be achieved.
- 1.4 A glossary of acoustic terminology is included in **Appendix One**.

2 Site Details

- 2.1 The site is located adjacent to the B5101 Berse Road at the northeastern boundary and approximately 380 m northwest of the A483 dual-carriageway. To the north, northeast and east are residential dwellings. To south and west of the site are farmlands. Therefore, road traffic noise is the dominant environmental noise sources affecting the site.
- 2.2 The site location is shown in **Appendix Two**.

3 Details of Proposed Development

- 3.1 The proposed development comprises 47 no. dwellings with a mix of cottage apartments and houses with associated gardens and car parking spaces. Access to the site would be provided from Berse Road.
- 3.2 A proposed site layout is shown in **Appendix Three**.

4 Assessment Methodology

- 4.1 The measured noise levels have been assessed with reference to the following current guidance documents:
 - Planning Policy Wales (Ed. 12, February. 2024);
 - Technical Advice Note (Wales) 11, Noise;
 - Wrexham Unitary Development Plan 1996 – 2011;
 - Professional Practice Guidance: Planning and Noise. Professional Practice Guidance on Planning & Noise – New Residential Development, May 2017;
 - Wrexham County Borough Council Local Plan
 - British Standard 8233: 2014, 'Guidance on sound insulation and noise reduction for buildings';

Planning Policy

Planning Policy Wales (Ed. 12, February. 2024)

- 4.2 Planning Policy Wales (PPW) defines the latest land use planning policies of the Welsh Government. The consideration of noise impacts and the overall encouragement of good soundscapes is widely discussed within the document and, of particular importance to this report, paragraph 6.7.14 of PPW states:

“6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission.”

- 4.3 PPW is supplemented by a series of Technical Advice Notes, including the TAN11 relating to the consideration of noise at the planning stage.

Technical Advice Note (Wales) 11, Noise

- 4.4 It should be noted that TAN11 is currently being re-drafted, and in the interim Welsh Ministers have advised that in order to provide as robust an assessment as possible, practitioners should incorporate advice contained within the most recent Government guidance in England. The assessment also therefore includes consideration of the requirement of Professional Practice Guidance on Planning and Noise (ProPG); the details of which are provided later in this Section.
- 4.5 TAN11 was introduced by the Welsh Government in October 1997. Paragraph 3 on page 1 of TAN11 indicates that it is intended to provide *“advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources.”*
- 4.6 In relation to the assessment of noise-sensitive development, TAN11 states that:
- “10. Local planning authorities should consider whether proposals for new noise-sensitive development would be incompatible with existing activities, taking into account the likely level of noise exposure at the time of the application and any increase that may reasonably be expected in the foreseeable future. Such development should not normally be permitted in areas which are, or are expected to become, subject to unacceptably high levels of noise and should not normally be permitted where high levels of noise will continue throughout the night.”*
- 4.7 Annex A of TAN11 include two tables showing noise exposure categories for dwellings and recommended noise exposure categories for new dwellings near existing noise resources. It should be noted however that the proposal development is not for permanent residences, but rather for short-term holiday accommodation operated on a commercial basis. In the absence of specific guidance on noise at holiday accommodation, reference to the criteria specified for permanent residences provides a cautiously robust assessment.

Noise Exposure Categories for Dwellings

- 4.8 A1. When assessing a proposal for private residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories

(NECs) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC (Table 4.1, overleaf).

- 4.9 A recommended range of noise levels is given in Table 4.2 for each of the NECs for dwellings exposed to noise from road traffic. However, in some cases it may be appropriate for local planning authorities to determine the range of noise levels they wish to attribute to the various NECs. Where there is a clear need for new residential development in an already noisy area some or all NECs might be increased by up to 3 dB(A) above the recommended levels. In other cases, a reduction of up to 3 dB(A) may be justified.

Table 4.1: Noise Exposure Categories (from TAN11)

Category	Criteria
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 4.2: Recommended NEC Noise Criteria for Sites affected by Road Traffic (from TAN11)

Noise Levels ⁽¹⁾ corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB				
Noise Source	Noise Exposure Category			
	A	B	C	D
Road traffic 0700-2300	<55	55-63	63-72	>72
Road traffic 2300-0700 ⁽²⁾	<45	45-57	57-66	>66
Notes ⁽¹⁾ Noise levels: the noise level(s) ($L_{Aeq,T}$) used when deciding the NEC of a site should be representatives of typical conditions. ⁽²⁾ Night-time noise levels (2300-0700): sites where individual noise events regularly exceed 82dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8h}$ (except where the $L_{Aeq,8h}$ already puts the site in NEC D).				

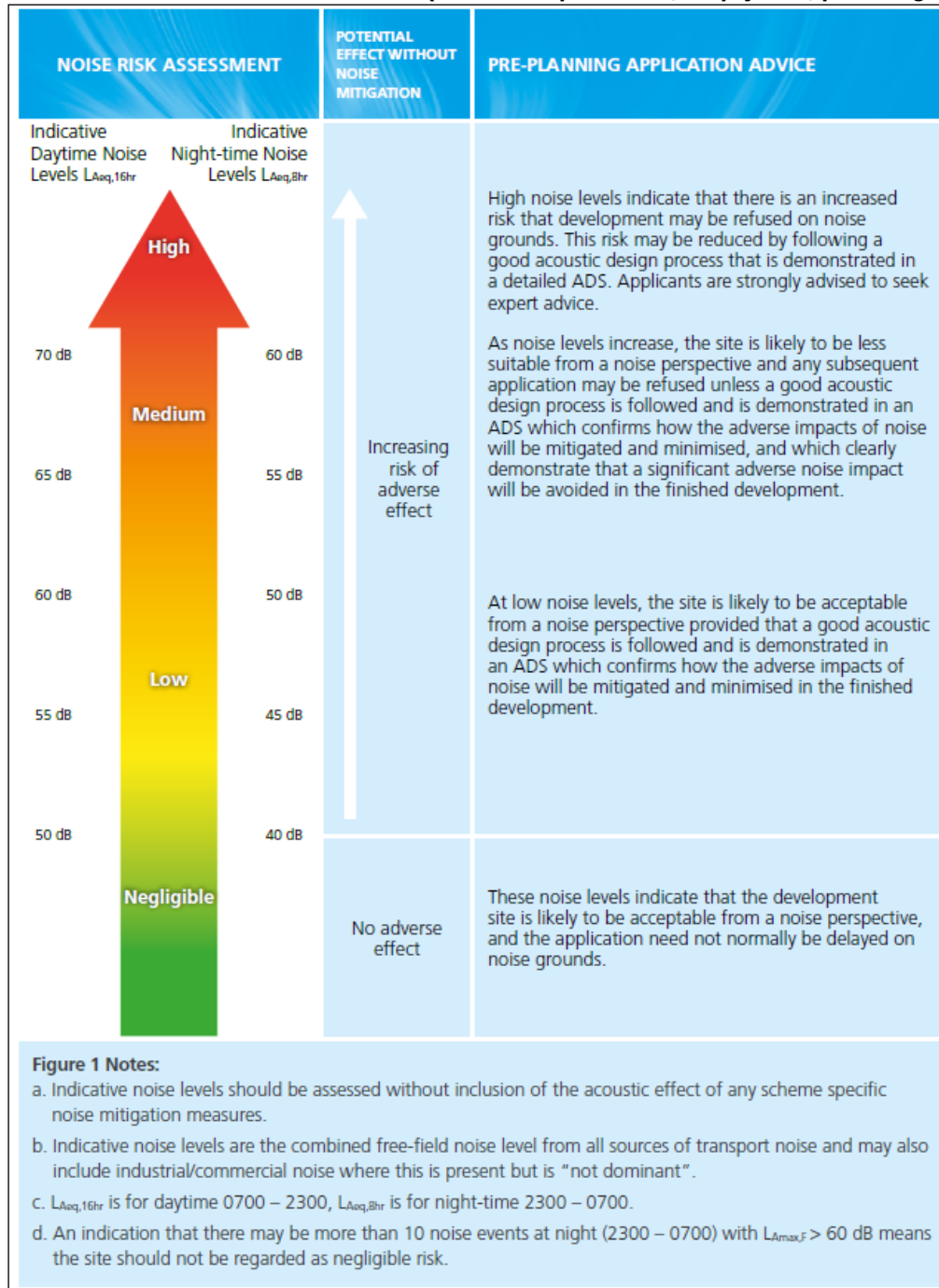
- 4.10 It also mentions that "Levels of noise from road and rail traffic are often specified at one metre from the facade, and these facade levels should be assumed to be 3 dB(A) higher than levels measured away from any buildings, unless a more accurate figure is available. For road traffic noise in NECs C and D, $L_{Aeq, 16h} \approx L_{A10, 18h} - 2$ dB." **ProPG: Planning and Noise**

- 4.12 Professional Practice Guidance on Planning and Noise for new residential development (ProPG) was published June 2017 by the Chartered Institute of Environmental Health

(CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA). The guidance has been produced to provide practitioners with guidance on the management of noise within the planning system in England. However, its use for consideration of noise for residential development in Wales is widely advised, in lieu of the publication of updated guidance from Welsh Government.

