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CONSULTING ENGINEERS

Countryside Properties PLC

Land south of Henham Road, Elsenham, Essex

Noise Assessment

REPORT REF.
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July 2022

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REV	ISSUE PURPOSE	AUTHOR	CHECKED	APPROVED	DATE
-	Draft	JG	CM	Draft	31/03/2022
-	Final	CM	CM	JG	28/07/22

Distribution

1. Introduction

1.1. Ardent Consulting Engineers were instructed by Countryside Properties PLC to undertake a Noise Assessment to support the residential development at land south of Henham Road, Elsenham, Essex (hereafter referred to as the site).

Site location

1.2. The site is set to the southeast of the village of Elsenham, Essex. It is bounded to the south and east by arable land with farm buildings located to the northeast. Henham Road forms the site boundary to the north, with Hall Road forming the site boundary to the west. Residential properties in Elsenham village are located to the northwest of the site. St Mary's Church is located approximately 230m to the south of the southern boundary.

1.3. The surrounding area and site boundary are shown in Figure 1.

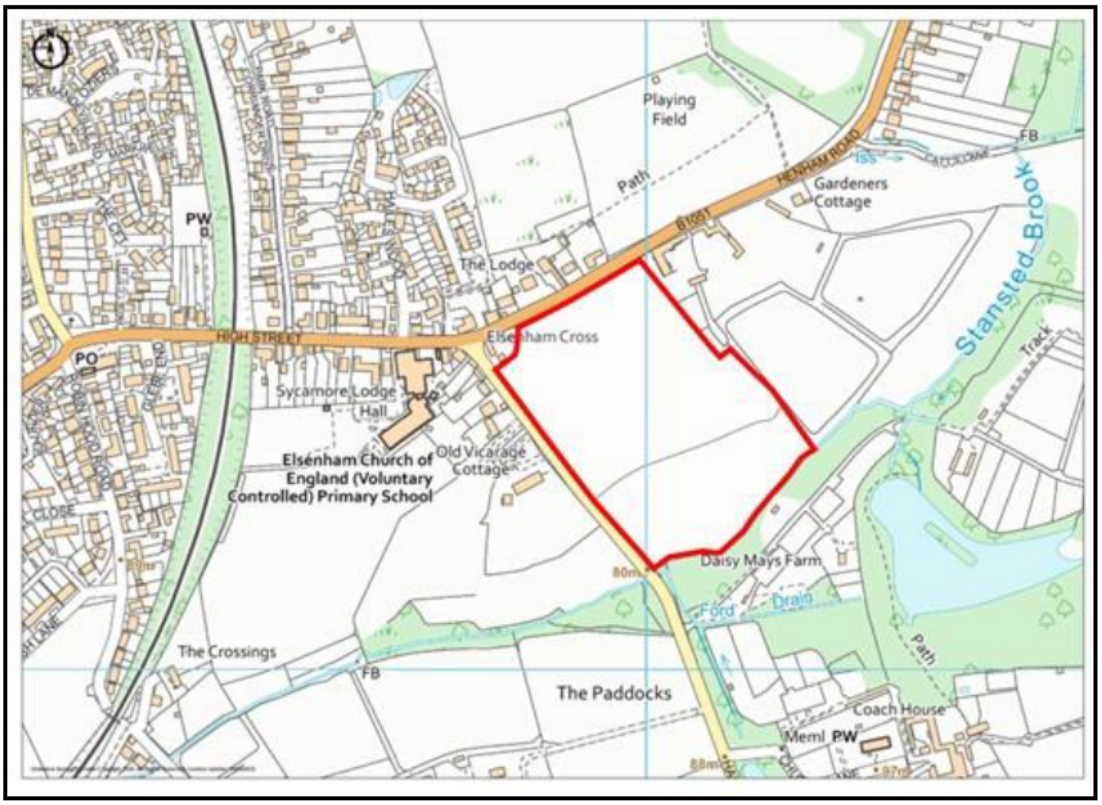


Figure 1: Surrounding area and site boundary

Site Proposals

1.4. The site totals 12.85 acres and has capacity for 130 units over one phase. Partnerships Home counties (Eastern Region) will be promoting the site through the Uttlesford Local Plan and submitting an immediate planning application.

1.5. The proposed scheme design plan is shown in Figure 2.

Figure 2: Proposed scheme design plan

2. Relevant Policy and Guidance

Liaison with Uttlesford District Council

2.1. Contact[1] was made with Uttlesford District Council (UDC) to discuss the proposals and approach/methodology towards the noise assessment. At the time of writing no response has been received.

2.2. The methodology in the following standards has therefore been followed in this assessment.

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

2.3. 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.

2.4. Table 2 of BS8233:2014 provides suitable internal levels for residential development and is reproduced in Table 1.

Table 1: Extract from BS8233:2014 Table 2 - Indoor ambient noise levels in dwellings

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

2.5. 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 $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not

[1] Telephone contact on 24/03/2022 with Environmental Health at Uttlesford District Council. At time of writing Ardent are awaiting the call to be returned.

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

2.6. 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.

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

2.8. 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 3 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.

