

ENVIRONMENT

Richborough Estates Ltd

Hinckley North – Phase 2,
Hinckley

Noise Impact Assessment

232746

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Hinckley North – Phase 2,
Hinckley

Noise Impact Assessment

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EXECUTIVE SUMMARY

BWB Consulting Ltd was appointed by Richborough Estates Ltd to undertake an environmental noise assessment for phase 2 of a proposed residential development at Hinckley North, Hinckley.

This assessment has been undertaken in accordance with current standards and guidance, following consultation with Hinckley and Bosworth Borough Council and is based on the results of a baseline noise survey undertaken in January 2022.

At this stage, the exact layout of the dwellings within the Proposed Development has yet to be determined. Consequently, this noise assessment demonstrates the feasibility of the Site for residential use, by assuming dwellings would be located at the closest point within the demarcated residential land use areas to the dominant noise source (i.e. Normandy Way).

To sufficiently reduce the road traffic noise in external living areas which may be located in the vicinity of Normandy Way, it is recommended that gardens are placed on the screened side of dwellings (i.e. on the opposite side of the dwellings to Normandy Way). Where this is not possible, it is considered likely that mitigation in the form of localised acoustic barriers will be required, which remove line of sight to the road, as a minimum.

For dwellings which would be set further back from the road (i.e. located further into the development), it is likely that a significant amount of screening would be afforded by the development itself. For any such dwellings, the proposed mitigation requirements set out above may be reduced.

For a notional worst-case facade facing onto Normandy Way, all criteria are likely to be achieved with double glazing which would need to provide a minimum acoustic performance of $R_w + C_{tr}$ of 33 dB (example configuration: 8mm pane / 12mm airgap / 10mm pane). For the provision of ventilation, acoustic ventilators which achieve a minimum acoustic performance of $D_{n,e,w} + C_{tr}$ 40 dB are likely to be required.

For a notional worst-case facade 10m from the farm access road, all criteria are likely to be achieved with double glazing which would need to provide a minimum acoustic performance of $R_w + C_{tr}$ of 27 dB (example configuration: 6mm pane / (6-16) mm airgap / 4mm pane). For the provision of ventilation, acoustic ventilators which achieve a minimum acoustic performance of $D_{n,e,w} + C_{tr}$ 36 dB, such as the Greenwood 2500EA are likely to be required.

Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development.

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1. INTRODUCTION

Appointment & Background

- 1.1 BWB Consulting Ltd was appointed by Richborough Estates Limited (the Client) to undertake an environmental noise assessment for phase 2 of a proposed residential development at Hinckley North, Hinckley (the Site). This assessment is to support an outline planning application for the Site.
- 1.2 This assessment, which considers the potential for noise impacts from Normandy Way and, to a lesser degree, Ashby Road, has been undertaken in accordance with current standards and guidance, following consultation with Hinckley and Bosworth Borough Council (HBBC) and is based on the results of a baseline noise survey undertaken at the Site.
- 1.3 Where appropriate, consideration has been given to generic noise mitigation measures to demonstrate how an appropriate level of protection could be afforded to proposed dwellings within the Site.
- 1.4 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Setting

- 1.5 The Site currently comprises a few existing structures among open farmlands. The Site is bound by Normandy Way to the south with existing commercial and residential premises situated beyond. To the west the Site is bordered by Phase 1 of the development with Stoke Road beyond. To the north-west lies an existing farm with an existing residential building. To the north, the Site is bordered by open farmland with Hinckley and Bosworth Community Hospital to the north-east. To the east, the Site is bordered by residential dwellings off Ashby Road.
- 1.6 The location of the Site is shown in **Figure 1.1**.

Figure 1.1: Site Location



Proposed Development

- 1.7 The Proposed Development will comprise up to 460 dwellings, associated open space, drainage, landscaping and infrastructure. The concept masterplan is shown below in **Figure 1.2**.
- 1.8 It should be noted that the current redline shows that the farm situated in the centre of the site will remain as an existing dwelling and is assumed to be an active farm.

Figure 1.2: Illustrative Layout



(Drawing Ref: n2225_006_Rev F - dated 20th February 2024)

2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

- 2.1 Published in 2012, and most recently revised in December 2023, this document sets out the Government's planning policies for England. It makes the following reference to noise in the section entitled Conserving and enhancing the natural environment:

"180. Planning policies and decisions should contribute to and enhance the natural and local environment by:

[...]

e) 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

- 2.2 It also makes the following references to noise in the Section entitled Ground conditions and pollution:

"191. 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:

a) 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 life⁶⁹;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

[...]

