

# Lea Castle Village, Kidderminster Outline Planning Application Site Suitability Assessment - Noise

Final Report



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## Report for

Homes England

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# Executive summary

## Purpose of this report

This report has been produced for the purpose of providing a noise and vibration assessment to accompany an outline planning application for a proposed residential-led mixed use development, including a school, village centre and some commercial units on land surrounding the former Lea Castle Hospital site. The Site is made up of three parcels of agricultural land, with the A451 Stourbridge Road to the east, the A449 Wolverhampton Road to the west and Axborough Lane to the north.

The nearest railway lies approximately 1.5 km south of the site boundary, and a desk-based review of the Site and surrounding area identified no other significant sources of vibration that are likely to influence baseline conditions at the Site. As such, it is considered most unlikely that there would be significant levels of groundborne vibration present at the site, and further assessment of groundborne vibration is therefore scoped out.

The assessment has been undertaken in accordance with relevant planning policies, guidance and British Standards. Existing noise levels across the Site due to vehicle movements on the local road network have been quantified and characterised by prediction of road traffic noise levels, which have been validated by on-site measurements of road traffic noise levels. A noise model of the site and surrounding area and road vehicle movements has been produced based on predicted flows of traffic in the year 2036. The assessment of residential suitability has been undertaken based on the results of the noise model. The assessment of industrial and commercial sound from the commercial/industrial areas on The Site has been based on limits set by embedded measures.

## Outcomes

The assessment has determined that a small area at the boundaries of the north, east and west parcels which are adjacent to roads fall within a medium noise risk area, in the worst case, with the majority of the Site falling within low noise risk areas.

To avoid any adverse impacts from any fixed plant items associated with the Proposed Development it is recommended that residential plant rooms/building services and commercial properties are designed so that the rating noise level determined in accordance with *BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound* will not exceed the existing background sound levels at the nearest noise sensitive receptors.

Recommendations have been made to optimise the layout and to provide mitigation in terms of appropriate glazing, ventilation and boundary treatments such that adverse noise impacts to future residents will be avoided. This will 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 planning condition/ conditions. The planning condition/ conditions should require 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 Homes England (hereafter referred to as 'the Applicant') are seeking outline planning permission from Wyre Forest District Council for a residential led mixed-use development on the former Lea Castle Hospital wider site ('the Proposed Development'), located to the northeast of Kidderminster (the 'Site').
- 1.1.2 The nearest railway lies approximately 1.5 km south of the site boundary, and a desk-based review of the Site and surrounding area identified no other significant sources of vibration that are likely to influence baseline conditions at the Site. As such, it is considered most unlikely that there would be significant levels of groundborne vibration present at the site, and further assessment of groundborne vibration is therefore scoped out.
- 1.1.3 The Site is broadly divided into four land parcels; a western parcel, a northern parcel, an eastern parcel and a central parcel known as the 'Vistry Scheme', which is currently under construction. The Proposed Development consists of the northern, western and eastern parcels. Delivering connectivity and a sense of one place will be essential to successfully fulfilling the ambitions of a Sustainable Urban Village (SUV). The core site was granted outline consent in November 2018 for up to 600 new dwellings and up to 3,500 square metres of employment floorspace. This is now under construction by Linden Homes.
- 1.1.4 Homes England appointed Wood Environment & Infrastructure Solutions UK Ltd. to prepare an outline planning application for residential and associated mixed uses on the remainder of the site (western, northern and eastern parcels). This will comprise of up to 800 new homes, 7 hectares of new employment land, a new village centre including a new primary school and significant new green infrastructure and public open space which wraps around the core central site which is currently under construction.

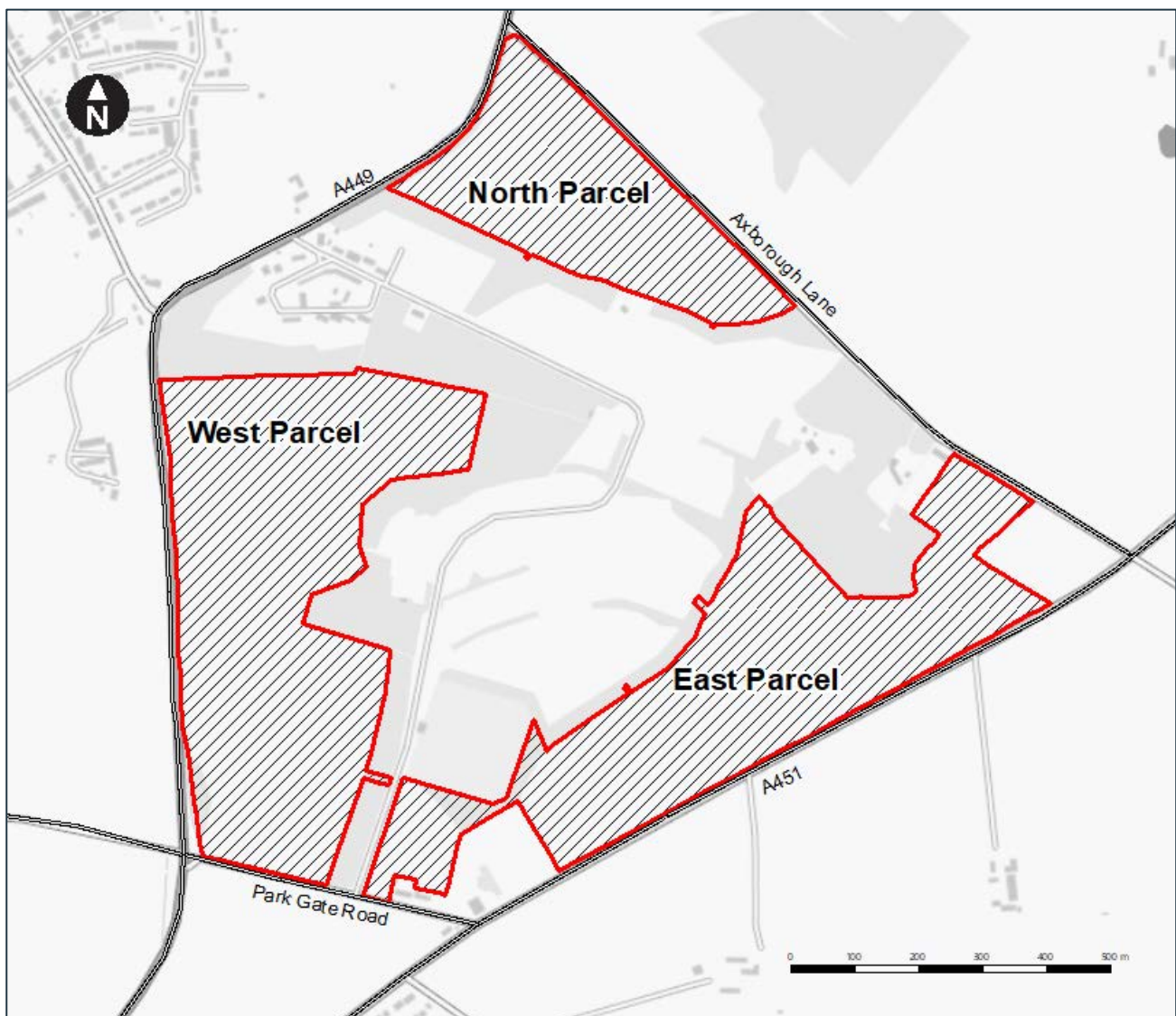
## 2. Description of the Proposed Development

### 2.1 Development description

#### Site location

1.1.5 The Site is located approximately 3 km northeast of Kidderminster town centre in Wyre Forest District Council, as shown in **Figure 2.1**. It is centred on National Grid Reference SO852791, 79167. The total area of the 3 land parcels are around 57 ha.