2.9. 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."*

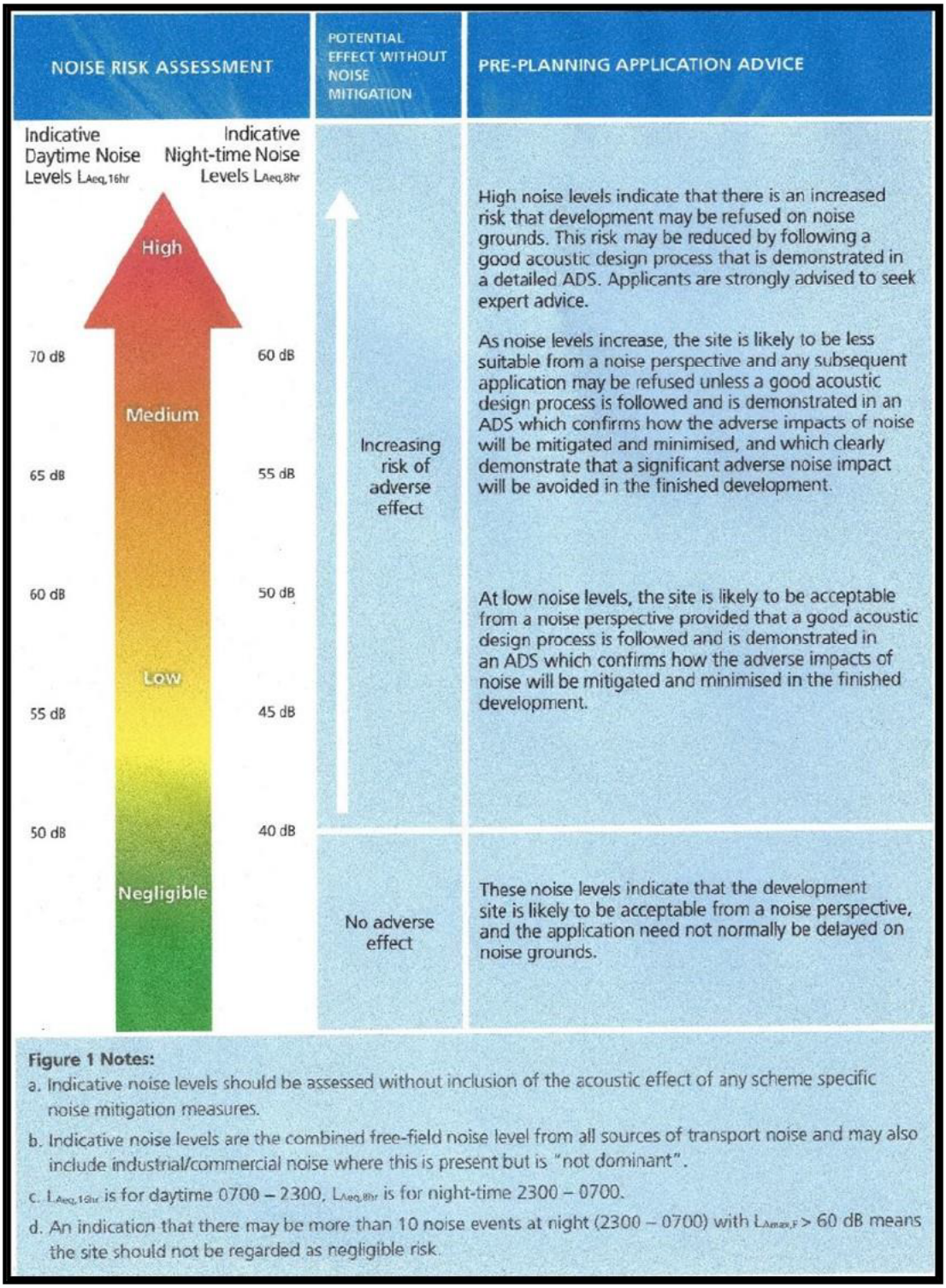


Figure 3: Extract from Figure 1 in ProPG - Initial Site Noise Risk Assessment

National Planning Policy Framework (NPPF) – July 2021

2.10. Under the NPPF: paragraph 185 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)

2.11. 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."

2.12. 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 both 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.

2.13. NPSE does not numerically define levels for 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 or day of the week, etc.

National Planning Practice Guidance (2014)

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

2.15. The guidance includes a table (as shown in Figure 4) that summarises "the noise exposure hierarchy, based on the likely average response" and which offers "examples of outcomes" relevant to NOEL, LOAEL, and SOAEL effect levels described in the NPSE.

Perception	Examples of outcomes	Increasing effect level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, eg 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, eg 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 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.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, eg regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, eg auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Figure 4: NPPG Noise Exposure Hierarchy, based on the Likely Average Response

Acoustics Ventilation and Overheating – Residential Design Guide, January 2020

2.16. 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.

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

2.18. 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).

2.19. 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.

2.20. 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).

2.21. Figure 5 explains the two-level noise assessment procedure for overheating conditions.

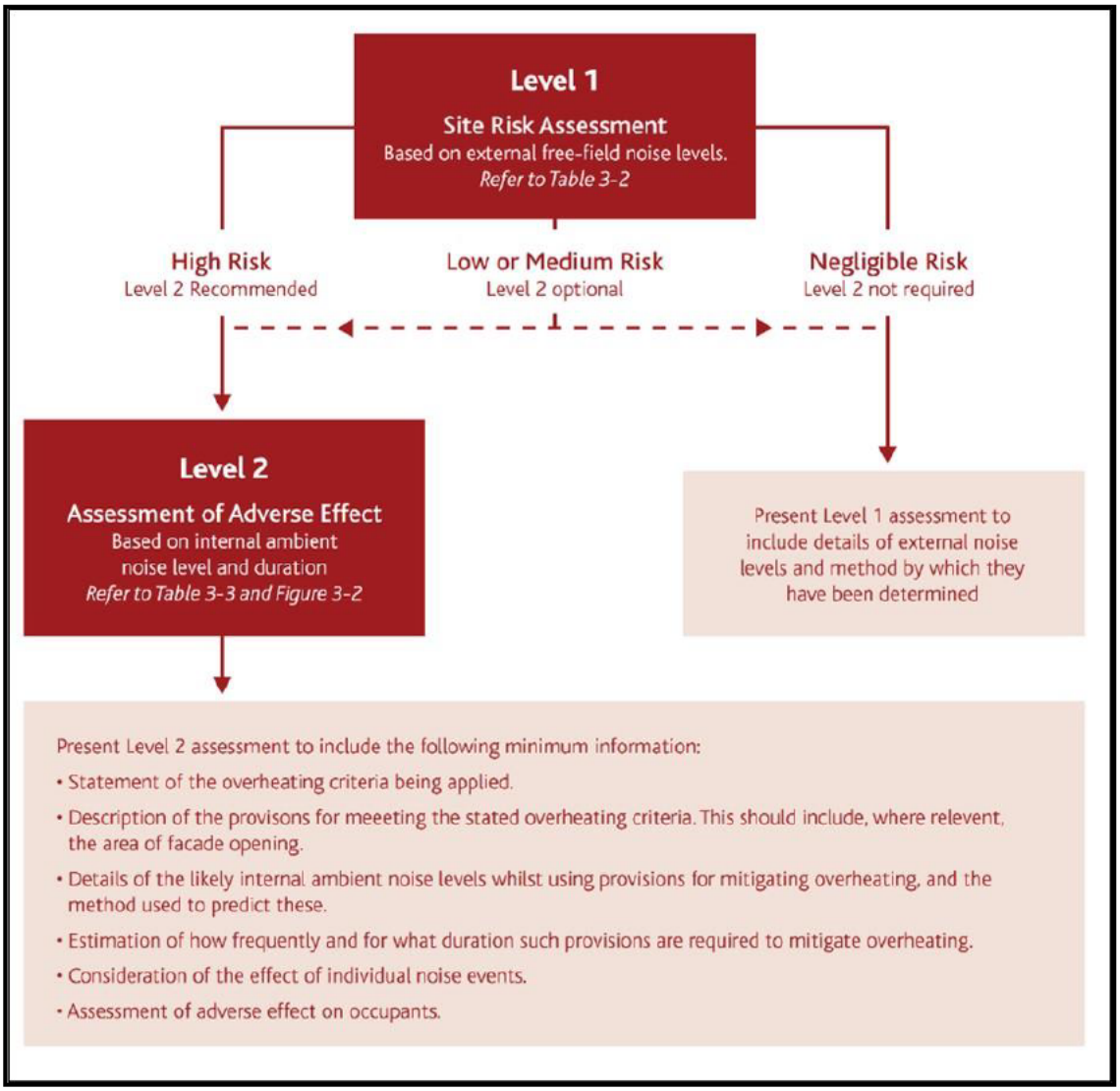


Figure 5: Two-level Assessment Procedure (Figure 3-1 of AVO Guidance)