⁶⁹ See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

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

- 2.3 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

- 2.4 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 2.1**:

Table 2.1: Summary of Internal Ambient Noise Levels to be achieved in Habitable Rooms when Assessed in Accordance with BS 8233

Activity	Location	Period	
		07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Night-time
Resting	Living Room	35 dB LAeq, 16 Hour	-
Dining	Dining Room/area	40 dB LAeq, 16 Hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16 Hour	30 dB LAeq, 8 Hour

- 2.5 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or LA_{Fmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise* below.
- 2.6 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

World Health Organisation (WHO) 1999: Guidelines for Community Noise

- 2.7 The World Health Organisation (WHO) guidance: 1999: *Guidelines for Community noise* includes guidance for individual maximum noise events during the night-time. This document draws upon guidance from Vallet and Vernay, which states:

"For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LA_{Fmax} more than 10-15 times per night."

Consultation with Hinckley and Bosworth Borough Council

- 2.8 In January 2022, consultation was undertaken with Mr. Simon Smith, Senior Environmental Health Officer at Hinckley and Bosworth Borough Council via email. A response was received from Mr. Smith on 21st January 2022, agreeing to the methodology.
- 2.9 Following the baseline noise survey, further consultation was undertaken with Mr Smith, where it was also agreed that noise associated with the existing commercial premises

to the south need not to be considered within the assessment as road traffic was dominant during periods of observation.

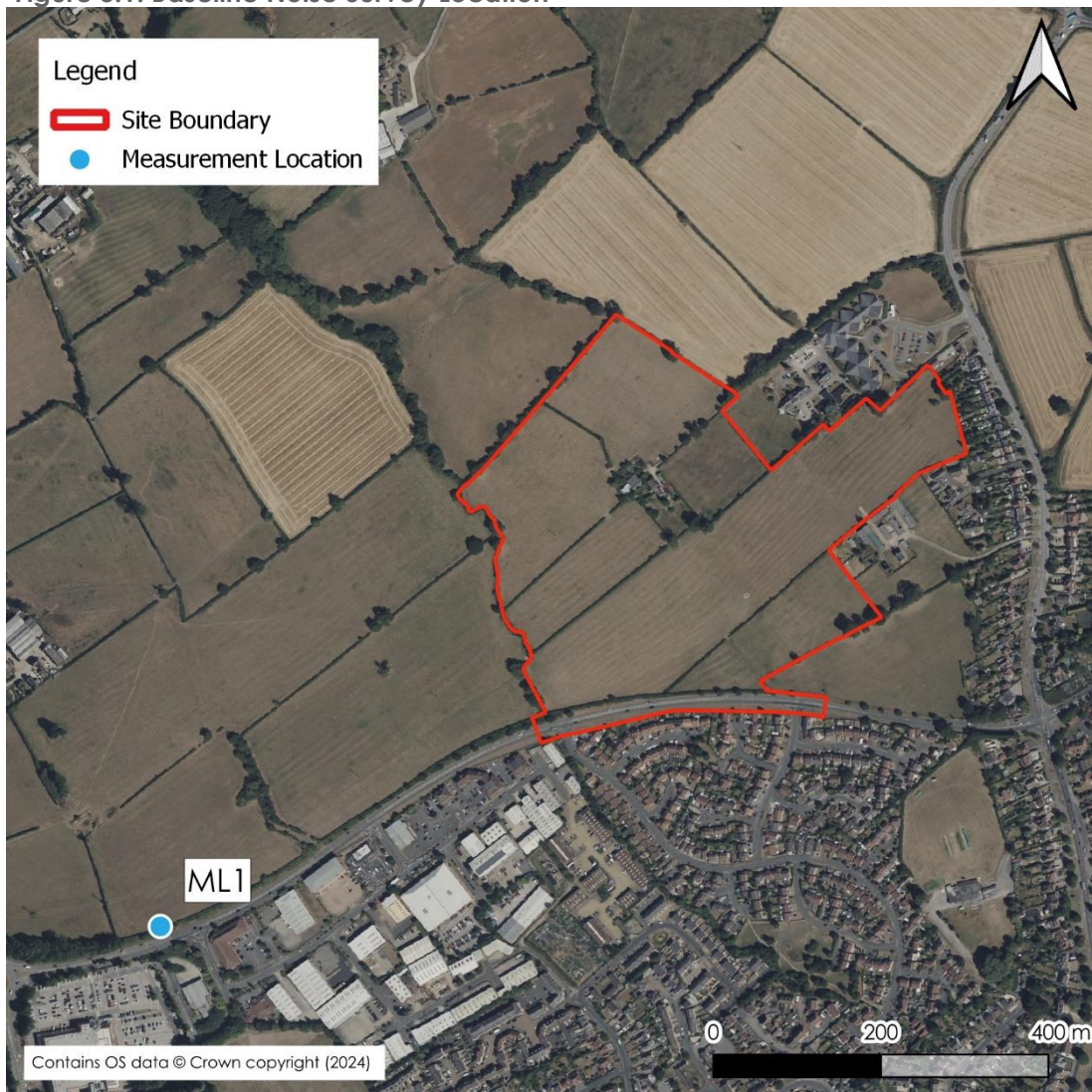
- 2.10 As part of the consultation, Mr Smith noted that should the existing farm remain as an operating premises, consideration should be given to the impact of noise associated with farm operations within the assessment.
- 2.11 Mr Smith provided further correspondence on 18th October 2023 in which he advised that he had been out to the Site to investigate whether plant noise from Hinckley and Bosworth Community Hospital to the north-east would pose a noise constraint. Mr Smith confirmed that having visited the Site, he was satisfied that noise from plant associated with the hospital need not be considered.

