

ADVISORY

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Land at Pendle Road
Clitheroe
Noise Impact Assessment

255496

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EXECUTIVE SUMMARY

BWB Consulting (BWB) was instructed by Richborough (the Client) to carry out a Noise Impact Assessment to support an outline planning application for a residential development at Land at Pendle Road, Clitheroe.

The assessment is based on the Department for Environmental Food and Rural Affairs (DEFRA) strategic noise mapping and has been undertaken in accordance with current standards and guidance, following consultation with Ribble Valley Borough Council (RVBC).

As the exact location of the dwellings is unknown at this time, mitigation has been suggested in outline terms only. It is considered that the internal and external noise levels could meet the requirements of BS 8233 with appropriate mitigation in place.

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

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APPENDICES

APPENDIX A: Glossary of Acoustic Terms

1. INTRODUCTION

Instruction

- 1.1 BWB Consulting (BWB) was instructed by Richborough (the Client) to undertake a Noise Impact Assessment in support of an outline planning application for a residential development on Land at Pendle Road (the Site). This project will consist of up to 200 residential dwellings.
- 1.2 This assessment has been undertaken based on Department for Environmental Food and Rural Affairs (DEFRA) strategic noise mapping. Noise impact on the proposed development has been assessed in accordance with current standards and guidance, following consultation with Ribble Valley Borough Council (RVBC).
- 1.3 Where appropriate, consideration has been given to noise mitigation measures in outline terms to reduce noise levels at proposed noise sensitive receptors.
- 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 is located on Land at Pendle Road, Clitheroe, within the administrative area of RVBC and currently comprises open farmland. The Site is bound to the north by open farmland; to the east by an un-named road with open land and the A59 beyond; to the south by Pendle Road with existing dwellings beyond; and to the west by High Moor Road, an isolated existing dwelling, and open farmland beyond.
- 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 comprises the outline application for up to 200 residential dwellings on Land at Pendle Road, Clitheroe. The Illustrative Development Framework Plan is shown below in **Figure 1.2**.

Figure 1.2: Illustrative Development Framework Plan



Drawing by Pegasus Group. DRWG: P25-2353_DE_002_01 Rev: E

2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

- 2.1 Published in December 2024, 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:

"187. 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:

"198. 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 impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁷²;

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.

⁷² 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 and office 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** below:

Table 2.1: Summary of Internal Ambient Noise Levels to be Achieved in Habitable Rooms

Activity	Location	Internal noise level criteria ($L_{Aeq,T}$, dB)	
		Daytime (07:00 - 23:00hrs)	Night-time (23:00 - 07:00hrs)
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30

- 2.5 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of Sound Exposure Level (SEL) or L_{AFmax} 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.
- 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 $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ 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 L_{AFmax} more than 10-15 times per night"

Approved Document O (Overheating Mitigation)

- 2.8 This document provides guidance on how to comply with Part O of the building regulations. The aim of Part O of the building regulations is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures. Approved Document O (AD-O) provides guidance on how to comply with Part O of the building regulations and applies to new residential development only.
- 2.9 Paragraphs 3.2 and 3.3 of AD-O refer to noise within bedrooms at night. It is considered that the intention is to manage the impact from sound generated from all non-natural

sources. Sources such as road, rail and air traffic, sources of an industrial or commercial nature, and sounds arising from entertainment venues are all within scope.

2.10 Paragraph 2.10 of AD-O lists the means for removing excess heat as:

- “Opening Windows
- Ventilation louvres in external walls
- A mechanical ventilation system
- A mechanical cooling system”

2.11 Paragraph 3.2 of AD-O states:

“In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take into account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).”

2.12 Paragraph 3.3 of AD-O states:

“Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

(a) 40 dB $L_{Aeq,T}$ averaged over 8 hours (between 11pm and 7am).

(b) 55 dB L_{AFmax} more than 10 times a night (between 11pm and 7am).”

2.13 The document goes on to state that ventilators and windows should be open as required based on the overheating mitigation strategy. Where there is a natural ventilation strategy using open windows, the extent to which windows will need to be opened will depend on the physical arrangement, environmental conditions, and the number of room occupants, as determined in the CIBSE TM59 dynamic thermal modelling.

2.14 The Association of Noise Consultants (ANC) issued a guide in November 2024 entitled “Approved Document O Noise Guide”.

2.15 Table 1 of this guidance document is replicated in **Table 2.2** and defines the noise levels at moderate and high-risk locations when considering the simplified assessment method.