2.22. Figure 6 shows the Level 1 site risk assessment of noise, relating to overheating conditions.

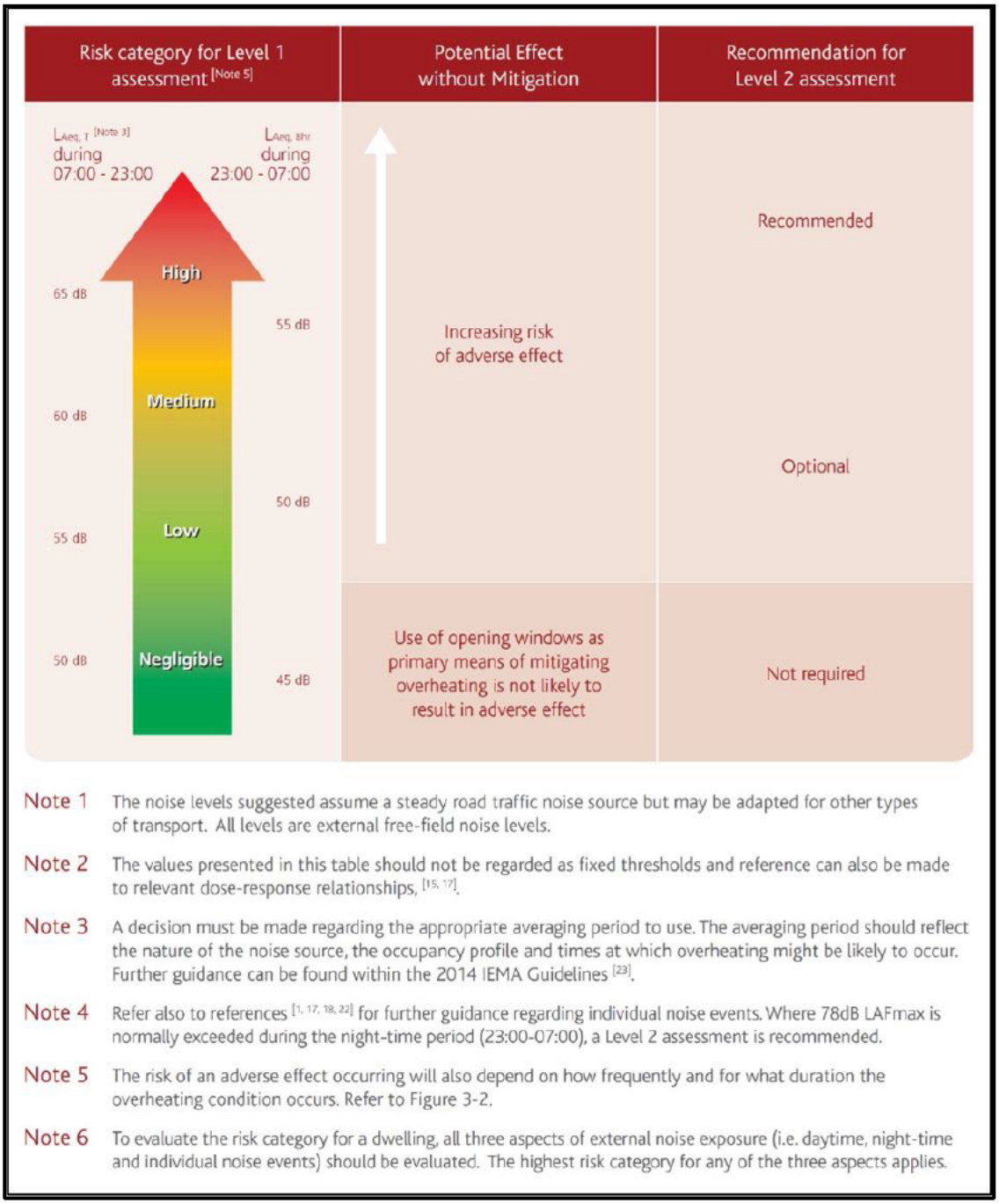


Figure 6: Level 1 Risk Assessment (Figure 3-2 of AVO Guidance)

2.23. Figure 7 shows the Level 2 site risk assessment of noise, relating to overheating conditions.

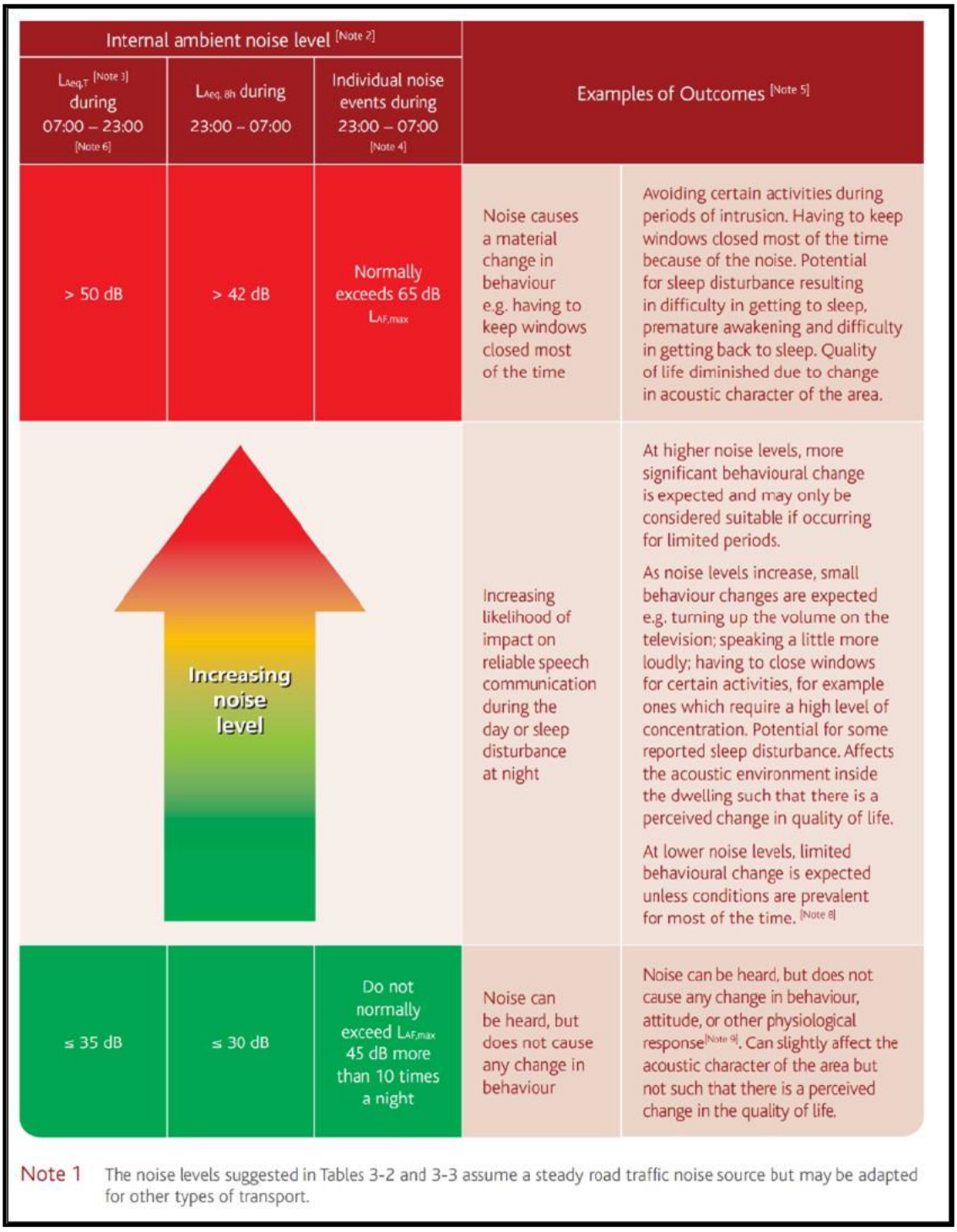


Figure 7: Level 2 Risk Assessment (Figure 3-3 of AVO Guidance)

2.24. The noise levels suggested in Figure 6 and Figure 7 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.

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

2.25. 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),

2.26. 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.

