

Earl Shilton SUE

Site Suitability Assessment – Noise & Vibration



BLOOR HOMES

Jelson
HOMES

BARWOOD
LAND

Report for

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Document revisions

No.	Details	Date
1	Draft Report	November 2021
2	Final Report	December 2021

Executive summary

Purpose of this report

This report has been produced for the purpose of providing a sound assessment for accompanying a full planning application for a proposed residential-led mixed use development, including a school and some commercial units on land at Weaver's Fields, Earl Shilton. The Site is currently large agricultural fields, with the A47 running along the southern and eastern border, Thurlaston Lane to the north and Earl Shilton residential developments along the northern and western border of the Site. A Wastewater Treatment Works (WwTW) plant lies to the north-east of the Site.

The assessment has been undertaken in accordance with relevant planning policies, guidance and British Standards, to quantify and characterise existing noise levels across the Site due to the vehicle movements on the local road network and the existing WwTW.

A noise model of the transport sources has been produced using predicted traffic flows. The assessment of transport noise is based on a future year, with the development fully built out and occupied, in order to investigate site suitability in the foreseeable future with predicted growth in road vehicle movements.

The assessment of industrial and commercial sound has been based on limits set by embedded measures and assuming a worst case scenario in regard to the existing WwTW.

Outcomes

The assessment has determined that a section of the Site closest to the A47 would be subject to a medium night-time noise risk, in the worst case, with the majority of the Site falling within low night-time noise risk areas.

The assessment of industrial and commercial sound indicates that, if the new proposed commercial units noise limits are within +5dB above background levels at the closest noise sensitive receptors, as implemented through an embedded measure of the Proposed Development, then adverse impacts are unlikely. As a worst case scenario, it has been assumed that significant adverse impacts are possible from the WwTW.

Recommendations have been made to optimise the layout and to provide mitigation in terms of appropriate glazing, ventilation and boundary treatments such that adverse impacts to future residents will be avoided. This will then be subject to further assessment at the detailed design stage.

The recommendation to the local planning authority is to grant permission for the development with the inclusion of an appropriate noise condition. A suggested draft condition is provided which requires that schemes of mitigation to avoid adverse impacts due to transport noise and industrial and commercial sound are submitted to the Local Planning Authority and approved in writing.

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1. Overview of Proposed Development

- 1.1.1 Bloor Homes, Barwood Land, and Jelson Homes (hereafter referred to as 'the Applicants') are seeking outline planning permission from Hinckley & Bosworth Borough Council (HBBC) for a residential led mixed-use development on land at Weavers Fields, ('the Proposed Development'), located to the east and south-east of Earl Shilton, Leicestershire (the 'Site'). The Site extends to 64.2 hectares (ha) and forms most of the land allocated as a Sustainable Urban Extension (SUE) by HBBC.
- 1.1.2 The Proposed Development comprises up to 1,500 dwellings, with up to 5.3 ha of space for business uses (Class B1, B2, and B8)¹, local centre and a primary school, together with strategic infrastructure including green-space, with all other Matters Reserved apart from strategic vehicular access.
- 1.1.3 The site of the Proposed Development has been identified by HBBC in their Core Strategy document², as the location of a SUE. HBBC have prepared an Area Action Plan (AAP)³ to provide detailed guidance on the development of the SUE, and the Applicants are preparing a joint outline planning application for the development of the SUE at Earl Shilton in parallel with the AAP.

¹ Recent change to the *Use Classes Order (Amendment Regulations 2020)*, which came into effect from the 1 September 2020 means that the future planning application for the Proposed Development will include the new class E (to replace the former B1).

² Hinckley and Bosworth Borough Council (2009). Hinckley and Bosworth Borough Council Local Development Framework Core Strategy [online] available at: https://www.hinckley-bosworth.gov.uk/downloads/file/487/core_strategy_adopted_document [accessed 8 July 2020].

³ Hinckley and Bosworth Borough Council (2014). Earl Shilton and Barwell Area Action Plan (AAP) Development Plan Document (DPD) [online] available at: https://www.hinckley-bosworth.gov.uk/info/856/local_plan_2006_to_2026/439/earl_shilton_and_barwell_area_action_plan [accessed 8 July 2020].

2. Description of the Proposed Development

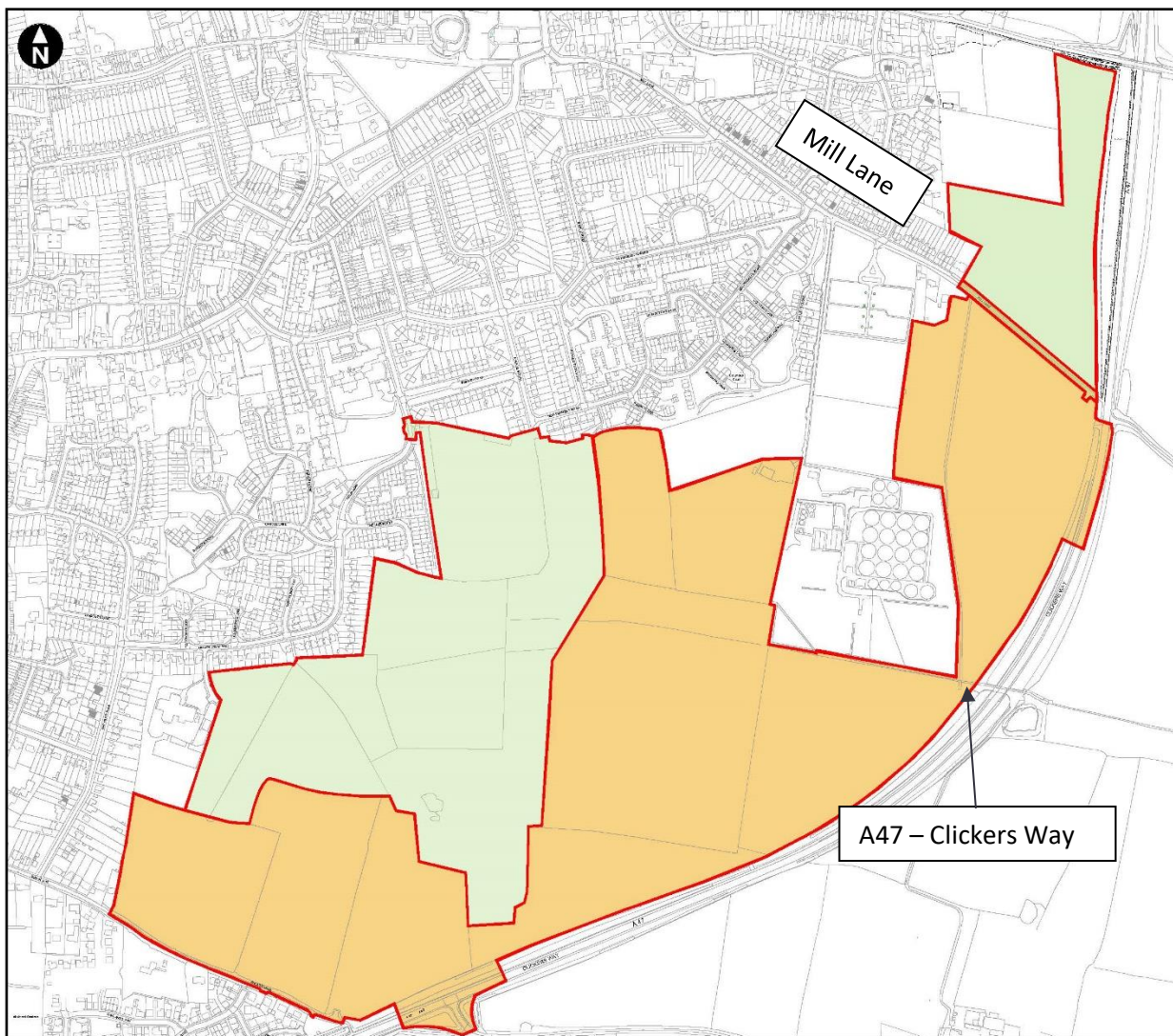
2.1 Development description

Site location

2.1.1 The Site is located immediately to the south-east of Earl Shilton, approximately 8km to the west of Leicester in the borough of Hinckley & Bosworth, as shown in **Figure 2.1**. It is centred on National Grid Reference SP447185, 297356. The total Site area is 64.2ha. Land ownership is presently split between the following companies and public bodies:

- Bloor Homes;
- Barwood Land;
- Jelson Homes; and
- Earl Shilton Town Council.