Table 2.2: Noise Levels Using the Simplified Method

Parameter	High Risk Location	Moderate Risk Location
$L_{Aeq, 8h}$ averaged over 8 hours (between 11pm and 7am)	45 dB	50 dB
L_{AFmax} more than 10 times a night (between 11pm and 7am)	60 dB	65 dB

- 2.16 For clarity, the above table suggests that the sound insulation performance of the external building fabric when a window is open wide enough to comply with the guidance in AD-O, is only in the region of 5 dB for high risk locations (where the opening is larger), and 10 dB for moderate risk locations (where the required window opening is smaller).
- 2.17 Where the simplified method cannot be used, dynamic thermal modelling is required following the procedures of CIBSE TM59. The equivalent area of the open windows required to mitigate overheating determined through thermal modelling can then be used to determine internal noise levels and compare against the AD-O acoustic criteria.

Ribble Valley Borough Council Local Policy

- 2.18 A review of the RVBC Local Plan 2008-2028 found no relevant noise policies to this application.

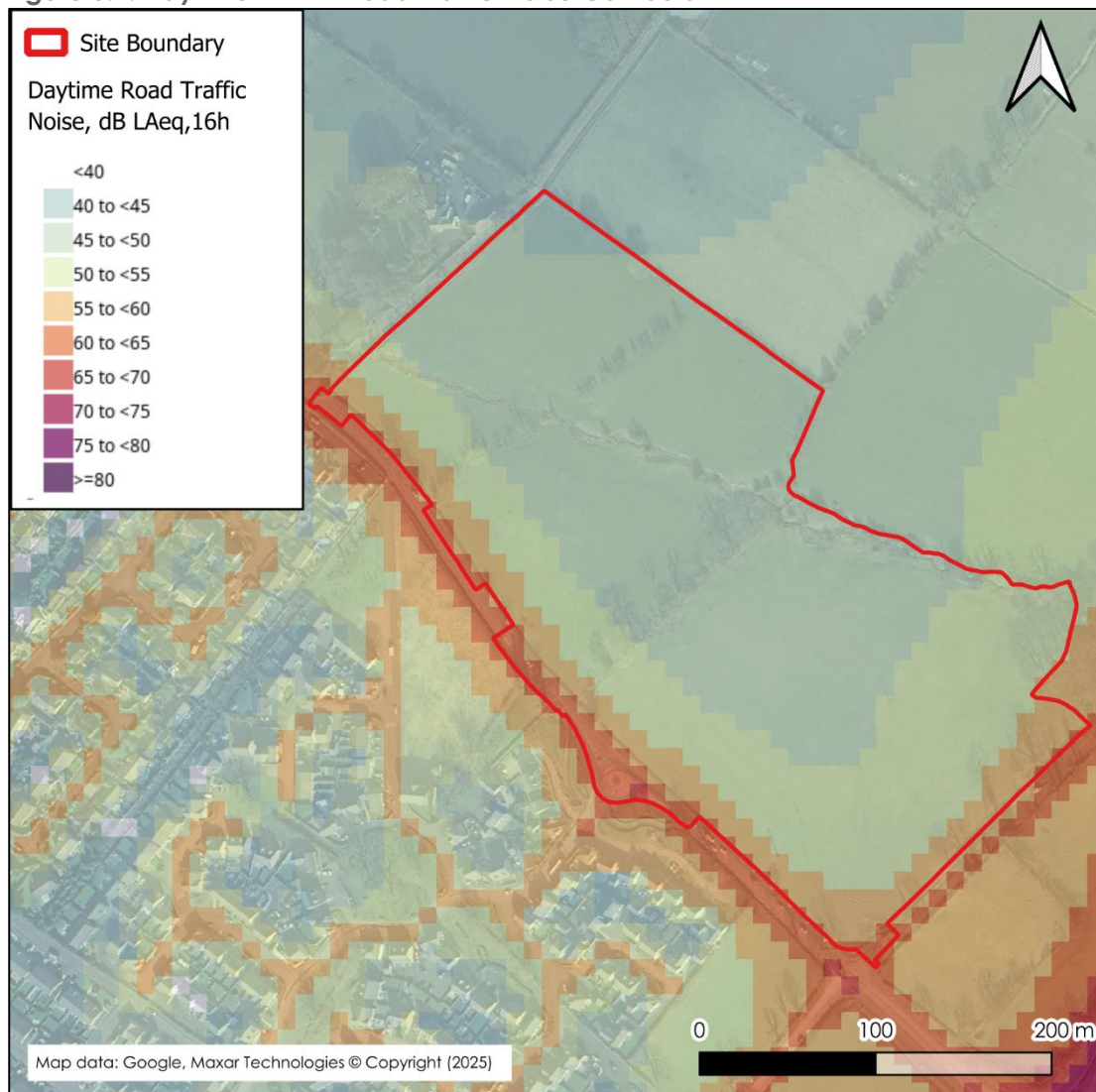
Consultation with Ribble Valley Borough Council