- 4.13 It should be noted again that the guidance provided within ProPG is specific to permanent occupancy of residential dwellings, and not to short-term occupancy associated with holiday accommodation as part of a commercial operation.
- 4.14 The guidance focusses on proposed new residential development and existing transport noise sources and reflects the Government's overarching Noise Policy Statement for England (NPSE, the National Planning Policy Framework (NPPF) and Planning Practice Guidance (including PPGN), as well as other authoritative sources of guidance.
- 4.15 The guidance provides advice for Local Planning Authorities (LPAs) and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:
- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
 - Encourage the process of good acoustic design in and around new residential developments;
 - Outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
 - Improve understanding of how to determine the extent of potential noise impact and effect; and
 - Assist the delivery of sustainable development.
- 4.16 ProPG provides guidance for the producing an initial site noise risk assessment, pre-mitigation, based on the prevailing daytime and night-time noise levels across the site, from which the site (or areas thereof) can be zoned. Figure 4.1 shows the Stage 1 noise risk assessment criteria taken from Figure 1 of ProPG.

Figure 4.1 Initial Site Risk Assessment (measured/predicted, empty site, pre mitigation)



- 4.17 Stage 2 of the ProPG assessment requires consideration of four key elements to be undertaken in parallel. The Stage 2 assessment is intended to be proportionate to the risk, as determined by the initial site risk assessment.
- 4.18 The four elements of the Stage 2 assessment and implications on acoustic design are discussed below.

Element 1 - Good Acoustic Design Process

- Following a good acoustic design process is a key part of achieving good design, as required by NPPF and NPSE. It is imperative that acoustic design is considered at an early stage of the development process.
- A good acoustic design process takes an overarching and integrated approach in order to achieve optimal acoustic conditions, both in terms of internal noise levels within habitable rooms and external amenity noise (e.g. in gardens, balconies etc.).
- Good acoustic design should avoid 'unreasonable' acoustic conditions and prevent 'unacceptable acoustic conditions. ProPG notes that good acoustic design does not mean over-engineering or 'gold plating' all new developments but instead should aim to provide an optimum acoustic outcome for a particular site.

Element 2 - Internal Noise Level Guidelines

- The second element of Stage 2 is to seek to achieve recommended internal noise levels inside noise sensitive rooms in new residential development. The guideline values proposed are the same as those provided in BS 8233:2014 and WHO, including the recommendation that maximum noise levels should not exceed 45 dB L_{Amax} more than 10 times per night.
- Designers should principally aim, through good acoustic design, to achieve these noise levels in sensitive rooms with windows open. Where noise levels are assessed with windows closed, justification is to be provided.

Element 3 - External Amenity Area Noise Assessment

- ProPG recommends the guideline values of 50 – 55 dB $L_{Aeq,16hr}$ in gardens and external amenity areas, where such areas are an intrinsic part of the overall design. If these values cannot be achieved in all areas, the development should be designed to achieve the lowest practicable noise levels. The provision of relatively quiet alternative publically accessible external amenity space may help to offset the noise impact in high noise areas.

Element 4 - Assessment of Other Relevant Issues

- This guidance reflects advice already provided in NPSE and PPG-Noise and includes acoustic factors that determine whether noise could be a concern, e.g. the number, frequency and pattern of noise events; the spectral content of the noise, the character of the noise (i.e. the presence of tones or other features such as impulsiveness), possible cumulative impacts from several sources as well as local topology and topography.
- Other relevant issues to be considered include: magnitude and extent of compliance with ProPG; likely occupants of the development; acoustic design vs. unintended adverse consequences; acoustic design vs. wider planning objectives.

British Standard 8233: 2014 Guidance on Sound Insulation and Noise Reduction for Buildings

- 4.19 BS 8233:2014 provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings, or refurbished buildings undergoing a change of use.
- 4.20 With regards to external sound sources affecting habitable residential spaces, Table 4 of BS 8233:2014 provides guideline values that it is desirable to not exceed during daytime and night time periods. These guideline values are based on guidelines issued by the WHO, and are reproduced in Table A4.3.

Table A4.3: Indoor ambient sound levels for dwellings

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

- 4.21 The internal sound requirements are not intended to be met with open windows, although BS 8223:2014 states that the internal sound levels should take account of the proposed ventilation strategy.
- 4.22 BS 8233:2014 also notes that:
“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved”.
- 4.23 BS8233:2014 does not provide specific guidance on sound levels for regular individual sound events, such as passing trains, which can cause sleep disturbance. Guidance on suitable sound levels for individual events is provided in the WHO Guidelines for Community Noise.
- 4.24 The WHO guidelines state that for a reasonable standard in bedrooms to be achieved individual sound events should not normally exceed 45dB L_{Amax} 10 to 15 times during the night time period.
- 4.25 For traditional external areas that are used for amenity space, such as gardens and patios, BS8233 states that it is desirable that the external sound 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. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated sound levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Acoustics Ventilation and Overheating - Residential Design Guide

- 4.26 Developments will normally (but not always) require additional ventilation (above ADF whole dwelling ventilation provisions) in order to mitigate overheating. Where an overheating assessment is undertaken, it should provide details as to the duration and rate of any additional ventilation required to meet overheating compliance criteria. Where this additional ventilation is provided passively, the overheating assessment should also provide information about the required size of façade openings.

- Table 4.4 Guidance for Level 1 site risk assessment of noise from transport noise sources relating to overheating condition**

Risk category for Level 1 assessment [Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
L_{Aeq,T} [Note 3] during 07:00 - 23:00 L_{Aeq,8hr} during 23:00 - 07:00 65 dB High 60 dB Medium 55 dB Low 50 dB Negligible 45 dB	↑ Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Table 4.5 Guidance for Level 2 assessment of noise from transport noise sources relating to overheating condition

Internal ambient noise level [Note 2]			Examples of Outcomes [Note 5]	
$L_{Aeq,T}$ [Note 3] during 07:00 – 23:00 [Note 6]	$L_{Aeq,2h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 [Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{A,F,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{A,F,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response [Note 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

- 4.29 The use of mechanical systems to control overheating could include systems which provide ambient air at high ventilation rates (ventilative cooling) or systems which provide cooled air, commonly referred to as comfort cooling systems.
- 4.30 These systems would normally be occupant controlled, but there may be options for automation.
- 4.31 Recommendations for desirable internal ambient noise levels for overheating conditions are set out in Table 4.6 (Table 3-5 in the guidance).

Table 4.6: Indoor ambient noise levels from mechanical services - Overheating condition

Possible system or design solution	Desirable upper internal ambient noise levels from mechanical services
Ventilative cooling or Comfort cooling	Bedrooms L_{Aeq} 30 ($\pm$ 5) dB
	Living / Dining Rooms L_{Aeq} 35 ($\pm$ 5) dB

5 Baseline Sound Level Survey

- 5.1 Two short-term attended measurements were conducted on the 19th June 2024 at monitoring locations M2 and M3. A long-term unattended measurement was also carried out at monitoring location M4 between 19th and 20th June 2024.
- 5.2 The survey locations are shown on the site plan in **Appendix Two**.
- 5.3 The location of the long-term monitoring position was considered representative of the general ambient daytime noise levels at this location with the microphone positioned 1.5 m above ground level.
- 5.4 The short-term monitoring was taken with 15-minute time interval at each location. The following table show the measured noise levels.