3. BASELINE NOISE CONDITIONS

Summary

- 3.1 A baseline noise survey was undertaken to inform the adjacent application in January 2022. The results of which have been utilised to determine noise levels incident on the Site due to road traffic on Normandy Way to the south. The measurement location adopted during the survey is identified in **Figure 3.1**.

Figure 3.1: Baseline Noise Survey Location



Survey Methodology

Noise Measurement Location 1 (ML1)

- 3.2 Noise measurements were undertaken at ML1 over a 24-hour period commencing at 15:00 on Thursday 27th January 2022. The microphone at ML1 was established at 1.8 m above local ground level and at 15 m from nearside kerb edge of Normandy Way to the south. The noise climate at ML1 was dominated by road traffic on Normandy Way.

Measurement Equipment

- 3.3 The baseline noise survey was undertaken using the Class 1 specification noise measurement equipment detailed in **Table 3.1**. Equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meter, pre-amplifier and microphone were calibrated to UKAS standards at an accredited laboratory within the 24 months prior to the measurements. The portable calibrator were calibrated within the 12 months preceding the date of the survey.

Table 3.1: Noise Measurement Equipment

Position	Equipment	Make & Model	Serial Number
ML1	Sound Level Meter	SVAN 971	60745
	Microphone	ACO 7052E	64535
	Preamp	SV18	66815
	Calibrator	B&K DB0311	449050

Meteorological Conditions

The weather throughout the survey remained conducive to environmental noise measurement, it being dry with negligible winds ($<5\text{ms}^{-1}$).

Measurement Results

- 3.4 A summary of measured sound pressure levels at ML1 is presented in **Table 3.2** and **Table 3.3** below. Further details of the survey data is presented in **Appendix B**.

Table 3.2: Summary of Measured Sound Pressure Level at ML1

Period	Start Time	Period (T)	dB L _{Aeq,T}	dB L _{A90,T} ²	dB L _{AFmax} ³
Daytime	27/01/2022 15:00	16-hours	62 ¹	56	-
Night-Time	27/01/2022 23:00	8-hours	56	37	74

¹ logarithmic average L_{Aeq,15mins} noise level between 15:00 – 23:00 on 27/01/22 and between 07:00 – 15:00 on 28/01/22
² arithmetic average L_{A90,15mins} during measurement period
³ 10th highest L_{AFmax} noise levels during measurement period

Table 3.3: Summary of Octave Band Measured Sound Pressure Levels at ML1

Period	Sound Pressure Level (dB) per Octave Band (Hz)							
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Daytime	70	64	60	53	59	56	46	39
Night-Time	63	57	53	45	52	50	40	30