- 2.19 A consultation request was sent to Mr Dent, Head of Environmental Health at RVBC via email on 16th October 2025. An overview of the proposed survey and assessment methodology is detailed below:
- Determine noise from road traffic at proposed noise sensitive receptors using DEFRA Strategic Noise Mapping;
 - Undertake a noise assessment in accordance with BS8233:2014;
 - Undertake an assessment of internal noise levels against the requirements in Approved Document O and good practice guidance in the Association of Noise Consultants Approved Document O Noise Guide (2025); and
 - Where appropriate, noise mitigation measures will be considered, in outline terms only, to reduce noise to within acceptable levels at proposed noise sensitive receptors.
- 2.20 Mr Dent replied via email on 23rd October 2025 agreeing with the proposed scope and methodology.

3. EXISTING NOISE CLIMATE

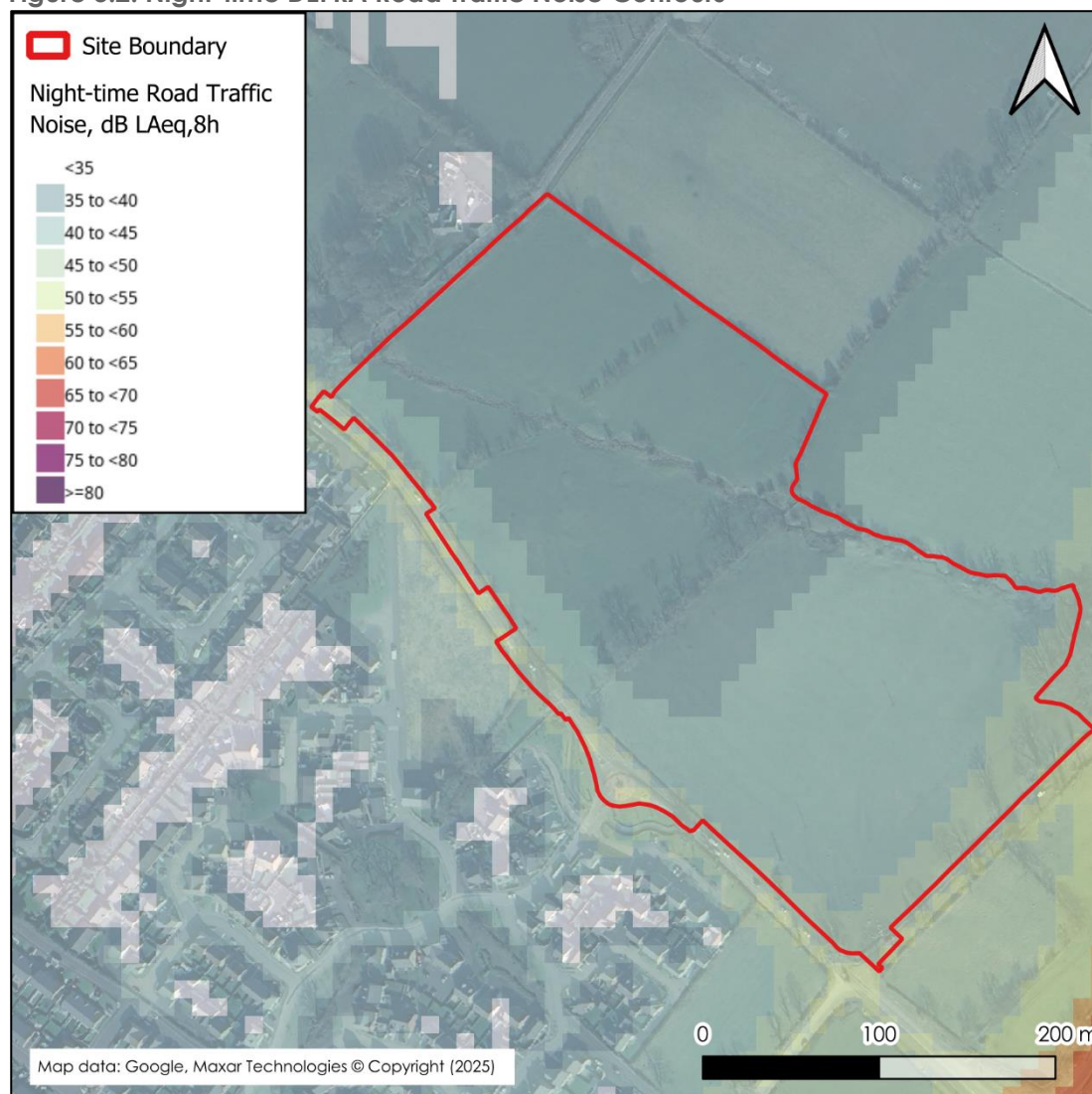
- 3.1 DEFRA strategic noise mapping has been gathered for the Site and is summarised in this section. The noise levels are calculated on a 10x10 m grid at a receptor height of 4 m above local ground.
- 3.2 **Figure 3.1** and **Figure 3.2** show the daytime (07:00-23:00 hours) and night-time (23:00-07:00 hours) DEFRA noise maps respectively for all roads in the vicinity of the Site.