Figure 2.1 Site location plan: red line boundary



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## Existing site and surroundings

- 2.1.1 The Site currently is comprised predominantly of arable farmland with field boundary hedgerows and some hedgerow trees. The Site, surrounding area, and the three land parcels are indicated in **Figure 2.1**. The A449 is a main arterial road serving the town of Kidderminster and connects Kidderminster to Kingswinford. The Site is bound to the northeast by Axborough Lane, the A451 to the southeast and the A449 to the west and north. Land use beyond the A449 to the north and west predominantly comprises of open arable agricultural land interspersed by isolated farmsteads and villages such as Cookley.
- 2.1.2 There are no recorded designated assets within the Site. The Grade II Listed Building North Lodge and gateway, at Lea Castle, lie just to the west of the Site. Development of the Site is unlikely to have any direct or indirect impacts on the designated asset.
- 2.1.3 In terms of biodiversity, the closest Statutory Nature Conservation Site is Bishop's Field Local Nature Reserve (LNR) which is located approximately 2km to the west of the Proposed Development.
- 2.1.4 At the time of writing, the land adjacent to the A449 directly west of the Site has been proposed as a site for a new quarry. The application for this site is yet to be determined. However, due to the advanced stage of the application, and its proximity to the Wolverhampton Road signalised crossroads, the forecasted traffic flow from the quarry has been included within the assessment.

## Development proposals

- 2.1.5 The Proposed Development comprises of a mixed use residential led development together with areas of formal and informal open space and landscaping. In summary the key elements of the Proposed Development are:
- up to 800 dwellings (class C3) and an element of C2 extra care, the envisaged nature of which is set out below;
  - 7 ha of employment land comprising a mix of E (g) uses;
  - a primary school (class F1);
  - a flexible community building and small scale retail in the village centre;
  - 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.
- 2.1.6 The envisaged land use for the Site is set out in **Figure 2.1**.

Figure 2.1 Envisaged land use for the Site



- 2.1.7 The proposed residential and employment areas are intended to contribute to the borough's housing provision (see **paragraph 2.1.9**) and provide a source of employment to the local area.
- 2.1.8 The majority of the Site will be developed with 1 to 5 bed dwellings. Other primary uses, include a primary school and employment land with building heights subject to further detailed design and assessment at reserved matters.

## Proposed Site layout

- 2.1.9 As shown in the indicative Site layout in **Figure 2.1**, residential dwellings would be located in all three development parcels. The north parcel consists of a residential area and informal green space, including the integration of Sustainable Urban Drainage Systems (SuDS). The east parcel is predominantly split between residential and employment areas, with the residential areas separated by green space and SuDS features, and the employment land adjacent to the A451. The west parcel consists of mainly dwellings and also includes the primary school and village centre.

## 2.2 Scope of assessment

### Scope of report

- 2.1.10 The assessment of the suitability of the Site for its proposed residential lead use forms the scope of this report.
- 2.1.11 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*<sup>1</sup> for the proposed residential areas and *Building Bulletin 93: Acoustic Design in Schools*<sup>2</sup> for the proposed school site, along with other relevant British Standards.
- 2.1.12 Based on review of aerial imagery, and from onsite observations, road vehicle movements on the local road network have been identified as the dominant sound source influencing the Site. Ambient noise levels which inform the Site Suitability assessment have been obtained from 3D road traffic noise modelling, validated by on-site measurement.
- 2.1.13 Road traffic noise levels have been predicted based on 18-hour traffic flow data for the surrounding road network. Road traffic noise levels have been predicted using the methodology presented in *Calculation of Road Traffic Noise (CRTN) (1988)*<sup>3</sup>.
- 2.1.14 This Site Suitability report will therefore specify façade elements to address the potential impacts from the predicted road traffic noise levels at potentially affected dwellings. The sound from road traffic noise will be measured and re-assessed at the Reserved Matters stage.
- 2.1.15 To avoid adverse impact from any fixed plant items associated with the Proposed Development it is recommended that residential plant rooms/building services and commercial properties are designed so that the rating noise level determined in accordance with *BS 4142:2014+A1:2019 – Methods for rating and assessing industrial and*

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<sup>1</sup> 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].

<sup>2</sup> 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](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/400784/BB93_February_2015.pdf) [Accessed 16 September 2021].

<sup>3</sup> The Department of Transport (1988). *Calculation of Road Traffic Noise*. DfT, London, UK.

*commercial sound* will not exceed the existing background sound levels at the nearest noise sensitive receptors.

- 1.2.1 Based on aerial imagery of the site, no significant sources of vibration have been identified. Based on this review, it is considered unlikely that the Proposed Development would be subject to significant levels of vibration. As such, vibration is not considered any further.

## 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 levels<sup>4</sup>

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. Ambient sound

<sup>4</sup> Bies, D. A., Hansen, C. H., 2009. Engineering Noise Control: Theory & Practice. 4th Edition. Abingdon: Spon Press.

levels are described with this index.  $L_{Aeq,T}$  is considered the best general purpose index for environmental sound, as it is the index which generally best represents how sound levels are perceived;

- $L_{A90,T}$  This noise index represents the sound level exceeded for 90% of the measurement period and is used to indicate quieter times during the measurement period. In BS 4142 assessments it is usually referred to as the background sound level, and describes the quietest 10% of a measurement period;
- $L_{Amax}$  Is the maximum recorded sound level during the measurement period.

#### 1.2.2

In addition, the following descriptors are often used in noise assessments:

- Ambient sound: Totally encompassing sound in a given situation, at a given time, usually composed of sound from many sources near and far.
- Specific sound: When assessing industrial or commercial sound, the specific sound is the sound of the (proposed or existing) industrial or commercial activity under assessment.
- Rating level: When assessing industrial or commercial sound, the rating level is equal to the specific sound level plus any rating penalties which are applied to account for any features of the specific sound which may serve to make the specific sound more distinct and distinguishable in the residual acoustic environment.
- Residual sound: When assessing industrial or commercial sound, the residual sound level is equal to the ambient sound level, in the absence of the specific sound (in the case of a proposed industrial or commercial activity, the residual sound level is equivalent to the existing ambient sound level prior to addition of the specific sound level to the acoustic environment).
- Fast Time Weighting: A sound pressure level measurement using a 125ms 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 facades, other than the ground, e.g. building facades, close boarded fence work etc.; and
- Façade level: A standard correction of +3 dB may be added to a free field sound level to estimate the sound level 1 m away from a façade, to account for both the incident sound and the reflected sound from the façade. When considering the break in of external sound into a room, the sound level which is incident upon the façade, rather than the façade level, is considered because only the incident sound will pass through the fabric of the building, whilst reflected sound travels away from the building. The standard +3 dB façade correction is most applicable in situations where the façade has a relatively unobstructed angle of view of the source (i.e. an uninterrupted 180° angle of view of the source in the horizontal plane).

It is typically only necessary to consider façade sound levels when measurements must be undertaken at a façade location, for example: where a dwelling is located entirely at first floor level, or above, with no external amenity space at ground floor level.

- 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: 2013<sup>5</sup> 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*'.

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<sup>5</sup> 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 Framework<sup>6</sup>

- 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, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability”.*
- 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*

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<sup>6</sup> 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](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf) [Accessed 16 September 2021].



*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.

- 4.1.7 The NPPF document does not refer to any other documents regarding noise other than the Noise Policy Statement for England<sup>7</sup> (NPSE, 2010).

## Noise Policy Statement for England (2010)<sup>7</sup>

- 4.1.8 The NPSE 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 NPPF<sup>6</sup>:

*"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 NPSE<sup>6</sup> (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

<sup>7</sup> 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](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf) [Accessed 16 September 2021].

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.