4. ASSESSMENT

- 4.1 The results of the baseline noise survey undertaken in January 2022 have been used as a basis for the noise assessment of the Site's suitability for residential development. The assessment considers noise from road traffic on Normandy Way, which is deemed to be the dominant source of noise across the Site. Whilst noise from road traffic on Ashby Road (A447) to the east may be perceptible, it is not considered to be the most dominant source of noise. This is as a result of the distance between the residential land use areas within the Site and the highway, and the existing properties or business premises which lie to the east of the Site. Therefore, this assessment is focused on residential land use areas nearest to Normandy Way (i.e. the worst-case).
- 4.2 In addition, the assessment gives consideration to potential noise impacts from the nearby existing farm, situated in the centre of the site.
- 4.3 It should be noted that as the layout of proposed dwellings has yet to be determined, this assessment is based on the assumption that dwellings may be located at the extremities of the residential land use areas, nearest to Normandy Way, indicated in **Figure 1.2**. This is considered to present a robust assessment case.

Noise Model

- 4.4 A detailed noise model has been generated in order to calculate the daytime and night-time noise propagation across the Site from road traffic. The following prediction methodologies were adopted for the modelling exercise:
- The noise model was set up to apply the noise prediction methodology set out in the 1988 Department of Transport and the Welsh Office document Calculation of Road Traffic Noise for road traffic noise sources;
 - The noise data collected from ML1 was used to calibrate the road traffic noise sources;
 - Mapping of the Site and the surrounding area was calibrated into the noise model based on known Ordinance Survey grid reference points;
 - Ground topography was approximated using publicly available Lidar Data from DEFRA;
 - Off-site buildings which would provide screening to the Site have been incorporated as reflective façades;
 - To reflect the local ground cover, ground absorption was set to $G = 0.5$ (50% acoustically absorptive ground);
 - The model was set to include second order reflected noise from solid structures;
 - Noise levels in external living areas have been predicted with the grid height set at 1.5 m; and,
 - Incident noise levels at notional windows of habitable rooms have been predicted at 4 m.
- 4.5 The concept masterplan, shown in **Figure 1.2**, has been incorporated into the model, and the free-field levels have been calculated during the daytime and night-time. Noise

contours have been generated showing the free-field noise level in external living areas, across the Site. The predicted noise levels have been used to inform the assessment.

Noise from Road Traffic

External Noise Levels

- 4.6 **Figures 4.1 and 4.2** present the ambient road traffic noise levels during the daytime and night-time, respectively. The daytime noise contour plot shown in **Figure 4.1** indicates that for the majority of the Site, noise levels are likely to be below the recommended upper 'desirable' guideline threshold of 55 dB $L_{Aeq,T}$ in line with BS 8233 and WHO guidance. However, the upper 'desirable' guideline threshold is likely to be exceeded towards the southern boundary in the vicinity of Normandy Way. Therefore, consideration is given to generic forms of mitigation in **Section 5**.

Figure 4.1: Noise Contour Plot without Mitigation, dB $L_{Aeq,16h}$, 1.5m Above Ground