Figure 3.1: Daytime DEFRA Road Traffic Noise Contours



- 3.3 The daytime DEFRA road traffic noise contours shown in **Figure 3.1** indicate that the majority of the Site will experience road traffic noise levels below 55 dB LAeq,16h with a large portion of the Site experiencing levels below 50 dB LAeq,16h. A small portion of the Site is expected to experience levels up to 65 dB LAeq,16h along the southern and eastern boundaries.

Figure 3.2: Night-time DEFRA Road Traffic Noise Contours



- 3.4 The night-time DEFRA road traffic noise contours shown in **Figure 3.2** indicate that the majority of the Site will experience road traffic noise levels below 45 dB LAeq,8h with a large portion of the Site experiencing levels below 40 dB LAeq,8h. A small portion of the Site is expected to experience levels up to 50 dB LAeq,8h along the eastern boundary.

Representative LAfmax Levels

- 3.5 As the DEFRA strategic road traffic noise mapping does not incorporate LAfmax levels, this assessment has been undertaken utilising the results of baseline noise surveys completed previously by BWB Consulting. Noise measurements were undertaken of roads with similar speed and traffic flow characteristics as Pendle Road to the south and the A59 to the east.
- 3.6 **Figure 3.1** shows the night-time LAfmax levels measured previously by BWB Consulting, representative of Pendle Road and the A59.

Table 3.1: Representative L_{AFmax} Levels

Road	Representative Night-time L_{AFmax} ¹
Pendle Road	62 ²
A59	74 ³
¹ 10 th highest L_{AFmax} level at 5 minute resolution ² Measured at 9 m from the nearside kerb. ³ Measured at 13 m from the nearside Kerb	

4. ASSESSMENT

- 4.1 This assessment considers noise from road traffic on Pendle Road to the south and the A59 to the east of the proposed development on proposed noise sensitive receptors.
- 4.2 As the application is in outline and the masterplan has not been fixed, the following assessment is based on notional receptors located 10 m from the Site boundary to the A59 to the east and Pendle Road to the south. **Figure 4.1** and **Figure 4.2** show the 10 m buffer from the Site boundary against the daytime and night-time DEFRA road traffic noise contours.

Figure 4.1: Daytime DEFRA Road Traffic Noise Contours with 10 m Site Boundary Buffer