2.27. 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:

Table 2: Table 3.54A of DMRB

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

3. Environmental Noise Levels

3.1. An environmental noise survey was undertaken at the site between 8th and 11th March 2022. Measurement positions from the survey are shown in Figure 8.

3.2. Noise measurements were taken on at the northern and western boundaries of the site, adjacent to Henham Road and Hall Road respectively. These locations were the best practicable measurement locations available to obtain representative baseline noise levels due to the main observed noise sources around the site. As these measurement locations are adjacent to the dominant noise sources at the site, they are considered to be worst-case noise levels.

3.3. Photographs of the measurement positions are shown in Figure 9 and Figure 10.

Figure 8: Survey measurement locations

Figure 9: Photograph of MP1

Figure 10: Photograph of MP2

3.4. The equipment used was as follows:

- Svantek 971 Sound Level Meter (serial no. 34787)
- Svantek 977 Sound Level Meter (serial no. 34133)
- Rion NC-74 Calibrator (serial no. 34172694)

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

3.6. Observations regarding the prevailing weather conditions were taken during the survey, which noted no precipitation and low wind speeds and therefore considered suitable for environmental noise measurements.

3.7. Time histories of measured data are shown in Appendix A and a summary of the measured noise levels taken at the site are summarised in Table 3.

Table 3 Summary of measured noise levels

Monitoring Position	Ambient Noise Level dB $L_{Aeq,\,T}$		Typical Background Sound Level dB $L_{A90,T}$		Representative Night-time Maximum Noise Level dB L_{AFmax}
	Daytime	Night-time	Daytime	Night-time	
MP1	67	59	52	46	82
MP2	69	62	51	45	85

3.8. The representative L_{AFmax} level is the value which has been exceeded fewer than 10 times in the 8-hour night-time period, i.e., one which can be considered to be 'not normally exceeded' as per the WHO guidelines.

3.9. There were limited secure locations to install noise monitoring equipment on site, which meant that equipment could not be installed at positions which were representative of dwellings on site. Table 4 shown the distance corrected ambient and maximum noise levels at the proposed closest facades to Hall Road and Henham Road:

Table 4 Façade representative noise levels

Monitoring Position	Ambient Noise Level dB $L_{Aeq, T}$		Representative Night-time Maximum Noise Level dB L_{AFmax}
	Daytime	Night-time	
Henham Road	63	55	74
Hall Road	65	58	78

3.10. Based on these noise levels, facades in close proximity to Henham Road will be 'medium' risk and facades in close proximity to Hall Road are considered to be 'medium to high risk' risk. Facades which are sufficiently far away from the surrounding road network are considered to be ' low' risk and facades which are far away enough and screened from the surrounding road network are considered 'negligible risk' when compared with Figure 1 included in Section 2 of ProPG, as shown in Figure 3.

3.11. This would not prohibit the development as good acoustic design processes will be followed to reduce sound levels to as low as practical across the site.

3.12. Representative octave band levels are provided in Table 5. These are used in glazing calculations to ensure a robust assessment of internal noise levels.

Table 5: Octave Band data for noise monitoring locations

		Octave Band Centre Frequency, dB							
		63	125	250	500	1k	2k	4k	8k
MP1	$L_{Aeq,T}$ (day)	74	65	62	61	64	59	48	39
	$L_{Aeq,T}$ (night)	63	59	56	54	56	51	39	29
	$L_{AFmax,T}$ (night)	83	75	75	76	80	73	62	52
MP2	$L_{Aeq,T}$ (day)	69	66	64	64	66	61	56	48
	$L_{Aeq,T}$ (night)	62	60	59	57	59	54	47	39
	$L_{AFmax,T}$ (night)	82	78	76	79	82	79	76	69

3.13. Where appropriate, effects such as acoustic screening and distance attenuation have been taken into account in the predicted noise levels at the development site.

4. Construction Phase

4.1. Given the proximity of the proposed construction to neighbouring noise sensitive properties such as residential areas, it is possible that the site clearance, preparation and construction noise may impact nearby receptors.

4.2. A detailed construction methodology, including specific plant data and construction activities/operations are not available at this stage of the project. Therefore, it is not possible to undertake a detailed assessment of likely impact at this time.

4.3. Reasonable construction noise limits can be derived using the Example Method 1 (the ABC Method) of BS5228, within section E.3.2. Table E.1 from the standard is reproduced in Figure 11.

Table E.1 Example threshold of significant effect at dwellings

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.

Figure 11: BS5228: Part 1 - Table E.1

4.4. Existing ambient noise levels at the site will place the site and surroundings within Category A of Table E.1.

4.5. Therefore, the ambient noise levels (as a result of construction activities) in Table 6 should be considered as reasonable limits to adhere to during construction works.

Table 6: Construction Noise Limits

Time Period	Construction Noise Limits L_{Aeq} (dB)
Weekdays 08:00 – 18:00 & Saturday 08:00 – 13:00	65

5. Road Traffic Noise

5.1. Traffic flow volumes have been provided by Ardent's transport team, which have been used to calculate the change in noise levels arising from operational road traffic, i.e. during occupation, of the site. The data is presented as 24-hour AADT (0600 – 0000) flows.

5.2. Table 7 shows the traffic flows and predicted changes in noise levels for the change in traffic flow between future baseline (without development) at completion year and operational traffic flows.

Table 7 Change in noise levels due to operational traffic compared to future baseline

Road	Completion Year Baseline (Without Development)	Completion Year Baseline (With Development)	Change in Noise Level, dB
Henham Road, east of Hall Road	8,419	8,792	0.2
Hall Road, south of Henham Road	9,499	10,393	0.4

5.3. The changes in noise levels are negligible in all cases when compared to Table 3.54b of DMRB, LA 111, as shown in Appendix B. There will be no adverse impacts arising from the proposed development in relation to road traffic noise.

6. Mitigation Recommendations

6.1. The measured results and layout were used to undertake calculations for suitable façade treatments, presented in Appendix C, and other mitigation measures required for the site, outlined as follows.

6.2. Façade treatment calculations have been undertaken for three scenarios on the site. These are for property facades in close proximity to and facing Hall Road, the same for Henham Road, and for properties that are set back from both Hall Road and Henham Road.

6.3. The aim of this section of the report is to identify mitigation measures capable of providing suitable levels of attenuation to achieve the required internal sound levels based on the predicted noise levels and the planning noise assessment. The assessment presents a worst case scenario based on the noise levels measured at the site, the mitigation measures, e.g., glazing and ventilation, will be refined further as part of the detailed design of the site.

6.4. To achieve suitable internal amenity sound levels during normal conditions, dwellings exposed to noise from Hall Road and Henham Road will require close, but not sealed, windows and an alternative means of ventilation provided. Windows do not need to be sealed shut and residents will have the choice to open them, e.g., for purge ventilation, whilst accepting elevated noise levels. For dwellings which are far away enough from the surrounding road network and/or sufficiently screened by other dwellings on site open windows are suitable.

External Building Fabric – Non-Glazed Elements

6.5. 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 8 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').

Table 8 Non-glazed Elements Assumed Sound Reduction Performance

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

External Building Fabric - Glazing

6.6. Minimum attenuation values are provided for the development. Properties along the western boundary will be in close proximity to traffic passing on Hall Road. Façades facing Hall Road will require upgraded glazing specification to control internal noise levels.