Figure 2.1 Site location plan – red line boundary



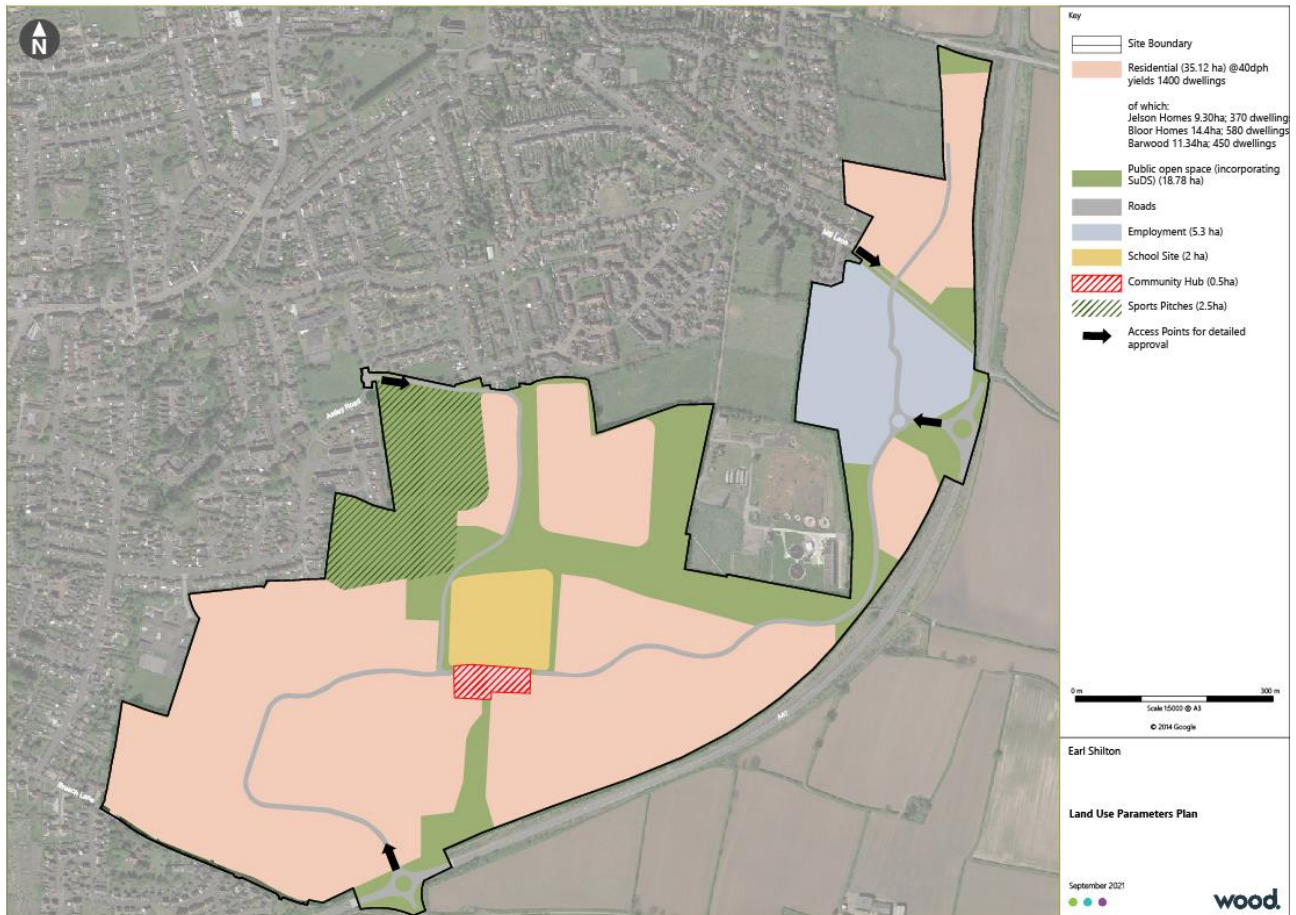
Existing site and surroundings

- 2.1.2 The Site is split into two applications, Application A (green), the Barwood Land, and Application B (orange), Jelson Homes and Bloor Homes. The division of the Site can be seen in **Figure 2.1**.
- 2.1.3 The Site currently comprises predominantly arable farmland with field boundary hedgerows and intermittent hedgerow trees. It is split into two distinctive parcels: north and south of Mill Lane. Plot 2 forms the area north of Mill Lane whilst Plots 1 and 3 are south of Mill Lane (see **Figure 2.1**).
- 2.1.4 South of Mill Lane, the Site is bound to the north and west by the outskirts of Earl Shilton (comprising mostly residential development), and to the south and east by the A47 bypass ('Clicker's Way'). The A47 provides a bypass around the towns of Hinckley and Earl Shilton and runs from the A5 to the west to Leicester in the east. North of Mill Lane, the Site is bound to the west by the outskirts of Earl Shilton, to the north by Thurlaston Lane, and to the east by the A47. Land use beyond the A47 to the south and east predominantly comprises open arable agricultural land interspersed by isolated farmsteads and villages such as Huncote, Stoney Stanton and Croft. Croft Quarry (granite) is also a major feature in the landscape to the east of the Site, beyond the M69 which runs south-west to north-east between the M6 and M1 motorways.
- 2.1.5 There are few designated historical features or sites in the proximity of the Site. There is a scheduled monument (Earl Shilton Motte and Bailey Castle), within 1km, located on the northern outskirts of Earl Shilton. There are also several listed buildings within Earl Shilton town centre.
- 2.1.6 In terms of biodiversity, the closest Statutory Nature Conservation Site is Burbage Common Local Nature Reserve (LNR) which is located approximately 2.2km to the southwest of the Proposed Development. There are ten Local Wildlife Sites (LWS) and seven potential / historic LWS within 1km. The closest of these is an unnamed pond, located 90m off-site, to the south-east of the A47.

Development proposals

- 2.1.7 The Proposed Development comprises of a residential and employment development together with areas of formal and informal open space and landscaping. In summary the key elements of the Proposed Development are:
- up to 1,500 dwellings (class C3), the envisaged nature of which is set out below;
 - up to 5.3 ha of employment land comprising a mix of office and light industry uses (class B2, B8, and E);
 - a two-form entry primary school (class F.1);
 - up to 2,000m² for a community hub (comprising of a mix of class E, F.1 and F.2);
 - up to 19.3ha of public open space including areas of new planting, landscaping, and Sustainable urban Drainage Systems (SuDS); and
 - new services such as gas, electricity, water, telecommunications, and drainage.
- 2.1.8 The envisaged land use for the Site is set out in **Figure 2.2**.

Figure 2.2 Envisaged land use for the Site



- 2.1.9 The proposed residential and employment areas are intended to contribute to the borough's housing provision (see **Section 2.1**) and provide a source of employment to the local area.
- 2.1.10 The majority of the Site will be developed with two to two and a half storey dwellings, of maximum heights of 10 m and 12 m respectively. Dwellings will include a range of homes with one to five bedrooms.
- 2.1.11 Within the centre of the site, around the community hub and occasionally at nodes in the Site there may be potential for some dwellings up to 3 storeys (15 m) in height subject to further detailed design and assessment at reserved matters.
- 2.1.12 In respect of other uses, the primary school is assumed to be three storeys (15 m) and the employment land would be approximately no more than 17 m in height to offer a range of flexible and adaptable accommodation.
- 2.1.13 The Site forms the majority of a SUE allocation totalling an area of 68.4 ha. The total extent of the SUE includes the Site, plus an additional field to the north-west of the WwTW and three fields between Mill Lane and Thurlaston Lane which are outside the application boundary for the Proposed Development. The SUE as a whole is allocated for a minimum of 1,600 dwellings.

Proposed Site layout

- 2.1.14 As shown in the indicative Site layout (**Figure 2.2**), residential dwellings would be located in both areas north and south of Mill Lane. The entire parcel of land north of Mill Lane would consist of a residential area and informal green space, including the integration of Sustainable Urban Drainage

Systems (SuDS). To the south of Mill Lane, residential dwellings would be located in three distinct areas; the largest would encompass the southern area of the Site, the second largest would be located west of the WwTW, and the smallest would be to the east of the WwTW. The residential areas would not bound the WwTW and would be separated by green space and SuDS features.

- 2.1.15 The employment land is located south of Mill Lane, to the north and north-east of the WwTW, fronting the A47. The community hub and primary school are centrally located within the main residential area and on the spine road to maximise connectivity and accessibility by all modes.

2.2 Scope of assessment

Scope of report

- 2.2.1 The assessment of the suitability of the Site for its proposed residential led use forms the scope of this report.
- 2.2.2 The Site suitability assessment will be carried out in accordance with the guidance provided in *ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise: New Residential Development*⁴ for the proposed residential areas and *Building Bulletin 93: Acoustic Design in Schools*⁵ for the proposed school site, along with other relevant British Standards.
- 2.2.3 The dominant sound source across the Site is road traffic noise. Ambient noise levels forming the basis of the Site Suitability assessment has been obtained from 3D road traffic noise modelling.
- 2.2.4 Due to COVID-19 restrictions, no site surveys were undertaken. As the Site is mainly influenced by noise from road traffic on the local network, modelled traffic flows have been used to predict noise levels from road traffic. Therefore, for the assessment of potential effects on the Proposed Development due to the existing Wastewater Treatment Works (WwTW), it has been assumed that the industrial sound from this facility is capable of giving rise to a BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*⁶ rating level of 10dB above the background sound level at the dwellings adjacent to it. This provides a worst case scenario and therefore a conservative assessment.
- 2.2.5 An embedded measure of the Proposed Development is that new commercial units will not give rise of more than +5dB above background levels at the nearest noise sensitive receptors. Due to no site surveys being undertaken in recent years, it has been assumed that the industrial sound from the proposed commercial units are capable of giving rise to a BS 4142:2014+A1:2019 rating level of 5dB above the background sound level at the closest dwellings. This provides a worst case scenario and therefore a conservative assessment.
- 2.2.6 This Site Suitability report will therefore specify façade elements to address the potential impacts from the modelled road noise and assumed industrial noise levels at potentially affected dwellings. The sound from these noise sources will be measured and re-assessed at the Reserved Matters stage, thus allowing for a less onerous design if possible.
- 2.2.7 An assessment of vibration has not been included in this report as there are no significant sources of vibration in the vicinity of the Site.

⁴ Institute of Acoustics, Association of Noise Consultants, Chartered Institute of Environmental Health (2017). ProPG: Planning & Noise. Professional Practice Guidance on Planning & Noise – New Residential Development. [online] Available at: <https://www.ioa.org.uk/sites/default/files/14720%20ProPG%20Main%20Document.pdf> [Accessed 16 September 2021].

⁵ Department for Education (2015). Building bulletin 93: Acoustic design of schools: performance standards. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/400784/BB93_February_2015.pdf [Accessed 16 September 2021].

⁶ British Standards Institute (2019). BS 4142:2014 Methods for rating and assessing industrial and commercial sound. BSI, London.

Consultation

2.2.8

The assessment methodology and assessment criteria described in this report were agreed with the Environmental Health Officer (EHO) at Hinckley & Bosworth Borough Council (HBBC) via email prior to preparing this report.

3. Terminology

- 3.1.1 The ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. Due to this wide range, a scale based on logarithms is used in noise level measurement. The scale used is the decibel (dB) scale which extends from 0 to 140 dB, corresponding to the intensity of the sound pressure level.
- 3.1.2 The ear has the ability to recognise a particular sound depending on the pitch or frequencies found at the source. Microphones cannot differentiate noise in the same way as the ear; and to counter this weakness the noise measuring instrument applies a correction to correspond more closely to the frequency response of the ear. The correction factor is called 'A-weighting' and the resulting measurements are written as dB(A). 'A-weighting' refers to the sound level that represents the human ear's response to sound.
- 3.1.3 The dB(A) unit is internationally accepted and has been found to correspond well with people's subjective reaction to sound. Typical dB(A) sound levels for familiar sounds are given in **Table 3.1**.

Table 3.1 Typical sound levels⁷

Approximate Noise Level dB(A)	Example
0	Threshold of hearing for normal young people.
20	Recording studio, ambient level.
40	Quiet residential neighbourhood, ambient level.
60	Department store, restaurant, speech levels.
80	Next to busy highway, shouting.
100	Textile mill; press room with presses running; punch press and wood planers, at operator's position.
120	Ship's engine room; rock concert, in front and close to speakers.
140	Moon launch at 100 m; artillery fire, gunner's position.