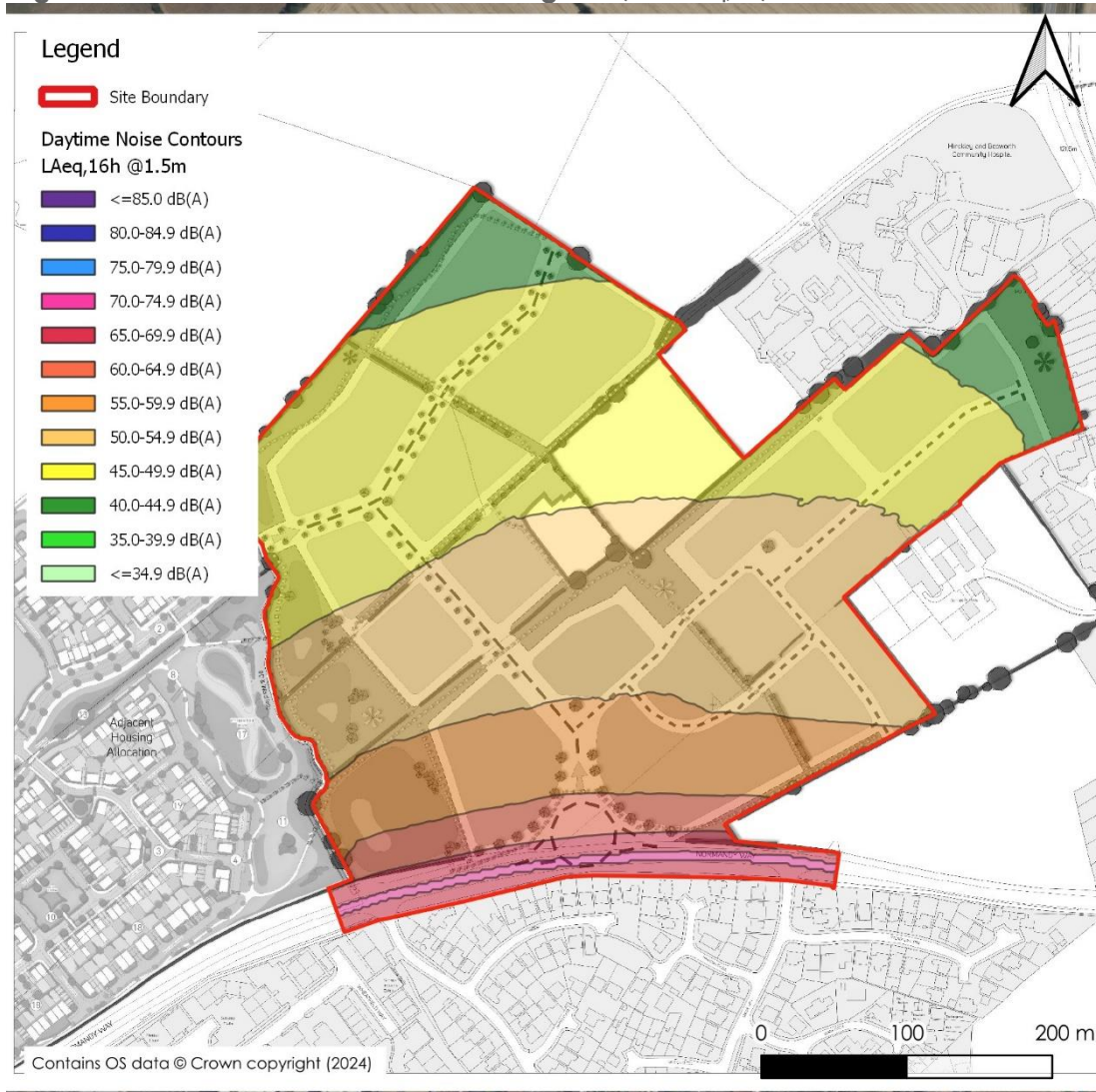
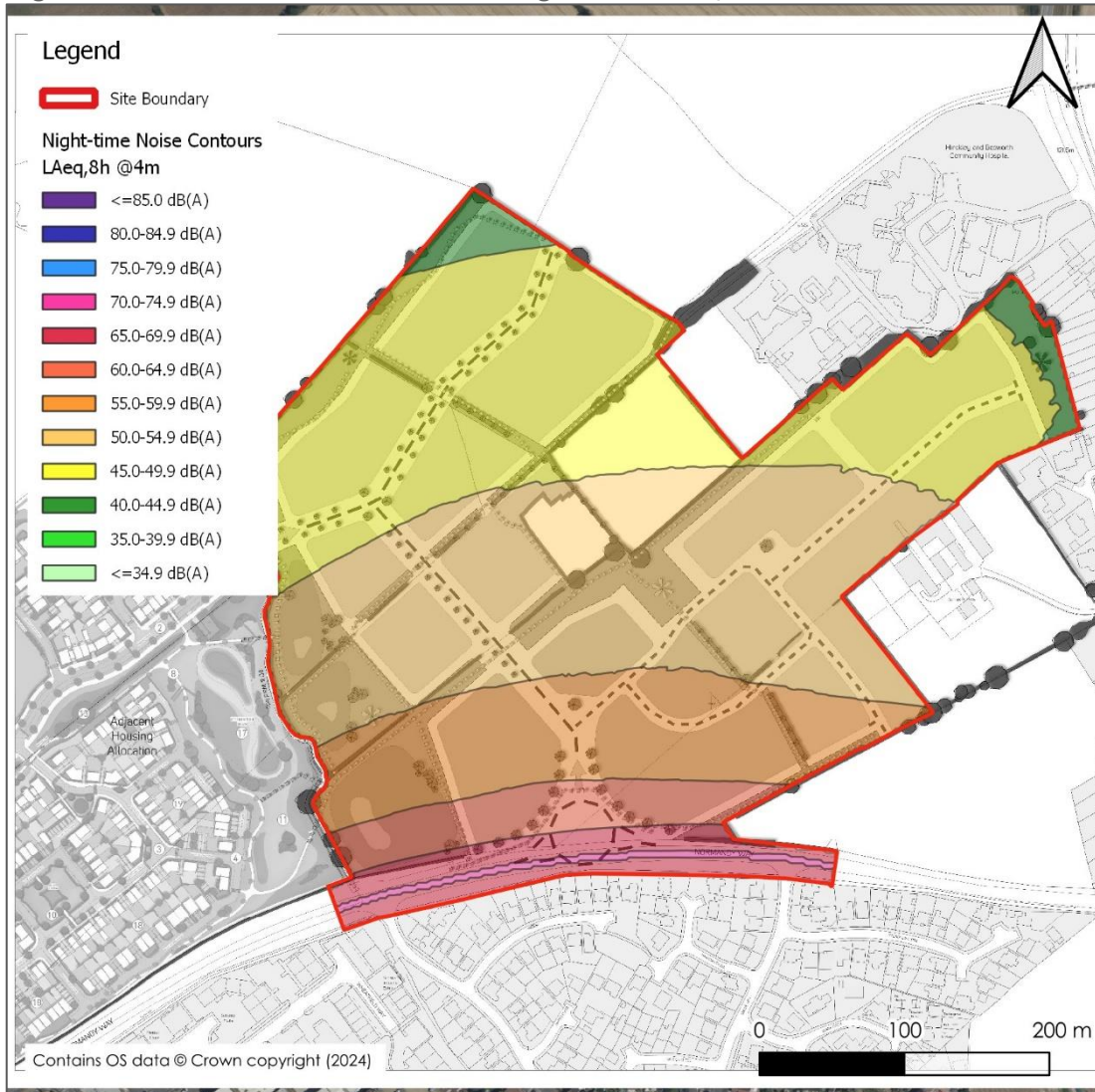