6.7. Facades facing the northern boundary of the site and therefore exposed to road traffic noise on Henham Road will also require upgraded glazing to control internal noise levels, although measured levels along the northern boundary are lower than those at the western boundary of site. Facades that which are screened or set back from the surrounding road network do not require upgraded glazing.

6.8. Table 9 sets out the required glazing performance types for property locations across the site. This specification takes into account the glass, frame, seals and associated fittings.

Table 9 Required Minimum Attenuation Values for Glazing

Glazing Type	Sound Reduction Index, R_w	Octave band centre frequency SRI, dB					
		125	250	500	1k	2k	4k
Type 1 - Property facades screened from roads	29	21	17	25	35	37	31
Type 2 - Property facades facing Hall Road and Henham Road	35	24	24	32	37	42	43

6.9. The minimum attenuation values in Table 9 are sufficient to ensure that internal noise levels are within the criteria of BS8233 for living rooms and bedrooms across the development.

External Building Fabric - Ventilation

6.10. Table 10 sets out the required ventilation performance. Due to the elevated noise levels measured on the western boundary of the site, property facades facing Hall Road will require upgraded ventilation.

Table 10 Required Minimum Attenuation Values for Ventilation

Ventilation Type	Element Normalised level difference, D_{new}	Octave band centre frequency SRI, dB					
		125	250	500	1k	2k	4k
Type 1 - Standard Trickle Ventilation	35	36	34	31	34	38	38
Type 2 – Property facades facing Hall Road	38	38	38	29	47	42	40

6.11. The above tables should be viewed in conjunction with Figure 12, which indicates the location of glazing and ventilation specifications.

Figure 12: Facades requiring upgraded glazing and ventilation specification

6.12. Where non-sensitive rooms and sensitive rooms form part of an open plan area, for example a dining and kitchen area, the glazing and ventilation specification for the more sensitive room should be used across the combined area.

6.13. All major building elements should be tested in accordance with BS EN ISO 10140-2:2010. Sole glass performance data would not necessarily demonstrate compliance with this specification. It should be noted that there may be additional considerations for glazing requirements such as overheating, security, thermal performance, and air quality. Alternative glazing could be used assuming the minimum acoustic performance is met.

Overheating

6.14. Noise levels place facades in close proximity to Henham Road will be 'medium' risk categories and facades in close proximity to Hall Road are considered to be 'medium to high risk' risk categories. Facades which are sufficiently far away from the surrounding road network are considered to be ' low' risk categories and facades which are far away enough and screened from the surrounding road network are considered 'negligible risk' categories of noise impact during overheating according to Acoustics Ventilation and Overheating (AVO) guidance.

6.15. In these circumstances a Level 2 AVO assessment should be conducted for parts of the site which fall into the medium and high-risk categories of noise impact during overheating conditions. Marked up site plans showing the noise impact during overheating risk categories are shown in Appendix D. A Level 2 assessment of the noise impact during overheating conditions will be undertaken as part of the detailed design for the site.

External Amenity Areas

6.16. The layout of dwellings and private amenity areas (gardens) at the site are shown in Figure 2 above. It can be seen that private amenity areas are provided to properties along the western boundary, with a small number exposed to noise from Hall Road. A small number of properties in close proximity to the northern boundary are also exposed to road traffic noise from Henham Road.

6.17. Based on the measurements taken at the site, external sound levels in gardens in close proximity to and unscreened from the surrounding road network would be expected to exceed the upper guideline value of 55dB $L_{Aeq,16hour}$ for external amenity

areas, as defined in BS8233. All other gardens on site are expected to meet the guidance levels of BS8233.

6.18. The provision of 2m high close boarded timber fences is recommended for gardens at the western and northern boundaries of the site. The proposed fences would reduce noise levels by a minimum of 5dB. Figure 13 shows the location of acoustic screening required to external amenity areas.

Figure 13: Location of acoustic screening to external amenity areas

6.19. With the proposed fences, noise levels in gardens would be expected to fall below the guidance levels of BS8233 for all but the most exposed parts of this site.

6.20. There is a communal amenity space to the south east corner of the site which will have external noise levels which meet the guidance levels. Therefore all residents have access to amenity areas with external sound levels which meet the guidance levels values.

Construction Phase

6.21. Construction activities should only take place between 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays. No construction activity should be carried out during the night, on Sundays or on bank holidays without additional consideration to controlling noise and with the prior approval of Uttlesford District Council (UDC).

6.22. A detailed Construction Noise and Vibration Management Plan will be prepared and agreed with UDC. The plan should consider the impact of noise and vibration on nearby noise sensitive receivers.

6.23. During construction, the contractor will employ best practicable means to control noise from construction operations.

6.24. Stationary equipment and plant such as generators will be placed as far as practicable from noise sensitive receptors, and preferably in areas benefiting from existing or purpose-built attenuation such as hording or behind non-sensitive buildings.

6.25. Delivery of materials and removal of waste from the site will be planned to minimise disturbance to neighbouring receptors. Idling of plant, machinery and delivery vehicles should be prohibited when not in use.

6.26. If required noise levels can be monitored regularly in accordance with BS 5228 to ensure the above set limits are not exceeded. In addition to the above all other guidance within BS 5228 will be followed at all times.

7. Conclusions

7.1. A noise survey has been undertaken and measured levels have been used to calculate and assess suitable glazing specifications.

7.2. To achieve suitable internal amenity sound levels during normal conditions, dwellings exposed to noise from Hall Road and Henham Road will require close, but not sealed, windows and an alternative means of ventilation provided. Windows do not need to be sealed shut and residents will have the choice to open them, e.g., for purge ventilation, whilst accepting elevated noise levels. For dwellings which are far away enough from the surrounding road network and/or sufficiently screened by other dwellings on site open windows are suitable

7.3. Mitigation measures have been proposed to reduce noise by as much as practically possible in external amenity areas (private gardens). External sound levels are expected to exceed the upper guideline value of BS8233 at a small number of properties close to both Henham Road and Hall Road. External sound levels at properties screened from road traffic noise are expected to be below the upper guideline value of BS8233.

7.4. There is a communal amenity space to the south east corner of the site which will have external noise levels which meet the guidance levels. Therefore all residents have access to amenity areas with external sound levels which meet the guidance levels values.

7.5. Noise levels place facades in close proximity to Henham Road will be 'medium' risk categories and facades in close proximity to Hall Road are considered to be 'medium to high risk' risk categories. Facades which are sufficiently far away from the surrounding road network are considered to be ' low' risk categories and facades which are far away enough and screened from the surrounding road network are considered 'negligible risk' categories of noise impact during overheating according to Acoustics Ventilation and Overheating (AVO) guidance.

7.6. In these circumstances a Level 2 overheating assessment should be conducted for parts of the site which fall into the medium and high-risk categories of noise impact during overheating conditions. A Level 2 assessment of the noise impact during overheating conditions will be undertaken as part of the detailed design for the site.