- 3.1.4 The sound levels given in **Table 3.1** are sound pressure levels (L_p) and describe the sound level at a point in space. Sound power levels (L_w) are used to describe the sound output of a sound source. Sound levels vary over time depending on sound generating activities. The following indices are used to take account of these variations:
- $L_{Aeq,T}$ is the equivalent continuous sound level and is the sound level of a steady sound having the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. $L_{Aeq,T}$ is considered the best general purpose index for environmental sound;
 - $L_{A90,T}$ index represents the sound level exceeded for 90% of the measurement period and is used to indicate quieter times during the measurement period. It is usually referred to as the background sound level;

⁷ Bies, D. A., Hansen, C. H., (2009). Engineering Noise Control: Theory & Practice. 4th Edition. CRC Press: Florida, USA.

- $L_{A10,T}$ refers to the level exceeded for 10% of the measurement period. $L_{A10,T}$ is widely used as a descriptor of road traffic noise; and
- L_{Amax} is maximum recorded noise level during the measurement period.

3.1.5

In addition, the following definitions may be helpful when reading this report:

- ambient sound: totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far;
- background sound (see $L_{A90,T}$): The A-weighted sound pressure level of the residual sound at the assessment position that is exceeded for 90% of a given time interval, T , measured using the fast time weighting;
- fast time weighting, F: A sound pressure level measurement using a 125 ms moving average time weighting period is said to have been determined using 'fast weighting';
- free field: Signifies that a sound measurement has been undertaken in 'free field' conditions i.e. away from any reflecting façades e.g. building façades, close boarded fence work etc.;
- façade level: Addition of 3dB(A) façade correction to free field levels to reach a sound level at the façade of a building (1m or less) as advised in BS 4142:2014 +A1:2019;
- specific sound level, $L_{Aeq,T}$: The equivalent continuous A-weighted sound pressure level at the assessment position produced by an industrial sound source over a given reference time interval, T ;
- rating sound level, $L_{Ar,T}$: The specific sound level plus any adjustment for the characteristic features of the sound;
- normalised weighted element level difference $D_{n,e,w}$: Provides a single value to describe the external-to-internal sound reduction performance of ventilation elements. Often quoted as $D_{n,e,w}(C;C_{tr})$ – see below;
- weighted sound reduction index R_w : Provides a single value to describe the external-to-internal sound reduction performance of glazing and the wall construction elements. Often quoted as $R_w(C;C_{tr})$ – see below; and
- spectrum adaptation terms C (A-weighted pink noise) and C_{tr} (A-weighted urban traffic noise): indicate the level of correction applied to $D_{n,e,w}$ and R_w to account for different noise sources. BS EN ISO 717-1: 2013⁸ states that '*the spectra of most of the usual prevailing indoor and outdoor noise sources lie in the range of spectra Nos. 1 [A-weighted pink noise] and 2 [A-weighted urban traffic noise]; the spectrum adaptation terms C and C_{tr} may therefore be used to characterize the sound insulation with respect to many types of noise*'.

⁸ British Standards Institute (2013). BS EN ISO 717-1:2013 Acoustics — Rating of sound insulation in buildings and of building elements Part 1: Airborne sound insulation. BSI, London.

4. Relevant policy and guidance

4.1 National planning policy

National Planning Policy Framework⁹

- 4.1.1 Noise can be a material consideration in planning. Noise is considered by the National Planning Policy Framework (NPPF, July 2021).
- 4.1.2 The NPPF advises that significant adverse impacts on health and the quality of life as a result of noise from new development should be avoided. It also advises that other adverse impacts on health and quality of life arising from noise from new development should be reduced to a minimum.
- 4.1.3 The NPPF is taken into account by Local Authorities when preparing their local and neighbourhood plans which form the basis for noise (including vibration) policies within an area.
- 4.1.4 Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst other considerations):
- “Preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability”.*
- 4.1.5 The NPPF goes on to state in Paragraph 185 that “Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the Site or the wider area to impacts that could arise from the development. In doing so they should:
- *“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”; and*
 - *“identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason”.*
- 4.1.6 Paragraph 187 advises that *“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”* This should be taken into account when considering whether proposed development is an acceptable use of land.

⁹ Ministry of Housing, Communities & Local Government (2021). National Planning Policy Framework. [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf [Accessed 16 September 2021].

- 4.1.7 The NPPF document does not refer to any other documents regarding noise other than the Noise Policy Statement for England¹⁰ (NPSE, 2010).

Noise Policy Statement for England (2010)¹⁰

- 4.1.8 The NPSE¹⁰ was published by DEFRA in March 2010 and forms the overarching statement of noise policy for England (and hence is of direct relevance to the assessment of planning applications under the NPPF for developments in England only). It sets out the long-term vision of the Government, as follows:

"[to] Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

- 4.1.9 This vision is supported by the following aims, which are reflected in the provisions of the NPPF⁹:

"through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

avoid significant adverse impacts on health and quality of life;

mitigate and minimise adverse impacts on health and quality of life; and

where possible, contribute to the improvement of health and quality of life."

- 4.1.10 The Explanatory Note to the NPSE⁹ (paragraph 2.14) acknowledges that noise contributing to annoyance and/or sleep disturbance in human populations can have long-term consequences for health and wellbeing. It introduces three 'Effect Levels' relevant to the assessment of noise. These are:

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

- 4.1.11 The aim of the NPSE is to avoid all noise occurring at the SOAEL level and to minimise, as far as possible, all noise occurring between the LOAEL and SOAEL brackets.

- 4.1.12 The NPSE states that it is not possible to have a single, numerical definition of the SOAEL that is applicable to all sources of noise in all situations, since the SOAEL is likely to be different for different noise sources, for different receptors and at different times. Further research is required to increase understanding of what constitutes a significant adverse impact on health and quality of life due to noise, and the NPSE states that not stating specific SOAEL levels provides a suitable degree of policy flexibility until such evidence is available.

¹⁰ Department for Environment, Food and Rural Affairs (2010). Noise Policy Statement for England (NPSE). [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Accessed 16 September 2021].

Planning Practice Guidance for Noise, 2019¹¹

- 4.1.13 The Planning Practice Guidance for Noise (PPG-N), published by the Department for Communities and Local Government, was revised in July 2019.
- 4.1.14 The PPG-N introduces a fourth effect level which has not yet been updated in the NPSE:
- UOAE – Unacceptable Observed Adverse Effect Level – This is the level above which extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physical effects occurs.
- 4.1.15 The PPG-N advises that local planning authorities should consider whether the overall effect of the noise exposure is, or would be, above or below the SOAEL and the UOAE.
- 4.1.16 The PPG-N gives a noise exposure hierarchy based on the likely average response as detailed in **Table 4.1**.

Table 4.1 Noise exposure hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect (NOAEL)			
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 (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, 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 perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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 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

¹¹ Ministry of Housing, Communities & Local Government (2019). Planning Practice Guidance for Noise. [online] Available at: <https://www.gov.uk/guidance/noise--2> [Accessed 16 September 2021].

Perception	Examples of Outcomes	Increasing Effect Level	Action
Unacceptable Observed Adverse Effect Level (UOAE)			
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, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Observed Adverse Effect	Prevent

4.1.17 In cases where existing noise sensitive locations already experience high noise levels, PPG-N¹¹ suggests that a development that is expected to cause even a small increase in noise may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.

4.1.18 PPG-N¹¹ advises that the noise impact may be partially offset if the residents of those dwellings have access to:

- a relatively quiet façade (containing windows to habitable rooms) as part of their dwelling;
- a relatively quiet external amenity space for their sole use (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur;
- a relatively quiet, protected, nearby external amenity space for sole use and by a limited group of residents as part of the amenity of their dwellings; and
- a relatively quiet, protected, external publicly accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within 5 minutes walking distance).

4.1.19 The potential effect of an existing business on a new residential development being located close to it should be carefully considered as the existing noise levels from the business may be regarded as unacceptable by the new residents and subject to enforcement action.

4.2 British Standards and other guidance

4.2.1 The precise numerical values of noise in relation to the NOEL, LOAEL, SOAEL and UOAE levels have not yet been established by research. The documents summarised in **Table 4.2** provide threshold values for noise both inside and outside dwellings and will be used within the Site Suitability assessment to ensure suitable conditions for residential use. Pertinent criteria adopted within this report have been highlighted in bold.

Table 4.2 British Standards and noise guidance documents

Guidance Document	Summary
Calculation of Road Traffic Noise (CRTN) (1988) ¹²	Presents a noise prediction methodology for road traffic noise. Using detailed information on two way traffic flows, % of HGV movements, road gradient, vehicle speed, ground conditions and screening, the methodology calculates the propagation of noise from roads. Although CRTN is predominantly a prediction methodology it also provides advice on measurements. It also

¹² Department of Transport Welsh Office (1988). *Calculation of Road Traffic Noise*. HMSO, Swansea

Guidance Document	Summary
	provides a “shortened measurement procedure” whereby a continuous measurement taken for 3 hours between 10:00 and 17:00 can be converted to the $L_{10,18hr}$.
TRL and Casella Stanger 'Method for Converting the UK Road Traffic Noise Index $L_{A10,18h}$ to the EU Noise Indices for Road Noise Mapping' ¹³	Presents an empirical formula for the conversion of $L_{A10,18hr}$ to $L_{Aeq,16hr}$
Standards for Highways, Design Manual for Roads and Bridges (DMRB) LA111 Noise and Vibration (2020 – Revision 2) ¹⁴	Contains advice on the assessment of noise from road traffic, particularly that from new/altered roads.
BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' ¹⁵	Presents design criteria for noise within habitable rooms in a new residential development to avoid adverse impacts on suitability for the intended use. In summary, these include: Resting in Living Rooms: 35dB $L_{Aeq,16h}$ (daytime) Dining in Dining Rooms / Areas: 40dB $L_{Aeq,16h}$ (daytime) Sleeping or resting in Bedrooms: 35dB $L_{Aeq,16h}$ (daytime) / 30dB $L_{Aeq,8hr}$ (night-time). It is stated within the guidance that where development is considered necessary or desirable, a relaxation of up to 5dB on these levels may be available, and reasonable conditions still achieved. Consideration of regular, individual noise events (e.g. scheduled aircraft or passing trains) is also required, as these can lead to sleep disturbance. The specification of noise limits, in terms of L_{AFmax} should be based upon the character and number of events per night. It is advised that noise limits should only be considered for large balconies that will be used for relaxation and that noise limits should not be necessary for small balconies. Design criteria for non-domestic buildings include: Cafeteria, canteen, kitchen: 50-55dB $L_{Aeq,T}$ Open plan office: 45-50dB $L_{Aeq,T}$ Meeting room, training room: 35-45dB $L_{Aeq,T}$ Place of worship: 30-35dB $L_{Aeq,T}$
World Health Organisation 'Guidelines for community noise' (1999) ¹⁶	Presents guideline noise levels for community noise in specific residential environments e.g. in outdoor living areas. In order to avoid significant annoyance in outdoor living areas, a threshold of 55dB $L_{Aeq,T}$ is specified. In order to avoid moderate annoyance, a threshold of 50dB $L_{Aeq,T}$ is given. The guidelines also provide threshold levels for sleep disturbance stating “For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events.”.
World Health Organisation 'Night noise guidelines for Europe' (2009) ¹⁷	Presents guideline threshold levels relating to the effects noise exposure can have on sleep.