Table 5.1: Measured free-field noise levels (daytime)

Monitoring Location	Start Time	Sound Pressure Level, dB (Fast, Free-field)			
		L _{Aeq,T}	L _{AFmax,T}	L _{A10,T}	L _{A90,T}
M2	16:02	50.7	63.1	52.4	48.5
M3	16:27	51.4	63.4	53.2	48.8

- 5.5 The noise monitoring equipment was calibrated at the beginning and end of the assessment period using an acoustic calibrator, which had itself been calibrated against a reference set traceable to National and International Standards. No significant shift in calibration level was observed, i.e. <0.5dB.
- 5.6 Meteorological conditions during the daytime attended monitoring were dry and light cloud. Throughout the survey, there was a breeze (0 – 1 m/s), and temperature of 20-21°C.
- 5.7 Long-term measurement was undertaken at M4 with 15-min time interval, with the L_{A10}, L_{A90}, L_{Amax} and L_{Aeq} indices.
- 5.8 Meteorological conditions during the long-term monitoring period were dry and light cloud. Throughout the survey, there was a breeze (0 – 1 m/s) mainly from the NW and N, and temperature of 11-23°C.
- 5.9 **Table 5.2** presents a summary of the sound level survey results during the long-term monitoring. The full long-term measurement data is shown in **Appendix Four**.

Table 5.2: Summary of derived sound levels at the long-term monitoring location

Date	Period	Sound Pressure Level, dB re: 20µPa (Fast, Free-field)			
		L _{Aeq,T}	L _{Amax,T}	L _{A10,T}	L _{A90,T}
19-20/06/24	Day	38 – 51 Average 45	47 – 73 Average 56	40 – 53 Average 46	31 – 48 Average 40
	Night	39 – 51 Average 44	48 – 60 Average 54	42 – 53 Average 47	27 – 48 Mode 36

Notes: T = 15-minute sample interval

- 5.10 The dominant sound source was road traffic on the A483 during the survey period. Other contributory sound sources at the site include occasional birdsong, distant aircraft and Intermittent traffic on Berse Road.
- 5.11 Therefore, at the measurement point, the representative $L_{Aeq,16h}$ is **45 dB** and $L_{Aeq,8h}$ is **44 dB**, as presented in Table 5.2. The values at MP2, MP3 and M4 were used to calibrate the sound propagation model in Section 6.

CRTN measurement

- 5.12 Noise levels of road traffic were measured approximately 5 m from the edge of the B5101 Berse Road. Noise measurements were taken over a period of three hours during a typical weekday afternoon and were used to determine a 16-hour L_{Aeq} . The following table shows the measured noise levels.

Table 5.3: Measured free-field noise levels 5m from Chester Road

Period	$L_{Aeq,1hour}$ dB	$L_{A10,1hour}$ dB	$L_{A90,1hour}$ dB
12:58 – 13:58	58.1	62.3	56.0
13:58 – 14:58	59.0	62.4	58.0
14:58 – 15:58	58.8	62.9	57.5
Arithmetic Average		62.5	
Calculated $L_{A10,18h}$ dB		61.5	

Notes: $L_{A10,18h}$ dB calculated in accordance with Calculation of Road Traffic Noise (1988).

- 5.13 The $L_{A10,18h}$ parameter has been used to predict the daytime $L_{Aeq,16h}$. It is generally accepted that the $L_{Aeq,16h}$ is approximately equal to the $L_{A10,18h}$ minus 2 dB, where road traffic noise is the dominant source. This is detailed in BS 8233. The predicted daytime $L_{Aeq,16h}$ noise level at the measurement location is displayed in Table 5.4 below.
- 5.14 The Transport Research Laboratories (TRL) report, “*Converting UK Traffic Noise Index $L_{A10,18hour}$ to EU Noise Indices for Noise Mapping (2002)*”, provides advice on converting daytime $L_{A10,18h}$ to a night-time $L_{Aeq,8h}$ (2300 – 0700). The following formula was used and the results have been displayed in Table 5.3;

- For non-motorways: $L_{A10,18h} \times 0.9 - 3.77 = L_{Aeq,8h}$

Table 5.4: Calculated free field noise levels (dB) at measurement locations

Calculation Point	$L_{A10,18h}$ dB	$L_{Aeq,16h}$ dB (Day)	$L_{Aeq,8h}$ dB (Night)
5m from Chester Road	61.5	59.5	51.6

Notes: The $L_{Aeq,16h}$ level has been estimated from the $L_{Aeq,18h}$ level by subtracting 2 dB. The $L_{Aeq,8h}$ night-time level has been estimated from the $L_{A10,18h}$ level in accordance with TRL guidance.

6 Noise Propagation Modelling and Assessment

- 6.1 A sound propagation model of the site has been prepared using the CadnaA software package. The sound sources in the model have been calibrated based on the measured sound level survey data, from which the propagation of sound across the site can be calculated.
- 6.2 Baseline topographical data at 1m resolution was incorporated into the model. The future finished floor levels of the development were also incorporated into the model.
- 6.3 Ground absorption was assumed to be 0.2 (i.e. marginally absorbing) across the development site; 2 orders of reflection were assumed.
- 6.4 Daytime grids were calculated at 1.5m height. Night time grids were calculated at 1st floor height (4m).
- 6.5 Garden fencing was included within the model and was assumed to be 1.8m high.
- 6.6 Figures 6.1 and 6.2 show the predicted propagation of sound across the undeveloped site during daytime and night-time periods, respectively.
- 6.7 Figures 6.3 and 6.4 show the results of the Initial Noise Risk Assessment during daytime and night-time periods, respectively.

Figure 6.1: Predicted daytime noise propagation across the undeveloped site - L_{Aeq}

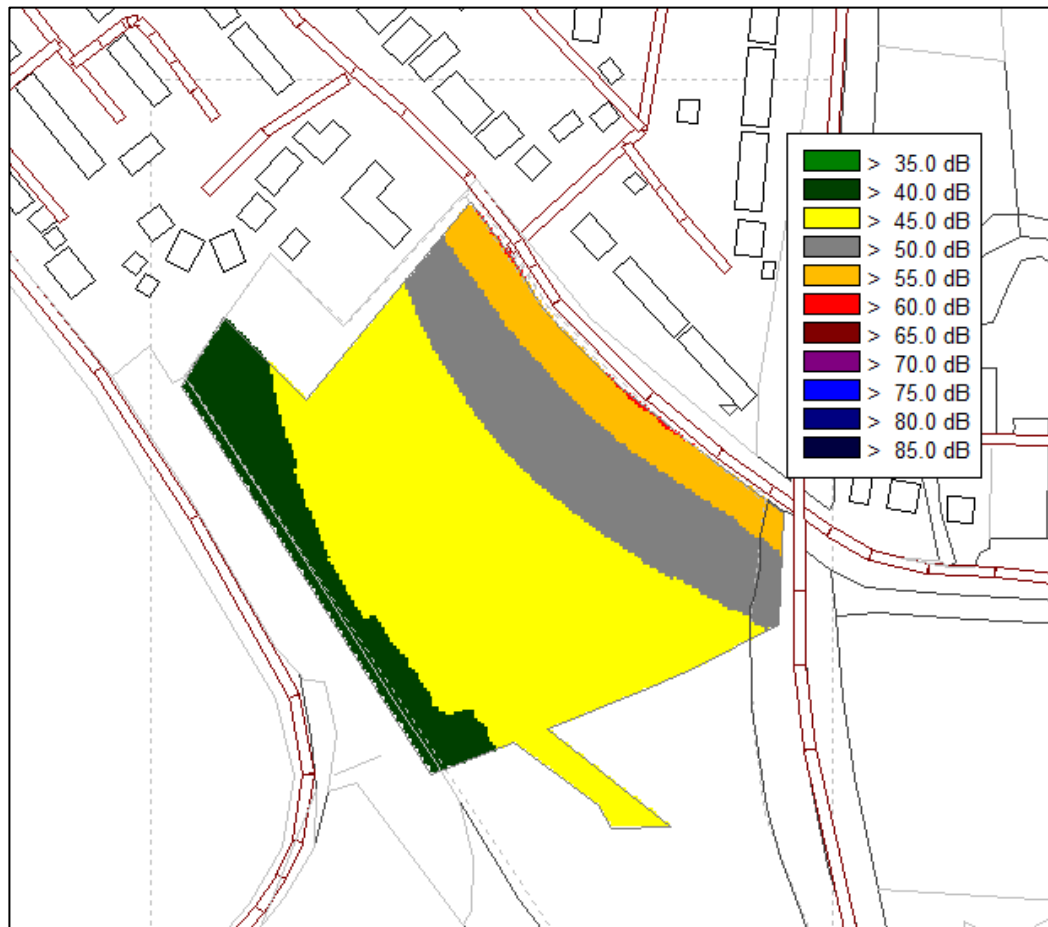


Figure 6.2: Predicted night time noise propagation across the undeveloped site - L_{Aeq}