### Planning Practice Guidance for Noise, 2019<sup>8</sup>

- 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:
- UOAEL – 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 UOAEL.
- 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
<b>Not Noticeable</b>	No Effect	No Observed Effect	No specific measures required
<b>No Observed Adverse Effect (NOAEL)</b>			
<b>Noticeable and not intrusive</b>	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
<b>Lowest Observed Adverse Effect Level (LOAEL)</b>			
<b>Noticeable and intrusive</b>	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
<b>Significant Observed Adverse Effect Level (SOAEL)</b>			

<sup>8</sup> 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
<b>Noticeable and disruptive</b>	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
<b>Unacceptable Observed Adverse Effect Level (UOAEI)</b>			
<b>Noticeable and very disruptive</b>	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-N<sup>8</sup> 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-N<sup>8</sup> 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 UOAEI 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) <sup>3</sup>	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 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' <sup>9</sup>	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) <sup>10</sup>	Contains advice on the assessment of noise from road traffic, particularly that from new/altered roads.
ProPG: Planning & Noise 'Professional Practice Guidance on Planning & Noise' (2017) <sup>11</sup>	<p>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. The criteria contained in ProPG are based on the guidance contained in BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'. The BS 8233:2014 criteria are reproduced below.</p> <p>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.</p>

<sup>9</sup> 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](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].

<sup>10</sup> Highways England (2020). *Design Manual for Roads and Bridges LA111 Noise and vibration*. [online] Available at: <https://www.standardsforhighways.co.uk/dmr/b/search/cc8cfcf7-c235-4052-8d32-d5398796b364> [Accessed 16 September 2021].

<sup>11</sup> Association of Noise Consultants, Institute of Acoustics and 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 30 July 2020).

Guidance Document	Summary
BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' <sup>12</sup>	<p>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:</p> <p>Resting in Living Rooms: 35 dB <math>L_{Aeq,16h}</math> (daytime)  Dining in Dining Rooms / Areas: 40 dB <math>L_{Aeq,16h}</math> (daytime)  Sleeping or resting in Bedrooms: 35 dB <math>L_{Aeq,16h}</math> (daytime) / 30 dB <math>L_{Aeq,8hr}</math> (night-time).</p> <p>It is stated within the guidance that where development is considered necessary or desirable, a relaxation of up to 5 dB on these levels can be applied, and reasonable conditions still achieved.</p> <p>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 <math>L_{AFmax}</math> should be based upon the character and number of events per night.</p> <p>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.</p> <p>Design criteria for non-domestic buildings include:  Cafeteria, canteen, kitchen: 50-55 dB <math>L_{Aeq,T}</math>  Open plan office: 45-50 dB <math>L_{Aeq,T}</math>  Meeting room, training room: 35-45 dB <math>L_{Aeq,T}</math>  Place of worship: 30-35 dB <math>L_{Aeq,T}</math></p>
World Health Organisation 'Guidelines for community noise' (1999) <sup>13</sup>	<p>Presents guideline noise levels for community noise in specific residential environments e.g. in outdoor living areas.</p> <p>In order to avoid significant annoyance in outdoor living areas, a threshold of 55 dB <math>L_{Aeq,T}</math> is specified. In order to avoid moderate annoyance, a threshold of 50 dB <math>L_{Aeq,T}</math> is given.</p> <p>The guidelines also provide threshold levels for sleep disturbance stating "For bedrooms the critical effect is sleep disturbance. Indoor guideline values for bedrooms are 30 dB <math>L_{Aeq}</math> for continuous noise and 45 dB <math>L_{Amax}</math> for single sound events."</p>
World Health Organisation 'Night noise guidelines for Europe' (2009) <sup>14</sup>	<p>Presents guideline threshold levels relating to the effects noise exposure can have on sleep.</p>
World Health Organisation 'Environmental Noise Guidelines for the European Region' (2018) <sup>15</sup>	<p>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 53 dB <math>L_{den}</math> is specified for day-evening-night and 45 dB <math>L_{night}</math> for night time road noise.</p>

<sup>12</sup> British Standards Institute (2014). *BS 8233:2014 Guidance on sound insulation and noise reduction for buildings*. BSI, London.

<sup>13</sup> 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].

<sup>14</sup> 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](https://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf) [Accessed 16 September 2021].

<sup>15</sup> 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](https://www.euro.who.int/_data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf) [Accessed 16 September 2021].

Guidance Document	Summary
	This guidance document supersedes the WHO 'Guidelines for Community Noise' (1999) and 'Night noise guidelines for Europe' (2009) when considering external noise only.
'Building Bulletin 93: Acoustic Design of Schools – Performance Standards' (BB 93) <sup>16</sup>	Sets out acoustic performance standards appropriate for education facilities covered by The Building Regulations Approved Document E <sup>17</sup> . In BB93 the most conservative limit for indoor ambient noise is 35 dB $L_{Aeq, 30mins}$ and is specified for rooms where the uses include nursery school rooms, primary or secondary school classrooms, teaching areas, or laboratories. The indoor noise limit has been adopted as the daytime impact criterion for the educational facilities non-residential receptor group.
Acoustic of Schools: a design guide <sup>18</sup>	Presents design criteria for noise within teaching and outdoor play areas for new schools. It recommends an internal ambient limit of 35 dB $L_{Aeq, 30mins}$ for teaching areas (external levels can be mitigated up to 70 dB $L_{Aeq, 30min}$ at the building façade). Noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB $L_{Aeq, 30min}$ and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB $L_{Aeq, 30min}$ . If this is not possible, due to a lack of suitably quiet sites, acoustic screening should be used to reduce noise levels in these areas as much as practicable, and an assessment of noise levels and options for reducing these should be carried out. Noise levels can be reduced by up to 10 dB at positions near an acoustic screen.
BS 4142:2014+A1:2019 <i>Methods for rating and assessing industrial and commercial sound</i> <sup>19</sup>	Standard for determining magnitude of impact from commercial or industrial sound on existing or proposed residential receptors.
BS 7445-1 <i>Description and measurement of environmental noise – Part 1: Guide to quantities and procedures</i> <sup>20</sup>	Defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

## 4.3 Local planning policy

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

Table 4.3 Local planning policy

Policy reference	Policy issue
Wyre Forrest Borough Council Core Strategy (2006-	<b>Core Policy 11: Quality design and local distinctiveness</b>

<sup>16</sup> Department for Education. Building Bulletin 93. Acoustic Design of Schools: A Design Guide. 2015.

<sup>17</sup> Ministry of Housing, Communities & Local Government. Approved Document E: Resistance to the Passage of Sound. 2015.

<sup>18</sup> IOA & ANC. Acoustics of Schools: a design guide. November 2015.

<sup>19</sup> British Standards Institution, 2019. BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound. BSI, London.

<sup>20</sup> British Standards Institution, 2003. BS 7445-1 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures. BSI, London.

Policy reference	Policy issue
2026) Wyre forest local development framework <sup>21</sup>	New buildings and spaces are designed to be fit for purpose and capable of future adaptation.
<b>The Wyre Forest District Local Plan (2016 - 2036)</b> <sup>22</sup>	<p>The Wyre Forest District Local Plan (2016 - 2036) was submitted to the Secretary of State for Examination on 30th April 2020. The Local Plan will be presented to Council on 26 April 2022 for consideration for adoption. Whilst the Local Plan is not yet adopted, it is anticipated that it will be adopted with minimal or no changes to the relevant aspects outlined below.</p> <p>Lea Castle is allocated in the Local Plan for the development of a new sustainable village.</p> <p>Policy SP.LCV2 - Lea Castle Village Principles of Development, states:</p> <p><b>“Overall Design</b></p> <p><i>i. The site must be planned and developed on a comprehensive basis. Design principles will be agreed in accordance with an approved indicative masterplan for the entire site to ensure a sustainable and high quality development and all developers will be expected to adhere to these agreed principles. Any mitigation required in terms of noise, air quality, drainage and ecology should be determined at an early stage. ...”</i></p>

<sup>21</sup>Wyre Forreast Borough Council (2010). Core Strategy (2006-2026) Wyre Forreast Development Framework. [online] Available at: [Adopted Core Strategy \(December 2010\) \(wyreforestdc.gov.uk\)](#) [Accessed 24/12/21].