¹³ TRL (2002). Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping. [online] Available at: https://webarchive.nationalarchives.gov.uk/ukgwa/20130402151656/http://archive.defra.gov.uk/environment/quality/noise/research/crtn/documents/noise_crtn.pdf [Accessed 16 September 2021].

¹⁴ Highways England (2020). Design Manual for Roads and Bridges LA111 Noise and vibration. [online] Available at: <https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364> [Accessed 16 September 2021].

¹⁵ British Standards Institute (2014). BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI, London.

¹⁶ World Health Organisation (1999). Guidelines for community noise. [online] Available at: <https://www.who.int/docstore/peh/noise/Comnoise-1.pdf> [Accessed 16 September 2021].

¹⁷ World Health Organisation (2009). Night noise guidelines for Europe. [online] Available at: https://www.euro.who.int/data/assets/pdf_file/0017/43316/E92845.pdf [Accessed 16 September 2021].

Guidance Document	Summary
World Health Organisation 'Environmental Noise Guidelines for the European Region' (2018) ¹⁸	Presents the latest guideline noise levels for community noise in specific residential environments e.g. in outdoor living areas. The document provides recommended threshold noise levels for road, railway, aviation wind turbine noise and leisure noise. In order to avoid adverse health effects due to road noise a threshold level of 53dB L_{den} is specified for day-evening-night and 45dB L_{night} for night time road noise. This guidance document supersedes the WHO 'Guidelines for Community Noise' (1999) and 'Night noise guidelines for Europe' (2009) when considering external noise only.
BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' ⁶	BS 4142:2014+A1:2019 is used to rate and assess sound of an industrial nature including, but not limited to, assessing sound from proposed, new, modified or additional sources of industrial sound, and sound at proposed new dwellings. It contains guidance on the monitoring and assessment of industrial and commercial sound sources (including fixed installations comprising mechanical and electrical plant and equipment) affecting sensitive receptors. The methodology detailed for determining the effects of new or existing sound sources relies on comparing the operational rating level, $L_{Ar,Tr}$, with the background sound level, $L_{A90,T}$ (i.e. the level that would be present without the development) over a representative time period. The representative time period depends on the time of day that the sound source operates, i.e. 1 hour during the daytime and 15 minutes during the night-time. It provides guidance on the measurement of background sound, the determination of specific sound and calculation of the rating level. Certain acoustic features can increase the significance of effect over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, a character correction should be added to the specific sound level to obtain the rating level. The BS 4142:2014 + A1:2019 assessment methodology also states that: ● typically, the higher the rating level is above the background sound level the greater the magnitude of impact; ● the lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact; ● a difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context; ● a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and ● where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
ProPG: Planning & Noise 'Professional Practice Guidance on Planning & Noise' (2017) ⁴	ProPG provides practitioners with guidance on a recommended approach to the management of noise for new residential development within the planning system in England. The guidance encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise. ProPG recommends a 2-stage approach. Stage 1 of ProPG comprises an initial risk assessment of the proposed development site where the ambient noise levels around the site are compared to the initial site noise risk assessment classification scale. Where the results indicate that noise requires further consideration, a full assessment in the form of an Acoustic Design Statement (ADS) comprises stage 2 of ProPG.

4.3 Local planning policy

4.3.1 A summary of the relevant local planning policies is given in **Table 4.3**.

¹⁸ World Health Organisation (2018). Environmental Noise Guidelines for the European Region. [online] Available at: https://www.euro.who.int/_data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf [Accessed 16 September 2021].

Table 4.3 Local planning policy

Policy reference	Policy issue
Hinckley & Bosworth Borough Council Site Allocations and Development Management Policies DPD ¹⁹	Policy DM7 – Preventing Pollution and Flooding To ensure that developments do not cause noise or vibration levels which would disturb areas that are valued for their tranquillity in terms of recreation or amenity. Policy DM10 – Development and Design To ensure that developments do not have a significant adverse effect on the privacy and amenity of nearby residents and occupiers of adjacent buildings including matters of noise and vibration.

¹⁹ Hinckley & Bosworth Borough Council (2016). Site Allocations and Development Management Policies DPD. [online] Available at: <https://www.hinckley-bosworth.gov.uk/downloads/file/5295/site-allocations-and-development-management-policies-dpd-adopted-july-2016> [Accessed 23 March 2021].

5. Environmental measures embedded into the development proposals

5.1.1 A range of environmental measures have been embedded into the development proposals. **Table 5.1** outlines the embedded measures relevant to noise and vibration and how they will influence this assessment.

Table 5.1 Summary of embedded environmental measures and how these influence the noise and vibration assessment

Receptor	Changes and effects	Embedded measures and influence on assessment
Residential units built as part of the development	Unsuitable internal noise levels due to transport and commercial sources	Residential units designed to achieve, at minimum, the 'reasonable' internal noise level criteria of BS 8233:2014 for living rooms, dining rooms and bedrooms
Residential units built as part of the development	Unsuitable external noise levels due to transport and commercial sources	External living areas (gardens etc.) to be positioned, where practicable, on the opposite side of residential units from the major road/rail noise sources
Primary school built as part of the development	Unsuitable internal noise levels due to transport and commercial sources	School buildings to be designed to meet the internal noise level criteria of BB93 within specified noise sensitive use areas (e.g. classrooms, workshops etc.)
Primary school built as part of the development	Unsuitable external noise levels due to transport and commercial sources	Outdoor teaching areas provided to comply with BB93 guidance for noise levels in outdoor teaching areas
Residential units built as part of the development	Unsuitable internal noise levels due to proposed commercial sources	Noise emissions (rating level, $L_{A,T}$) for proposed commercial uses to be designed to meet a noise emissions criteria of +5dB(A) above background noise level at the worst affected receptors

6. Methodology

6.1 Baseline sound levels

- 6.1.1 Due to COVID-19 restrictions, no noise surveys have taken place in recent years.
- 6.1.2 In the absence of survey and plant data for the Severn Trent WwTW site, it has been assumed that the WwTW is capable of giving rise to a BS 4142:2014 + A1:2019 rating level of 10dB above the background sound level at the dwellings adjacent to it. This again provides a worst-case scenario and a conservative assessment.
- 6.1.3 As stated in **Table 5.1**, an embedded measure of the Proposed Development is that the noise rating level L_{Ar} from the proposed commercial and industrial units will be no more than +5dB(A) above the background noise level at the worst affected receptors. It is therefore assumed that this is the case, providing a worst-case scenario and a conservative assessment.
- 6.1.4 As road traffic noise is the dominant source within the area, ambient noise levels forming the basis of this Site suitability assessment have been obtained through 3D road traffic noise modelling.

6.2 Assessment criteria

Residential suitability

- 6.2.1 The assessment of residential suitability has been undertaken in accordance with the guidance and criteria provided within ProPG⁴. The ProPG⁴ criteria for continuous daytime and night-time noise levels due to transport sources is reproduced in **Table 6.1** below, with additional categories between the negligible, medium and low categories as provided in the guidance.

Table 6.1 Criteria for residential suitability

Risk category	Daytime sound levels	Night-time sound levels
High	>70dB $L_{Aeq,16h}$	>60dB $L_{Aeq,8h}$
Medium	65 – 70dB $L_{Aeq,16h}$	55 – 60dB $L_{Aeq,8h}$
Medium – Low	60 – 65dB $L_{Aeq,16h}$	50 – 55dB $L_{Aeq,8h}$
Low	55 – 60dB $L_{Aeq,16h}$	45 – 50dB $L_{Aeq,8h}$
Low – Negligible	50 – 55dB $L_{Aeq,16h}$	40 – 45dB $L_{Aeq,8h}$
Negligible	< 50dB $L_{Aeq,16h}$	< 40dB $L_{Aeq,8h}$

On the basis of the noise risk categories above, requirements for whole façade attenuation are provided in below.

Table 6.2 Façade transmission loss required for different noise risk categories

Risk category	Total façade transmission loss required, dB	
	Daytime	Night-time
High	> 35	> 30
Medium	30 – 35	25 – 30
Medium – Low	25 – 30	20 – 25
Low	20 – 25	15 – 20
Low – Negligible	15 – 20	10 – 15
Negligible	≤ 15	≤ 10

- 6.2.2 With regard to short duration events during the night-time, instantaneous maximum noise levels within bedrooms should not normally exceed 45dB L_{Amax} more than ten times per night.

Educational facilities

- 6.2.3 Building Bulletin 93⁵ sets out acoustic performance standards appropriate for education facilities covered by the Building Regulations Approved Document E²⁰. In BB93, the most conservative limit for indoor ambient noise is 35dB $L_{Aeq, 30 \text{ min}}$ and is specified for rooms where the uses include nursery school rooms, primary or secondary school classrooms, teaching areas or laboratories. This indoor noise limit has been adopted as the daytime impact criterion for the educational facilities receptor group. The associated daytime external criteria is 50dB $L_{Aeq, 30 \text{ min}}$, assuming a partially open window will provide 15dB of attenuation.

Industrial/commercial sources

- 6.2.4 BS 4142:2014 + A1:2019 is used to assess sound of an industrial nature, including, but not limited to, assessing the sound from proposed, new, modified or additional sources of industrial sound. It contains guidance on the monitoring and assessment of industrial and commercial sound sources (including fixed installations comprising mechanical and electrical plant and equipment) affecting sensitive receptors.
- 6.2.5 A methodology is detailed for determining the effects of new or existing sound sources and relies on comparing the operational rating level, $L_{Ar, Tr}$, with the background level, $L_{A90, T}$ (i.e. the level that would be present without the development) over a representative time period. The representative time period depends on the time period that the source operates, i.e. 1 hour during the daytime and 15 minutes during the night-time. It provides guidance on the measurement of background sound, the determination of specific sound and calculation of the rating level.
- 6.2.6 The BS 4142:2014 + A1:2019 assessment methodology also states that:
- typically, the higher the rating level is above the background sound level the greater the magnitude of impact;

²⁰ HM Government (2015). The Building Regulations 2010 Approved Document E Resistance to the passage of sound (including 2013 and 2015 amendments). [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/468870/ADE_LOCKED.pdf [Accessed 16 September 2021].