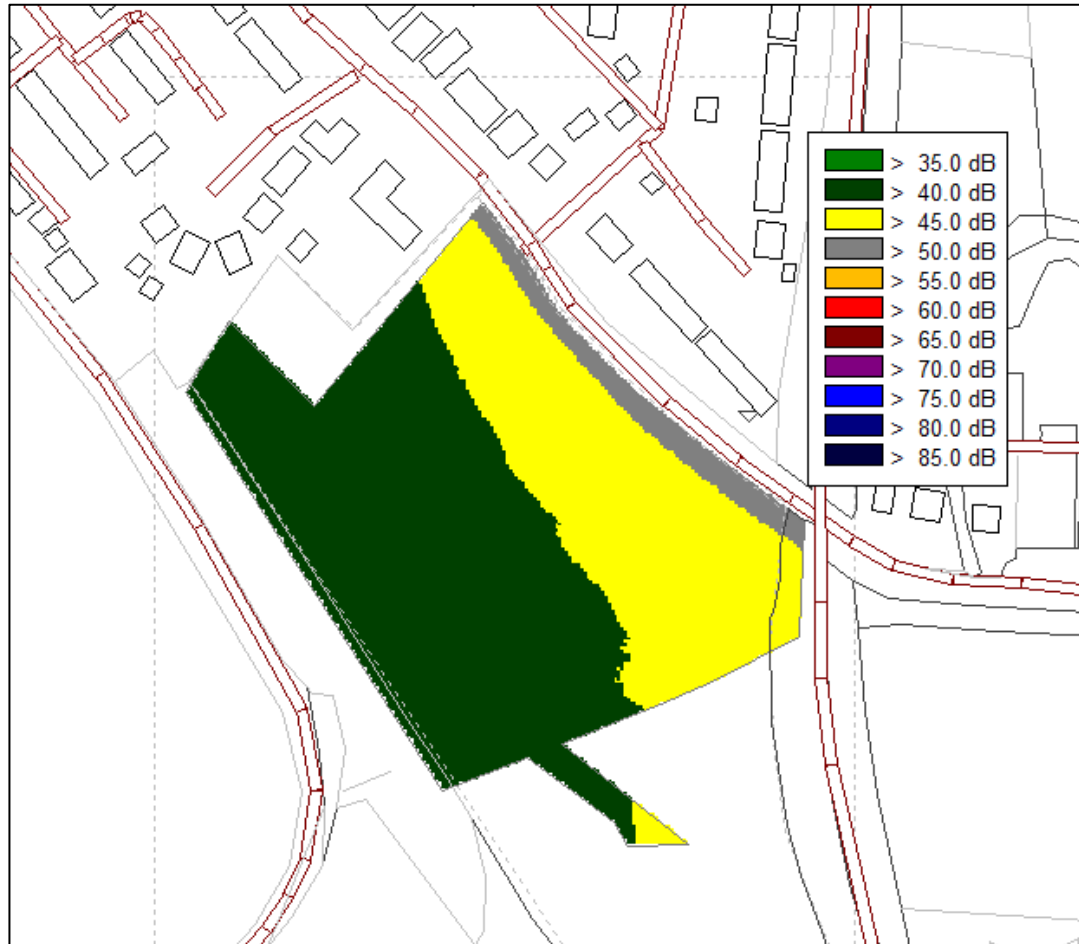


Figure 6.3: Initial Noise Risk Assessment - Daytime

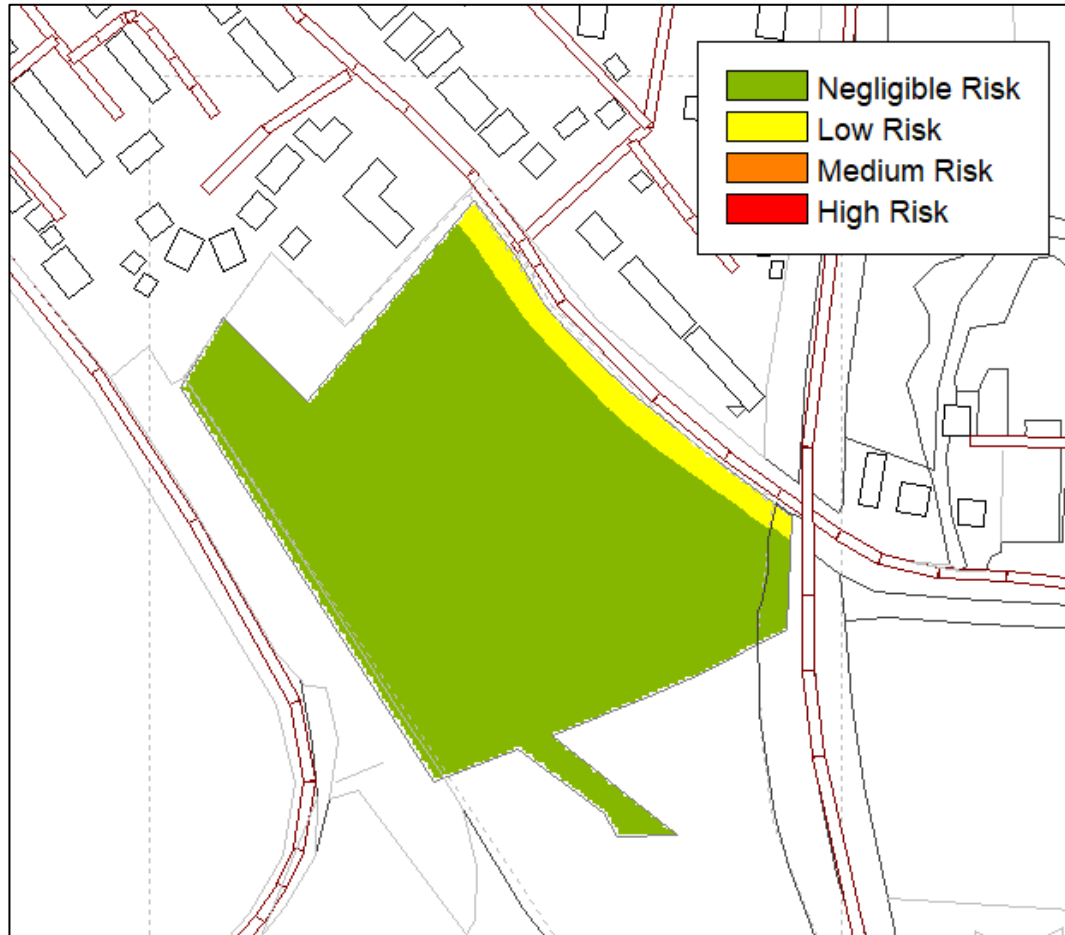
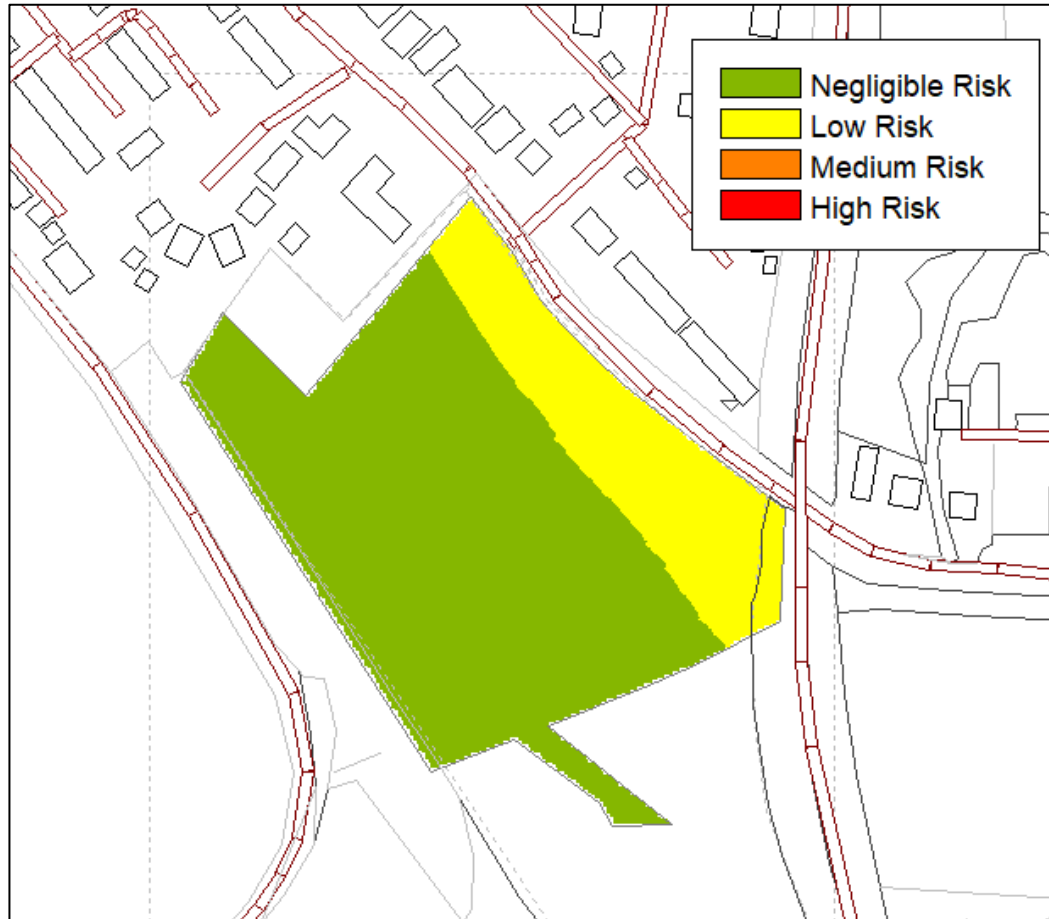


