

Bellway Homes Ltd

Land at Home Farm, Warminster

Noise Assessment

**REPORT REF.
2204791-ACE-XX-XX-RP-C-0601**

February 2026

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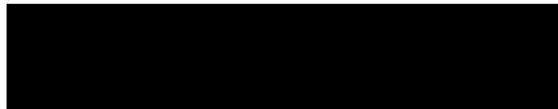
Appendix E: Acoustic Design Statement

Appendix F: Acoustic Terminology

Annex A: Relevant Policy & Guidance

Document Control Sheet

Rev	Issue Purpose	Author	Checked	Approved	Date
-	Draft	JR	AS	Draft Only	28/11/25
-	Final	JR	JR	AS	27/02/26



Distribution

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1. Introduction

- 1.1. Ardent Consulting Engineers have been instructed by Bellway Homes Ltd to undertake a Noise Assessment at Land at Home Farm, Warminster (hereafter referred to as the site).
- 1.2. The site was previously subject to an outline planning application for the development of up to 135 dwellings and supporting infrastructure with all matters reserved excluding access (Wiltshire Council planning ref. 16/10502/OUT). This application was formally withdrawn on 29th January 2020, due to concerns over the heritage impact of the proposed development. Noise appeared to not previously been considered within the application.

Site Description

- 1.3. The site is situated to the east of Warminster. The site is bound to the south by Boreham Road. To the north is an MOD sports facility and agricultural land. Existing residential properties are also located to the west and south, with Home Farm and Bishopstrow Hotel to the east.
- 1.4. The site and surrounding area is shown in Figure 1-1.



Figure 1-1: Site and surrounding area

Proposed Development

1.5. The following development description is available:

"Full planning permission for residential development (Use Class C3) comprising 135 dwellings with associated private amenity space and car/cycle parking, a comprehensive landscaping scheme to include publicly accessibly amenity space, sustainable drainage features, new tree planting and associated works. Alterations to the existing Home Farm access from Boreham Road, and new vehicular, cycle and pedestrian routes through the site. All associated infrastructure works."

1.6. The site layout is shown in Figure 1-2 below.

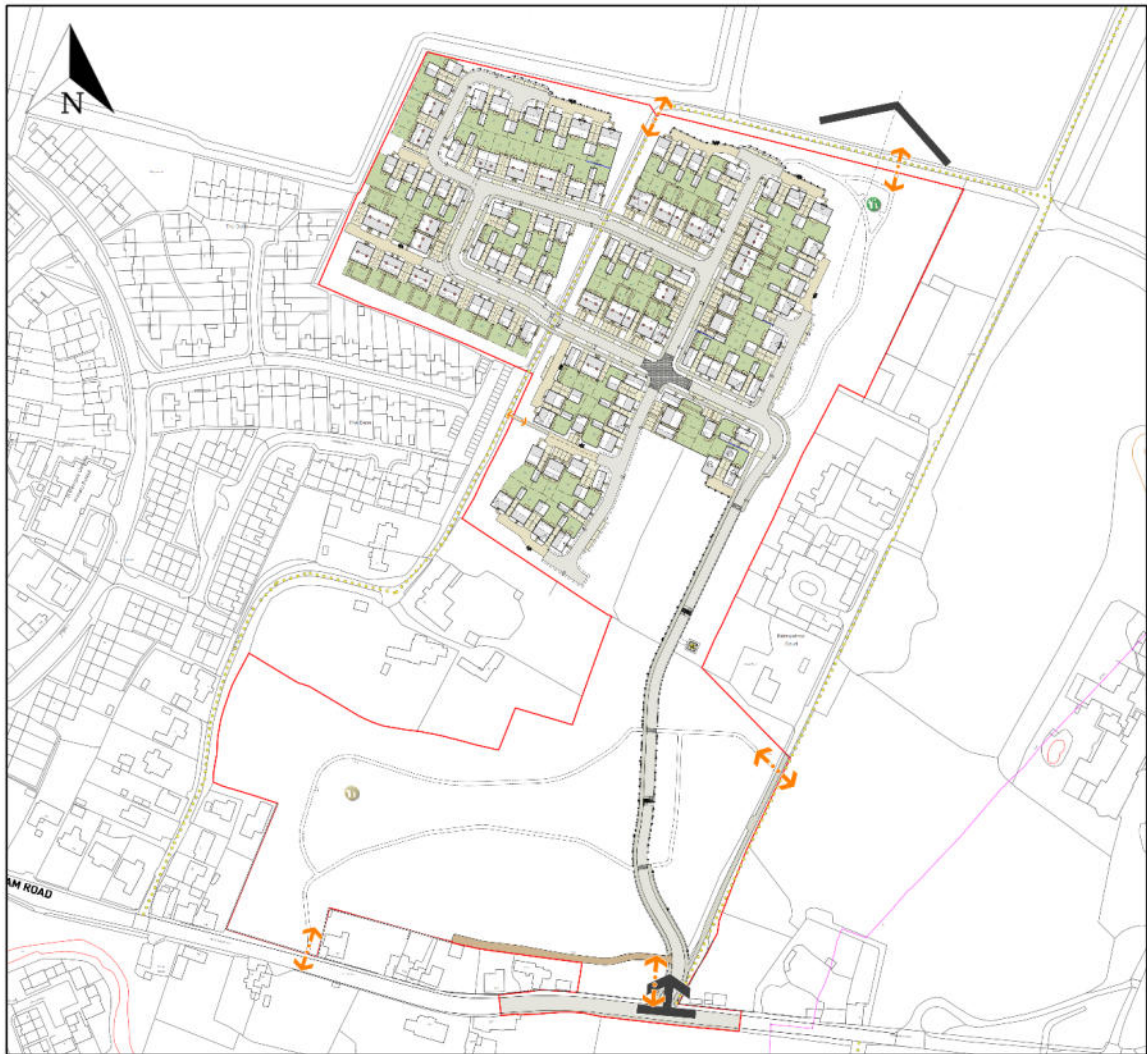


Figure 1-2: Site Plan (Extract)

2. Local Authority Liaison

2.1. Contact¹ has been made with Officers at Wiltshire Council² and the following methodology was proposed:

- The survey methodology would cover 2 positions for 5 days and include a weekend, during school term time;
- Assessment of the suitability for the site would be in accordance with BS 8233 and ProPG;
- Potential impact of overheating would be considered in accordance with AVO Guidelines;
- An assessment of traffic noise impact will be undertaken in accordance with DMRB LA111.

2.2. At the time of writing this report, no response has been received.

2.3. A summary of relevant guidance and policy is shown in Annex A.

¹ Email sent on 27/11/25

3. Environmental Noise Levels

- 3.1. An environmental noise survey was undertaken between 9th and 13th October 2025.
- 3.2. The measurement positions are shown in Figure 3-1. Measurement positions were selected to obtain representative baseline noise levels due to the main observed sources.



Figure 3-1: Measurement Positions

3.3. A description of the measurements positions is as follows:

- **Measurement Position 1** – The microphone was mounted on a tripod at a height of 2m above local ground level in freefield conditions with an unobstructed path to Boreham Road.
- **Measurement Position 2** – The microphone was mounted on the boundary fence at a height of 1.5m above local ground level in freefield conditions.

3.4. The equipment used for the surveys was as follows:

- Svantek 977 Sound Level Meter (serial number: 34133)
- Svantek 977 Sound Level Meter (serial number: 45355)
- Rion NC-74 Sound Calibrator (serial number: 34172694)

3.5. All equipment used has been professionally calibrated. Field calibration of the sound level meters (and complete measurement signal chain) was undertaken before and after measurements to ensure no significant drift of the calibration signal. Calibration certificates are available upon request.

3.6. The weather conditions were noted during the setup and collection. The conditions for the noise survey were considered to be suitable, with low wind speeds and were considered suitable for environmental noise measurements. and the details can be found in Table 3-1 below.

Date	Position	Wind Direction	Wind Speed (m/s)	Temperature (°C)	Cloud Cover (%)	Conditions
09/10/25	MP 1/2 (Setup)	North-west	2	20	80	Cloudy
13/10/25	MP 1/2 (Collection)	North-east	1	14	100	Cloudy

Table 3-1: Weather conditions

3.7. A summary of the measurements is in Table 3-2 and time histories of measured noise levels are shown in Appendix A.

Monitoring Position	Ambient Sound Level dB L _{Aeq, T} Range (Average)		Background Sound Level dB L _{A90, T} Range (Average)		Night dB L _{AFmax} Range (generally exceeded fewer than 10 times per night)
	Day	Night	Day	Night	
MP1	51-63 (60)	23-61 (51)	30-51 (42)	19-39 (28)	21-85 (73)
MP2	30-54 (40)	15-45 (33)	24-30 (32)	11-33 (24)	15-65 (57)

Table 3-2: Summary of Measured Noise Levels

3.8. Representative octave band levels are provided in Table 3-3. Where appropriate, these are used in glazing calculations to ensure a robust assessment of internal noise levels.

		Octave Band Centre Frequency, dB							
		63	125	250	500	1k	2k	4k	8k
MP1	L _{eq, T} (day)	60	55	54	53	57	53	44	34
	L _{eq, T} (night)	51	46	45	45	48	45	37	28
	L _{max, T} (night)	76	68	69	70	69	67	60	51
MP2	L _{eq, T} (day)	49	41	33	34	36	33	31	29
	L _{eq, T} (night)	41	32	27	29	30	23	23	17
	L _{max, T} (night)	48	55	57	42	50	51	51	40

Table 3-3: Octave Band Data for Noise Monitoring Locations

3.9. The dominant noise source was local road traffic particularly from the Boreham Road at both positions. Noise associated with the MOD sports pitch was negligible when compared to road traffic noise on Boreham Road.