- a difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context; and
- a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

6.2.7

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse effect. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

7. Noise modelling

7.1 Sound propagation model

- 7.1.1 To calculate noise levels across the Site from road traffic a noise model was produced using LimA, a software package that implements the prediction methodology contained within *ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*²¹. The sound propagation model was developed with reference to road traffic noise sources affecting ambient ($L_{Aeq,T}$) noise levels across the Site.
- 7.1.2 LimA is used widely in sound modelling and noise mapping projects throughout the UK and Europe. Developed by Braunstein and Berndt GmbH, it can implement a number of methodologies for the calculation of noise levels. For this assessment the calculation of road traffic noise has been implemented, in accordance with the CRTN¹² methodology.
- 7.1.3 LimA modelling software utilises publicly available topography data and digital terrain mapping to generate a 3D environmental model. The model implements the following factors to predict noise propagation:
- sound source location;
 - relative distances between sound sources/receivers;
 - location and dimensions of object barriers including man-made or natural;
 - ground contours, determining the relative ground heights; and
 - ground absorption effects due to soft/hard ground.
- 7.1.4 The assessment of Site Suitability is based on daytime and night-time ambient $L_{Aeq,T}$ sound pressure levels. Predicted road traffic noise levels, in terms of $L_{A10, 18hr}$, were converted into $L_{Aeq, 16hr}$ (day) and night-time $L_{Aeq, 8hr}$ (night) using TRL 'Method 3'¹³.
- 7.1.5 In terms of the sound levels incident at the façades of the properties, it is assumed that the frequency spectrum reflects that typical of road traffic, as presented in Table 1 of *BS EN 1793-3:1998 'Road traffic noise reducing devices. Test method for determining the acoustic performance – Part 3: Normalized traffic noise spectrum'*²².

Modelling assumptions

- 7.1.6 The calculation results are considered to be worst case as they assume downwind propagation, which in reality would not occur at all times due to changes in wind direction. Predictions assume hard ground attenuation due to the built-up nature of the local environment.

²¹ International Standards Organisation (1996). *ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*. ISO, Geneva.

²² British Standards Institute (1998). *BS EN 1793-3:1998 Road traffic noise reducing devices. Test method for determining the acoustic performance – Part 3: Normalized traffic noise spectrum*. BSI, London.

8. Acoustic Design Statement

8.1 Stage 1: Initial Site noise risk assessment

- 8.1.1 An initial risk assessment of the Site (following the guidance of ProPG) has been conducted to provide an indication of the likely risk of adverse effects in the event that no subsequent mitigation is to be included as part of the development proposals. This is informed by Figure 1 of ProPG which is shown in **Appendix B** of this report for reference.

Transportation sources

- 8.1.2 ProPG is restricted to sites that are exposed predominantly to noise from transportation sources, which applies to this Site as road traffic noise is the dominant source.
- 8.1.3 Noise levels have been predicted across the Site using the methodology within CRTN and have been used in the initial risk assessment. Future predicted traffic flow data for 2036, including the effects due to the Proposed Development, has been used for the assessment. This approach provides a robust assessment.
- 8.1.4 The results of the Stage 1 risk assessment based on the ProPG criteria in **Table 6.1**, are provided in **Appendix A**. The assessment has been undertaken assuming an open site.
- 8.1.5 With reference to

- 8.1.6 **Figure A1 of Appendix A**, during the daytime, noise levels predicted are below 60dB $L_{Aeq,16hr}$ for the majority of the Site, with large areas <55dB $L_{Aeq,16hr}$. Noise levels closer to the A47 Clickers Way along the eastern boundary are higher and predicted to be 60 - 70dB $L_{Aeq,16hr}$.
- 8.1.7 With reference to **Figure A2 of Appendix A** during the night-time noise levels are below 50dB $L_{Aeq,8hr}$ for the majority of the Site. Noise levels closer to the A47 Clickers Way along the eastern boundary are higher and predicted to be 50 - 60dB $L_{Aeq,8hr}$.
- 8.1.8 The predicted results indicate that the part of the proposed housing across the Site falls within a medium risk noise area, with the rest of the Site falling between negligible – low, in line with Figure 1 of ProPG, reproduced in **Appendix B**. ProPG states that *"At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development."*

8.2 Stage 2: Full assessment

- 8.2.1 Predicted traffic flows have been used to predict daytime and night-time sound levels from the surrounding road network.
- 8.2.2 Stage 2 of a ProPG assessment comprises of four elements. Together these elements ensure that a robust acoustic design for the Proposed Development is achieved. As full detailed design information has not yet been determined, the following sections present an indicative assessment and recommendations to inform the detailed design stage.

Element 1 – Good acoustic design process

- 8.2.3 Part of the proposed housing area falls within a medium risk noise area, with the rest of the Site falling between negligible – low. Good acoustic design should be a factor considered at the detailed design stage to ensure acceptable internal and external noise environments are achieved.
- 8.2.4 It is recommended that, where possible, habitable rooms (living/dining areas and bedrooms) are positioned facing away from the adjacent roads in order to minimise internal noise levels, particularly for housing falling within the medium noise risk area. Conversely, rooms which are less sensitive (kitchens, bathrooms, storage rooms, corridors etc.) should be placed on the noisy side of the building. This should avoid the potential for significant adverse effects of individual noise events ($L_{Amax,F}$) on sleep i.e. behavioural awakenings and physiological impacts. An additional way of minimising the intrusion of noise is to minimise the number of doors and windows on the noisy side of dwellings. These elements will be confirmed at the detailed design stage.

Element 2 – Internal noise level guidelines

- 8.2.5 ProPG states that *"The second element of Stage 2 is to seek to achieve recommended noise levels inside noise sensitive rooms in new residential development."*
- 8.2.6 BS 8233:2014 *Guidance on sound insulation and noise reduction in buildings* provides design criteria for noise within habitable rooms in new residential development to avoid adverse impacts on sustainability for the intended use. Table 4 in Section 7.7.2 of the standard has been reproduced in **Table 8.1** below.

Table 8.1 BS 8233:2014 design criteria for noise within habitable rooms

Activity	Location	0700 – 2300 (daytime)	2300 – 0700 (night-time)
Resting	Living room	35dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16h}$	30dB $L_{Aeq,8h}$

- 8.2.7 Contour plots of transport noise have been devised by Wood to detail potential sound insulation classes suitable for this outline application and can be seen in **Figure A3** and **Figure A4** of **Appendix A**. It should be noted these contours are indicative only and that further work should be completed at the detailed design stage to ensure all elements of the building envelope are suitably rated acoustically.
- 8.2.8 Wood has applied a class system when determining the likely sound insulation requirements for proposed dwellings. The sound insulation classes are defined as follows:
- 8.2.9 Class A: Properties which meet the standard or relaxed/reasonable internal noise levels of BS 8233:2014 with open windows (based on minimum 10dB(A) of attenuation provided by an open window);
- 8.2.10 Class B: Properties which meet the standard internal noise levels of BS 8233:2014 when fitted with closed, standard double glazing (assessment based on 25dB R_w+C_{tr} , i.e. 4(6-16)6mm glazing configuration) and appropriate acoustic ventilation alternative to an open window; and
- 8.2.11 Class C: Properties which would require up-rated glazing and ventilation elements to meet the standard or relaxed/reasonable internal noise levels of BS 8233:2014.

Night-time maximum internal noise levels

- 8.2.12 To quantify the frequency and magnitude of instantaneous maximum noise level events during the night-time, further noise surveying and assessment should be carried out at the detailed stage. Long-term monitoring should be undertaken at locations representative of proposed façades in the closest proximity to roads to ensure the 'as built' design is specified appropriately to control instantaneous maximum noise level events during the night-time.

Element 3 – External amenity area noise assessment

- 8.2.13 WHO guidelines and BS 8233:2014 state that in order to avoid significant annoyance in outdoor living areas, a threshold of 55dB $L_{Aeq,T}$ should not be exceeded, with a threshold of 50dB $L_{Aeq,T}$ given to avoid moderate annoyance.
- 8.2.14 Based on a visual inspection of the predicted daytime transport noise levels presented in **Figure A1** in **Appendix A**, the following observations are made with regard to external amenity areas:
- the majority of the Site falls below the desirable upper limit of 55dB $L_{Aeq,16h}$; and
 - the exception to this would be properties lining the A47 (the eastern boundary of the Site), which are predicted to experience daytime levels of 55 – 60dB $L_{Aeq,T}$.
- 8.2.15 The above is based on an open site. At the detailed design stage, assessments should be undertaken which account for the screening provided by proposed dwellings, which will result in substantial attenuation of transport noise to many gardens. It is recommended that gardens

associated with dwellings lining the A47 are positioned on the opposite side of the dwelling to the road, so that the dwelling itself provides screening.

Element 4 – Assessment of Other Relevant Issues

Compliance with relevant national and local policy

- 8.2.16 The assessment demonstrates that noise from transport sources is likely to cause a significant effect at the eastern boundary of the Site, in close proximity to the A47. It is recommended good acoustic design is used to achieve acceptable internal sound levels within habitable rooms. On this basis, and in consideration of national planning policy and the guidance in **Table 4.1**, it is considered that adverse effects due to internal noise levels will be no greater than NOAEL.
- 8.2.17 Therefore, the results of the assessment indicate that the Proposed Development accords with national planning policies.
- 8.2.18 With regards to local planning policies, it is considered that the assessment has demonstrated that the amenity of future residents will be protected at the Proposed Development and therefore accords with the local policy.

Magnitude and extent of compliance with ProPG

- 8.2.19 The assessment has demonstrated that subject to further assessment at the detailed design stage, all proposed housing areas will comply with the recommendations for internal and external noise levels due to transport sources set out in ProPG, with good acoustic design taken into consideration. In the event that further assessment at the detailed design stage indicated non-compliance with any of the criteria at any proposed dwelling, recommendations will be made to increase stand-off distances to nearby noise sources in order to ensure compliance.