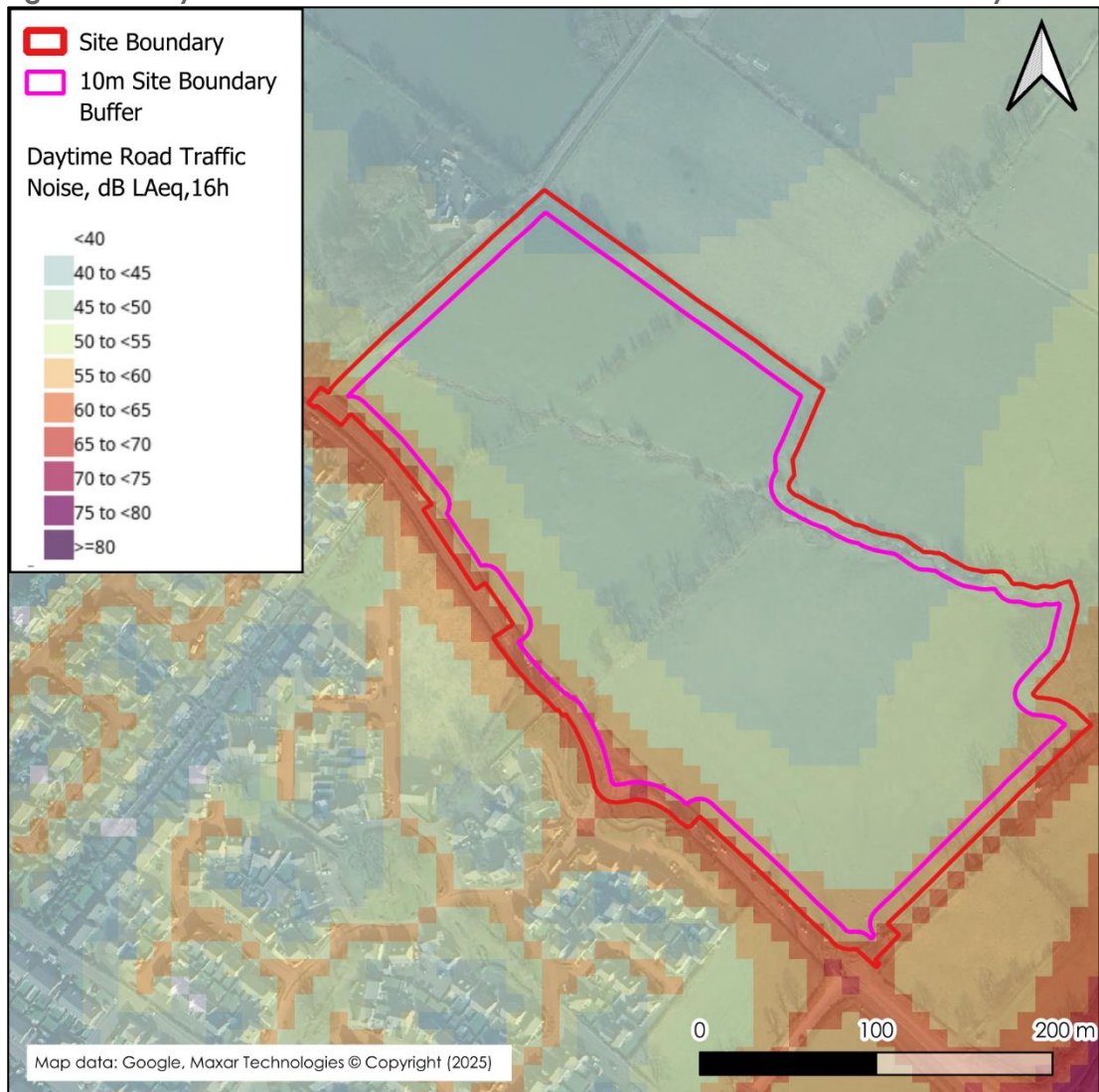
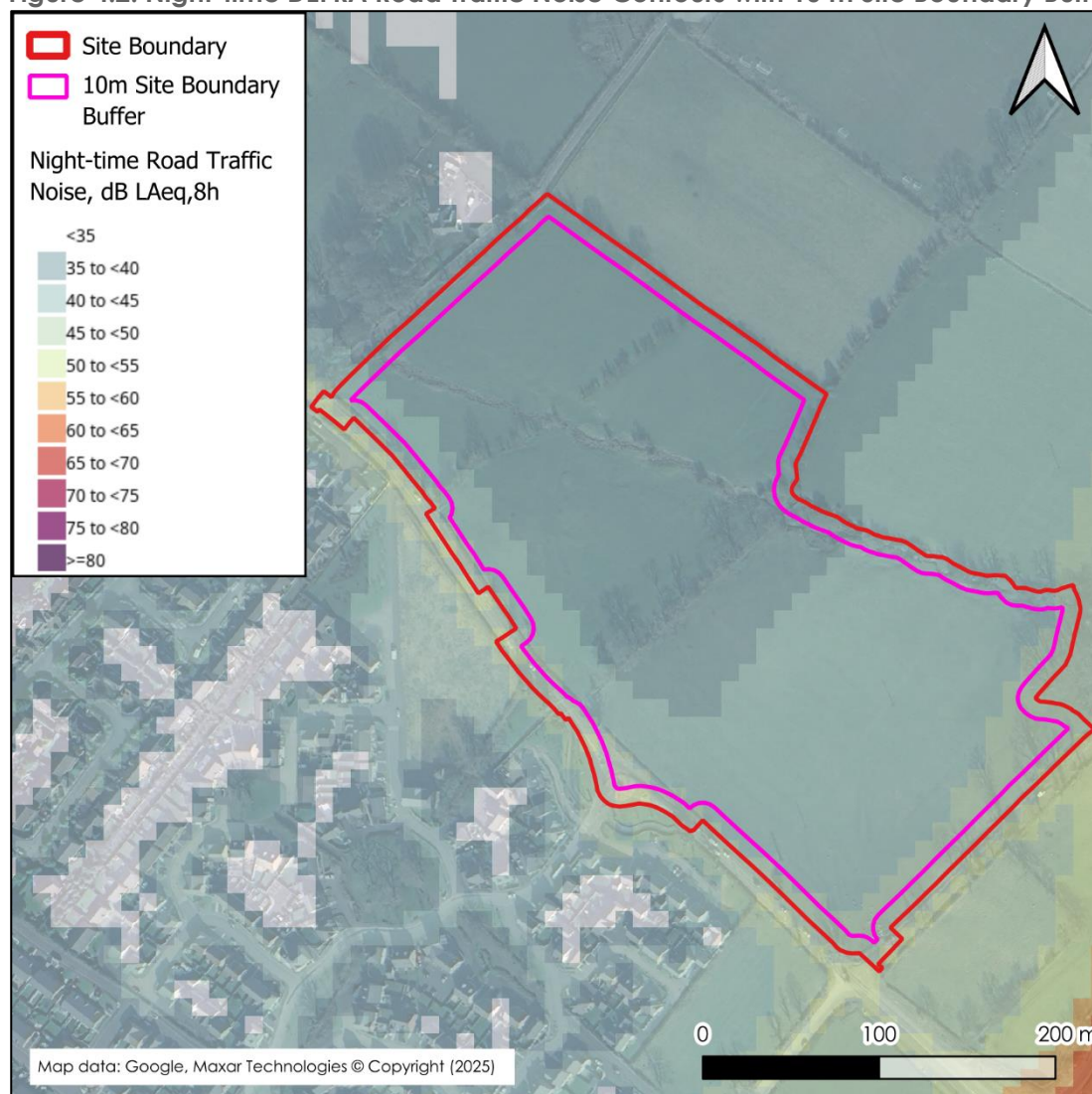