3.10. Based on the measurements, a 3D computer based environmental noise model has been created using DataKustik 'CadnaA' Noise Mapping software. The following has been taken in account in the generation of the noise model:

- The noise model was set up to apply the noise prediction methodology set out in ISO 9613-2: Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation;
- The model has been set to include second order reflected noise from solid structures;

- The topography of the site and surrounding area has been taken into consideration in the assessment;
- Acoustic screening and reflections afforded by nearby buildings, solid structures and fences/barriers;
- The model has been calibrated and verified using the noise survey data and the current baseline traffic flows for the surrounding road network.

3.11. Noise contours are shown in Appendix B.

3.12. Based on the noise survey results, baseline model and in accordance with Figure 1 of the ProPG guidance, areas of the site on the southern boundary in close proximity to Boreham Road would be considered low risk during the day and night. The central and northern areas of the site, which are being developed, would be considered to be negligible risk during the day and night.

3.13. As noted in ProPG, there were over 10 instances exceeding 60 dB $L_{Amax,F}$ during the night with 71 dB being the representative $L_{Amax,F}$ level for MP1. As such the site is considered to be in the low risk category.

3.14. This would not prohibit the development as good acoustic design processes can be followed to reduce sound levels to as low as practical across the proposed development. An acoustic design statement has been produced, which is shown in Appendix E.

4. Construction Phase

- 4.1. The construction phase of the proposed development will include various noise generating processes and plant. The most significant processes in terms of noise generation would be site clearance/excavation operations, piling (if required) and concreting operations.
- 4.2. To assess reasonable noise thresholds for construction noise experienced at the nearest residential properties, Example Method 1 (the ABC Method) of BS 5228, within section E.3.2 is used. Table E.1 from the standard is reproduced at Table 4.1.

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23.00–07.00)	45	50	55
Evenings and weekends ^{D)}	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

^{A)} Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

^{B)} Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

^{C)} Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

^{D)} 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

Table 4-1: Table E.1 – BS 5228 Part 1

- 4.3. Ambient noise levels place the site within Category A and B of Table E.1. Therefore, the following noise levels set out in Table 4-2 from construction activities are considered to be a reasonable noise threshold to avoid significant adverse impact at the nearest receptors.

Time Period	Construction Target Noise Level dB L_{Aeq}
Monday to Friday (07:00 – 19:00) & Saturday (07:00 – 13:00)	≤65

Table 4-2: Construction Target Noise Level

Best Practice Recommendations

- 4.4. Construction and mobile plant operations are likely to generate high noise levels that have the potential to adversely affect neighbouring noise sensitive properties.
- 4.5. During construction, the contractor will employ best practicable means to control noise from construction operations. This will form part of the construction environmental management plan (CEMP) for the site.
- 4.6. Operations will be reasonably transient, and it is expected that noisy operations will take place for relatively short periods throughout the demolition and construction.
- 4.7. Temporary screening in the form of solid timber hoarding can be used where operations are adjacent to sensitive receptors. Consideration will be given to neighbouring residential properties when locating the temporary compounds and material stockpiles.
- 4.8. Stationary equipment and plant such as generators will be placed as far as practicable from noise sensitive properties, and preferably in areas benefiting from existing or purpose-built attenuation such as bunding or behind non-sensitive buildings.
- 4.9. Delivery of materials and removal of waste from the Development will be planned to minimise disturbance to neighbouring properties. Idling of plant, machinery and delivery vehicles should be prohibited when not in use.
- 4.10. If required noise levels can be monitored regularly in accordance with BS 5228-1 to ensure the above set thresholds are not exceeded. In addition to the above all other guidance within BS 5228-1 will be followed at all times.

5. Road Traffic Noise

- 5.1. Traffic flow volumes have been provided by Ardent transport, which have been used to calculate the change in noise levels arising from operational traffic. The data is presented as AAWT traffic flows and is shown in Appendix D, along with calculations of road traffic noise.
- 5.2. Table 5-1 shows a summary of the worst case, Opening Year 2031 traffic flows, and the resulting predicted change in noise levels with the development.

Road	2031 Opening Year (AAWT)	2031 Opening Year + Development traffic (AAWT)	Change in Noise Level, dB
Boreham Road (East of Site Access)	4898	5140	0.9
Boreham Road (West of Site Access)	4898	5455	0.3

Table 5-1: Change in Noise Levels Due to Development Traffic

- 5.3. The change in noise levels is negligible when compared to Table 3.54a of DMRB, LA 111 for all scenarios and no further assessment is necessary.

6. Mitigation Recommendations

- 6.1. The aim of this section is to identify mitigation measures to achieve the guidance sound levels. Good acoustic design principles have been included in the development with the closest residential properties approximately 250m from the dominant noise source of Boreham Road.
- 6.2. All properties across the site can rely on partially open windows to provide adequate ventilation whilst achieving suitable internal amenity sound levels during the day and night in accordance with BS 8233:2014.
- 6.3. Calculations to determine the glazing requirements for properties has been conducted based on the measured noise levels and the noise model. The calculations are presented in Appendix C.

External Building Fabric - Non-Glazed Elements

- 6.4. It is assumed that the non-glazed external building fabric elements comprise masonry cavity walls. This would typically provide a sound reduction performance of at least the figures shown in Table 6-1 when tested in accordance with BS EN ISO 10140-2:2010 (figures derived from: Representative Values of Airborne SRI for Some Common Structures: Appendix B of Flakt Woods 'Guide to Noise Control').

Element	Octave band centre frequency SRI, dB					
	125	250	500	1k	2k	4k
Masonry Cavity Wall	34	43	55	66	77	85

Table 6-1: Non-glazed Elements Assumed Sound Reduction Performance

External Building Fabric - Glazing

- 6.5. Table 6-2 sets out the required glazing performance, these specifications take into account the glass, frame, seals and associated fittings.

Glazing Type	Sound Reduction Index, R_w	Octave band centre frequency SRI, dB					
		125	250	500	1k	2k	4k
Type 1	29	21	17	25	35	37	31

Table 6-2: Required Minimum Sound Reduction for Glazing

External Building Fabric - Ventilation

- 6.6. Based on the measured noise levels at the site and calibrated noise model, all properties can rely on partially open windows to provide ventilation whilst still achieving suitable internal amenity sound levels. Therefore, as no alternative means of ventilation is required.
- 6.7. Where non-sensitive rooms and sensitive rooms form part of an open plan area, for example a living room, dining and kitchen area, the glazing specification for the more sensitive room should be used across the combined area.
- 6.8. All major building elements should be tested in accordance with BS EN ISO 10140-2:2010. Glass performance data alone would not necessarily demonstrate compliance with this specification.
- 6.9. It should be noted that there may be additional considerations for glazing and ventilation such as overheating, security, thermal performance, and air quality. Alternative glazing could be used assuming the minimum acoustic performance is met.

Overheating

- 6.10. Noise levels place facades in the negligible risk category of noise impact during the day and night periods of overheating where residents might open windows.
- 6.11. Good acoustic design is demonstrated within the proposals to maximise distance from Boreham Road as much as practical to minimise any potential noise impact during overheating conditions.
- 6.12. The site is considered within the negligible risk category which would not require a level 2 AVO assessment.
- 6.13. Further consideration will be given to the noise impact during overheating conditions at the detailed design stage of the Development and as part of demonstrating compliance with Approved Document O of the Building Regulations.

External Amenity Areas

- 6.14. Gardens will be located behind and screened from Boreham Road by the properties in accordance with good acoustics design principles where possible.
- 6.15. It is assumed garden fences are included for all private gardens at a height of 1.8m, if necessary these can be close boarded.
- 6.16. External sound levels across all private gardens will meet the 50 dB $L_{Aeq,16h}$ guidance criteria in accordance with BS 8233.
- 6.17. Additionally, there are Local Equipped Area for Play (LEAP) proposed within the development to the south which will be subject to external noise levels below 50 dB $L_{Aeq,16h}$ guidance criteria providing all residents with suitable external amenity.