<sup>22</sup> Wyre Forest District Council. Wyre Forest District Council's Local Plan (2016 – 2036). [online] Available at: <https://www.wyreforestdc.gov.uk/planning-and-buildings/planning-policy/local-plan-review/local-plan/> [Accessed 24/12/21].

## 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 how they will influence this assessment.

Table 5.1 Summary of embedded environmental measures

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  Sound arising from commercial and industrial sources will be controlled in accordance with BS 4142:2014 <sup>19</sup> .
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, $L_{A,r}$ ) for proposed commercial uses to be designed to meet a noise emissions criteria no greater than equal to the background sound levels at the worst affected receptors



## 6. Methodology

### 6.1 Baseline noise survey

- 6.1.1 A baseline noise survey was completed on 15 September 2021. Noise monitoring was undertaken using a Rion NL-52 Type 1 Integrating Sound Level Meter (SLM). The purpose of monitoring was to measure the road traffic noise level to validate results of the noise propagation model.
- 6.1.2 Noise monitoring was completed in accordance with the CRTN<sup>3</sup> shortened measurement procedure. The microphone was positioned between 1.2 and 1.5 m above local ground level in free field conditions. The calibration of the SLM was checked using a Rion NC-74 calibrator at the start and end of the monitoring period. The SLM was operated using the 'fast' time-weighting and A-weighting, and was set to continuously measure noise levels using 15-minute measurement periods. Further details of the monitoring equipment used are included in **Appendix C**.
- 6.1.3 Weather conditions during the monitoring period were reported to be dry with wind speeds <5 m/s.
- 6.1.4 Noise monitoring locations are presented in **Table 6.1** and graphically in **Figure 6.1**.

Table 6.1 Noise monitoring location

Position reference	British Grid reference (Easting, Northing)	Type of monitoring
MP1	384662, 278748	Short term

Figure 6.1 Noise monitoring location – MP1



Map imagery source: Google Earth Pro © 2022

## 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 ProPG<sup>1</sup>. The ProPG<sup>1</sup> criteria for continuous daytime and night-time noise levels due to transport sources is reproduced in **Table 6.2** below, with additional categories between the negligible, medium and low categories as provided in the guidance.

Table 6.2 Criteria for residential suitability

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

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

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

Table 6.3 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 45 dB  $L_{Amax}$  more than ten times per night.

## Educational facilities

- 6.2.3 Building Bulletin 93<sup>23</sup> sets out acoustic performance standards appropriate for education facilities covered by the Building Regulations Approved Document E<sup>23</sup>. In BB93, the most conservative limit for indoor ambient noise is 35 dB  $L_{Aeq,30 min}$  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 50 dB  $L_{Aeq,30 min,r}$ , assuming a partially open window will provide 15 dB of attenuation.

<sup>23</sup> 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](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/468870/ADE_LOCKED.pdf) [Accessed 16 September 2021].

## Industrial/commercial sources

- 6.2.4 BS 4142:2014+A1:2019<sup>24</sup> is used to assess sound of an industrial and commercial 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 residential 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;
  - a difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context; and
  - a difference of around +5 dB 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.

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<sup>24</sup> British Standards Institution (2014). *BS 4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sound*. ISBN: 978 0 539 02069 4. BSI; London, UK

## 7. Noise modelling

### 7.1 Sound propagation model

- 7.1.1 To predict noise levels across the Site from road traffic a noise model was produced using LimA, a 3D noise propagation prediction software package. The calculation of road traffic noise has been predicted in accordance with the CRTN<sup>3</sup> methodology. Predicted road traffic noise levels were converted from  $L_{A10,18h}$  sound levels, from the CRTN method, into  $L_{Aeq,16hr}$  (day) and night-time  $L_{Aeq,8hr}$  (night) using TRL 'Method 3'<sup>9</sup>, for use in the assessment.
- 7.1.2 The model 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 objects and barriers including man-made or natural that may provide screening or reflections;
  - ground contours, determining the relative ground heights; and
  - Model predictions assume mixed ground attenuation due to the nature of the local environment.
- 1.2.3 The model results are representative of a future scenario, in the year 2036, with contributions from road vehicle movements generated by the Proposed Development.

### Model validation

- 1.2.4 A summary of the average 15-minute  $L_{A10,T}$  sound pressure level is presented in **Table 7.1** alongside a comparison with the predicted noise results from the noise modelling exercise. Subjectively, on site observations confirmed that road traffic noise is the dominant noise source within the study area.

Table 7.1 Measured and predicted noise level comparison

Monitoring location	Measured sound level, dB $L_{A10,18h}$	Predicted sound level, dB $L_{A10,18h}$	Difference, dB	Comments
MP1	75	75	0	Difference within $\pm 3$ dB; acceptable

- 1.2.5 The results presented in **Table 7.1** indicate that the predicted and measured  $L_{A10,18hr}$  levels are in agreement, within a tolerance of  $\pm 3$  dB. The results of the comparison therefore indicate that results from the noise model are valid for the purposes of the assessment.

## 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 method provided in ProPG<sup>1</sup>) has been conducted to provide an indication of the likely risk of adverse effects, in the absence of any further consideration of the mitigation required to achieve good acoustic conditions within dwellings or external amenity areas (i.e. risks of adverse effects identified in the Stage 1 assessment may be appropriately addressed by good acoustic design).

#### Transportation sources

- 8.1.2 ProPG is restricted to sites that are exposed predominantly to noise from transportation sources, which applies to this Site, where road traffic noise is the dominant source.
- 8.1.3 Noise levels have been predicted across the Site using the methodology within CRTN<sup>3</sup> 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 6.2**, are provided in **Appendix A**. The assessment has been undertaken assuming an open site.
- 8.1.5 With reference to **Figure A1** in **Appendix A**, during the daytime, predicted road traffic noise levels are below 55 dB  $L_{Aeq,16hr}$  for a significant proportion of the Site (around a third of the Site areas), with around half of the site between 55 - 60 dB  $L_{Aeq,16hr}$ . Predicted road traffic noise levels closer to adjacent roads, the A449, A541, Axborough Lane and Parkgate road are higher and predicted to be between 60 to 70 dB  $L_{Aeq,16hr}$ .
- 8.1.6 With reference to **Figure A2** in **Appendix A**, predicted night-time road traffic noise levels are below 50 dB  $L_{Aeq,8hr}$  for the majority of the Site. Noise levels closer to adjacent roads, the A449, A541, Axborough Lane and Parkgate road are higher and predicted to be 50 – 60 dB  $L_{Aeq,8hr}$ .
- 8.1.7 The predicted results indicate that a small part of the proposed housing areas fall within a medium risk noise area, with the rest of the Site falling between low-negligible to medium-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 The Stage 2 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

- 8.2.2 Part of the proposed housing areas fall within a medium risk noise area, with the rest of the Site falling between low-negligible to medium-low. Good acoustic design should be a factor considered at the detailed design stage to achieve good internal and external noise environments throughout the Proposed Development.
- 8.2.3 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 medium noise risk areas. Conversely, rooms which are less sensitive (kitchens, bathrooms, storage rooms, corridors etc.) may 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. This approach may not be necessary for plots in medium noise risk areas, but may be considered at the detailed design stage.