Figure 4:2: Noise Contour Plot without Mitigation, dB LAeq,8h, 4m Above Ground



Internal Noise Levels

- 4.7 The results of the noise modelling indicate that should dwellings be located at the extremity of the residential land use area nearest to Normandy Way, they would be exposed to free-field levels of 64 dB LAeq,16hr and 58 dB LAeq,8hr for daytime and night-time, respectively. The typical LAfmax level has been corrected for distance assuming a point source correction and the free-field level at the notional façade has been predicted as 73 dB. This is based on the 10th highest measured night-time LAfmax level of 74 dB.
- 4.8 Assuming a 15 dB loss through a partially opened window, this would result in internal levels of 49 dB LAeq,16h and 43 dB LAeq,8h for daytime and night-time, respectively. A

partially opened window would also result in an internal level of 58 dB $L_{A_{Fmax}}$ during the night-time. Therefore, the criteria of 35 dB for the daytime and 30 dB and 45 dB for the night-time, are likely to be exceeded, assuming partially opened windows. Consideration has therefore been given to forms of mitigation in Section 5.

Noise from Farm Operations

- 4.9 As the existing farm is situated within the centre of the site, consideration has been given to potential impacts from operations at the premises.
- 4.10 From a review of available information, the farm appears to be solely arable farming and therefore likely to operate on a seasonal basis. As the baseline noise survey was undertaken during the winter months, operations at the farm were not considered to be typical.
- 4.11 To inform the assessment, measured library data of similar operations have been considered. Given the nature of the operations, it is considered likely that the most dominant source of noise will be from vehicle movements within the farm and along the access road. Tractor movements have therefore been considered for both the daytime and night-time periods.
- 4.12 In the absence of specific noise measurements, data for a tractor pass-by is included in **Table 4.1** which is considered to be representative of a tractor travelling along the Site access road.