7. Conclusions

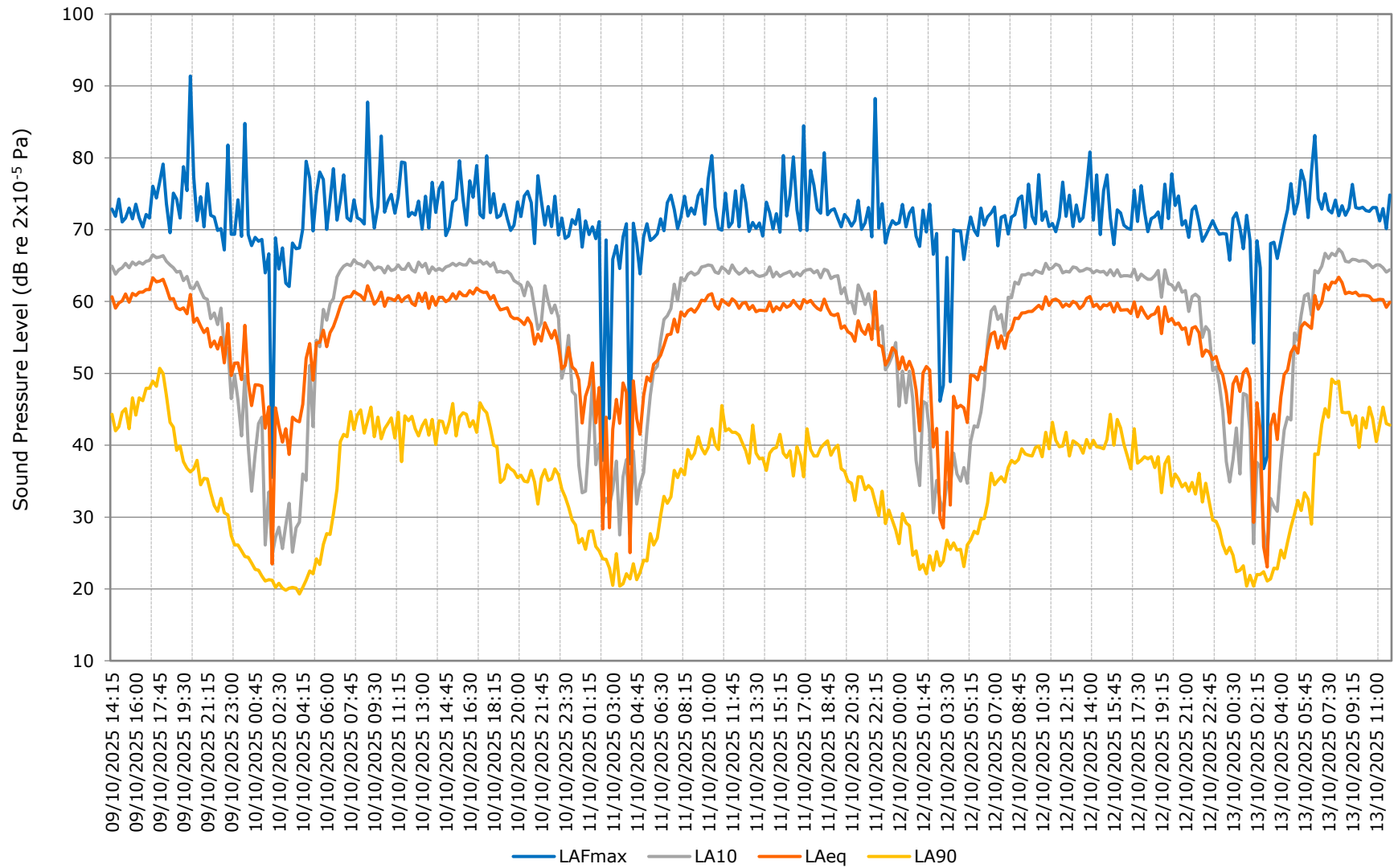
- 7.1. A noise survey has been undertaken on site, the measured noise levels and results of the noise model have been used to inform the acoustic design and assessments.
- 7.2. The majority of the site would be considered negligible risk in accordance with ProPG Guidance, with a low risk towards the southern boundary of the site. This would not prohibit the development as recommendations to reduce internal sound levels in habitable rooms and amenity areas are included.
- 7.3. The change in noise levels due to operational traffic at the site is negligible when compared to Table 3.54a of DMRB, LA 111.
- 7.4. Properties across the site can rely on open windows to achieve suitable internal amenity sound levels during the day and night.
- 7.5. The risk of noise impact during overheating conditions within properties has been considered in accordance with Acoustics Ventilation and Overheating (AVO) Guidance. Noise levels place facades in the negligible categories of noise impact during overheating conditions during the day and night for the majority of the site.
- 7.6. The strategy to provide thermal comfort and suitable internal noise levels will be developed as part of the detailed design of the site. Therefore, the impact of noise during overheating conditions will be mitigated so that suitable internal amenity can be achieved for all dwellings on site.
- 7.7. External sound levels in private gardens across the whole site will meet the 50 dB $L_{Aeq,16h}$ guidance criteria.
- 7.8. All residents will have access to a public LEAP facility at the site which achieve suitable external amenity below 50 dB $L_{Aeq,16h}$ in accordance with BS 8233.
- 7.9. This assessment demonstrates that the site is suitable for development subject to the recommendations included in this report.