Figure 4.2: Night-time DEFRA Road Traffic Noise Contours with 10 m Site Boundary Buffer



4.3 **Table 4.1** and **Table 4.2** show the highest expected road traffic noise levels at 10 m from the Site boundary to the A59 to the east and Pendle Road to the South respectively.

Table 4.1: Highest Expected Road Traffic Noise levels from the A59, 10 m from the Eastern Boundary

Period	dB LAeq,16h	dB LAfmax ¹
Daytime	60	-
Night-time	50	61

¹ Representative measured LAfmax levels corrected for distance using simple point source attenuation calculation

Table 4.2: Highest Expected Road Traffic Noise levels from the Pendle Road, 10 m from the Southern Boundary

Period	dB L _{Aeq,16h}	dB L _{AFmax} ¹
Daytime	60	-
Night-time	45	59
¹ Representative measured L _{AFmax} levels corrected for distance using point source attenuation		

External Daytime Noise Levels

- 4.4 The DEFRA strategic road traffic noise mapping indicates that the noise level at 10 m from the Site boundary to the east and to the south is up to 60 dB L_{Aeq,16h} during the daytime which is above the upper guideline value of 55 dB L_{Aeq,16h} recommended in BS8233 and WHO Guidance for external amenity areas. Therefore, mitigation will be required to reduce noise levels in outdoor living areas located closest to the A59 to the east and Pendle Road to the South. Consideration to mitigation is given in **Section 5**.
- 4.5 For the majority of the Site, further from the A59 and Pendle Road, noise levels are expected to be below the upper guideline value of 55 dB L_{Aeq,16h} and a large area of the Site is expected to be below the desired guideline value of 50 dB L_{Aeq,16h}. Therefore, mitigation will not be required for proposed dwellings located further from the east and south Site boundary.

Internal Noise Levels

East Boundary

- 4.6 The DEFRA strategic road traffic noise mapping indicates that the noise level at 10 m from the Site boundary to the east, closest to the A59 is up to 60 dB L_{Aeq,16h} and 50 dB L_{Aeq,8h} during the daytime and night-time respectively. The night-time L_{AFmax} level is expected to be 61 dB.
- 4.7 Assuming a 15 dB loss through a partially opened window, this would result in internal noise levels of 45 dB L_{Aeq,16h} and 35 dB L_{Aeq,8h} for daytime and night-time, respectively. A partially opened window would also result in an internal noise level of 46 dB L_{AFmax} during the night-time. Therefore, the daytime criteria of 35dB L_{Aeq,16h} and night-time criteria of 30dB L_{Aeq,8h} and 45dB L_{AFmax} are likely to be exceeded for dwellings closest to the A59 to the east, assuming partially opened windows. Consideration has been given to mitigation in **Section 5**.

South Boundary

- 4.8 The DEFRA strategic road traffic noise mapping indicates that the noise level at 10 m from the Site boundary to the south, closest to Pendle Road, is up to 60 dB L_{Aeq,16h} and 45 dB L_{Aeq,8h} during the daytime and night-time respectively. The night-time L_{AFmax} level is expected to be 59 dB.
- 4.9 Assuming a 15 dB loss through a partially opened window, this would result in internal noise levels of 45 dB L_{Aeq,16h} and 30 dB L_{Aeq,8h} for daytime and night-time, respectively. A

partially opened window would also result in an internal noise level of 44 dB L_{AFmax} during the night-time. Therefore, the daytime criteria of 35 dB $L_{Aeq,16h}$ is likely to be exceeded for dwellings closest to Pendle Road to the south, assuming partially opened windows. Consideration has been given to mitigation in **Section 5**.