Table 4.1: Summary of historic HGV pass-by noise data used in assessment

Source	BS 5228 Ref	Pass by dB, $L_{A_{f,max}}$
Tractor towing trailer	C.4, item 75	79

- 4.13 The noise levels from a tractor passby has been calculated using the *Method for mobile plant using a regular well-defined route (e.g. haul roads)* from BS 5228-1:2019+A1:2014¹, which is shown below:

$$SWL = L_{A_{max}@10m} + 28$$

- 4.14 In calculating the level of noise produced by tractor pass-bys on the site access road, two tractor movements have been assumed and vehicle speed of 10mph (16kmph) have been accounted for. The following equation has been used:

$$L_{Aeq,1hr} = L_{WA} - 33 + 10 \log_{10} Q - 10 \log_{10} V - 10 \log_{10} (d) \quad (BS5228-1:2009+A1:2014(F.6)).$$

Where:

L_{WA} sound power level of the plant;

¹ British Standards Institute (2014), British Standard (BS) 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Part 1: Noise

- Q number of vehicles per hour; and
- V average vehicle speed in km/h.
- d distance in m.

- 4.15 **Table 4.2** calculates the level of noise from the farm access road as per the calculation detailed in BS 5228-1:2009+A1:2014. The sound power level used in equation F.6 has been derived from the sound pressure level in **Table 4.1**.

Table 4.2: Calculation of noise level from the access road

Period	L _{WA}	Number of vehicles per period	Average vehicle speed in km/h	Sound pressure level of access road at 10m L _{Aeq,1hr}
Day	107	2	16	55

- 4.16 Based on a buffer distance of 10m, the above indicates that at worst, this would achieve the recommended upper 'desirable' guideline threshold of 55 dB L_{Aeq,T} in line with BS 8233.
- 4.17 Assuming a 15 dB loss through a partially opened window, this would result in internal levels of 40 dB L_{Aeq,1h} for daytime and night-time periods, the criteria of 35 dB for the daytime and 30 dB for the night-time, are likely to be exceeded, assuming partially opened windows.
- 4.18 A partially opened window would also result in an internal level of 64 dB L_{AFmax} during the night-time which would exceed the criteria of 45dB L_{AFmax}. However, given that this criteria should not be exceeded more than 10-15 times per night, and vehicle pass-bys will likely be the only dominant source within the site itself, it is considered unlikely that there would be more than 15 pass-bys during the night-time period. Therefore, the predicted L_{AFmax} level is considered to be acceptable.

5. MITIGATION

- 5.1 In **Section 4**, it has been determined that consideration should be given to mitigation measures for external and internal living areas of the Proposed Development to provide a commensurate level of protection for future occupants.

External Living Areas

- 5.2 To reduce noise levels in external living areas (i.e. garden spaces) to within acceptable limits, it is recommended that gardens are placed on the screened side of dwellings (i.e. on the opposite side of the dwellings to Normandy Way). Where other design constraints do not allow for this, it is considered likely that mitigation in the form of localised acoustic barriers will be required, which remove line of sight to the road, as a minimum. It is widely accepted that a barrier of sufficient mass and which removes line of sight to the noise source will provide a reduction of approximately 10 dB. The barriers must extend from ground level to at least the specified height, be solid i.e., imperforate and have a minimum superficial mass of 15kg/m². Any penetrations or junctions should be treated to maintain acoustic integrity.

Internal Living Areas

- 5.3 It is widely considered that first amelioration measures available to an occupant will be to close windows. Therefore, in order to assess the mitigation required to ensure an adequate level of protection against noise, it is appropriate to explore the protection that could be afforded by the sound insulation performance of the external building fabric, in particular the glazing elements. As previously stated, the calculations are based on the assumption that dwellings are located at the extremity of the residential land use area nearest to Normandy Way and 10m back from the farm access road
- 5.4 Noise break-in calculations have been undertaken in accordance with the rigorous method from section G.2 from BS 8233 based on the frequency spectra measured on-site, BS5228 frequency spectra for a tractor and the following assumptions:
- Façade make up of 2x103 mm brick (75 mm gap + plast);
 - Room dimensions (W3 m x L4 m x H2.5 m) and window sizes (30% window, 70% wall);
 - Glazing area of 2.5 m²;
 - A reverberation time of 0.5 seconds; and,
 - A single 2500 mm² ventilator per habitable room.
- 5.5 The break-in calculations have been undertaken for the 1st floor, to provide a worst-case scenario.