APPENDIX A

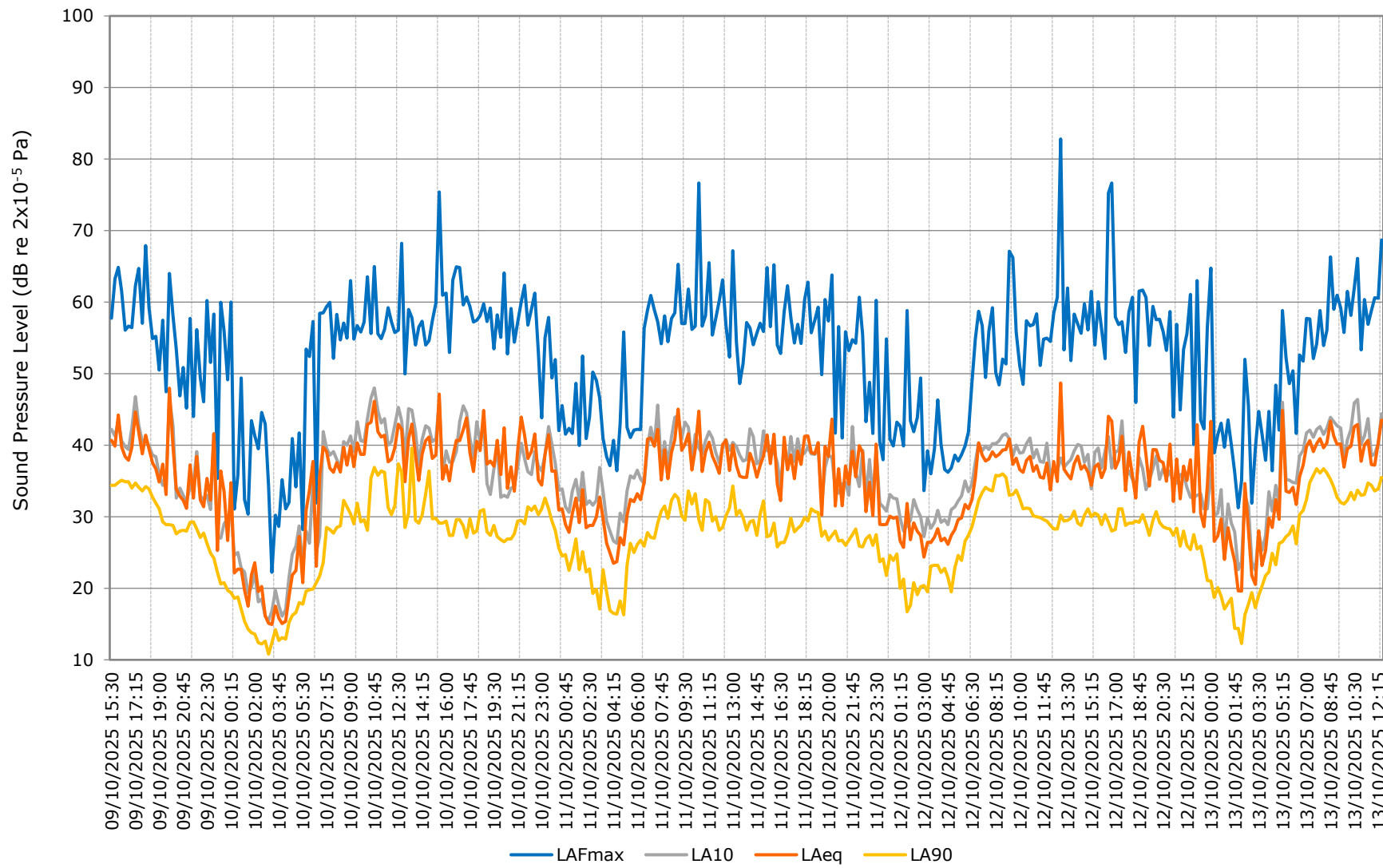
Position 1 - Boreham Road, Warminster

Environmental Noise Time History

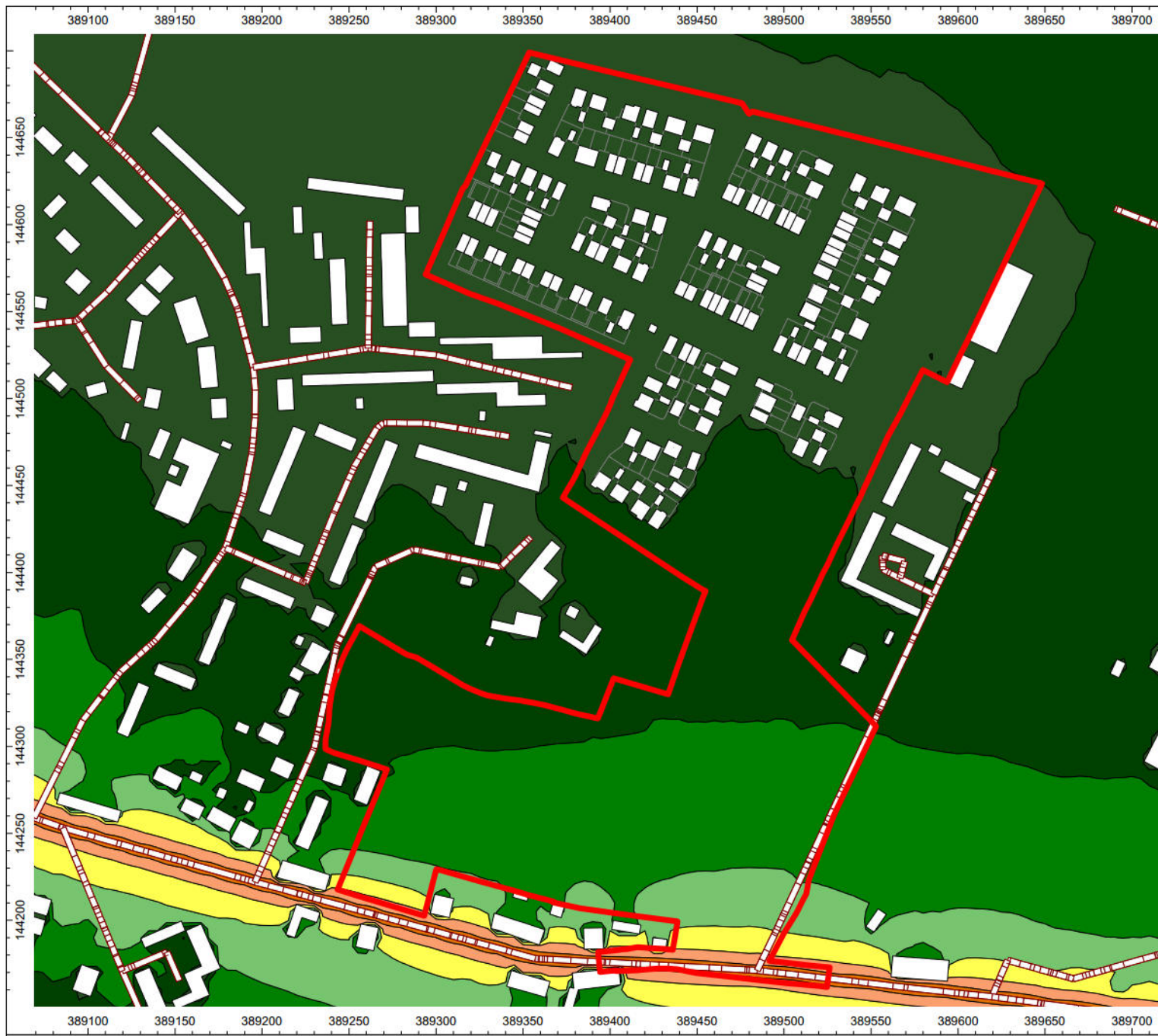
9th to 13th October 2025



Position 2 - Boreham Road, Warminster
Environmental Noise Time History
9th to 13th October 2025



APPENDIX B

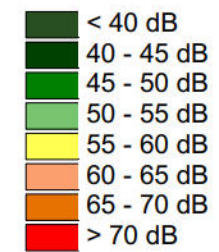


Client:
Bellway Strategic Land
(West)

Project:
Boreham Road, Warminster

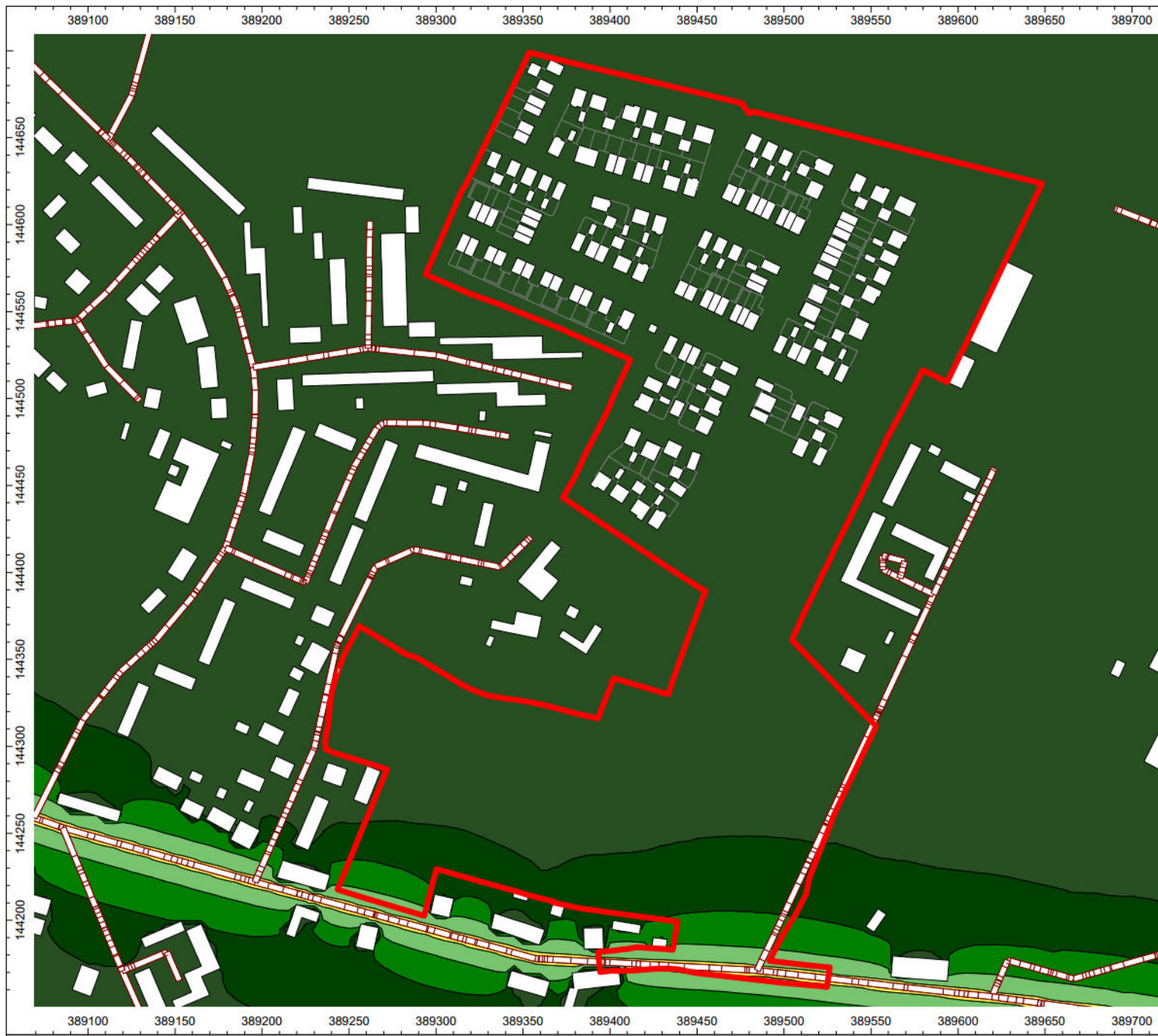
Date:
27/11/25

Scenario:
Day dB LAeq, 16 hour
1.5m Grid Height



Red Line Boundary

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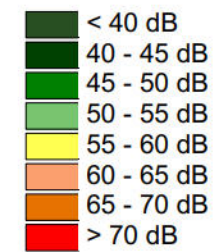


Client:
Bellway Strategic Land
(West)

Project:
Boreham Road, Warminster

Date:
27/11/25

Scenario:
Night dB LAeq, 8 hour
4.0m Grid Height



Red Line Boundary

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APPENDIX C

Noise Break-in Calculation - Position 1 South

Description

Ardent CE Project No.	2204791
Property Address	Boreham Road, Warminster
Room Type	Living Room
Parameter	Leq, 16h

Room Dimensions and Areas

Room volume	35.00
Total Surface area	65.50
Wall façade area	10.00
Roof façade area	0.00
Glazing area	3.60

- Based on typical size

Total façade area	13.60
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Room Absorption Calculation	63	125	250	500	1000	2000	4000	8000	
Estimated Reverberation time	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Alpha bar	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Total Absorption	11.27	11.27	11.27	11.27	11.27	11.27	11.27	11.27	
10Log S/A	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	

- Typical Bedroom RT

Façade level	63	125	250	500	1000	2000	4000	8000	A
Measured Noise Level	60	55	54	53	57	53	44	34	60
Façade to free field	0	0	0	0	0	0	0	0	
Angle of view	0	0	0	0	0	0	0	0	
Screening (Maekewa)	0	0	0	0	0	0	0	0	
Distance correction	0	0	0	0	0	0	0	0	
Model correction	-18	-18	-18	-18	-18	-18	-18	-18	
Noise level at façade (Leq)	42	37	36	35	39	35	26	16	42

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	18	21	17	25	35	37	31	40	29
Transmission Coefficient	0.015849	0.007943	0.019953	0.003162	0.000316	0.000200	0.000794	0.000100	
Wall SRI	28	34	43	55	66	77	85	85	55
Transmission Coefficient	0.001585	0.000398	0.000050	0.000003	0.000000	0.000000	0.000000	0.000000	
Roof SRI	23	26	43	52	60	65	65	65	51
Transmission Coefficient	0.005012	0.002512	0.000050	0.000006	0.000001	0.000000	0.000000	0.000000	
Average Transmission Coeff	0.005361	0.002395	0.005318	0.000839	0.000084	0.000053	0.000210	0.000026	
Average SRI	23	26	23	31	41	43	37	46	35

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	21.1	13.0	15.4	6.4	0.1	-5.6	-9.3	-28.0	10
Lp (Direct)	19.3	11.2	13.6	4.5	-1.8	-7.4	-11.1	-29.8	8
Lp (Rev & Direct)	23	15	18	9	2	-3	-7	-26	12
BS8233	23	15	17	8	2	-4	-7	-26	12

Criteria

≤ 35

≤ 35

Noise Break-in Calculation - Position 1 South

Description

Ardent CE Project No.	2204791
Property Address	Boreham Road, Warminster
Room Type	Bedroom
Parameter	Leq, 8h

Room Dimensions and Areas

Room volume	35.00
Total Surface area	65.50
Wall façade area	10.00
Roof façade area	0.00
Glazing area	3.60

- Based on typical size

Total façade area	13.60
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Room Absorption Calculation

	63	125	250	500	1000	2000	4000	8000	
Estimated Reverberation time	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Alpha bar	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Total Absorption	11.27	11.27	11.27	11.27	11.27	11.27	11.27	11.27	
10Log S/A	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	