Overheating

- 4.10 Consideration has been given to the balance between habitable noise levels within internal spaces and thermal comfort. This assessment is based on guidance set out in AD-O, the ANC "Approved Document O Noise Guide" and the predicted noise levels at the facades of proposed receptors.
- 4.11 As this is a medium risk location as defined in AD-O, the resulting outside-to-inside level difference for window openings necessary to satisfy the simplified method of AD-O is expected to be 10 dB in line with the guidance in the ANC "Approved Document O Noise Guide".
- 4.12 Therefore, to show the adopted criteria as stated in AD-O is achieved using the simplified method, the noise level at the facade of proposed properties should not exceed the following during night-time:
 - a. 50 dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
 - b. 65 dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).
- 4.13 Based on the DEFRA strategic road traffic noise mapping and the measured representative L_{AFmax} levels closest to the Site boundary to the east and west, these criteria are achieved. This suggests that openable windows could be a viable strategy for mitigating overheating without compromising the internal acoustic environment. However, confirmation of the overheating mitigation strategy requires completion of a simplified overheating assessment.

5. MITIGATION

- 5.1 In **Section 4**, it has been determined that consideration should be given to mitigation measures to protect the amenity of sensitive receptors associated with the proposed development.

External Noise Levels

- 5.2 To reduce the noise impact at proposed dwellings and gardens nearest to the east and south boundary to within acceptable levels, it is recommended that gardens are located on the screened side of dwellings in the first instance.
- 5.3 Should gardens face onto Pendle Road or towards the A59, then localised acoustic barriers will likely be required around garden areas. It is widely accepted that an acoustic barrier which removes line of sight to the road will provide a reduction of around 10 dB.
- 5.4 Localised barriers should have a minimum surface density of 15kg/m² and form a continuous unbroken barrier with no gaps at the bottom. This could be achieved with a suitably designed close boarded timber fence meeting this minimum specification. The exact height, location and extent of any barriers, if required, can be determined once plans reach a more detailed stage.

Internal Noise Levels

- 5.5 In order to assess the noise mitigation required to ensure an adequate level of protection against noise, it is appropriate to explore in the first instance the protection that could be afforded by the sound insulation performance of the external building fabric, and in particular the glazing elements.
- 5.6 Detailed 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 in BS EN 1793-3:1998¹ and the following assumed dimensions and assumptions;
- Room dimensions of 3m (width) x 2.5m (depth) x 2.5m (height);
 - Double glazed window dimensions of 1.2m (width) x 1.2m (height);
 - External building fabric elements shall achieve a sound reduction performance of at least $R_w + C_{tr}$ 48dB;
 - A reverberation time of 0.5 seconds; and
 - Assumed ventilator(s) provide an equivalent area of 8000mm² per habitable room, in accordance with Approved Document F.
- 5.7 As this assessment is based on DEFRA Strategic Noise Mapping and no baseline noise survey has been undertaken on the proposed Site, the break-in calculations are based on the normalised road traffic noise spectrum given in BS EN 1793-3:1998¹. The frequency

¹ British Standard BS EN 1793-3:1998 Road Traffic Noise Reducing Devices – Test Method for Determining the Acoustic Performance: Part 3. Normalised Traffic Noise Spectrum

spectra, and correction to reflect road traffic noise levels at the Site can be seen in **Table 5.1** and **Table 5.2** for the east and south boundaries respectively.

Table 5.1: Road Traffic Noise Frequency Spectra Along the East Boundary

	Octave Band Sound Pressure Levels (L_{eq} dB)						dB (A)
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
Normalized traffic noise spectrum	2.0	-1.4	-3.9	-3.8	-7.5	-12.4	-
Corrected daytime ($L_{eq,16h}$) ¹	59.0	55.6	53.1	53.2	49.5	44.6	60
Corrected night-time ($L_{eq,16h}$) ¹	49.0	45.6	43.1	43.2	39.5	34.6	50
Corrected night-time (L_{AFmax}) ¹	60.0	56.6	54.1	54.2	50.5	45.6	61
¹ BE EN 1793-3:1998 normalised traffic noise spectrum adjusted to reflect the expected road traffic noise levels along the A59 to the east.							

Table 5.2: Road Traffic Noise Frequency Spectra Along the South Boundary

	Octave Band Sound Pressure Levels (L_{eq} dB)						dB (A)
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
Normalized traffic noise spectrum	2.0	-1.4	-3.9	-3.8	-7.5	-12.4	-
Corrected daytime ($L_{eq,16h}$) ¹	59.0	55.6	53.1	53.2	49.5	44.6	60
Corrected night-time ($L_{eq,16h}$) ¹	44.0	40.6	38.1	38.2	34.5	29.6	45
Corrected night-time (L_{AFmax}) ¹	58.0	54.6	52.1	52.2	48.5	43.6	59
¹ BE EN 1793-3:1998 normalised traffic noise spectrum adjusted to reflect the expected road traffic noise levels along Pendle Road to the south.							