## Element 2 – Internal noise level guidelines

- 8.2.4 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.”*
- 8.2.5 ProPG provides the same criteria for internal noise levels as provided in BS 8233:2014<sup>12</sup>. Design criteria for noise within habitable rooms in new residential development to avoid adverse impacts on sustainability for the intended use provided in ProPG and BS 8233:2014 are reproduced in **Table 4.2**.
- 1.2.6 Contour plots of transport noise have been produced detailing potential sound insulation classes suitable for the housing areas included in the Proposed Development. These are provided in **Figure A1** and **Figure A2** of **Appendix A**. It should be noted these contours are indicative only and that further assessment will be required at the detailed design stage to ensure the acoustic performance of façade elements are specified appropriately.
- 8.2.6 An indicative class system has been applied when determining the likely sound insulation requirements for proposed dwellings. The indicative sound insulation classes are defined as follows:
- **Class A:** Properties which achieve good internal noise levels in accordance with BS 8233:2014 with partially open windows, based on 15 dB attenuation provided by a partially open window;
  - **Class B:** Properties which achieve good internal noise levels in accordance with BS 8233:2014 with closed standard double glazed windows (assessment based on 25 dB  $R_w+C_{tr}$ , i.e. (4 (6-16) 6 mm) glazing configuration) and through wall/ through window trickle vents with an appropriate acoustic performance; and
  - **Class C:** Properties requiring glazing and vents with an increased acoustic performance to achieve good internal noise levels in accordance with BS 8233:2014.

### Night-time maximum internal noise levels

- 8.2.7 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.
- 8.2.8 Long-term monitoring undertaken over a number of night-times, at locations representative of proposed façades in the closest proximity to roads, would be the most robust method to inform the design such that night-time instantaneous maximum noise levels are appropriately controlled. Extrapolation from shorter duration measurements to indicate representative night-time instantaneous maximum noise levels may also be acceptable.

### Element 3 – External amenity area noise assessment

- 8.2.9 BS 8233:2014<sup>12</sup> states that it is desirable that ambient sound levels in gardens do not exceed 50 dB  $L_{Aeq,16h}$  and provides a criterion of 55 dB  $L_{Aeq,16h}$  as the upper guideline value that would be acceptable in noisier environments.
- 8.2.10 Based on a visual inspection of the predicted daytime transport noise levels presented in **Figure A1** in **Appendix A**, the following observations are made:
- around a third of the Site area falls between the desirable value of 50 dB  $L_{Aeq,16h}$  and the upper guideline value of 55 dB  $L_{Aeq,16h}$ ;
  - about half of the Site area falls between the upper guideline limit of 55 dB  $L_{Aeq,16h}$  and 60 dB  $L_{Aeq,16h}$ ;
  - some areas closer to adjacent roads are predicted to experience daytime road traffic noise levels between 60 – 65 dB  $L_{Aeq,16h}$ .
- 8.2.11 The above is based on an open site, and hence does not include any screening from buildings forming part of the Proposed Development.
- 8.2.12 With reference to the draft masterplan in **Figure 2.1**, proposed housing areas near to adjacent roads are limited in number and include significant buffer zones (containing SUDs, lanes/ private drives, recreation areas, woodland, etc) between housing areas and nearby roads, which will serve to reduce road traffic noise levels.
- 8.2.13 It is recommended that gardens to dwellings near to the surrounding road network are positioned on the opposite side of the dwelling to the road, so that the dwelling itself provides screening. It may also be beneficial, in proposed housing areas most exposed to road traffic noise, to minimise gaps between dwellings to increase screening to the gardens beyond.
- 8.2.14 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 expected that, with screening provided by dwellings and garden fences, ambient sound levels would likely fall below 55 dB  $L_{Aeq,16h}$  in all gardens.



- 8.2.15 In any case, if 55 dB  $L_{Aeq,16h}$  cannot be achieved in all gardens, despite incorporating good acoustic design in terms of layout of plots and provision of solid boundary treatments, then this should not be an obstacle to gaining planning consent. This is on the basis of the guidance from BS 8233:2014, reiterated in ProPG, which states: *“These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.”*

## Element 4 – Assessment of Other Relevant Issues

### Compliance with relevant national and local policy

- 8.2.16 The considerations and measures discussed in this report provide the basis for good acoustic design. Further work at the detailed design stage will ensure that good acoustic design will be demonstrated in the ‘as built’ design. Review of the draft masterplan indicates that the outline scheme design already incorporates measures representative of good acoustic design (siting of non-residential elements in highest noise level areas and providing buffer zones between nearby roads and proposed housing areas).
- 8.2.17 The assessment provided herein indicates that, with further work at the detailed design stage, good internal and external acoustic environments may be achieved throughout the Proposed Development. On this basis, and in consideration of national planning policy and the guidance in **Table 4.1**, it is considered that adverse noise effects will be no greater than the NOAEL.
- 8.2.18 On the basis of the above, the Proposed Development accords with national planning policies. With regards to local planning policies, it is considered that the assessment has demonstrated that the amenity of future residents will be protected through buildings and spaces that are fit for purpose and the Proposed Development therefore accords with 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 should be made to amend the design of the Proposed Development (for example, by modifying the layout, enhancing the façade specification or increase stand-off distances to nearby noise sources, etc.) 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 and commercial sound

- 8.3.1 As part of the development, an area of employment land is proposed. To avoid adverse impact from any fixed plant items associated with the Proposed Development (e.g. residential plant rooms/building services and commercial properties) it is recommended that these are designed so that the rating noise level, determined in accordance with BS 4142, will not exceed the representative background sound level at the nearest noise sensitive receptors.
- 8.3.2 It will therefore be necessary, at the detailed design stage, to undertake an assessment of industrial and commercial sound to determine if any mitigation measures may be required to avoid unacceptable adverse impacts. If there is likely to be any significant noise emissions from the proposed commercial uses during the night-time a comprehensive set of night-time measurements should be undertaken to inform the assessment of potential; night-time impacts due to industrial or commercial sound across the Site, to determine what, if any, mitigation may be required.

## 8.4 Primary school

- 8.4.1 As part of the development, a new primary school is proposed, located within the main residential area.
- 8.4.2 BB 93 recommends internal noise levels of 35 dB  $L_{Aeq,30 \text{ min}}$  for rooms where the uses include nursery school rooms, primary or secondary school classrooms, teaching areas or laboratories. The associated daytime external criterion is 50 dB  $L_{Aeq,30 \text{ min}}$  assuming a partially open window will provide 15 dB of attenuation.
- 8.4.3 From visual inspection of **Figure A1** in **Appendix A**, the school is situated within an area that is labelled 'negligible - low' and is expected to experience external noise levels of 55 dB 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 located more centrally. With the additional screening provided by buildings between the A449 and Park Gate road, it is expected that noise levels at the school will fall below the external criterion of 50 dB  $L_{Aeq,30 \text{ min}}$  and therefore internal noise levels are likely to be met with an open window.
- 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. Consideration of industrial and commercial sound has also been provided, in terms of outlining the further work that should be undertaken to define appropriate noise limits for any industrial and commercial sources. Industrial and commercial sources should be designed appropriately such that the rating level from any one installation or facility does not exceed the background sound level at the nearest noise sensitive premises.
- 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. The assessment has demonstrated that external noise levels may be

appropriately attenuated by the design of the Proposed Development to achieve acceptable internal and external noise environments throughout. Requirements for the design to achieve acceptable internal and external noise environments, in accordance with BS 8233 and ProPG, may be included within the consent for the Proposed Development through suitably worded planning conditions.