Figure 6.4: Initial Noise Risk Assessment - Night-time



TAN11 Noise Exposure Category

- 6.8 According to the Noise Exposure Categories of road traffic noise in TAN11, the proposed development site falls within Category A ($< 55 \text{ dB } L_{Aeq,T}$) and B ($55\text{-}63 \text{ dB } L_{Aeq,T}$) of NEC for daytime, most of the site falls within the Category A of NEC for night-time ($< 45 \text{ dB } L_{Aeq,T}$), and a small area to the northeast of the site falls within Category B of NEC for night-time ($45 - 57 \text{ dB } L_{Aeq,T}$). Therefore, noise should be taken into account when determining planning applications and, where appropriate, appropriate acoustic design and sound insulation solutions should be considered at the beginning of the design stages.

Stage 1 Initial Noise Risk Assessment

- 6.9 The results of the sound propagation modelling indicate that during daytime periods the site is predominately of Negligible noise risk. At night, the site is Negligible to Low noise risk.
- 6.10 As such, a detailed Acoustic Design Statement (ADS) is required in order to demonstrate how adverse impacts of noise will be mitigated and minimised and which clearly demonstrates that a significant adverse noise impact will be avoided, particularly during night-time periods.

7 Acoustic Design Statement

Element 1 – Good Acoustic Design Process

- 7.1 This element looks to address how noise can be mitigated at the site in general terms and indicates that noise can be factored into the overall design process for the scheme.
- 7.2 As one of the main source of noise is road traffic on the Berse Road to the northeast, it is suggested that the proposed houses are orientated so that their respective private garden spaces are screened by the properties themselves.

Element 2 – Internal Noise Level Guidelines

- 7.3 The achievement of suitable internal sound levels in habitable spaces is dependent on the façade construction, and in particular the weaker acoustic elements (glazing and ventilation).
- 7.4 The accepted rule of thumb is that a window left open for ventilation purposes typically provides a reduction in external noise levels of 10 – 15 dB. In order to achieve guideline indoor noise levels with open windows, daytime ambient noise levels should not exceed around 50 dB $L_{Aeq,16hr}$; to achieve night-time guideline levels, external noise levels should not exceed around 45 dB $L_{Aeq,8hr}$ and 60 dB $L_{Amax,f}$ (more than 10 times per night).
- 7.5 Figures 7.1 to 7.2 show the noise propagation across the proposed development (C1091.011M_PROPOSED SITE LAYOUT, dated November 2022).

Figure 7.1: Predicted daytime noise contours across the development site (ground floor level)

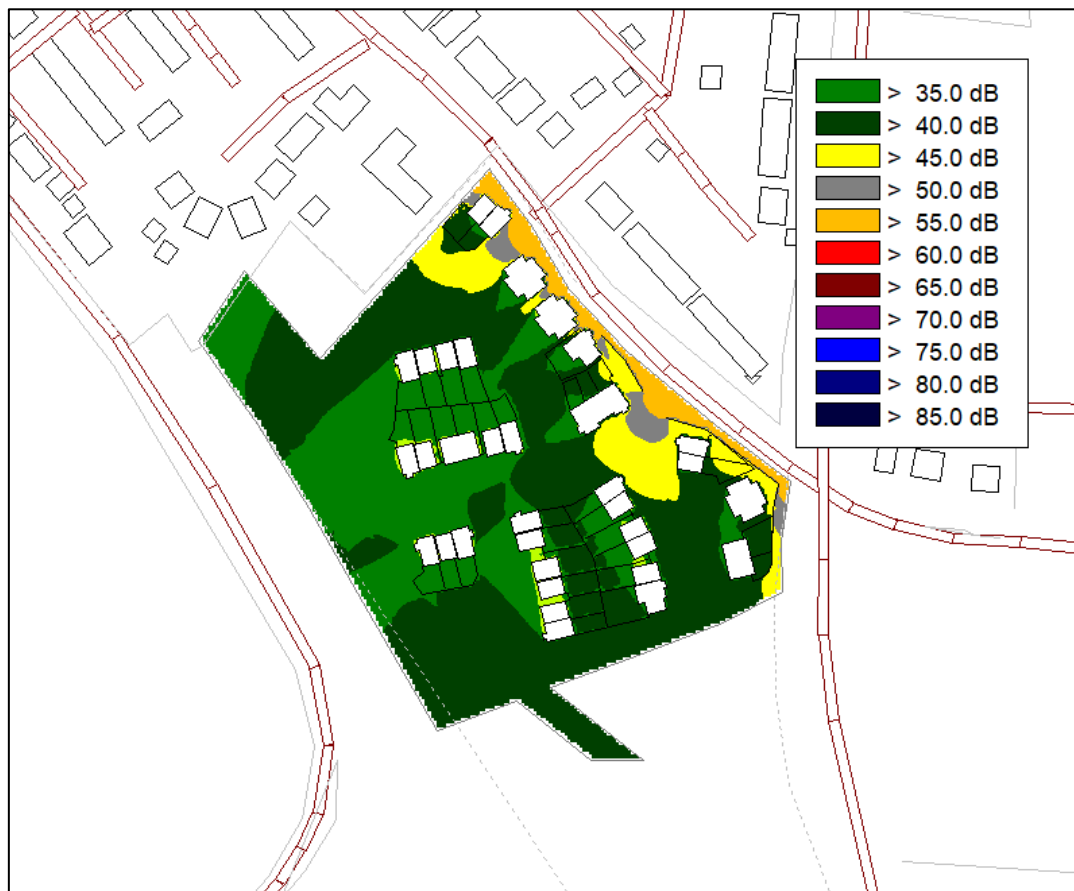
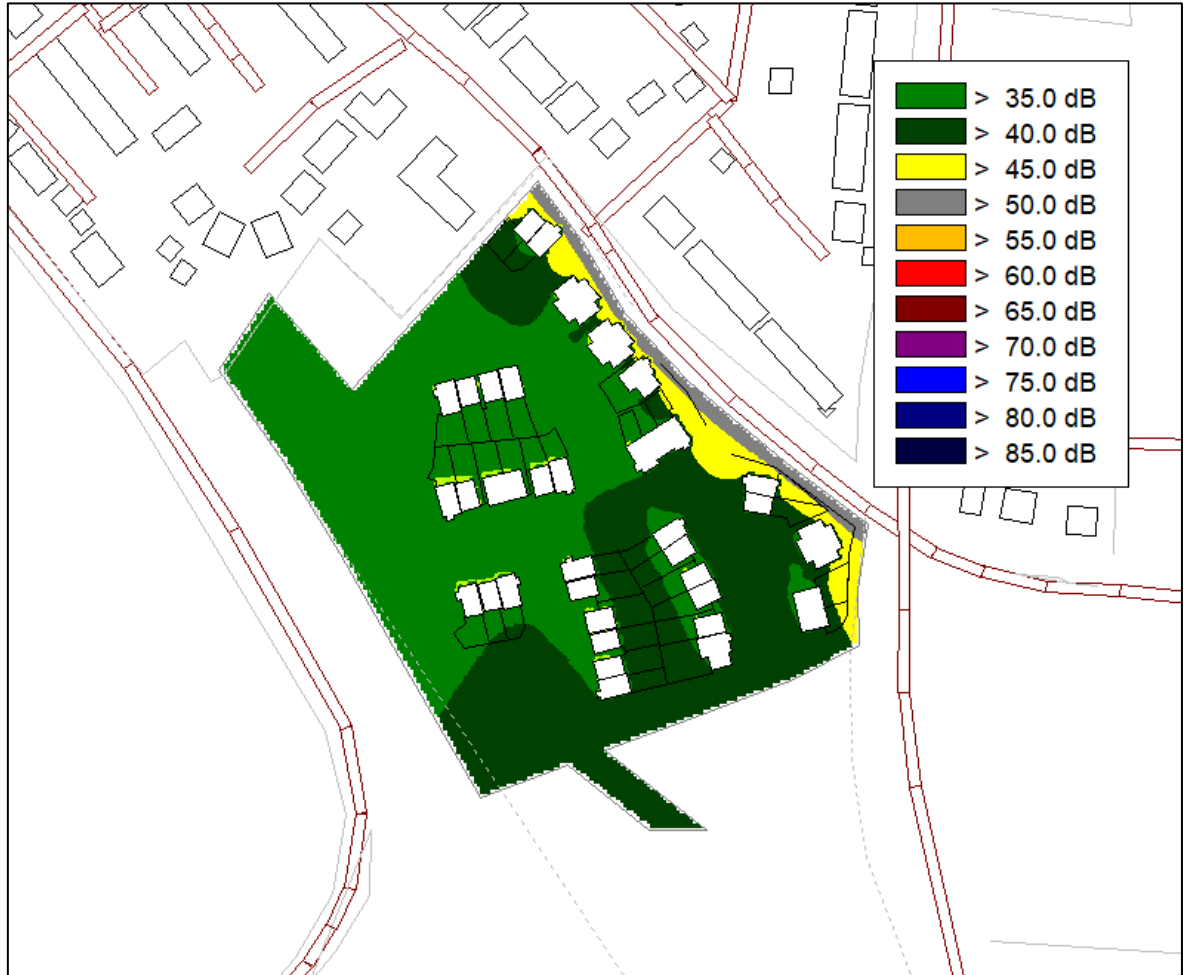