East Boundary

- 5.8 To achieve the daytime internal noise criterion of 35 dB $L_{Aeq,16h}$ adopted for this assessment, based on a façade closest to the A59 to the east experiencing 60 dB $L_{Aeq,16h}$ free-field at the facade, a reduction of 25 dB 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 20 dB would be required for habitable rooms.

South Boundary

- 5.9 To achieve the daytime internal noise criterion of 35 dB $L_{Aeq,16h}$ adopted for this assessment, based on a façade closest to Pendle Road to the south experiencing 60 dB $L_{Aeq,16h}$ free-field at the facade, a reduction of 25 dB 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 15 dB would be required for habitable rooms.
- 5.10 For dwellings located closest to both the east and south boundaries, all internal criteria would be achieved with double glazing (example configuration: 4mm/(6-16mm)/4mm), which would need to provide a minimum sound insulation performance of $R_w + C_{tr}$ of 25dB. Two acoustic trickle ventilators, which each achieve a minimum sound insulation performance of $D_{n,e,w} + C_{tr}$ 33 dB, such as the Greenwood 5000EA, would be required.
- 5.11 The octave band sound reduction index levels for the specified glazing and ventilation is provided in **Table 5.3** and **Table 5.4** below.

Table 5.3: Advised Glazing Specifications

Product	Octave Band Sound Reduction (SRI) (L_{eq} dB)								$R_w + C_{tr}$ (dB)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
4mm/(6-16mm)/4mm Double glazing	17	21	17	25	35	37	31	36	25

Table 5.4: Advised Ventilation Specifications

Product	Octave Band Level Difference for Ventilators ($D_{n,e}$ dB)								$D_{n,e,w} + C_{tr}$ (dB)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Greenwood 5000EA	34	40	37	36	32	31	34	34	33

- 5.12 For dwellings that are located further back into the Site that benefit from screening provided by the development itself, it is likely that standard double glazing and ventilation will be sufficient to mitigate noise to acceptable levels.
- 5.13 The above presents solutions to satisfy the proposed internal ambient noise limits within habitable room during normal ventilation conditions.
- 5.14 **Table 5.3** shows the resultant internal noise levels at the notional receptor, with mitigation in place.

Table 5.3: Predicted external and internal noise levels with mitigation, dB

Location	Predicted External Noise Level, free-field			Resultant Internal Noise Level		
	L _{Aeq,16h}	L _{Aeq,8h}	L _{AFmax}	L _{Aeq,16h}	L _{Aeq,8h}	L _{AFmax}
East Boundary	60	50	61	35	25	36
South Boundary	60	45	59	35	20	34

- 5.15 It is considered that with the suggested mitigation and the above specifications, internal and external rating levels will be within the BS8233 internal and external noise criterion. Therefore, impacts from noise associated with road traffic noise will be low in context.
- 5.16 The final glazing and ventilation schedule should be finalised on a plot-by-plot basis at the appropriate design stage by a qualified acoustician, once the final internal layouts and glazing areas for each room are known.

6. CONCLUSIONS

- 6.1 BWB Consulting (BWB) was instructed by Richborough to carry out a Noise Impact Assessment to support an outline planning application for a residential development at Land at Pendle Road, Clitheroe.
- 6.2 The assessment is based on the DEFRA strategic road traffic noise mapping data and has been undertaken in accordance with current standards and guidance, following consultation with RVBC.
- 6.3 As the exact location of the dwellings is unknown at this time, mitigation has been suggested in outline terms only. It is considered that the internal and external noise levels could meet the requirements of BS 8233 with appropriate mitigation in place.
- 6.4 Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development.

APPENDICES

APPENDIX A: Glossary of Acoustic 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.
Sound Power Level, L _w	logarithm of the ratio of a given sound power to the reference sound power. Such power level in decibels is ten times the logarithm to the base ten of the ratio. unless otherwise specified, the reference sound power is 1 pW. Sound power is the total sound energy radiated by a sound source and measured in watts (W). Sound power level
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.
R/R _w	R is the laboratory measurement of the sound insulating properties of a material or building element in a stated frequency band R _w is the weighted Sound Reduction Index a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies, based on laboratory measurements.
D _{ne} /D _{ne,w}	D _{ne} is the laboratory measured level difference of a building element which has been normalised to a referenced absorption of 10m ² . D _{ne,w} is the weighted element-normalised level difference. This is a single number quantity which characterises the airborne sound insulation of a building element over a range of frequencies, based on laboratory measurements.
C _{tr}	Spectrum Adaptation Terms (C and C _{tr}) the single number rating method defined in BS EN ISO 717 uses a standard reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation term C _{tr} is used to take into urban traffic noise.