- Typical Bedroom RT

Façade level

	63	125	250	500	1000	2000	4000	8000	A
Measured Noise Level	51	46	45	45	48	45	37	28	51
Façade to free field	0	0	0	0	0	0	0	0	
Angle of view	0	0	0	0	0	0	0	0	
Screening (Maekewa)	0	0	0	0	0	0	0	0	
Distance correction	0	0	0	0	0	0	0	0	
Model correction	-17	-17	-17	-17	-17	-17	-17	-17	
Noise level at façade (Leq)	34	29	28	28	31	28	20	11	34

Composite SRI

	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	18	21	17	25	35	37	31	40	29
Transmission Coefficient	0.015849	0.007943	0.019953	0.003162	0.000316	0.000200	0.000794	0.000100	
Wall SRI	28	34	43	55	66	77	85	85	55
Transmission Coefficient	0.001585	0.000398	0.000050	0.000003	0.000000	0.000000	0.000000	0.000000	
Roof SRI	23	26	43	52	60	65	65	65	51
Transmission Coefficient	0.005012	0.002512	0.000050	0.000006	0.000001	0.000000	0.000000	0.000000	
Average Transmission Coeff	0.005361	0.002395	0.005318	0.000839	0.000084	0.000053	0.000210	0.000026	
Average SRI	23	26	23	31	41	43	37	46	35

Calculated Internal Noise Level, dB

	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	12.6	4.1	7.4	-0.9	-7.5	-12.9	-15.5	-33.0	2
Lp (Direct)	10.8	2.3	5.6	-2.8	-9.4	-14.7	-17.3	-34.8	0
Lp (Rev & Direct)	15	6	10	1	-5	-11	-13	-31	4
BS8233	15	6	9	1	-6	-11	-13	-31	4

Criteria

≤ 30

≤ 30

ARDENT CONSULTING ENGINEERS
Noise Break-in Calculation - Position 1 South

Description	
Ardent CE Project No.	2204791
Property Address	Boreham Road, Warminster
Room Type	Bedroom
Parameter	Lmax

Room Dimensions and Areas	
Room volume	35.00
Total Surface area	65.50
Wall façade area	10.00
Roof façade area	0.00
Glazing area	3.60

- Based on typical size

Total façade area	13.60
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Room Absorption Calculation	63	125	250	500	1000	2000	4000	8000	
Estimated Reverberation time	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Alpha bar	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Total Absorption	11.27	11.27	11.27	11.27	11.27	11.27	11.27	11.27	
10Log S/A	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	

- Typical Bedroom RT

Façade level	63	125	250	500	1000	2000	4000	8000	A
Measured Noise Level	76	68	69	70	69	67	60	51	73
Façade to free field	0	0	0	0	0	0	0	0	
Angle of view	0	0	0	0	0	0	0	0	
Screening (Maekewa)	0	0	0	0	0	0	0	0	
Distance correction	-30	-30	-30	-30	-30	-30	-30	-30	
Model correction	0	0	0	0	0	0	0	0	
Noise level at façade (Lmax)	46	38	39	40	39	37	30	21	43

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	18	21	17	25	35	37	31	40	29
Transmission Coefficient	0.015849	0.007943	0.019953	0.003162	0.000316	0.000200	0.000794	0.000100	
Wall SRI	28	34	43	55	66	77	85	85	55
Transmission Coefficient	0.001585	0.000398	0.000050	0.000003	0.000000	0.000000	0.000000	0.000000	
Roof SRI	23	26	43	52	60	65	65	65	51
Transmission Coefficient	0.005012	0.002512	0.000050	0.000006	0.000001	0.000000	0.000000	0.000000	
Average Transmission Coeff	0.005361	0.002395	0.005318	0.000839	0.000084	0.000053	0.000210	0.000026	
Average SRI	23	26	23	31	41	43	37	46	35

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	25.5	13.4	18.5	11.0	0.3	-4.2	-5.5	-22.7	13
Lp (Direct)	23.7	11.6	16.7	9.1	-1.6	-6.0	-7.3	-24.5	11
Lp (Rev & Direct)	28	16	21	13	2	-2	-3	-21	15
BS8233	28	15	20	13	2	-2	-3	-21	15

Criteria

≤ 45

≤ 45

Noise Break-in Calculation - Position 2 North

Description

Ardent CE Project No.	2204791
Property Address	Boreham Road, Warminster
Room Type	Living Room
Parameter	Leq, 16h

Room Dimensions and Areas

Room volume	35.00
Total Surface area	65.50
Wall façade area	10.00
Roof façade area	0.00
Glazing area	3.60

- Based on typical size

Total façade area	13.60
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Room Absorption Calculation	63	125	250	500	1000	2000	4000	8000	
Estimated Reverberation time	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Alpha bar	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Total Absorption	11.27	11.27	11.27	11.27	11.27	11.27	11.27	11.27	
10Log S/A	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	

- Typical Bedroom RT

Façade level	63	125	250	500	1000	2000	4000	8000	A
Measured Noise Level	49	41	33	34	36	33	31	29	41
Façade to free field	0	0	0	0	0	0	0	0	
Angle of view	0	0	0	0	0	0	0	0	
Screening (Maekewa)	0	0	0	0	0	0	0	0	
Distance correction	0	0	0	0	0	0	0	0	
Model correction	-1	-1	-1	-1	-1	-1	-1	-1	
Noise level at façade (Leq)	48	40	32	33	35	32	30	28	40

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	18	21	17	25	35	37	31	40	29
Transmission Coefficient	0.015849	0.007943	0.019953	0.003162	0.000316	0.000200	0.000794	0.000100	
Wall SRI	28	34	43	55	66	77	85	85	55
Transmission Coefficient	0.001585	0.000398	0.000050	0.000003	0.000000	0.000000	0.000000	0.000000	
Roof SRI	23	26	43	52	60	65	65	65	51
Transmission Coefficient	0.005012	0.002512	0.000050	0.000006	0.000001	0.000000	0.000000	0.000000	
Average Transmission Coeff	0.005361	0.002395	0.005318	0.000839	0.000084	0.000053	0.000210	0.000026	
Average SRI	23	26	23	31	41	43	37	46	35

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	26.9	15.6	11.1	4.5	-3.5	-9.1	-5.1	-15.9	8
Lp (Direct)	25.1	13.8	9.3	2.6	-5.4	-10.9	-6.9	-17.7	6
Lp (Rev & Direct)	29	18	13	7	-1	-7	-3	-14	10
BS8233	29	18	13	6	-2	-7	-3	-14	10

Criteria

≤ 35

≤ 35

Noise Break-in Calculation - Position 2 North

Description

Ardent CE Project No.	2204791
Property Address	Boreham Road, Warminster
Room Type	Bedroom
Parameter	Leq, 8h

Room Dimensions and Areas

Room volume	35.00
Total Surface area	65.50
Wall façade area	10.00
Roof façade area	0.00
Glazing area	3.60

- Based on typical size

Total façade area	13.60
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Room Absorption Calculation

	63	125	250	500	1000	2000	4000	8000	
Estimated Reverberation time	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Alpha bar	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Total Absorption	11.27	11.27	11.27	11.27	11.27	11.27	11.27	11.27	
10Log S/A	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	

- Typical Bedroom RT

Façade level

	63	125	250	500	1000	2000	4000	8000	A
Measured Noise Level	41	32	27	29	30	23	23	17	33
Façade to free field	0	0	0	0	0	0	0	0	
Angle of view	0	0	0	0	0	0	0	0	
Screening (Maekewa)	0	0	0	0	0	0	0	0	
Distance correction	0	0	0	0	0	0	0	0	
Model correction	-1	-1	-1	-1	-1	-1	-1	-1	
Noise level at façade (Leq)	40	31	26	28	29	22	22	16	32

Composite SRI

	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	18	21	17	25	35	37	31	40	29
Transmission Coefficient	0.015849	0.007943	0.019953	0.003162	0.000316	0.000200	0.000794	0.000100	
Wall SRI	28	34	43	55	66	77	85	85	55
Transmission Coefficient	0.001585	0.000398	0.000050	0.000003	0.000000	0.000000	0.000000	0.000000	
Roof SRI	23	26	43	52	60	65	65	65	51
Transmission Coefficient	0.005012	0.002512	0.000050	0.000006	0.000001	0.000000	0.000000	0.000000	
Average Transmission Coeff	0.005361	0.002395	0.005318	0.000839	0.000084	0.000053	0.000210	0.000026	
Average SRI	23	26	23	31	41	43	37	46	35

Calculated Internal Noise Level, dB

	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	18.9	7.0	5.5	-0.7	-9.6	-18.7	-13.5	-28.4	1
Lp (Direct)	17.1	5.2	3.7	-2.6	-11.5	-20.5	-15.3	-30.2	0
Lp (Rev & Direct)	21	9	8	2	-8	-17	-11	-26	4
BS8233	21	9	7	1	-8	-17	-11	-26	3

Criteria

≤ 30

≤ 30

Noise Break-in Calculation - Position 2 North

Description

Ardent CE Project No.	2204791
Property Address	Boreham Road, Warminster
Room Type	Bedroom
Parameter	Lmax

Room Dimensions and Areas

Room volume	35.00
Total Surface area	65.50
Wall façade area	10.00
Roof façade area	0.00
Glazing area	3.60

- Based on typical size

Total façade area	13.60
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Room Absorption Calculation

	63	125	250	500	1000	2000	4000	8000	
Estimated Reverberation time	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Alpha bar	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Total Absorption	11.27	11.27	11.27	11.27	11.27	11.27	11.27	11.27	
10Log S/A	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	