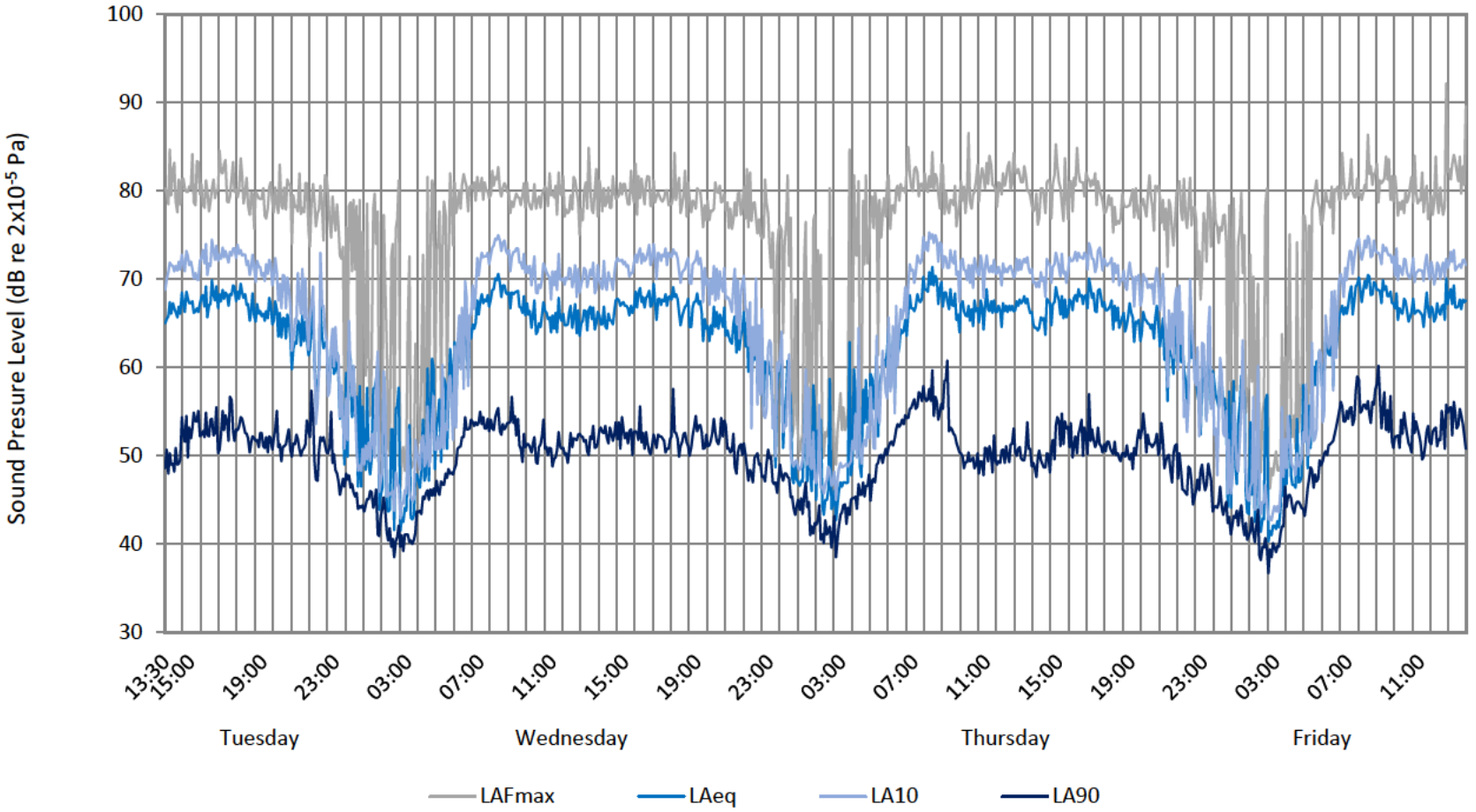
7.7. Control measures will be implemented to manage potential impacts from construction noise.

7.8. This assessment demonstrates that the site is suitable for residential development subject to the recommendations included in this report.

2008170 - Henham Road, Elsenham

Measurement Position 1

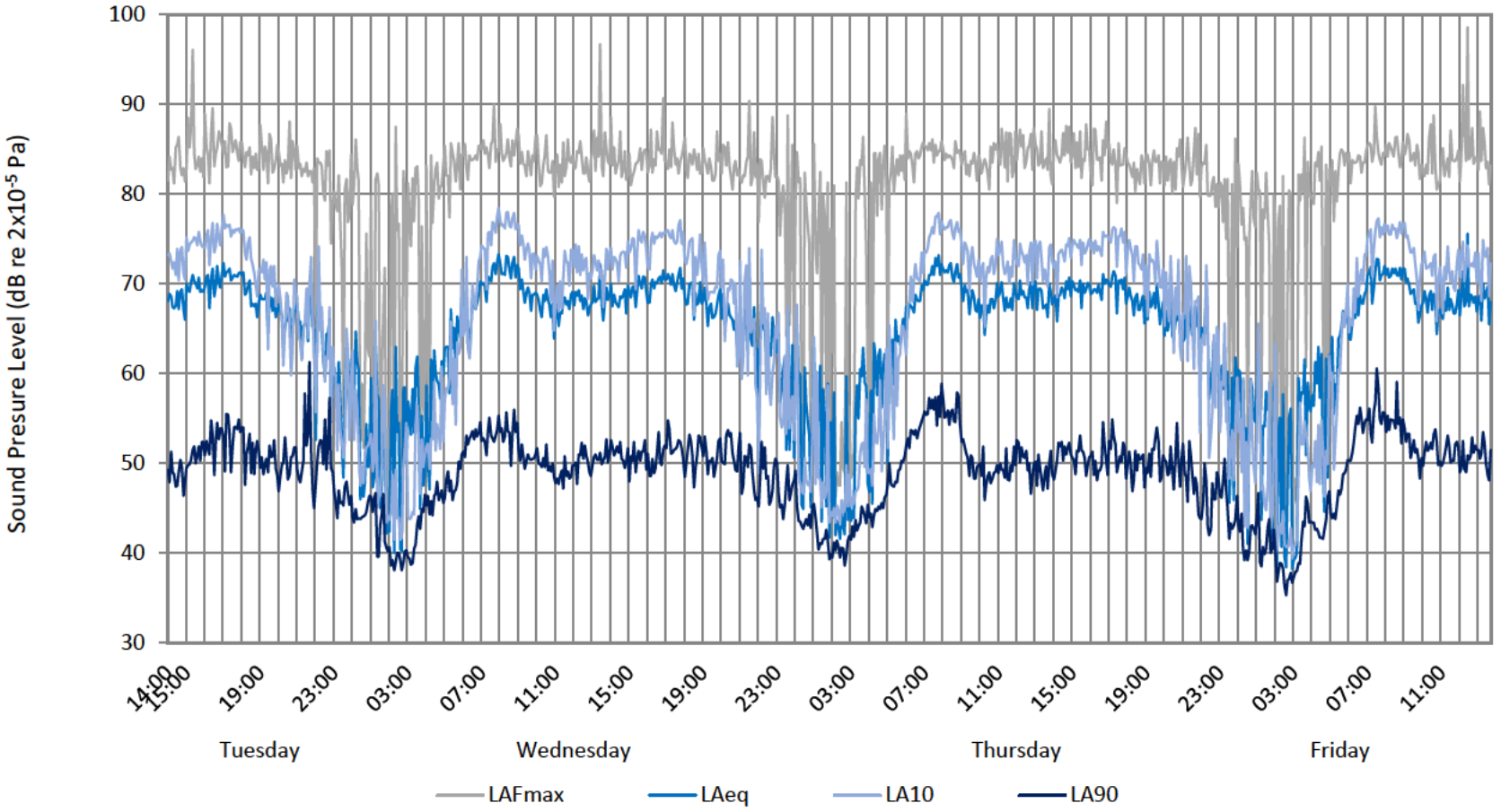
8th to 11th March 2022



2008170 - Henham Road, Elsenham

Measurement Position 2

8th to 11th March 2022



Appendix A. Time History of Measurement Data

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Position 1 - Henham Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAeq, 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
Dne Ref Area, A0	10.00