Figure 7.2: Predicted night-time noise contours across the development site (1st floor level)



- 7.6** The highest predicted daytime façade level at a proposed dwelling house is 59 dB $L_{Aeq,16h}$ (Plot 35). The highest predicted night-time façade level at a proposed dwelling house is 50 dB $L_{Aeq,8h}$ (Plot 35). As such, ventilation of the habitable rooms with the façades overlooking the Berse Road can't rely on open windows (Plot 1, Plot 3-6, and Plot 34-45).
- 7.7** Sound levels reduce away from Berse Road. As a result, the majority of other habitable rooms in the proposed properties the ventilation strategy can rely on open windows.
- 7.8** With regards to maximum sound levels, a level of 60 dB $L_{AFmax,1hour}$ was recorded at the long-term monitoring location M4 during night, and is therefore considered a robust assessment assumption for majority of the proposed properties distant from Berse Road. For the proposed first row of properties to Berse Road, a level of 63 L_{AFmax} measured at M2 is considered as representative of the sound levels on the façades overlooking Berse Road during night-time.
- 7.9** For habitable rooms that can't rely on open windows, the ventilation strategy should ensure that the requirements of Part F of the Buildings Regulations are achieved with closed windows. An appropriate ventilation system is one that complies with the performance specification of System 3 to AD-F. An example would be a decentralised constant mechanical

extract (dMEV) fan provided to each kitchen, bathroom and wet room, in conjunction with a trickle ventilator to each habitable room that achieves a minimum 25000 mm² equivalent free area and with a minimum weighted element normalised sound level difference of 33 dB $D_{ne,w}$ in the 'open' position.

- 7.10 All other properties have no specific constraint with regards to noise as suitable internal sound levels would be expected to be achieved with open windows. With closed windows, sound levels would be expected to be significantly lower. The ventilation requirements of Part F of the Building Regulations would be required to be achieved (to be assessed by others) but noise does not present a constraint.
- 7.11 In all cases, purge ventilation would be provided by openable windows. As the assessment indicates the site is of low to negligible noise risk in terms of road traffic noise, windows can be openable for mitigating the overheating condition.
- 7.12 For all facades, and properties, standard double-glazed units such as 4-12-4 or 6-12-6 (minimum sound reduction of 27 dB R_w+C_{tr}) may be installed. Where a higher specification is required (e.g., for thermal or safety reasons) this would be acoustically acceptable. Care is required during installation to ensure that frames are securely fitted within minimal gaps at the perimeter which are effectively sealed with non-setting flexible sealant.
- 7.13 Indicative noise break-in calculations, including a dMEV system and passive acoustic trickle ventilator, are provided in **Appendix Five**. The assessment is based on the following assumptions:
- Measured glazing/masonry area of façade;
 - 'Normal' internal surface finishes e.g., carpeted with curtains, bed etc. to achieve a reverberation time of 0.3 seconds in each octave band between 63 Hz and 8 kHz (as referenced in BRE Digest 338) within bedrooms and 0.5 seconds within living rooms (as referenced in Approved Document E of the Building Regulations 2010);
 - External walls assumed to be clad with masonry (brick or similar) with plasterboard lining;
 - Glazing sound insulation performance is typical of the window unit as a whole.
- 7.14 The highest internal sound levels from road traffic in living room and bedroom spaces during daytime periods are predicted to be 30 dB $L_{Aeq,16h}$ and the highest internal sound level due to road traffic in bedroom spaces during night-time periods are predicted to be 21 dB $L_{Aeq,8h}$ and 33 dB $L_{Amax,F}$, which therefore achieve the internal sound levels recommended by BS8233:2014.

Element 3 – External Amenity Noise Assessment

- 7.15 Figure 7.3 shows the predicted noise level across the site compared to guideline limits for garden areas.
- 7.16 Figure 7.3 indicates that the sound level in all external amenity spaces would be expected to be above the lower guideline value of 50 dB $L_{Aeq,16h}$. This is inclusive of standard 1.8m close boarded timber garden fences and the 2.1m anti climb fences that are included within the masterplan.
- 7.17 It is therefore concluded that garden noise levels across the garden can achieve the guideline value with the current site layout.

7.18 There are no other relevant issues that require assessment for this site.

8 Conclusions

- 8.1 Bureau Veritas was instructed by Caulmert Ltd to conduct an environmental noise assessment to support the planning application for a residential development site at Berse Road, Caego, Wrexham.
- 8.2 For the habitable rooms, a glazing and ventilation strategy has been proposed which provides suitable internal sound levels. In summary, the following mitigation measures are proposed:
- Glazing to be minimum 4-12-4/6-12-6; and
 - Window vents with sound reduction of 33 dB $D_{n,e,w}+C_{tr}$ for all the habitable rooms on the façades overlooking the Berse Road of the Plot 1, Plot 3-6, and Plot 34-45.
- 8.3 As the assessment indicates the site is of low to negligible noise risk in terms of road traffic noise, windows can be openable for mitigating the overheating condition.
- 8.4 The assessment of garden sound levels indicates that all spaces would be below the lower recommended value of 50 dB $L_{Aeq,16h}$ with the inclusion of standard 1.8m close boarded timber fencing and the 2.1m anti climb fences that are included within the masterplan. It is therefore concluded that garden noise levels across the development can achieve the guideline value with the current site layout.
- 8.5 All adverse impacts are therefore shown to be mitigated and minimised, in line with the current planning policy and guidance.

Appendix One – Glossary of Acoustic Terminology

"A" Weighting (dB(A))	The human ear does not respond uniformly to different frequencies. "A" weighting is commonly used to simulate the frequency response of the ear. It is used in the assessment of the risk of damage to hearing due to noise.
Decibel (dB)	The range of audible sound pressures is approximately 2×10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB.
Pascal (Pa)	Unit of pressure equal to 1 N/m^2 .
Frequency (Hz)	The number of cycles per second, for sound this is subjectively perceived as pitch.
Frequency Spectrum	Analysis of the relative contributions of different frequencies that make up a noise.
$L_{eq}(T)$	The equivalent continuous sound level. It is that steady sound level which would produce the same energy over a given time period T as a specified time varying sound.
$L_{90}(T)$	The noise level which is exceeded for 90% a given measurement time period T, i.e. the background sound level.
$L_{Amax}(T)$	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
Noise	Unwanted sound.
Ambient Sound	Totally encompassing sound in a given situation at any given time composed of noise from many sources, near and far.
Residual Sound	The ambient sound remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient sound.
VDV	Vibration Dose Value is a measure of vibration exposure; the fourth route of the integral, over the measurement period, of the fourth power of the frequency weighted time-varying acceleration (units: $\text{ms}^{-1.75}$).