Likely occupants of the development

- 8.2.20 The guidance under paragraph 2.26 of ProPG states that the '*detailed design may, to a certain extent, both reflect and influence the likely occupants of new residential development... certain groups such as families with young children, students and the elderly may all have different requirements and sensitivities as regards to acoustic conditions and, in particular, varying needs for access to quiet external space....*'.
- 8.2.21 The Proposed Development is considered typical in terms of its layout, setting and features. Future residents would therefore be expected to be composed of a typical mix of ages etc. The as built scheme will offer good access to private and public quiet external spaces. Some areas will be exposed to higher noise levels than others, as plots which are centrally located are anticipated to benefit from greater levels of local acoustic screening, and hence lower ambient noise levels.
- 8.2.22 On this basis it is considered that the Proposed Development is not prejudicial to any future occupants in terms of access to varying acoustic conditions appropriate to their likely requirements.

Acoustic design vs unintended adverse consequences

- 8.2.23 ProPG identifies a number of unintended consequences that may arise when addressing acoustic challenges. These include, but are not limited to:
- affecting the attractiveness of the living environment;
 - sealed balconies reducing the connection with the external environment;

- roadside barriers removing views or preventing road crossings; and
- sealed façades affecting personal control over the internal environment.

- 8.2.24 It is considered that the aspect with the most potential to be invoked by the mitigation suggested is the attractiveness of the living environment being negatively impacted by substantial acoustic fences. Therefore, a balance must be struck between achieving as low noise levels as are reasonably practicable, whilst maintaining a visually attractive design and avoiding creating an external space which feels too confined by tall boundary treatments.
- 8.2.25 During the detailed design stage, the specification of any required acoustic fences should be undertaken with care to ensure that no gardens are enclosed on all sides with tall boundary treatments.

8.3 Industrial sound

- 8.3.1 The Severn Trent Wastewater Treatment Works (WwTW) has been identified as a potential contributor of environmental noise and may be a cause of impact on proposed residential dwellings.
- 8.3.2 Due to COVID-19 travel restrictions, no surveys were undertaken for this assessment, including current noise measurements at the WwTW. Therefore, as a conservative worst-case assessment, it has been assumed that the WwTW is capable of giving rise to 10dB above background noise levels at the closest noise sensitive receptors and therefore would cause a significant adverse impact.
- 8.3.3 As part of the development, an area of employment land is proposed. It is an embedded measure of the scheme that these commercial units will not give rise to more than +5dB above background noise levels at the closest noise sensitive receptors, which would indicate an adverse impact in line with BS 4142:2014 + A1:2019.
- 8.3.4 It will therefore be necessary at the detailed design stage to undertake a thorough assessment of industrial and commercial sound at the WwTW and proposed commercial units in order to determine any appropriate mitigation measures to avoid unacceptable adverse impacts. A comprehensive set of night-time measurements should be undertaken to determine the dominance of industrial sound at the Site to investigate the potential for developing the Site with minimal or no mitigation.

8.4 Primary school consideration

- 8.4.1 As part of the development, a new primary school is proposed, centrally located within the main residential area.
- 8.4.2 BB93 recommends internal noise levels of 35dB $L_{Aeq,30 \text{ min}}$ for rooms where the uses include nursery school rooms, primary or secondary school classrooms, teaching areas or laboratories. The associated daytime external criterion is 50dB $L_{Aeq,30 \text{ min}}$ assuming a partially open window will provide 15dB of attenuation.
- 8.4.3 From a visual inspection of **Figure A1** in **Appendix A**, areas that are labelled 'negligible - low' are expected to experience external noise levels of 55dB or less. It is also expected that buildings constructed as part of the Proposed Development on the edge of the development will provide substantial screening, resulting in lower noise levels for buildings behind.
- 8.4.4 Further assessment will be undertaken at the detailed design stage to ensure that internal and external noise levels can be achieved for the proposed primary school.

8.5 Recommendation to the Local Planning Authority

- 8.5.1 The approach provided in ProPG has been followed to assess the Site for residential suitability based on the predicted future growth in road traffic. Assessments of industrial and commercial sound have also been undertaken based on a worst-case scenario on the closest noise sensitive receptors.
- 8.5.2 ProPG provides four possible recommendations which the noise practitioner may offer to the decision maker, based on the results of the assessments undertaken. These are:
- planning consent may be granted without any need for noise conditions;
 - planning consent may be granted subject to the inclusion of suitable noise conditions;
 - planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or
 - planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").
- 8.5.3 Based on the results of the assessment, it is recommended that **planning consent may be granted subject to the inclusion of suitable noise conditions**.

Basis for the recommendation

- 8.5.4 With regard to transport noise, no areas of the Site are predicted to fall within high risk noise areas. Recommendations are provided to mitigate external noise levels to an acceptable level to internal and external receptor locations through suitably worded conditions.
- 8.5.5 The assessment of industrial and commercial sound indicates that adverse and significant adverse impacts are possible in the areas surrounding the commercial units proposed as part of the employment land and surrounding the existing WwTW. With further measurement and assessment, the extent of the area affected by the impacts will be clarified and the detailed design of the residential elements of the Proposed Development assessed to ensure that significant adverse impacts are avoided and any residual adverse impacts are mitigated and reduced to a minimum. This may be achieved through suitably worded conditions, depending on the outcome of further assessment.

9. Summary and conclusions

- 9.1.1 This report presents a Site Suitability assessment to support an outline planning application for a Proposed Development for a residential led mixed-use development on land at Weavers Fields, Earl Shilton.
- 9.1.2 With regard to the acoustic environment, the majority of the Site is dominated by road traffic noise. As a worst-case scenario, it has been assumed that the Severn Water Wastewater Treatment Works (WwTW) is capable of giving rise to significant adverse effects at the closest proposed residential noise sensitive receptors. The Proposed Development also includes commercial units, which have been assumed to give rise of adverse effects at the closest noise sensitive receptors as a worst-case scenario based on embedded measures for the Proposed Development.
- 9.1.3 The Stage 1 ProPG assessment of transport noise indicates that the majority of the Site falls within a negligible to low noise risk area, with the eastern boundary area of the Site falling within a medium noise risk area at night-time. It is considered that, with the good acoustic design principles set out in this report and appropriate specification of façade elements and potential boundary treatments, significant adverse effects will be avoided.
- 9.1.4 The Stage 2 ProPG assessment considered the predicted internal and external transport noise levels at individual dwellings in greater detail and set out a number of recommendations to achieve acceptable noise environments throughout the Site.
- 9.1.5 As a worst-case scenario, it has been assumed that the existing WwTW is capable of giving rise to significant adverse effects whilst the proposed commercial units have been assumed to be capable of giving rise to adverse effects. Recommendations are made to avoid and mitigate significant adverse impacts and further measurement and assessment shall take place in relation to these elements.
- 9.1.6 In conclusion, with further assessment undertaken at the detailed design stage to determine precise requirements for layout optimisation and mitigation to achieve acceptable internal and external noise environments, significant adverse effects to future receptors will be avoided.

Appendix A

Grid Noise Maps

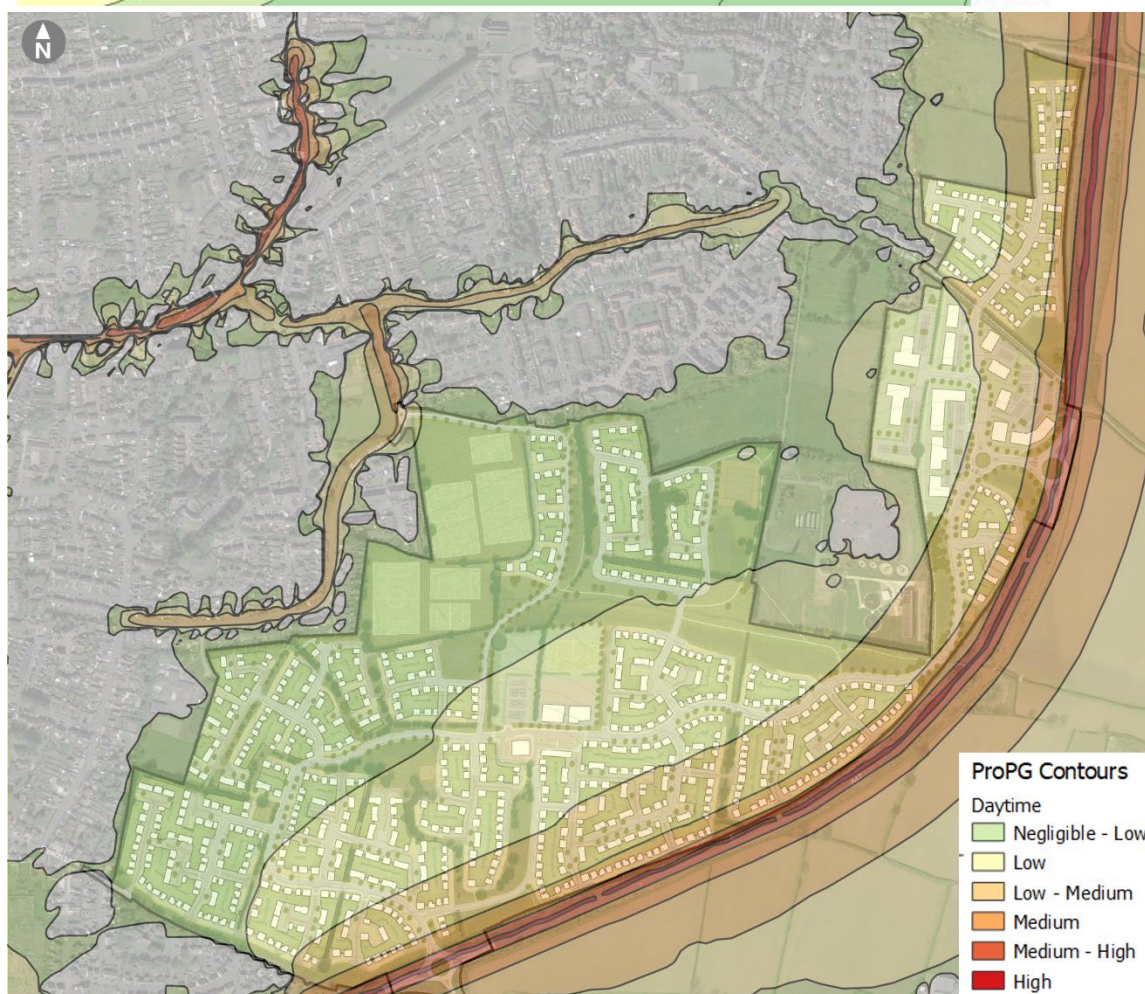
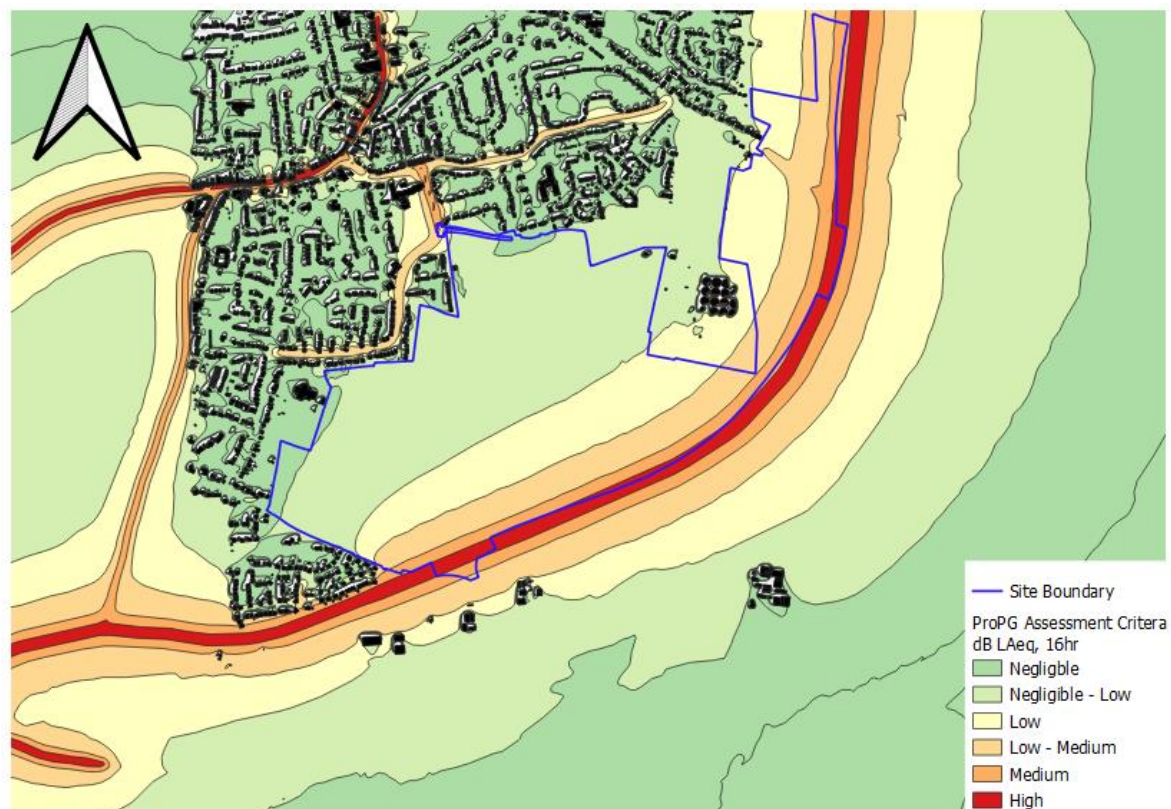
Figure A1 ProPG noise propagation assessment – Daytime dB $L_{Aeq,16hr}$ 