- Typical Bedroom RT

Façade level

	63	125	250	500	1000	2000	4000	8000	A
Measured Noise Level	48	55	57	42	50	51	51	40	57
Façade to free field	0	0	0	0	0	0	0	0	
Angle of view	0	0	0	0	0	0	0	0	
Screening (Maekewa)	0	0	0	0	0	0	0	0	
Distance correction	0	0	0	0	0	0	0	0	
Model correction	0	0	0	0	0	0	0	0	
Noise level at façade (Lmax)	48	55	57	42	50	51	51	40	57

Composite SRI

	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	18	21	17	25	35	37	31	40	29
Transmission Coefficient	0.015849	0.007943	0.019953	0.003162	0.000316	0.000200	0.000794	0.000100	
Wall SRI	28	34	43	55	66	77	85	85	55
Transmission Coefficient	0.001585	0.000398	0.000050	0.000003	0.000000	0.000000	0.000000	0.000000	
Roof SRI	23	26	43	52	60	65	65	65	51
Transmission Coefficient	0.005012	0.002512	0.000050	0.000006	0.000001	0.000000	0.000000	0.000000	
Average Transmission Coeff	0.005361	0.002395	0.005318	0.000839	0.000084	0.000053	0.000210	0.000026	
Average SRI	23	26	23	31	41	43	37	46	35

Calculated Internal Noise Level, dB

	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	27.3	30.2	36.5	12.9	10.8	10.0	15.8	-3.8	29
Lp (Direct)	25.5	28.4	34.7	11.0	8.9	8.2	14.0	-5.6	27
Lp (Rev & Direct)	30	32	39	15	13	12	18	-2	31
BS8233	29	32	38	15	13	12	18	-2	31

Criteria

≤ 45

≤ 45

APPENDIX D

Traffic Flows and Calculations

Boreham Road, Warminster				
Road	2031 Opening Year 18H AAWT (06:00-00:00)		Development Trips 18H AAWT (06:00-00:00)	
	All Vehicles	HGVs %	All Vehicles	HGVs %
Boreham Road (East of Site Access)	4898	3%	242	0%
Boreham Road (West of Site Access)	4898	3%	557	0%

Boreham Road, Warminster				
Road	2031 Opening Year	Development Traffic	2031 Opening Year + Development Traffic	Change in Noise Level, dB
Boreham Road (East of Site Access)	4898	242	5140	0.2
Boreham Road (West of Site Access)	4898	557	5455	0.5

APPENDIX E

Appendix E

Acoustic Design Statement – Boreham Road, Warminster

This Acoustic Design Statement (ADS) accompanies the Noise Assessment and Environmental Statement for the development at Boreham Road, Warminster. The approach to the ADS is in line with that set out in ProPG: Planning & Noise, May 2017.

Stage 1 Assessment

The ambient noise environment is controlled by road traffic noise on the surrounding road network, most notably Boreham Road. Noise levels are therefore highest at the southern boundary of the site and reduce towards the centre and northern boundary of the site. Towards the southern boundary the site is therefore considered to be *low* risk of adverse noise impact, with areas of the site set back from the surrounding road network tending towards a *negligible* risk of adverse noise impact.

The proposals are not expected to significantly alter the composition of the acoustic environment as the design of the site will incorporate measures to ensure there is adverse noise impact as a result of the proposed residential uses.

Where new residential receptors are introduced, any change in the predominant noise source is expected to be due to changes in the volume of road traffic; however the number of expected movements is low in comparison to the baseline traffic conditions and therefore it is not expected that new residential receptors will significantly increase noise levels.

Stage 2 Assessment

Element 1 – Good Acoustic Design

With a residential scheme the principles of good acoustic design are key to a successful development and to ensure there is no significant adverse noise impact on respective users of the site. The site plan seeks to maximise separation distances from the dominant noise source of Boreham Road for the all properties with a minimum distance of approximately 250m.

The design team have sought to follow the best practice principles including the hierarchy of noise control wherever practicable in developing the layout of the site. This is broadly set out as follows:

1. Noise control at source – through the careful positioning of potentially noisy activities away from sensitive receptors;
2. Noise control in the transmission path – by maximising acoustic screening with sensible layout by positioning higher sensitivity (internal and external) areas on the more sheltered sides of buildings;
3. Noise control at receptors – through appropriate building envelope mitigation to include glazing, ventilation and separating walls and floors.

Element 2 – Internal Noise Levels

Based on the measured and calculated noise levels the internal noise levels in residential units can be determined. Appropriate façade attenuation will be provided to ensure compliance with Figure 2 ProPG which incorporates the guidance in BS8233:2014. In doing so Element 2 requirements of Stage 2 are met.

It is predicted that all residents can open windows and still achieve suitable internal amenity sound levels, therefore no alternative ventilation is required.

Glazing specification is detailed in noise assessment.

Element 3 – External Amenity Area Noise Levels

Consideration will be given to good acoustic design principles, placing residential zones with maximised distance separation away from Boreham Road to reduce noise impacts within external amenity spaces.

Garden fences will be included for all private gardens at a height of 1.8m, where necessary these will be close boarded.

External sound levels across all private gardens meet the 50 dB $L_{Aeq,16h}$ guidance criteria, demonstrating principles of good acoustic design are followed.

Additionally a public local equipped area of play (LEAP) proposed within the scheme towards the south which will be subject to external noise levels below 50 dB L_{Aeq} guidance criteria providing all residents with suitable external amenity.

Therefore, it is expected that all residents will have access to external amenity spaces that achieve the desired guidance value in accordance with BS 8233.

Element 4 – Assessment of Other Relevant Issues

The good acoustic design principles which have been followed mean that the proposed development is in general compliance with the principles of the ProPG.

The development is designed as a high quality vibrant living environment that balances the needs of the occupiers of the spaces through high quality sustainable design.

The proposed facade sound insulation performances mean that internal residential noise levels when windows are closed will be in line with the ProPG guidance levels.

Noise levels in private amenity areas are compliant with the desired guidance value of 50 dB. The design of the site will reduce noise levels in private amenity spaces as far as practicable. Alternative, high quality shared amenity areas are provided within the site and comply with the ProPG guidance levels.

Recommendation for the Decision Maker

In the context of the existing acoustic environment at the site there is a varying risk of adverse noise impact, ranging from negligible risk at the south and centre of the site to low risk at southern boundary. However, principles of good acoustic design will be followed to minimise the potential impact of noise though; careful layout and orientation of buildings, self-screening and where appropriate façade mitigation. It is considered that the site is suitable on noise grounds and therefore planning may be granted subject to the inclusion of suitable noise conditions.

APPENDIX F

ACOUSTIC TERMINOLOGY

The effects of noise on human beings may be expressed in terms of physiological damage and annoyance. It is, however, only the annoyance impacts that need to be considered in detail when addressing environmental noise impacts. Annoyance also includes the immediate effects of activity interference, for example sleep disturbance and speech interference.

The practice has become to measure sound levels in decibels (dB). The decibel scale is logarithmic rather than linear and it is useful to bear in mind that a noise level change of 3dB would be equivalent to doubling the energy level (for example doubling the volume of traffic) and that an increase of 10 dB is perceived, subjectively, as a doubling of loudness. The human ear responds differently to sounds of different frequency. The ear perceives high frequency sound of a given sound pressure level more loudly than a low frequency sound at the same level. The A-weighted sound level, dB(A), takes this response into consideration and is commonly used for measurement of environmental noise in UK. It thus indicates the subjective human response to sound.

Environmental noise levels vary continuously from second to second, it is clearly impractical to specify the sound level continuously and thus time averaging is required. In practice human response has been related to various units which include allowance for the fluctuating nature of sound with time. For the purpose of this report these include:

$L_{Aeq,T}$: the equivalent A-weighted continuous sound level.

This unit relates to the equivalent level of continuous sound for a specific time period T, for example 16 hours for daytime noise. It contains all the sound energy of the varying sound levels over the same time period and expresses it as a continuous sound level over that period.

$L_{A10,T}$: the A-weighted level of sound exceeded for 10% of the time period T.

This unit is used for traffic noise measurement and is the preferred unit for prediction of traffic noise in the publication, 'Calculation of Road Traffic Noise'.

$L_{A90,T}$: the A-weighted level of sound exceeded for 90% of the time period T.

This unit is commonly used to represent the background noise and is used in assessing the effects of industrial noise in UK.

L_{Amax} : the maximum A-weighted level of sound over a period of measurement.

$L_{Ar,T}$: the rating level.

The specific Noise plus any adjustments for the characteristic features of the noise. Used for comparison between background levels with the noise source off.

SEL : the Sound Exposure Level.

Sound exposure level abbreviated as SEL and LAE, is the total noise energy produced from a single noise event condensed into a 1 second time period.

R_w : weighted sound reduction index.

A laboratory-measured value as defined in ISO717 Part 1.

D_{nTw} :

The equivalent of R_w , but measured onsite as oppose to in a laboratory

Annex A

RELEVANT POLICY & GUIDANCE

National Planning Policy Framework (NPPF) – December 2024

Under the NPPF: paragraph 198 of Section 15, with regard to environmental noise; Planning policies and decisions should aim to: -

- mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

Noise Policy Statement for England (NPSE)

To avoid and mitigate adverse noise effects on health arising from and impacting on new development, the NPPF makes reference to NPSE. The NPSE was published in March 2010 and covers all forms of noise, other than occupational noise. For the purposes of this report, "Neighbourhood Noise" is most relevant as NPSE defined at paragraph 2.5:

"neighbourhood noise which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street. "

NPSE introduces three concepts to the assessment of noise in the UK:

- NOEL – No Observed Effect Level – This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.
- LOAEL – Lowest Observable Adverse Effect Level – This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level – This is the level above which significant adverse effects on health and quality of life occur.