Appendix Two – Site location and monitoring locations

Figure A2.1 Site location and proposed development area

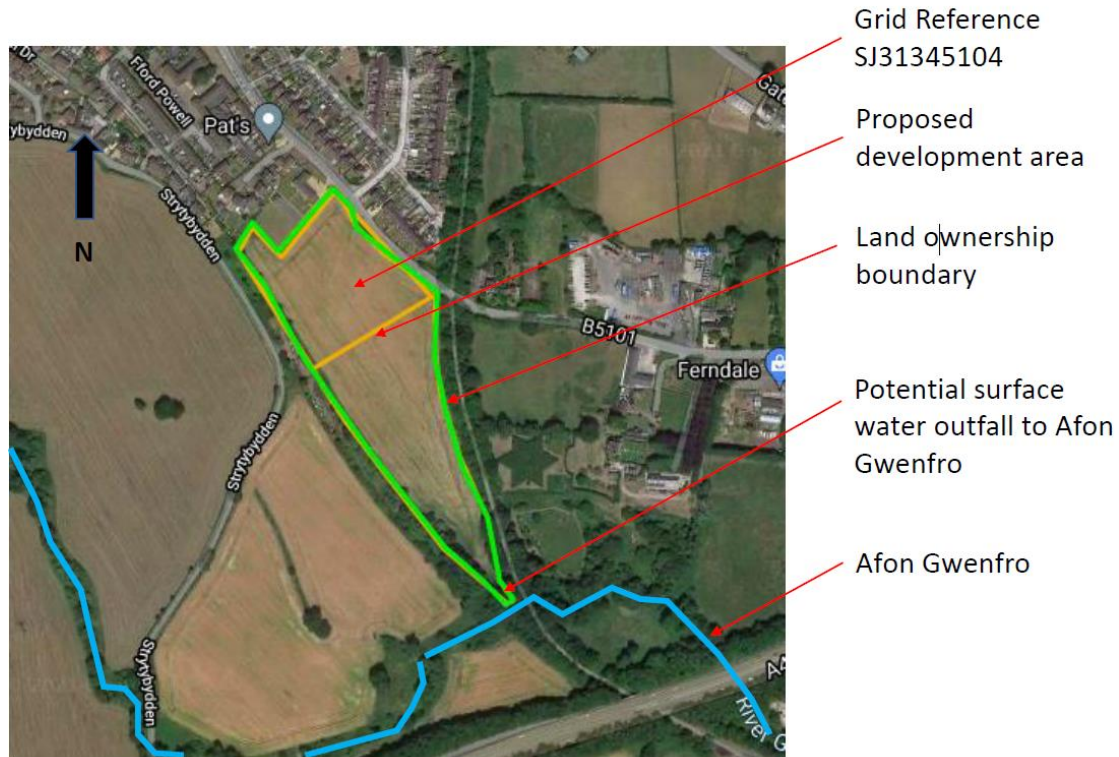


Figure A2.2 Monitoring locations

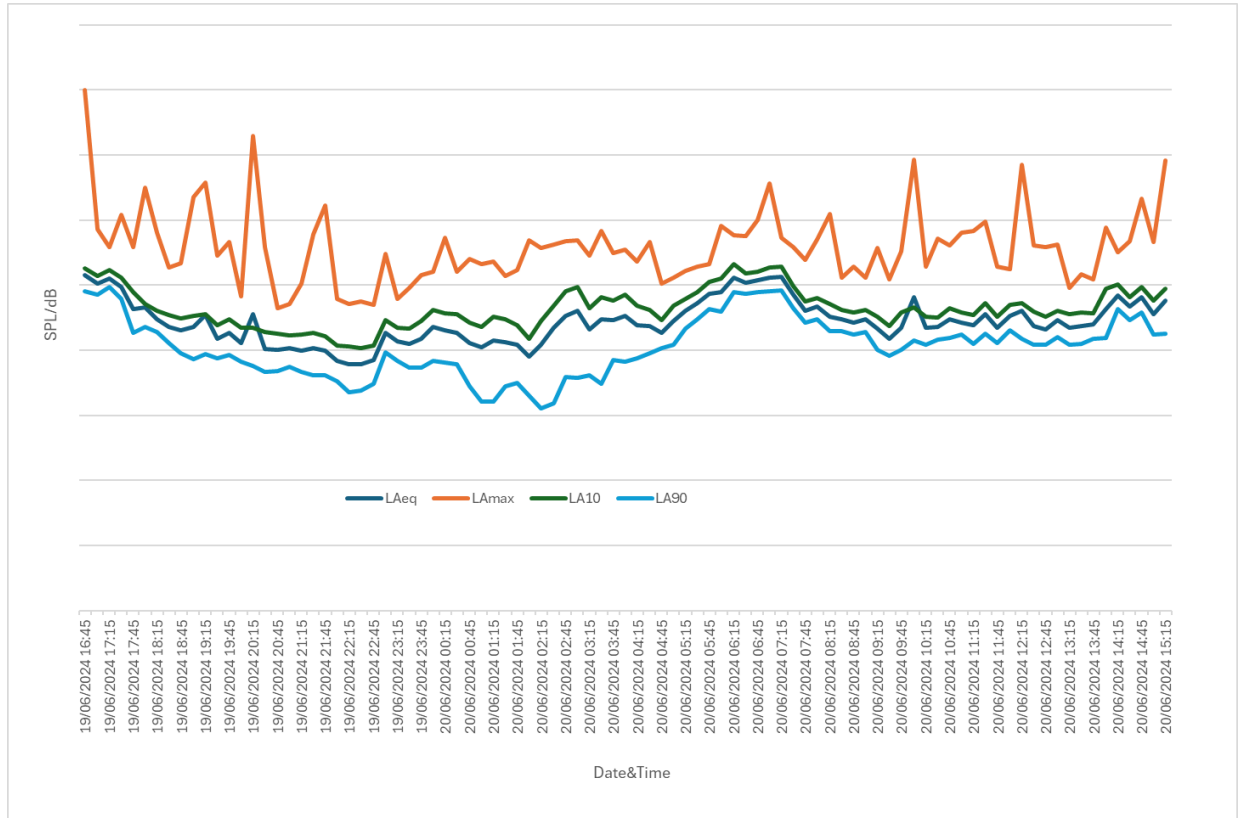


Appendix Three – Proposed Site Layout



Appendix Four – Survey Details

Figure A4.1: Time history of noise logging equipment at Location M4: 19/06/24 – 20/06/24



Appendix Five – Example Noise Ingress Calculations

Noise Ingress Calculation

Project: Bense Road
Description: Close to Bense Road, ground floor, northeast facade
Plot/Flat No: 35
Room Name: Living room

Calculation is based on methodology within BS 8233:2014 & BSEN ISO 12354-3. The following equation is utilised:

$$L_{internal} = L_{external} - \Sigma R + 10 \log S/A - DL_{sh} + 3$$

Where $A = 0.16V/T$
 and DL_{sh} is a correction to account for the influence of façade shape (e.g. where balconies or terraces are present)
 This can be broken down further to:

$$L_{eq,2} = L_{eq,2} + 10 \log ((A_0/S \times 10^4 \times (-DL_{sh}/10)) + (S_{ext}/S \times 10^4 \times (-R_{ext}/10)) + (S_{int}/S \times 10^4 \times (-R_{int}/10)) + 10 \log (S/A) - DL_{sh} + 3$$

The above terms are described below.