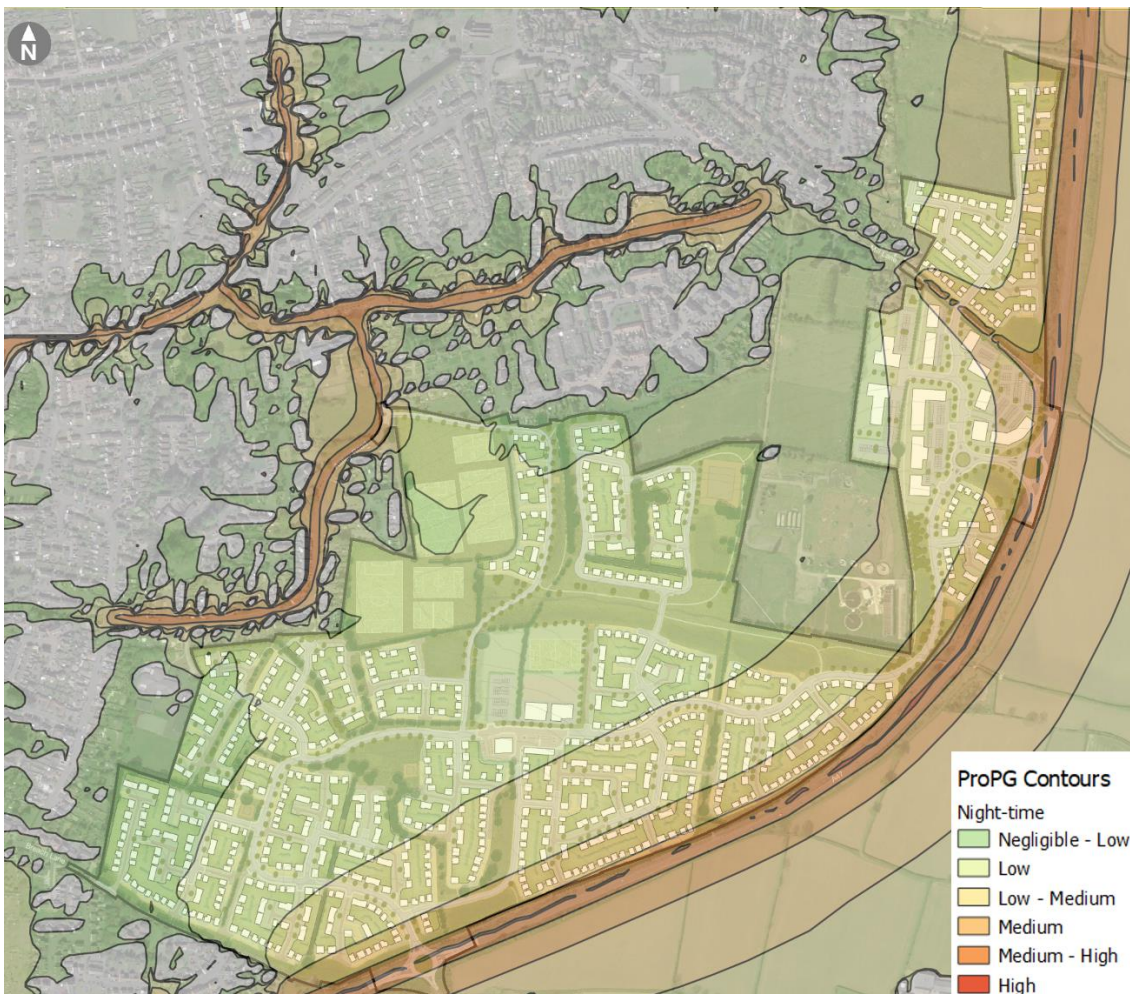
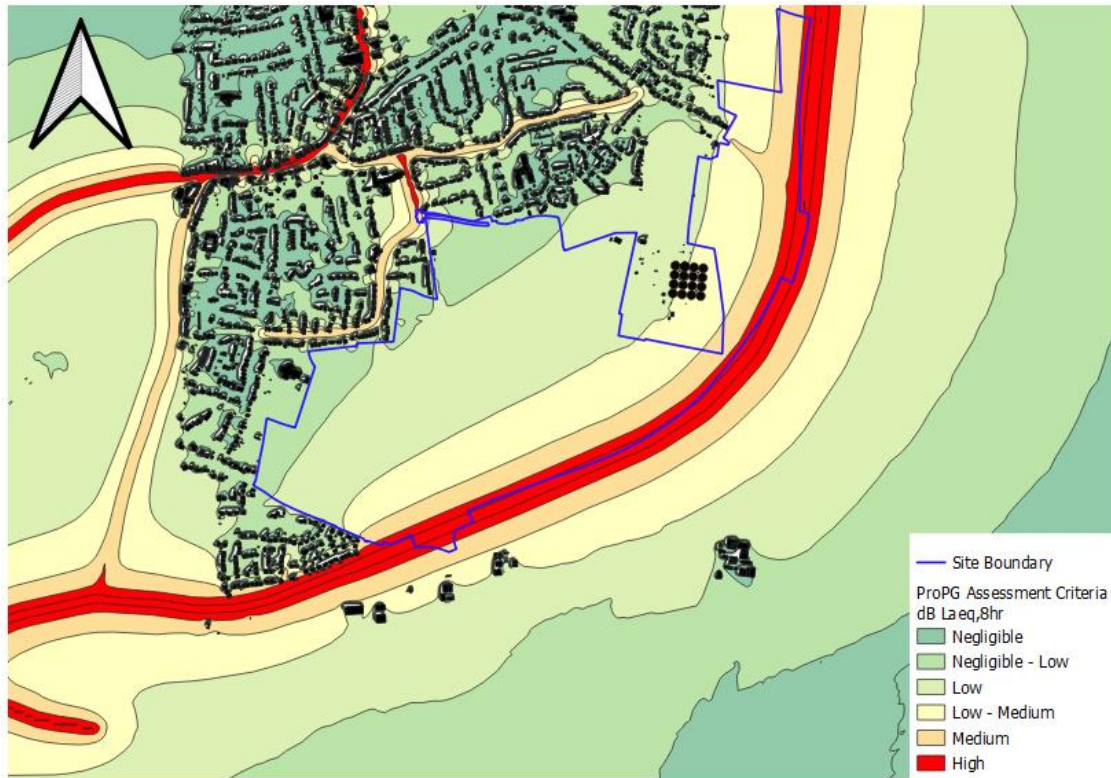
Figure A2 ProPG noise propagation assessment – Night-time dB $L_{Aeq,8hr}$ 