NPSE does not numerically define levels for the NOEL, LOAEL or SOAEL rather it makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc.

National Planning Practice Guidance (2019)

The purpose of the guidance is to complement the NPPF and provide advice on how to deliver its policies.

The guidance includes a table (as shown in Table 1) that summarises "the noise exposure hierarchy, based on the likely average response" and which offers "examples of outcomes" relevant to the NOEL, LOAEL and SOAEL effect levels described in the NPSE.

Response	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but no such that there is a change in the quality of life.	No Observed Adverse Effect Level	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect Level	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and Disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty 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.	Significant Observed Adverse Effect Level	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Table 1: Noise Exposure Hierarchy, Based on the Likely Average Response.

Calculation of Road Traffic Noise – 1988

For new developments, road traffic noise levels should be predicted in accordance with CRTN. This prediction method uses the traffic flow, vehicle speed, and percentage of heavy-duty vehicles (HDVs, over 3.5 tonnes), road gradient and other factors to calculate noise levels at receptor points.

Design Manual for Road and Bridges, Volume 11 (LA111 – Noise and Vibration

Changes in noise level as a result of additional vehicles on the public highway can be assessed using methodologies presented in Design Manual for Road and Bridges (DMRB LA111),

This guidance document sets out the requirements for noise and vibration assessments from road projects. The construction, operation and maintenance of highway projects can lead to changes in noise and vibration levels in the surrounding environment.

The magnitude of change (in sound level) is defined in Table 3.54a of the guidance for short term and Table 3.54b for long term, as presented in Table 2:

Short term magnitude	Short term noise change (dB $L_{A10,18hr}$ or L_{night})
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	less than 1.0

Long term magnitude	Long term noise change (dB $L_{A10,18hr}$ or L_{night})
Major	Greater than or equal to 10.0
Moderate	5.0 to 9.9
Minor	3.0 to 4.9
Negligible	less than 3.0

Table 2 (Table 3.54a and b DMRB, LA 111 - Magnitude of Change)

Control of Pollution Act 1974

The local authority has powers under the Control of Pollution Act 1974 to control noise from construction sites. Section 60 of the Act allows a local authority to serve a notice of its requirements for the control of site noise. This notice may include specification of plant that is or is not to be used, hours during which the construction works can be carried out and levels of noise emission. Section 61 of the Act allows a contractor or developer to take the initiative and agree with the local authority the methods of construction, steps to minimise noise and hours of work.

The Environmental Protection Act 1990

Local authorities have a duty to deal with statutory nuisances under the Environmental Protection Act 1990. For noise to amount to a statutory nuisance, it must be "prejudicial to health or a nuisance" as outlined in Section 79 of the Act. Any proposed development should not result in a statutory nuisance being declared.

Should the Local Authority declare a development to cause a statutory nuisance, an abatement notice can be served to the developer who has up to 21 days to appeal to Magistrates' Court, as detailed in Section 80 of the Act.

The Building Regulations 2010

Building Regulations approvals are required for most new buildings and for most types of works on existing buildings. Part 10 of The Building Regulations 2010 contains provisions, including power for local authorities to test building work, take samples, and provision to ensure compliance. Part E of the Regulation 'Resistance to the passage of sound' is expanded in Approved Document E, which provides robust details to control and mitigate noise within buildings. This Document is separated over four parts which include:

- E1: Protection against sound from other parts of the building and adjoining buildings;
- E2: Protection against sound within dwelling-house etc.;
- E3: Reverberation in the common internal parts of buildings containing flats or rooms for residential purposes;
- E4: Acoustic conditions in schools.

World Health Organisation

The WHO document Guidance on Community Noise specifies additional information for noise affecting noise sensitive receptors and forms the basis of many noise limitations and design ranges for internal and external ambient noise levels. It defines noise as 'a class of sounds that are considered unwanted' (by the listener), 'that adversely affects, or may affect the physiological and psychological wellbeing of people.' Much of the research around this study is based on transportation noise.

Further guidance on the recommended levels is given in the World Health Organisation (WHO) Guidelines for Community Noise. In this document it is stated that:

"To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq} ."

WHO also states the following paragraph with regard to the effects of L_{Amax} events in a night-time period:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991)."

WHO guidance 'Night Noise Guidelines for Europe' is concerned with the longer-term average noise levels that are covered by the EU Directive on Environmental Noise, although this does appear to suggest external maximum noise levels of around 57dBA outside bedrooms during the night to achieve internal maximum levels of 42dBA.

The World Health Organisation has recently published Environmental Noise Guidelines – for the European Region (2018) to provide recommendations for protecting human health from exposure to noise sources such as transportation (road traffic, railway and aircraft), wind turbine noise and leisure noise.

The guidance document defines the 'strength' of recommendation (for protecting against noise exposure) as either 'strong' or conditional', outlined below.

Strength of Recommendation

*"A **strong** recommendation can be adopted as policy in most situations. The guideline is based on the confidence that the desirable effects of adherence to the recommendation outweigh the undesirable consequences. The quality of evidence for a net benefit – combined with information about values, preference*

and resources – inform this recommendation, which should be implemented in most circumstances.”

*“A **conditional** recommendation requires a policy-making process with substantial debate and involvement of various stakeholders. There is less certainty of its efficacy owing to lower quality of evidence of a net benefit, opposing values and preferences of individuals and populations affected or the high resource implications of the recommendation, meaning there may be circumstances or settings in which it will not apply.”*

External (free-field) recommendations included in the Environmental Noise Guidelines for the European Region are presented in Table 3 for specific noise sources.

Noise Source	dB L _{den}	dB L _{night}	dB L _{Aeq, 24hr} (yearly average)	Recommendation
Road Traffic	53	45	-	Strong
Railway	54	44	-	Strong
Aircraft	45	40	-	Strong
Wind Turbine	45	-	-	Conditional
Entertainment	-	-	70	Strong/Conditional

Table 3: Extract from Environmental Noise Guidelines for the European Region

BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings

Formerly a Code of Practice, the 2014 revision of BS8233 is now presented and intended as a guidance document. The standard is mainly concerned with building design from an acoustic standpoint. It does however, contain information relevant to environmental noise more specifically by stating guidance for desirable internal noise levels for dwellings and other buildings.

Table 2 of BS8233:2014 provides suitable internal levels for spaces such as open-plan offices and restaurants and notes that an upper and lower noise levels should be considered, as presented in Table 4.

Objective	Typical Situation	Design range dB LAeq,T
Typical noise levels for acoustic privacy in shared spaces	Restaurant	40 - 55
	Open plan office	45 - 50
	Night club, public house	40 - 45
	Ballroom, banqueting hall	35 - 40

Table 4: Extract from Table 2 – Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important

An extract of Table 4 of the document relevant for residential development is reproduced in Table 5.

Activity	Location	07:00 to 23:00 dB LAeq,T 16hour	23:00 to 07:00 LAeq,T 8hour
Resting	Living room	35	-
Dining	Dining room / area	40	-
Sleeping (daytime resting)	Bedroom	35	30

Table 5: Extract from Table 4 – Indoor ambient noise levels in dwellings

Whilst the above criteria is for dwellings, BS8233 states that these recommendations are similar for hotel guestrooms and therefore these have been adopted as the criteria for assessment.

The guidance of BS8233:2014 with regards to external amenity spaces is as follows:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,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 noise 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."

ProPG: Planning and Noise - May 2017

Guidance in ProPG Planning and Noise provides an approach which aims to inform developers, practitioners and local authorities on how potential residential sites should be assessed. ProPG states that the guidance can be used for other types of residential institution and therefore it is considered applicable to the site.

The guidance also builds upon government planning policy that noise should not be treated in isolation and there should be a holistic approach to good acoustic design.

ProPG sets out a 2-stage approach; the first of which is a risk assessment to identify the likelihood of significant adverse impact, then depending on the outcome of this risk assessment the extent of the acoustic design statement required. The graphic in Figure 1 is an extract from ProPG and indicates the level of risk associated with ranges of sound levels and provides some guidance on the likely extent of work associated with progressing a development exposed to these sound levels.