Noise from Road Traffic

- 5.6 To achieve the daytime internal noise criterion of 35 dB L_{Aeq,16h} adopted for this assessment, based on the façade closest to Normandy Way experiencing 64 dB L_{Aeq,16h} free-field at the facade, a reduction of 29 dB(A) would be required for habitable rooms. To achieve the internal criteria of 30 dB L_{Aeq,8h} and 45 dB L_{AFmax} during the night-time,

adopted for this assessment, a reduction of up to 28 dB(A) would be required for habitable rooms.

- 5.7 For a notional worst-case facade facing onto Normandy Way, all criteria are likely to be achieved with double glazing which would need to provide a minimum acoustic performance of $R_w + C_{tr}$ of 33 dB (example configuration: 8mm pane / 12mm airgap / 10mm pane). For the provision of ventilation, acoustic ventilators which achieve a minimum acoustic performance of $D_{n,e,w} + C_{tr}$ 40 dB are likely to be required.
- 5.8 It is anticipated that for any other dwellings set further back from Normandy Road, the acoustic performance requirements stated above would also be sufficient.

Noise from Farm Operations

- 5.9 To achieve the daytime internal noise criterion of 35 dB $L_{Aeq,T}$ adopted for this assessment, based on the façade closest to the farm access road 55 dB $L_{Aeq,1h}$ free-field at the facade, a reduction of 20 dB(A) would be required for habitable rooms. To achieve the internal criteria of 30 dB $L_{Aeq,1h}$ during the night-time, adopted for this assessment, a reduction of up to 25 dB(A) would be required for habitable rooms.
- 5.10 For a notional worst-case façade 10m from the farm access road, all criteria are likely to be achieved with double glazing which would need to provide a minimum acoustic performance of $R_w + C_{tr}$ of 27 dB (example configuration: 6mm pane / (6-16) mm airgap / 4mm pane). For the provision of ventilation, acoustic ventilators which achieve a minimum acoustic performance of $D_{n,e,w} + C_{tr}$ 36 dB, such as the Greenwood 2500EA are likely to be required.

6. CONCLUSION AND RECOMMENDATIONS

- 6.1 BWB Consulting Ltd was appointed by Richborough Estates Ltd to undertake an environmental noise assessment for phase 2 of a proposed residential development at Hinckley North, Hinckley.
- 6.2 This assessment has been undertaken based on the results of a baseline noise survey undertaken in January 2022. The assessment has been undertaken in accordance with current standards and guidance, following consultation with Hinckley and Bosworth Borough Council.
- 6.3 At this stage, the exact layout of the dwellings within the Proposed Development has yet to be determined. Consequently, this noise assessment demonstrates the feasibility of the Site for residential use, by assuming dwellings would be located at the closest point within the demarcated residential land use areas to the dominant noise source (i.e. Normandy Way).
- 6.4 To sufficiently reduce the road traffic noise in external living areas which may be located in the vicinity of Normandy Way, it is recommended that gardens are placed on the screened side of dwellings (i.e. on the opposite side of the dwellings to Normandy Way). Where this is not possible, it is considered likely that mitigation in the form of localised acoustic barriers will be required, which remove line of sight to the road, as a minimum.
- 6.5 For dwellings which would be set further back from both the road (i.e. located further into the development), it is likely that a significant amount of screening would be afforded by the development itself. For any such dwellings, the proposed mitigation requirements set out above may be reduced.
- 6.6 For a notional worst-case façade facing onto Normandy Way, all criteria are likely to be achieved with double glazing which would need to provide a minimum acoustic performance of $R_w + C_{tr}$ of 33 dB (example configuration: 8mm pane / 12mm airgap / 10mm pane). For the provision of ventilation, acoustic ventilators which achieve a minimum acoustic performance of $D_{n,e,w} + C_{tr}$ 40 dB are likely to be required.
- 6.7 For a notional worst-case façade 10m from the farm access road, all criteria are likely to be achieved with double glazing which would need to provide a minimum acoustic performance of $R_w + C_{tr}$ of 27 dB (example configuration: 6mm pane / (6-16) mm airgap / 4mm pane). For the provision of ventilation, acoustic ventilators which achieve a minimum acoustic performance of $D_{n,e,w} + C_{tr}$ 36 dB, such as the Greenwood 2500EA are likely to be required.
- 6.8 Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10 ⁻⁵ Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L _{Aeq,T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L _{Amax}	L _{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L ₁₀ and L ₉₀	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L _n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time, and the L ₉₀ is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX B: Full Survey Results

Figure B1: Measurement Results from ML1