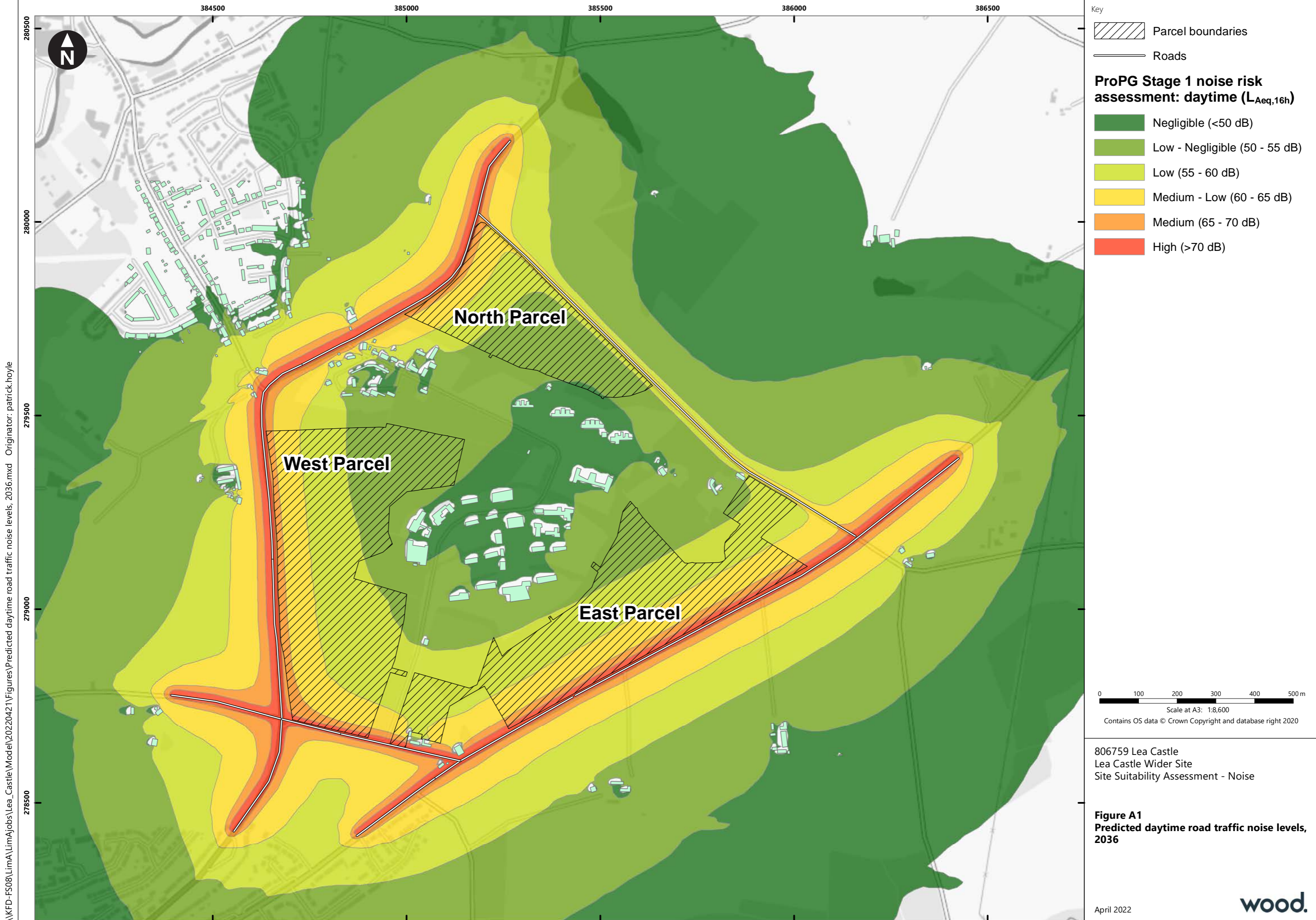
- 8.5.5 An assessment of industrial and commercial sound will be necessary to assess the potential for any adverse noise impacts. With further assessment, the extent of any area affected by potential noise impacts will be determined, and appropriate mitigation provided to avoid any unacceptable adverse impacts. The requirement for the design to address potential impacts from industrial and commercial sound may be included within the consent for the Proposed Development through a suitably worded planning condition/ conditions.
- 8.5.6 The planning condition/ conditions should require 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.

## 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 surrounding the former Lea Castle Hospital site.
- 9.1.2 From on-site observations and aerial imagery road traffic noise is considered the dominant noise source contributing to noise levels across the site.
- 9.1.3 Based on aerial imagery it is considered there are no significant sources vibration influencing the site, and that there will therefore be no adverse impacts due to vibration for future residents of the Proposed Development.
- 9.1.4 The Stage 1 ProPG assessment of transport noise indicates that the majority of the Site falls within a low-negligible to low noise risk area, with a small area at the boundaries of the north, east and west parcels which are adjacent to roads falling within a medium-low to medium noise risk area. It is considered that, with the good acoustic design principles set out in this report, and the determination of appropriate specification of façade elements and potential boundary treatments during the detailed design, good internal and external noise environments will be achieved.
- 9.1.5 The Stage 2 ProPG assessment considered the predicted internal and external transport noise levels at individual dwellings in greater detail and sets out a number of recommendations to achieve acceptable noise environments throughout the Site.
- 9.1.6 Recommendations for further work have been made to assess the potential for adverse noise impacts due to proposed sources of industrial and commercial sound. Subject to further work at the detailed design stage, and through the application of any mitigation which may be required as identified in the further work, unacceptable adverse impacts due to industrial and commercial sound will be avoided.
- 9.1.7 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 impacts to future receptors will be avoided.
- 9.1.8 As such, the recommendation to the Local Planning Authority is to grant permission for the development with the inclusion of an appropriate planning condition/ planning conditions. The condition/ conditions should require 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.



# Appendix A

## Grid Noise Maps









\\KFD-F508\LimA\LimA\Jobs\Lea\_Castle\20220421\Figures\Predicted daytime road traffic noise levels, 2036.mxd Originator: patrick.hoyle

Key

-  Parcel boundaries
-  Roads

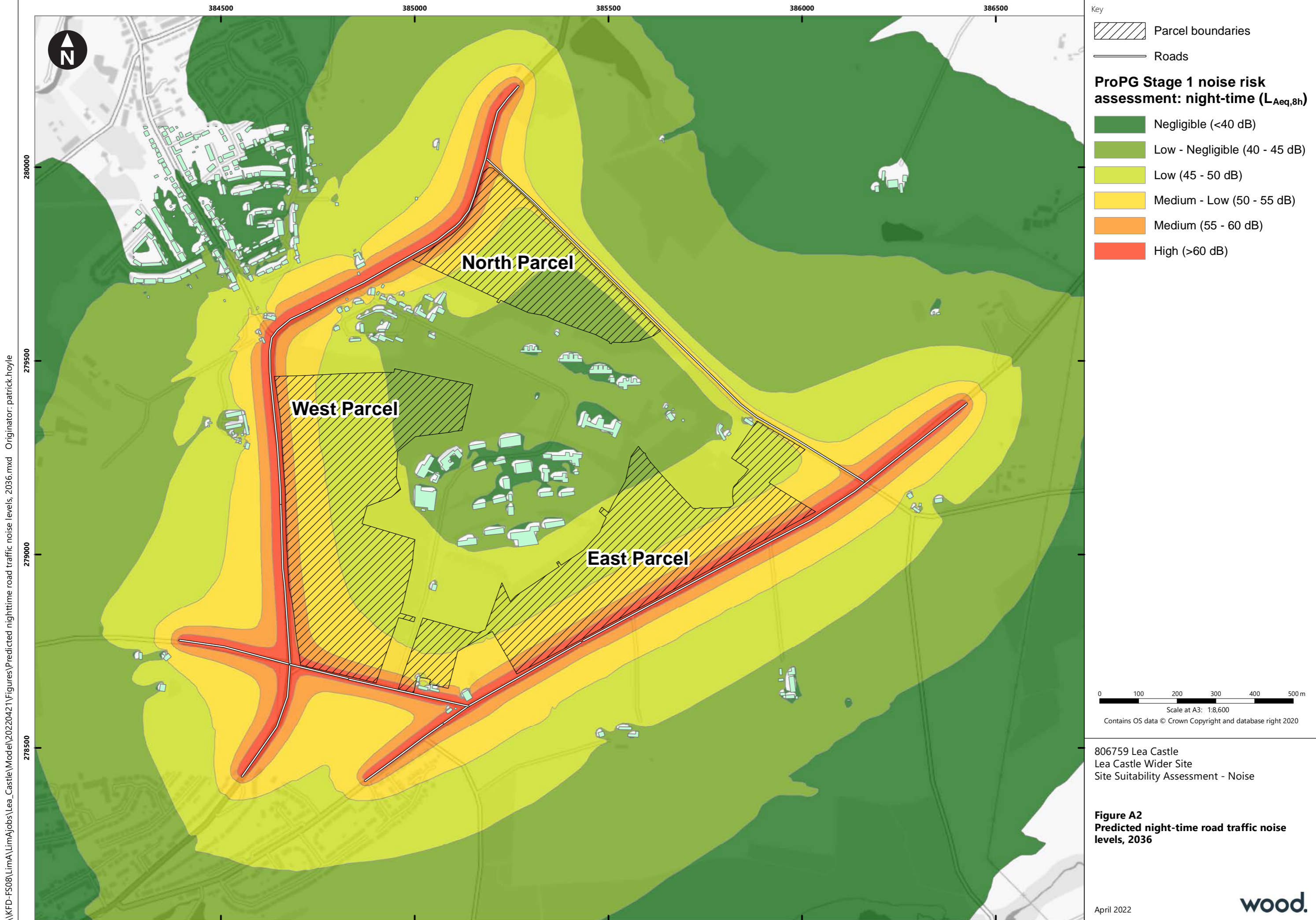
**ProPG Stage 1 noise risk assessment: daytime ( $L_{Aeq,16h}$ )**