Calcs By: YH
Date: 05/07/24
Calc ref: 1
Period: DT



Description	Term	Value	Room assessed: Living room	External wall	Window	Notes
Total facade area (m2)	S_f	11.7	Width (m): 2.4	Total linear (m): 4.5	Linear (m): 1.6	0
Window area (m2)	S_{wf}	2.6	Depth (m): 4.1		Height (m): 1.6	
External wall area (Sf - Swf)	S_{ew}	9.1	Height (m): 2.6			
Area of ceiling (m2)	S_{ce}	0.0	0			
Total area of elements (Sf + Ssr)	S	11.7				
Volume of receiving room (m3)	V	25.6				
Reference absorption area (m2)	A_0	10				
Number of ventilators in facade:		1				
Facade shape correction	DL_{sh}	0	See Annex C of BS EN 12354-3			

	Octave band centre frequency, Hz													
	63	125	250	500	1k	2k	4k	8k	dBA	R_w	C_{tr}	$R_w + C_{tr}$	Notes	
External L_{eq} , freefield (dB L_{eq})	66	59	56	53	54	52	49	49	59	-	-	-	Freefield L_{Aeq} level	
External L_{max} , freefield (dB L_{max})	-	-	-	-	-	-	-	-	-	-	-	-	Freefield L_{Amax} level	
One of each ventilator	34	38	35	34	31	34	37	42		34	-1	33	Greenwood 4000DFW, open	
Total One of all ventilators	34	38	35	34	31	34	37	42		34				
SRI of window (RW)	18	24	20	25	35	38	35	35		31	-4	27	4/12/4	
SRI of external wall (Rw)	21	36	45	62	75	75	75	75		58	-9	49	Calc 5 - house walls - brick outer	
SRI of roof and ceiling (Rtr)														
Flow time of receiving room (T) - secs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3						
All ventilators [eqn. B]	3E-04	0.0001	3E-04	3E-04	7E-04	3E-04	2E-04	5E-05					$A_0/S \times 10^4 \times (-Dne/10)$	
Glazing [eqn. C]	0.003	0.0009	0.002	7E-04	7E-05	3E-05	7E-05	7E-05					$Sw/S \times 10^4 \times (-RW/10)$	
External wall [eqn. D]	0.006	0.0002	2E-05	5E-07	2E-08	2E-08	2E-08	2E-08					$Sw/S \times 10^4 \times (-Rw/10)$	
Ceiling [eqn. E]	####	####	####	####	####	####	####	####					$Sr/S \times 10^4 \times (-Rtr/10)$	
All ventilators [10 x log "B"]	-34.7	-38.7	-35.7	-34.7	-31.7	-34.7	-37.7	-42.7						
Glazing [10 x log "C"]	-34.6	-30.6	-26.6	-31.6	-41.6	-44.6	-41.6	-41.6						
External wall [10 x log "D"]	-22.1	-37.1	-46.1	-63.1	-76.1	-76.1	-76.1	-76.1						
Ceiling [10 x log "E"]	####	####	####	####	####	####	####	####						
All elements combined [eqn. F]	-20.0	-29.2	-26.1	-29.9	-31.3	-34.3	-36.2	-39.1					Log sum of equations B,C,D,E	
Equiv. absorption area of rec. room (m ²)	14	14	14	14	14	14	14	14						
10 x log(S/A) [eqn. G]	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7	-0.7						
Facade shape correction, DL_{sh}	0	0	0	0	0	0	0	0						

	63	125	250	500	1k	2k	4k	8k	dBA	Target	Exc.	
Internal $L_{eq,2}$	48	33	32	25	25	20	15	12	30	35	-5	Equations (A+F+G) - $DL_{sh} + 3$ dB
Internal $L_{max,2}$	-	-	-	-	-	-	-	-	-	N/A	-	Equations (A+F+G) - $DL_{sh} + 3$ dB

A-weighted spectra	-26	-16	-9	-3	0	1	1	-1	dB Sum	Target	Exc.
A-weightings:	-26	-16	-9	-3	0	1	1	-1	30.4	35	-5
Internal $L_{Aeq,2}$	22	17	23	22	25	21	16	11	30.4	35	-5
Internal $L_{Amax,2}$	####	####	####	####	####	####	####	####	####	N/A	####

Noise Ingress Calculation

Project: Berse Road
Description: 'Close to Berse Road, ground floor, northeast facade
Plot/Flat No: 35
Room Name: Bedroom

Calcs By: YH
Date: 05/07/24
Calc ref: 3
Period: NT



Calculation is based on methodology within BS 8233:2014 & BSEN ISO 12354-3. The following equation is utilised:

$$L_{internal} = L_{external} - \Sigma R + 10 \log S/A - DL_b + 3$$

where $A = 0.16V/T$

and DL_b is a correction to account for the influence of façade shape (e.g. where balconies or terraces are present)

This can be broken down further to:

$$L_{eq,2} = L_{eq,2} + 10 \log ((A_0/S_0 \times 10^{(-D_{f,w}/10)}) + (S_{w,1}/S_0 \times 10^{(-R_{w,1}/10)}) + (S_{w,2}/S_0 \times 10^{(-R_{w,2}/10)}) + (S_{w,3}/S_0 \times 10^{(-R_{w,3}/10)}) + 10 \log (S/A) - DL_b + 3$$

The above terms are described below.

Description	Term	Value	Room assessed: Bedroom	External wall	Window	Notes
Total facade area (m ²)	S_0	11.7	Width (m): 4	Total linear (m): 4.5	Linear (m): 1.4	0
Window area (m ²)	$S_{w,1}$	2.0	Depth (m): 3.5		Height (m): 1.4	
External wall area (Sf - Sw)	$S_{w,2}$	9.7	Height (m): 2.6			
Area of ceiling (m ²)	S_c	0.0				
Total area of elements (Sf + Sm)	S	11.7				
Volume of receiving room (m ³)	V	36.4				
Reference absorption area (m ²)	A_0	10				
Number of ventilators in facade:		1				
Facade shape correction	DL_b	0	See Annex C of BS EN 12354-3			

	Octave band centre frequency, Hz								dBA	R_w	C_v	$R_w + C_v$	Notes
	63	125	250	500	1k	2k	4k	8k					
External L_{eq} , freefield (dB L_{eq} , f)	55	46	41	45	44	43	42	41	50	-	-	-	Freefield L_{eq} level
External L_{max} , freefield (dB L_{max} , f)	62	56	54	54	57	58	52	52	63	-	-	-	Freefield L_{max} level
One of each ventilator	34	38	35	34	31	34	37	42		34	-1	33	Greenwood 4000DFW, open
Total One of all ventilators	34	38	35	34	31	34	37	42		34			
SRI of window (Rw)	18	24	20	25	35	38	35	35		31	-4	27	4/12/4
SRI of external wall (Row)	21	36	45	62	75	75	75	75		58	-9	49	Calc 5 - house walls - brick outer
SRI of roof and ceiling (Rm)													
Rev time of receiving room (T) - secs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					
All ventilators [eqn. B]	3E-04	0.0001	3E-04	3E-04	7E-04	3E-04	2E-04	5E-05					$A_0/S \times 10^{(-D_{f,w}/10)}$
Glazing [eqn. C]	0.003	0.0007	0.002	5E-04	5E-05	3E-05	5E-05	5E-05					$S_{w,1}/S \times 10^{(-R_{w,1}/10)}$
External wall [eqn. D]	0.007	0.0002	3E-05	5E-07	3E-08	3E-08	3E-08	3E-08					$S_{w,2}/S \times 10^{(-R_{w,2}/10)}$
Ceiling [eqn. E]	####	####	####	####	####	####	####	####					$S_{m,1}/S \times 10^{(-R_{m,1}/10)}$
All ventilators [10 x log "B"]	-34.7	-38.7	-35.7	-34.7	-31.7	-34.7	-37.7	-42.7					
Glazing [10 x log "C"]	-25.8	-31.8	-27.8	-32.8	-42.8	-45.8	-42.8	-42.8					
External wall [10 x log "D"]	-21.8	-36.8	-45.8	-62.8	-75.8	-75.8	-75.8	-75.8					
Ceiling [10 x log "E"]	####	####	####	####	####	####	####	####					
All elements combined [eqn. F]	-20.2	-30.0	-27.1	-30.6	-31.4	-34.4	-36.5	-39.7					Log sum of equations B,C,D,E
Equiv. absorption area of rec. room (m ²)	12	12	12	12	12	12	12	12					
10 x log(S/A) [eqn. G]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Facade shape correction, DL_b	0	0	0	0	0	0	0	0					

	63	125	250	500	1k	2k	4k	8k	dBA	Target	Exc.	
Internal $L_{eq,2}$	38	19	17	17	16	12	8	4	21	30	-9	Equations (A+F+G) - DL_b +3 dB
Internal $L_{max,2}$	45	30	30	27	29	27	19	16	33	45	-12	Equations (A+F+G) - DL_b +3 dB

A-weighted spectra										Target	Exc.
A-weightings:	-26	-16	-9	-3	0	1	1	-1	dB Sum	Target	Exc.
Internal $L_{Aeq,2}$	12	3	8	14	16	13	9	3	20.8	30	-9
Internal $L_{Amax,2}$	19	14	21	24	29	28	20	15	33.2	45	-12