Total façade area	13.60

- Based on typical size

Room Absorption Calcuation	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	74	65	62	61	64	59	48	39	67
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	-4	-4	-4	-4	-4	-4	-4	-4	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (Leq)	70	61	58	57	60	55	44	35	63

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw	
Glazing SRI	19	24	24	32	37	42	43	48	35	**Pilkington 10/16/6**
Transmission Coefficient	0.012589	0.003981	0.003981	0.000631	0 000200	0.000063	0.000050	0 000016		
Wall SRI	28	34	43	55	66	77	85	85	55	**Typical masonry cavity wall (300mm - 380kg/m2)**
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		
Ventilation, Dne	32	38	38	29	47	42	40	40	38	**Airvac 2500 EAW - AC2**
Transmission Coefficient	0.000631	0.000158	0.000158	0.001259	0 000020	0.000063	0.000100	0 000100		
Average Transmission Coeff	0.004962	0.001463	0.001207	0.001095	0 000068	0.000063	0.000087	0 000078		
Average SRI	23	28	29	30	42	42	41	41	37	

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A	
Lp (Reverberant), line source	48.8	34.5	30.7	29.2	20.1	14.8	5 2	-4.3	30	
Lp (Direct)	47.0	32.7	28.8	27.4	18 3	13.0	3.4	-6.1	28	**Criteria**
Lp (Rev & Direct)	51	37	33	31	22	17	7	-2	32	**≤ 35**
BS8233	51	36	33	31	22	17	7	-2	32	**≤ 35**

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Position 1 - Henham Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAeq, 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
Dne Ref Area, A0	10 00

Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	63	59	56	54	56	51	39	29	59
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	-4	-4	-4	-4	-4	-4	-4	-4	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (Leq)	59	55	52	50	52	47	35	25	55

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw	
Glazing SRI	19	24	24	32	37	42	43	48	35	**Pilkington 10/16/6**
Transmission Coefficient	0.012589	0.003981	0.003981	0.000631	0 000200	0.000063	0.000050	0 000016		
Wall SRI	28	34	43	55	66	77	85	85	55	**Typical masonry cavity wall (300mm - 380kg/m2)**
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		
Ventilation, Dne	32	38	38	29	47	42	40	40	38	**Airvac 2500 EAW - AC2**
Transmission Coefficient	0.000631	0.000158	0.000158	0.001259	0 000020	0.000063	0.000100	0 000100		
Average Transmission Coeff	0.004962	0.001463	0.001207	0.001095	0 000068	0.000063	0.000087	0 000078		
Average SRI	23	28	29	30	42	42	41	41	37	

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A	
Lp (Reverberant), line source	37.8	28.5	24.7	22.2	12.1	6.8	-3 8	-14 3	22	
Lp (Direct)	36.0	26.7	22.8	20.4	10 3	5.0	-5 6	-16.1	21	**Criteria**
Lp (Rev & Direct)	40	31	27	24	14	9	-2	-12	25	**≤ 30**
BS8233	40	30	27	24	14	9	-2	-12	24	**≤ 30**

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Position 1 - Henham Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAmax**

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
Dne Ref Area, A0	10 00

Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	83	75	75	76	80	73	62	52	82
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	-8	-8	-8	-8	-8	-8	-8	-8	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (LAmax)	75	67	67	68	72	65	54	44	74

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw	
Glazing SRI	19	24	24	32	37	42	43	48	35	**Pilkington 10/16/6**
Transmission Coefficient	0.012589	0.003981	0.003981	0.000631	0 000200	0.000063	0.000050	0 000016		
Wall SRI	28	34	43	55	66	77	85	85	55	**Typical masonry cavity wall (300mm - 380kg/m2)**
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		
Ventilation, Dne	32	38	38	29	47	42	40	40	38	**Airvac 2500 EAW - AC2**
Transmission Coefficient	0.000631	0.000158	0.000158	0.001259	0 000020	0.000063	0.000100	0 000100		
Average Transmission Coeff	0.004962	0.001463	0.001207	0.001095	0 000068	0.000063	0.000087	0 000078		
Average SRI	23	28	29	30	42	42	41	41	37	

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A	
Lp (Reverberant), line source	53.3	40.4	39.2	40.2	31.7	25.1	15.1	4.4	40	
Lp (Direct)	51.5	38.6	37.4	38.3	29 8	23.3	13.3	2.5	38	**Criteria**
Lp (Rev & Direct)	56	43	41	42	34	27	17	7	42	**≤ 45**
BS8233	55	42	41	42	34	27	17	6	42	**≤ 45**

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Position 2 Hall Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAeq, 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
Dne Ref Area, A0	10 00
Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	69	66	64	64	66	61	56	48	69
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	-4	-4	-4	-4	-4	-4	-4	-4	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (Leq)	65	62	60	60	62	57	52	44	65

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw	
Glazing SRI	19	24	24	32	37	42	43	48	35	**Pilkington 10/16/6**
Transmission Coefficient	0.012589	0.003981	0.003981	0.000631	0 000200	0.000063	0.000050	0 000016		
Wall SRI	28	34	43	55	66	77	85	85	55	**Typical masonry cavity wall (300mm - 380kg/m2)**
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		
Ventilation, Dne	32	38	38	29	47	42	40	40	38	**Airvac 2500 EAW - AC2**
Transmission Coefficient	0.000631	0.000158	0.000158	0.001259	0 000020	0.000063	0.000100	0 000100		
Average Transmission Coeff	0.004962	0.001463	0.001207	0.001095	0 000068	0.000063	0.000087	0 000078		
Average SRI	23	28	29	30	42	42	41	41	37	

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A	
Lp (Reverberant), line source	43.8	35.5	32.7	32.2	22.1	16.8	13.2	4.7	32	
Lp (Direct)	42.0	33.7	30.8	30.4	20 3	15.0	11.4	2.9	30	**Criteria**
Lp (Rev & Direct)	46	38	35	34	24	19	15	7	34	**≤ 35**
BS8233	46	37	35	34	24	19	15	7	34	**≤ 35**

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Position 2 Hall Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAeq, 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
Dne Ref Area, A0	10 00

Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	62	60	59	57	59	54	47	39	62
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	-4	-4	-4	-4	-4	-4	-4	-4	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (Leq)	58	56	55	53	55	50	43	35	58

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw	
Glazing SRI	19	24	24	32	37	42	43	48	35	**Pilkington 10/16/6**
Transmission Coefficient	0.012589	0.003981	0.003981	0.000631	0 000200	0.000063	0.000050	0 000016		
Wall SRI	28	34	43	55	66	77	85	85	55	**Typical masonry cavity wall (300mm - 380kg/m2)**
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		
Ventilation, Dne	32	38	38	29	47	42	40	40	38	**Airvac 2500 EAW - AC2**
Transmission Coefficient	0.000631	0.000158	0.000158	0.001259	0 000020	0.000063	0.000100	0 000100		
Average Transmission Coeff	0.004962	0.001463	0.001207	0.001095	0 000068	0.000063	0.000087	0 000078		
Average SRI	23	28	29	30	42	42	41	41	37	