In relation to maximum noise levels, ProPG states that:

"In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

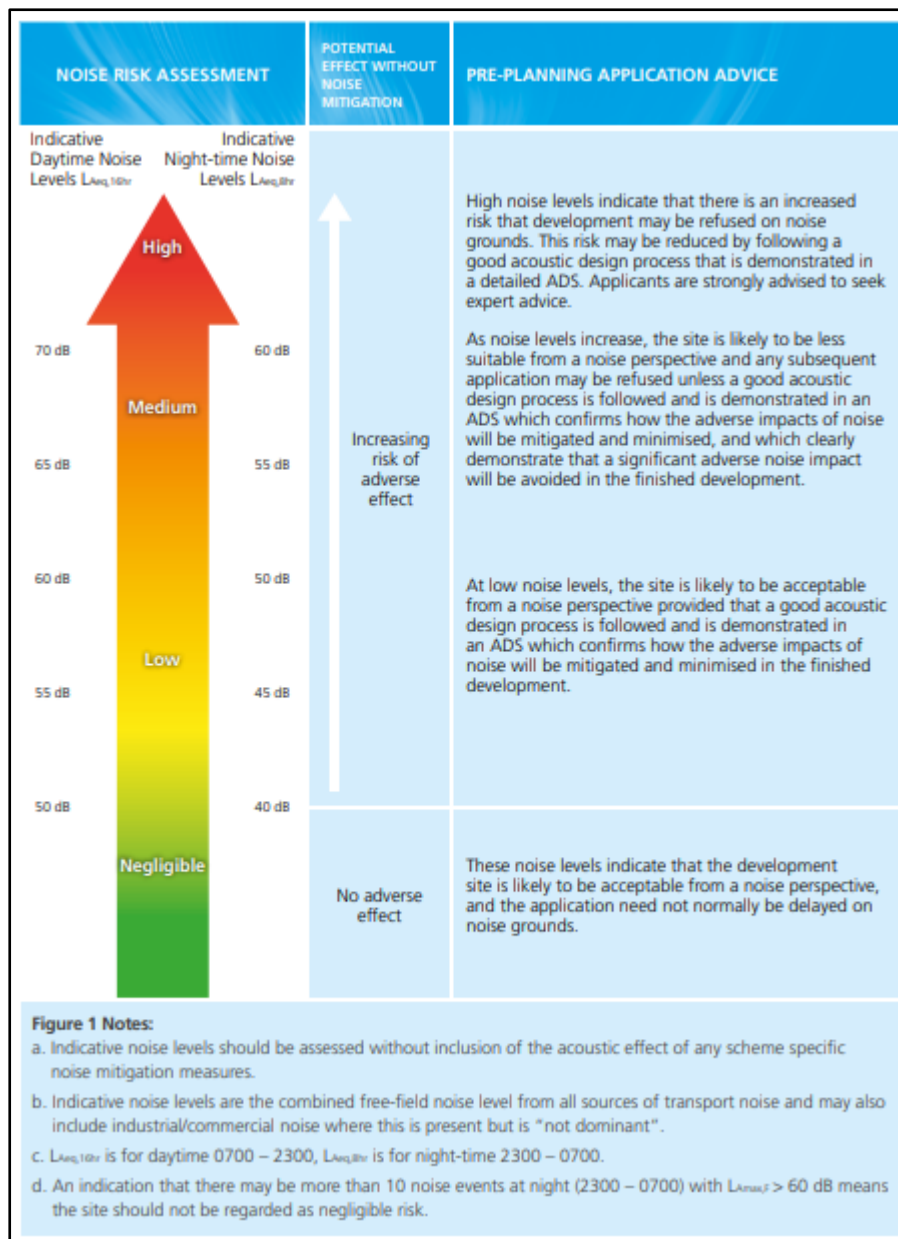


Figure 1: Extract from Figure 1 in ProPG – Initial Site Noise Risk Assessment

The second stage involves four key elements where discussion is expanded on:

- Element 1 – Good Acoustic Design Process
- Element 2 – Internal Noise Level Guidance
- Element 3 – External Amenity Area Noise Assessment
- Element 4 – Assessment of Other Relevant Issues

Having worked through the approach practitioners can present a recommendation to the decision maker.

Acoustics Ventilation and Overheating - Residential Design Guide, January 2020

Acoustics Ventilation and Overheating (AVO) recommends an approach to acoustic assessments for new residential development taking consideration for acoustics, ventilation, and overheating. AVO states that the guidance can be used for other types of residential institution and therefore it is considered applicable to the site.

Section 3 involves a two-level risk assessment approach to estimate the potential impact on occupants in the case of overheating.

The Level 1 site risk assessment is based on external free-field noise levels and the assumed scenario where a partially open window is used to mitigate overheating (Table 3-2 of the guidance).

The sound level reduction from outside to inside for a partially open window is 13dB in this instance. A Level 1 site risk assessment is considered adequate if the site falls within the 'Negligible risk' category. A Level 2 assessment can optionally be undertaken to give more confidence in the case of Low or Medium risk sites, where appropriate. The Level 2 assessment is strongly recommended for 'High' risk sites.

The Level 2 assessment suggests that assessment of the adverse effect from noise exposure should include an estimate of how frequently and for what duration the overheating condition occurs (Table 3-3 of the guidance)

Figure 2 explains the two-level noise assessment procedure for overheating conditions.

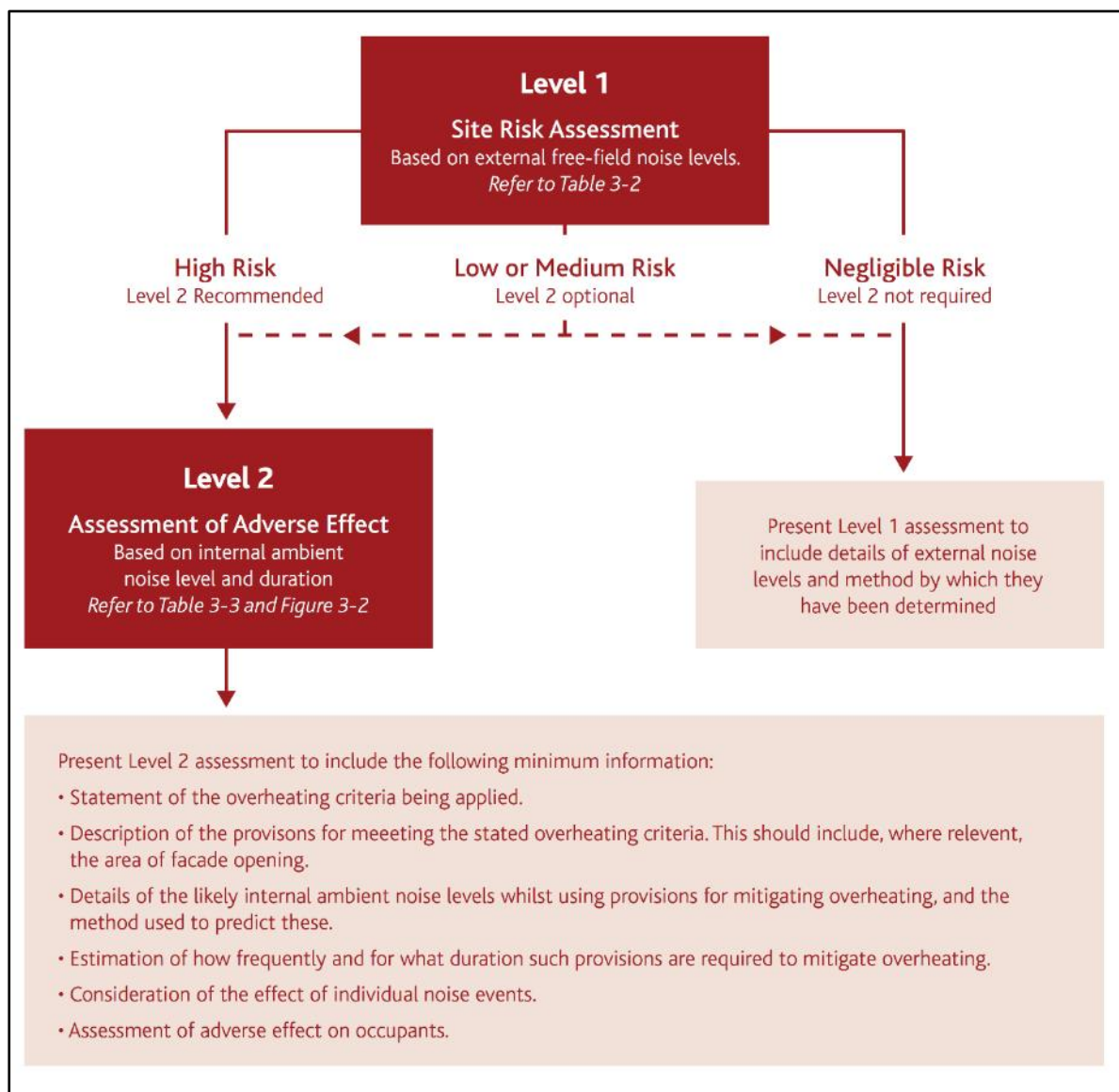


Figure 2: Two-level Assessment Procedure (Figure 3.1 of AVO Guidance)

Figure 3 shows the Level 1 site risk assessment of noise, relating to overheating conditions.

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 High Medium Low Negligible	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

Note 1 The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.

Note 2 The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, [15, 17].

Note 3 A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines [23].

Note 4 Refer also to references [1, 17, 18, 22] for further guidance regarding individual noise events. Where 78dB LAFmax is normally exceeded during the night-time period (23:00-07:00), a Level 2 assessment is recommended.

Note 5 The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.

Note 6 To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

Figure 3: Level 1 Risk Assessment (Figure 3.2 of AVO guidance)

Figure 4 shows the Level 2 site risk assessment of noise, relating to overheating conditions.

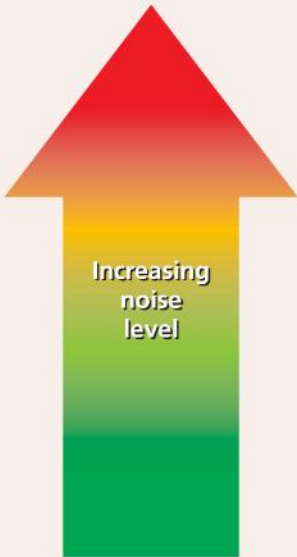
Internal ambient noise level ^[Note 2]			Examples of Outcomes ^[Note 5]	
$L_{Aeq,T}$ ^[Note 3] during 07:00 – 23:00 ^[Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 ^[Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in 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 $L_{AF,max}$ 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.
Note 1 The noise levels suggested in Tables 3-2 and 3-3 assume a steady road traffic noise source but may be adapted for other types of transport.				

Figure 4: Level 2 Risk Assessment (Figure 3.3 of AVO guidance)

The noise levels suggested in Figure 3 and Figure 4 assume a steady road traffic noise source but may be adapted for other types of transport by taking account of the differing responses to different transport sources.