-  Negligible (<50 dB)
-  Low - Negligible (50 - 55 dB)
-  Low (55 - 60 dB)
-  Medium - Low (60 - 65 dB)
-  Medium (65 - 70 dB)
-  High (>70 dB)

0 100 200 300 400 500 m  
 Scale at A3: 1:8,600  
 Contains OS data © Crown Copyright and database right 2020


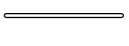
806759 Lea Castle  
 Lea Castle Wider Site  
 Site Suitability Assessment - Noise

**Figure A1**  
**Predicted daytime road traffic noise levels, 2036**









\\KFD-F508\LimA\LimA\Jobs\Lea\_Castle\Model\20220421\Figures\Predicted night-time road traffic noise levels, 2036.mxd Originator: patrick.hoyle

Key

-  Parcel boundaries
-  Roads

**ProPG Stage 1 noise risk assessment: night-time ( $L_{Aeq,8h}$ )**

-  Negligible (<40 dB)
-  Low - Negligible (40 - 45 dB)
-  Low (45 - 50 dB)
-  Medium - Low (50 - 55 dB)
-  Medium (55 - 60 dB)
-  High (>60 dB)

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 Scale at A3: 1:8,600  
 Contains OS data © Crown Copyright and database right 2020

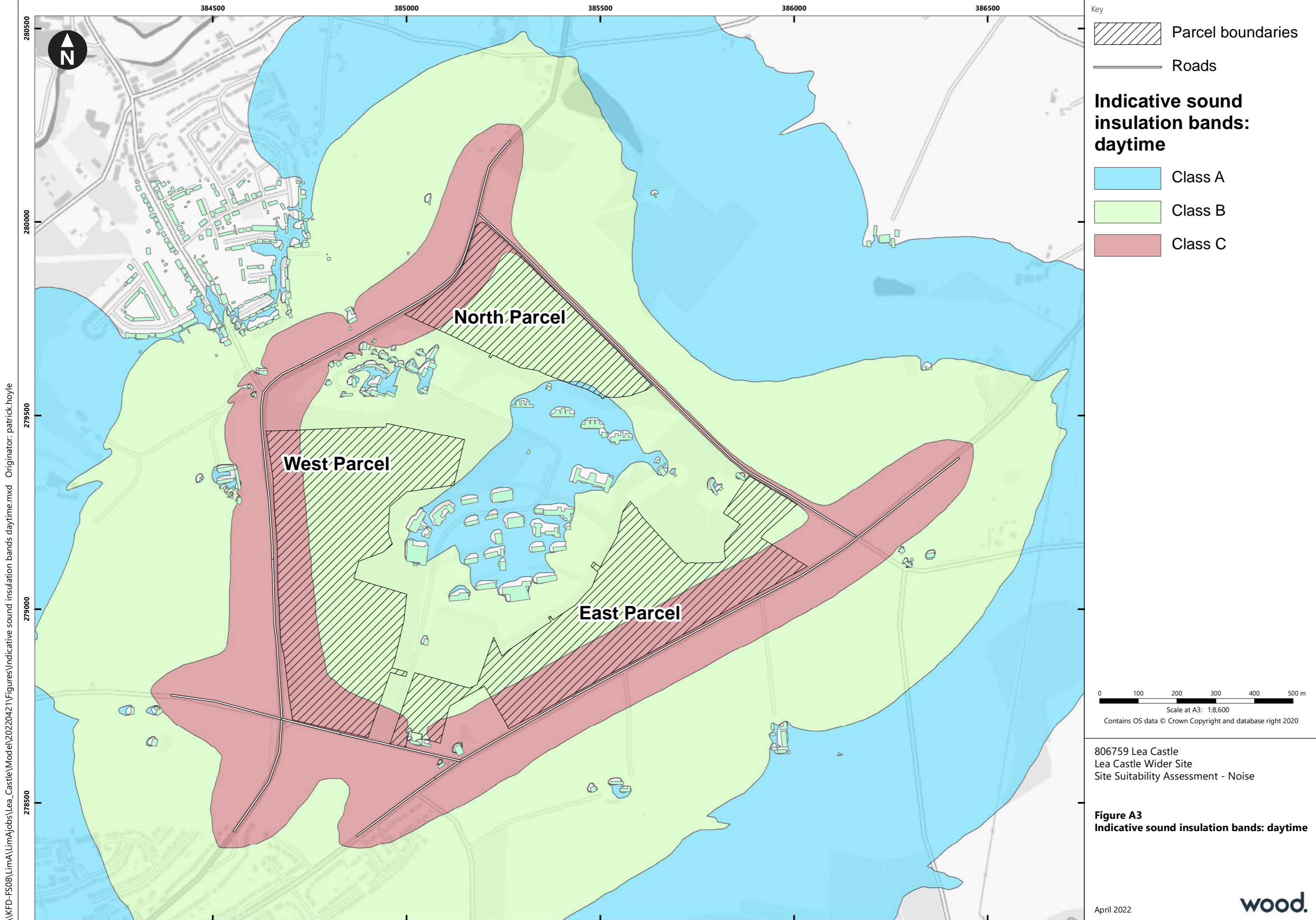
806759 Lea Castle  
 Lea Castle Wider Site  
 Site Suitability Assessment - Noise

**Figure A2**  
 Predicted night-time road traffic noise levels, 2036

April 2022


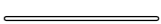




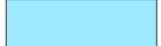




\\KFD-F508\LimA\LimA\jobs\Lea\_Castle\Model\20220421\Figures\Indicative sound insulation bands daytime.mxd Originator: patrick.hoyle