Figure A3 Likely sound insulation bands – Day time dB $L_{Aeq,16hr}$

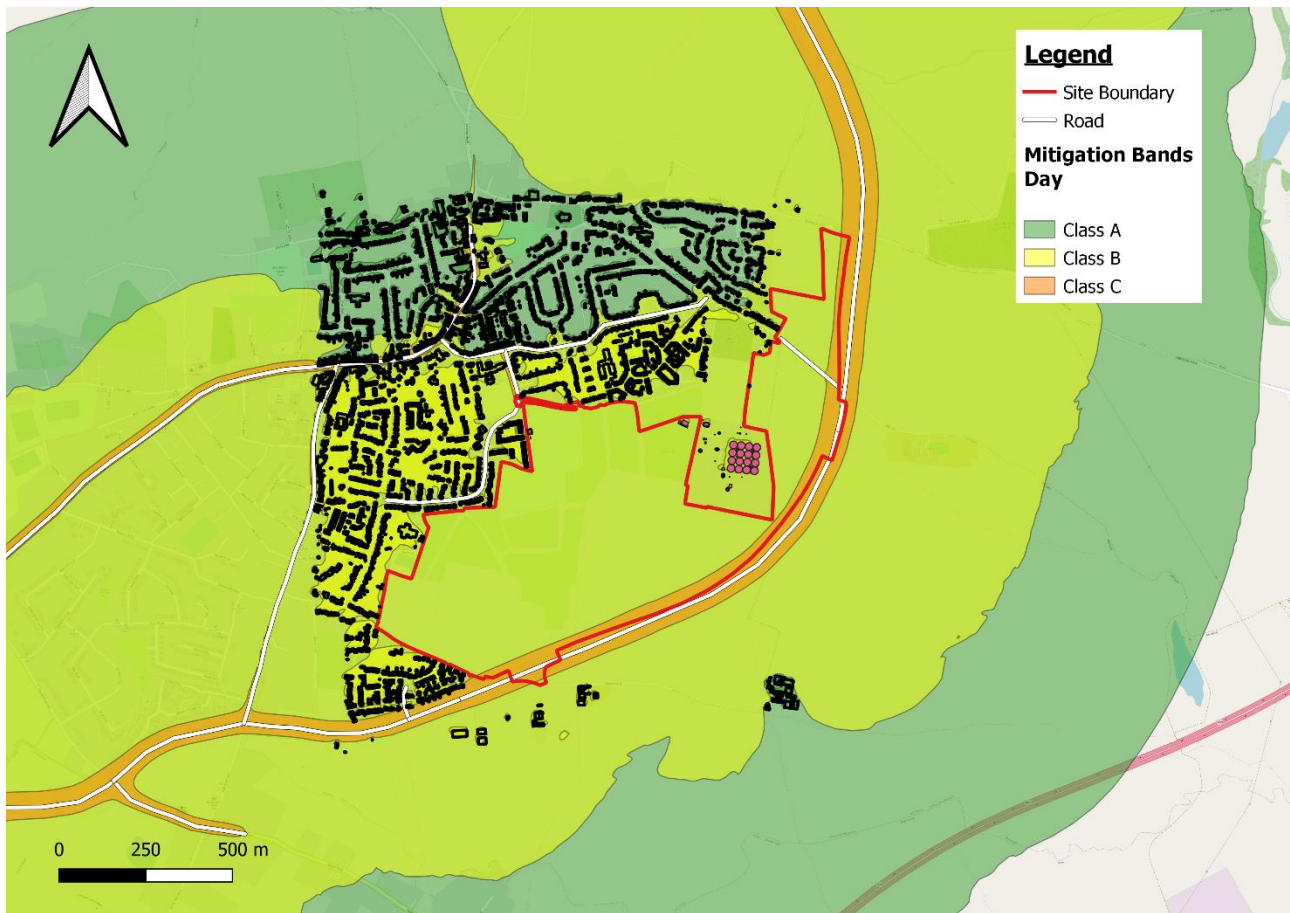
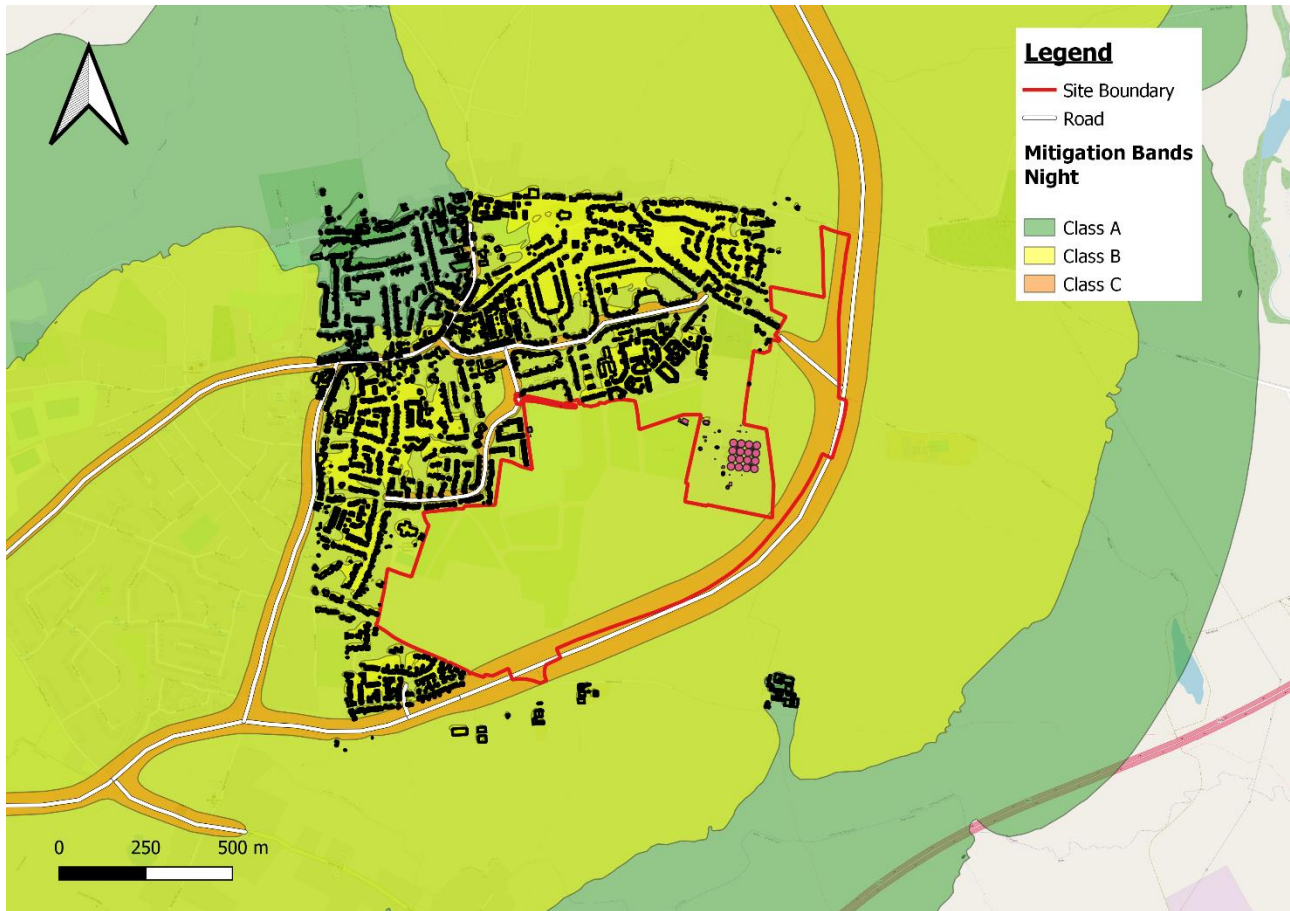


Figure A4 Likely sound insulation bands – Night-time dB $L_{Aeq,8hr}$



Appendix B Figure 1 ProPG

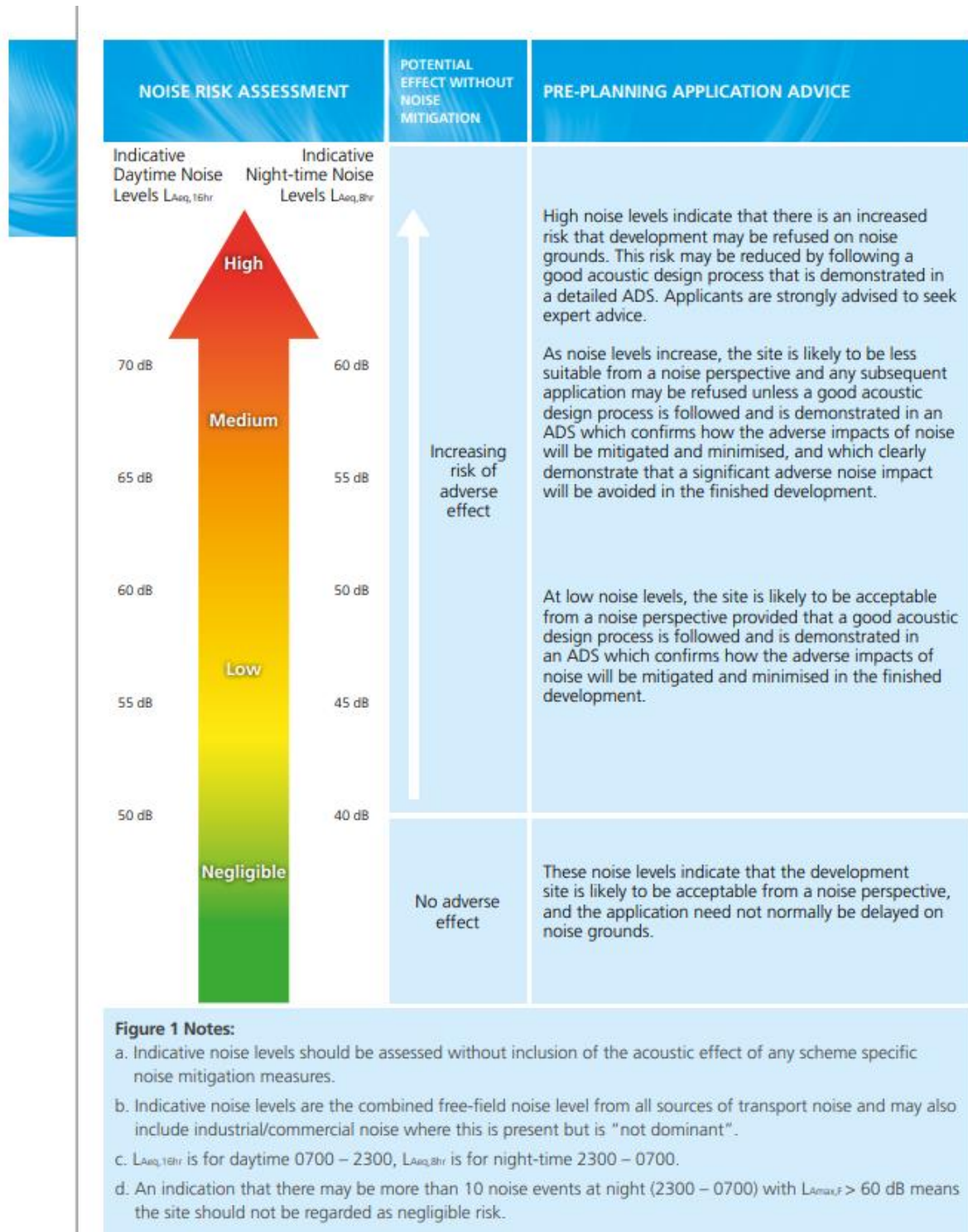


Figure 1. Stage 1– Initial Site Noise Risk Assessment

wood.