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A	
Lp (Reverberant), line source	36.8	29.5	27.7	25.2	15.1	9.8	4 2	-4.3	25	
Lp (Direct)	35.0	27.7	25.8	23.4	13 3	8.0	2.4	-6.1	23	**Criteria**
Lp (Rev & Direct)	39	32	30	27	17	12	6	-2	27	**≤ 30**
BS8233	39	31	30	27	17	12	6	-2	27	**≤ 30**

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Position 2 Hall Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAmax**

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
Dne Ref Area A0	10 00

Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	82	78	76	79	82	79	76	69	86
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	-8	-8	-8	-8	-8	-8	-8	-8	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (LAmax)	74	70	68	71	74	71	68	61	78

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	19	24	24	32	37	42	43	48	35
Transmission Coefficient	0.012589	0.003981	0.003981	0.000631	0 000200	0.000063	0.000050	0 000016	
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	
Ventilation, Dne	32	38	38	29	47	42	40	40	38
Transmission Coefficient	0.000631	0.000158	0.000158	0.001259	0 000020	0.000063	0.000100	0 000100	
Average Transmission Coeff	0.004962	0.001463	0.001207	0.001095	0 000068	0.000063	0.000087	0 000078	
Average SRI	23	28	29	30	42	42	41	41	37

Pilkington 10/16/6

Typical masonry cavity wall (300mm - 380kg/m2)

Airvac 2500 EAW - AC2

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	52.4	43.1	40.6	43.1	34.4	31.2	29.2	21 3	43
Lp (Direct)	50.6	41.3	38.8	41.2	32 5	29.3	27.4	19 5	41
Lp (Rev & Direct)	55	45	43	45	37	33	31	24	45
BS8233	54	45	43	45	36	33	31	23	45

Criteria

≤ 45

≤ 45

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Properties set back from Hall Road and Henham Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAeq, 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
Dne Ref Area, A0	10 00
Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	69	66	64	64	66	61	56	48	69
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	-6	-6	-6	-6	-6	-6	-6	-6	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (Leq)	63	60	58	58	60	55	50	42	63

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw	
Glazing SRI	18	21	20	26	38	37	39	44	31	**Pilkington 6/16/4**
Transmission Coefficient	0.015849	0.007943	0.010000	0.002512	0 000158	0.000200	0.000126	0 000040		
Wall SRI	28	34	43	55	66	77	85	85	55	**Typical masonry cavity wall (300mm - 380kg/m2)**
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		
Ventilation, Dne	36	36	34	31	34	38	38	38	35	**Standard Trickle Vent (35dB)**
Transmission Coefficient	0.000251	0.000251	0.000398	0.000794	0 000398	0.000158	0.000158	0 000158		
Average Transmission Coeff	0.005545	0.002580	0.002977	0.001251	0 000335	0.000169	0.000150	0 000127		
Average SRI	23	26	25	29	35	38	38	39	34	

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A	
Lp (Reverberant), line source	42.5	36.2	34.8	31.0	27 3	19.4	13.8	5.1	33	
Lp (Direct)	40.7	34.4	33.0	29.2	25 5	17.5	12.0	3.3	31	**Criteria**
Lp (Rev & Direct)	45	38	37	33	30	22	16	7	35	**≤ 35**
BS8233	45	38	37	33	29	21	16	7	35	**≤ 35**

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Properties set back from Hall Road and Henham Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAeq, 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
Dne Ref Area, A0	10 00
Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	62	60	59	57	59	54	47	39	62
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	-6	-6	-6	-6	-6	-6	-6	-6	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (Leq)	56	54	53	51	53	48	41	33	56

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw	
Glazing SRI	18	21	20	26	38	37	39	44	31	**Pilkington 6/16/4**
Transmission Coefficient	0.015849	0.007943	0.010000	0.002512	0 000158	0.000200	0.000126	0 000040		
Wall SRI	28	34	43	55	66	77	85	85	55	**Typical masonry cavity wall (300mm - 380kg/m2)**
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		
Ventilation, Dne	36	36	34	31	34	38	38	38	35	**Standard Trickle Vent (35dB)**
Transmission Coefficient	0.000251	0.000251	0.000398	0.000794	0 000398	0.000158	0.000158	0 000158		
Average Transmission Coeff	0.005545	0.002580	0.002977	0.001251	0 000335	0.000169	0.000150	0 000127		
Average SRI	23	26	25	29	35	38	38	39	34	

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A	
Lp (Reverberant), line source	35.5	30.2	29.8	24.0	20 3	12.4	4 8	-3.9	26	
Lp (Direct)	33.7	28.4	28.0	22.2	18 5	10.5	3 0	-5.7	24	**Criteria**
Lp (Rev & Direct)	38	32	32	26	23	15	7	-2	28	**≤ 30**
BS8233	38	32	32	26	22	14	7	-2	28	**≤ 30**

ARDENT CONSULTING ENGINEERS

Noise Break-in Calculation - Properties set back from Hall Road and Henham Road

Description	
Ardent CE Project No.	**2008170**
Property Address	**Henham Road, Elsenham**
Room Type	**Bedroom**
Parameter	**LAmax**

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
Dne Ref Area, A0	10 00

Total façade area	13 60

- Based on typical size

Room Absorption Calcuation	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	85	83	81	79	82	79	76	69	86
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	-11	-11	-11	-11	-11	-11	-11	-11	
Other	0	0	0	0	0	0	0	0	
Noise level at façade (LAmax)	74	72	70	68	71	68	65	58	74

15m Set back

Composite SRI	63	125	250	500	1000	2000	4000	8000	Rw
Glazing SRI	18	21	20	26	38	37	39	44	31
Transmission Coefficient	0.015849	0.007943	0.010000	0.002512	0 000158	0.000200	0.000126	0 000040	
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	
Ventilation, Dne	36	36	34	31	34	38	38	38	35
Transmission Coefficient	0.000251	0.000251	0.000398	0.000794	0 000398	0.000158	0.000158	0 000158	
Average Transmission Coeff	0.005545	0.002580	0.002977	0.001251	0 000335	0.000169	0.000150	0 000127	
Average SRI	23	26	25	29	35	38	38	39	34

Pilkington 6/16/4

Typical masonry cavity wall (300mm - 380kg/m2)

Standard Trickle Vent (35dB)

Calculated Internal Noise Level, dB	63	125	250	500	1000	2000	4000	8000	A
Lp (Reverberant), line source	52.8	47.5	46.1	40.3	37 6	31.6	28.1	20.4	43
Lp (Direct)	51.0	45.6	44.3	38.5	35 8	29.8	26.3	18 6	41
Lp (Rev & Direct)	55	50	48	43	40	34	30	23	45
BS8233	55	49	48	42	40	34	30	22	45

Criteria

≤ 45

≤ 45

Appendix B. Façade Treatment Calculations

Appendix C. Noise Impact During Overheating Risk Categories

Noise Impact During Overheating Risk Categories – Day & Night

Risk Category for Level 1 Assessment according to Table 3-2 Acoustics, Ventilation and Overheating: Residential Design Guide	
	High
	Medium
	Low
	Negligible

Appendix D. Glossary of Acoustic Terminology

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:

LAeq,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. The unit is used for assessing traffic and industrial noise for planning purposes and in particular for PPG24.

LA10,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'.

LA90,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.

LAmax : the maximum A-weighted level of sound over a period of measurement.

LAr,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.

Rw : weighted sound reduction index.

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

DnTw :

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