Key

-  Parcel boundaries
-  Roads

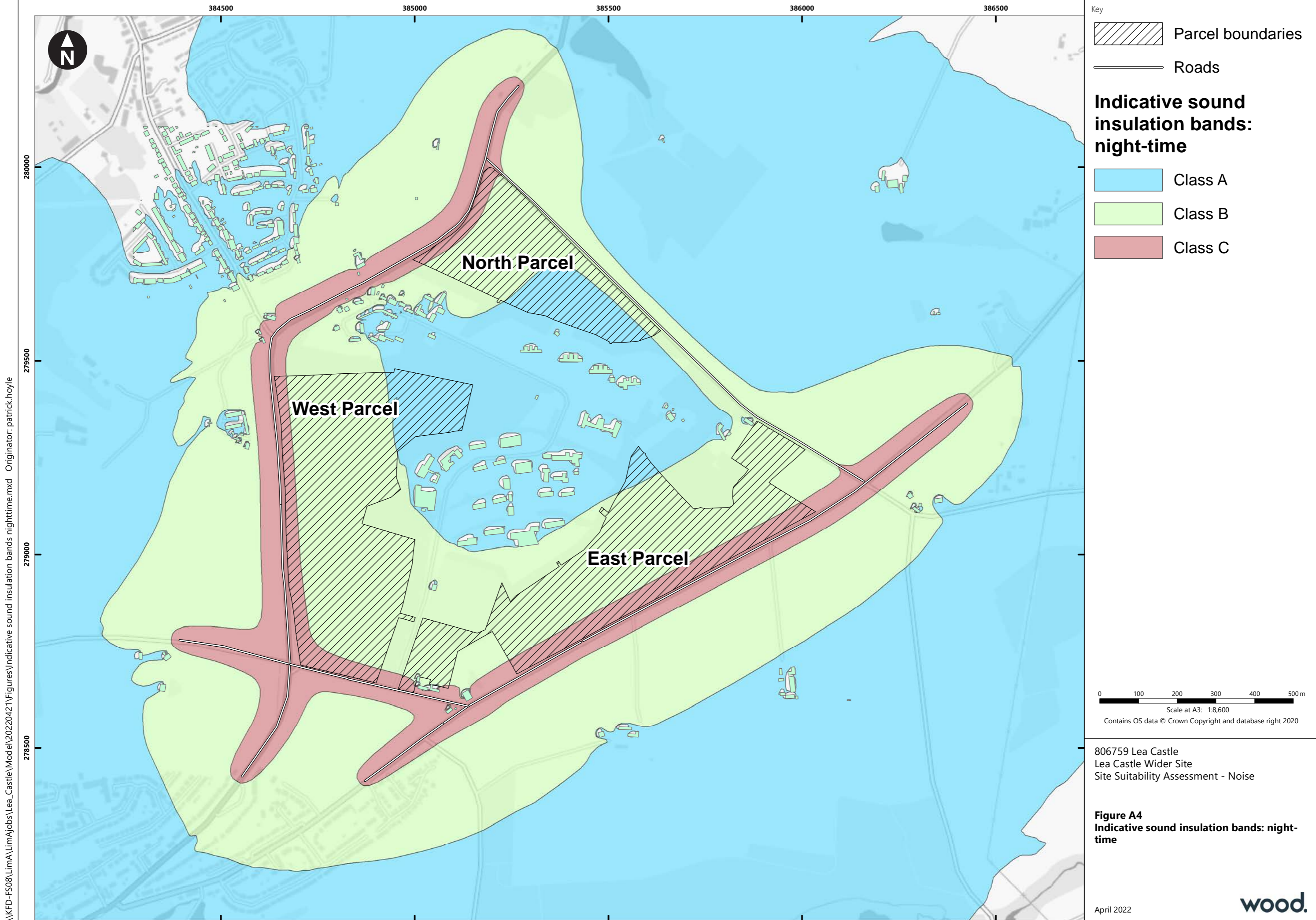
**Indicative sound insulation bands: daytime**

-  Class A
-  Class B
-  Class C

0 100 200 300 400 500 m  
 Scale at A3: 1:8,600  
 Contains OS data © Crown Copyright and database right 2020

806759 Lea Castle  
 Lea Castle Wider Site  
 Site Suitability Assessment - Noise

**Figure A3**  
 Indicative sound insulation bands: daytime



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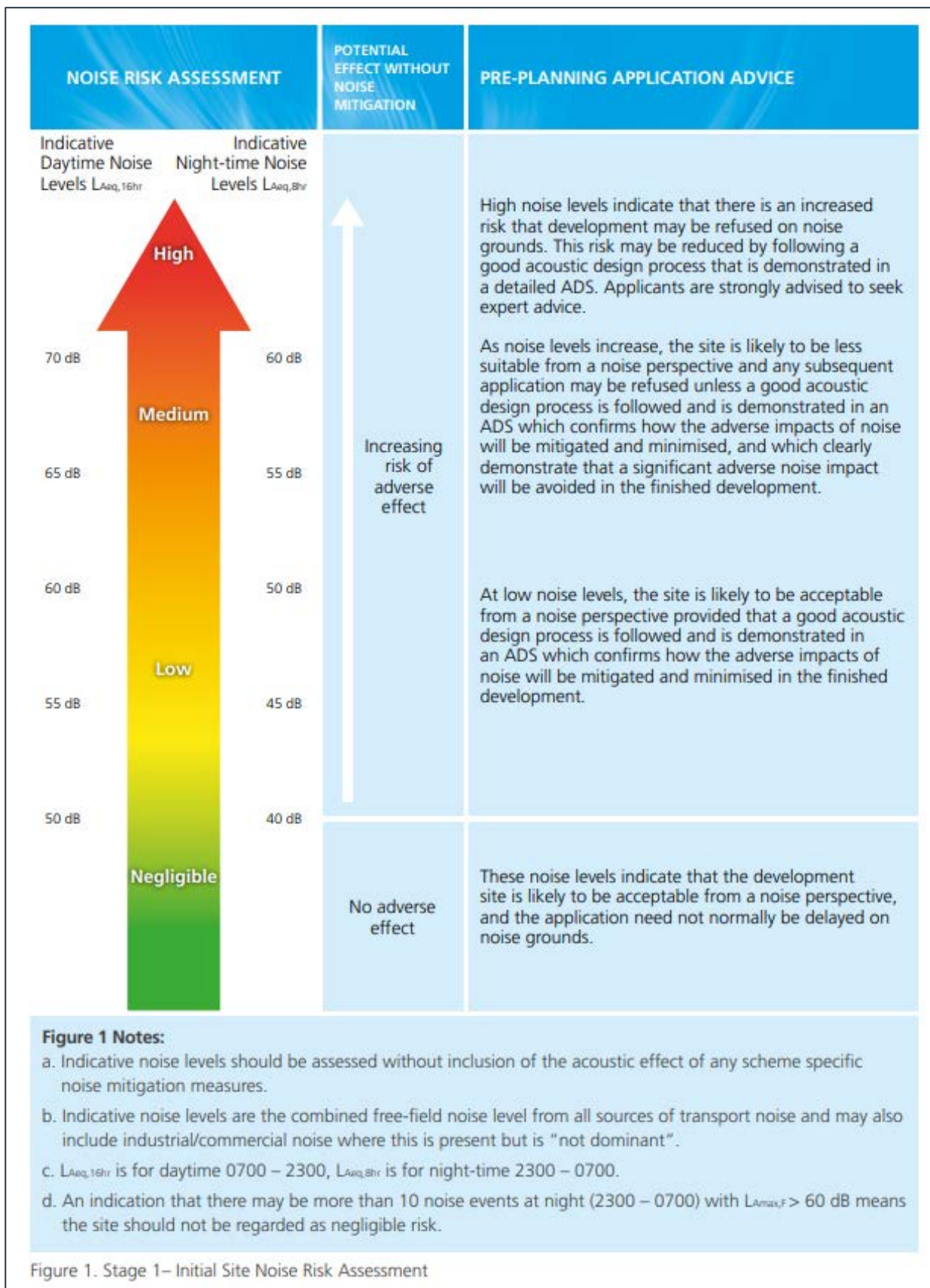
806759 Lea Castle  
 Lea Castle Wider Site  
 Site Suitability Assessment - Noise

**Figure A4**  
 Indicative sound insulation bands: night-time

April 2022



# Appendix B ProPG Figure 1



# Appendix C Instrumentation

Details of the instrumentation used to undertake the noise survey are provided below in Table C1

Table C1 Instrumentation details – NL52\_94

Manufacturer	Instrument	Type	Serial Number	Calibration Date
Rion	Sound Level Meter	NL52	01121394	29/03/2022
Rion	Pre Amplifier	NL52	21438	29/03/2022
Rion	Microphone	NL52	10448	29/03/2022

wood.