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Proposed Residential Development
Land to the west of Headlands Road, Liversedge, WF15 7NT

Noise Impact Assessment

For:
Martin Walsh Architectural

5th June 2024

Ref: NIA-11467-24-11689 v1 Headlands Road, Liversedge
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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Martin Walsh Architectural to undertake a noise impact assessment for the proposed residential development at land to the west of Headlands Road, Liversedge, WF15 7NT (hereafter referred to as 'the site').

The objectives of the noise impact assessment were to:

- Determine the ambient noise climate at the site
- Assess the potential impact of the existing noise climate on the consented residential development with reference to the National Planning Policy Framework and other pertinent guidelines
- Provide recommendations for a scheme of sound attenuation works, as necessary, so that the future occupants of the proposed development do not experience any unacceptable loss of amenity due to noise

This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation) and boundary treatments. It has been prepared to accompany a planning application to be submitted to Kirklees Council.

The report has been prepared for Martin Walsh Architectural for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult Martin Walsh Architectural and ENS as to the extent to which the findings may be appropriate for their use.

A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

1.2 Site Description and Development Proposals

The site comprises existing industrial buildings (to be demolished) and greenfield land to the west of Headlands Road, to the south of Liversedge, as shown (highlighted in red) in Figure 1.1.

Figure 1.1: Location of proposed residential development

The site is bound by:

- Headlands Road to the east
- Highgrove Beds to the north
- Existing residential dwellings to the south
- Spen Valley High School playing fields to the west

The ambient noise climate at the site is predominantly due to vehicles along Headlands Road and the surrounding road network.

Development proposals are for 23 no. new-build residential dwellings with associated landscaping and access roads. Layout plans indicate that the residential development footprint is set back circa 6 metres from the nearside kerb of Headlands Road.

2 Policy Context and Assessment Guidance

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[1] was updated in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied.

Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 180 where it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of…..noise pollution'.

Paragraph 191 advises 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'.

With regard to extant community noise sources and the potential to affect proposed new developments, Paragraph 193 states that:

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF.

1 National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2023)

2.2 Noise Policy Statement for England

The Noise Policy Statement for England[2] (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life
- Mitigate and minimise adverse impacts on health and quality of life
- Where possible, contribute to the improvement of health and quality of life

The NPSE describes the following levels at which noise impacts may be identified:

- 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
- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur

According to the explanatory notes in the statement, where a noise level falls between the lowest observable adverse effect level (LOAEL) and a level which represents a significant observable adverse effect level (SOAEL):

'….all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.'

2.3 Planning Practice Guidance on Noise

Planning Practice Guidance[3] (PPG) is an online resource which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur
- Whether or not an adverse effect is occurring or likely to occur
- Whether or not a good standard of amenity can be achieved

In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL.

The PPG also provides general advice on the typical options available for mitigating noise, suggesting that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

'Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed'.

2 Government Department for Environment, Food and Rural Affairs. Noise Policy Statement for England. March 2010.
3 Planning Practice Guidance on Noise: http://planningguidance.planningportal.gov.uk/blog/guidance/noise/

With regard to the mitigation of extant environmental noise at a proposed residential development, the guidance states that:

'... consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations'.

The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. The following guidance documents provide some meaningful context.

2.4 ProPG Planning and Noise: New Residential Development

ProPG Planning and Noise: New Residential Development (ProPG)[4] was published in 2017 by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health.

Stage 2: Element 2 of ProPG sets indoor ambient noise levels for residential dwellings based on the guidance contained in British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233), see Table 2.1.

Table 2.1: Indoor Ambient Noise Levels in Dwellings

Activity	Location	Indoor Ambient Noise Levels	
Resting	Living Room	35 dB $L_{Aeq\ (0700\text{-}2300)}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq\ (0700\text{-}2300)}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ (0700\text{-}2300)}$	30 dB $L_{Aeq\ (2300\text{-}0700)}$ 45 dB $L_{Amax,F\ (2300\text{-}0700)}$

Note 4 to the above table states:

'A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night.'

Note 5 to the above table states:

'Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7'.

This is consistent with the guidance contained within the PPG, which states that:

'... consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations'.

4 'ProPG Planning and Noise: New Residential Development (ProPG)', 2017. Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH)

On the basis of the above, the following criteria (with windows closed and an alternative means of ventilation provided) are considered appropriate for the proposed development and considered to represent good resting and sleeping conditions:

- ≤ 35 dB $L_{Aeq\ (0700\text{-}2300)}$ in habitable rooms during the daytime
- ≤ 30 dB $L_{Aeq\ (2300\text{-}0700)}$ in bedrooms during the night-time
- 45 dB L_{AFMax} not regularly exceeded in bedrooms during the night-time

With regard to external amenity, ProPG reflects the advice given in BS 8233 as follows:

'The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50–55 dB $L_{Aeq,16hr}$.'

'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.'

2.5 Approved Document O

Approved Document O, 2021 is written in support of Part O of Schedule 1 to the Building Regulations 2010. The approved document details methods of addressing overheating of residential dwellings and is applicable only across England.

The approved document has the following relevant guidance in Section 3 regarding noise ingress into buildings:

'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 account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

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

- *40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)*
- *55dB L_{Amax}, more than 10 times a night (between 11pm and 7am)'*

3 Noise Survey

3.1 Overview

In order to determine the level of external noise affecting the proposed development, noise monitoring was carried out on Wednesday 24th April through to Thursday 25th April 2024.

The adopted noise monitoring positions (shown in Appendix 2) were as follows:

- MP1 was located at the eastern boundary of the site, at circa 6 metres from Headlands Road
- MP2 was located along the northern boundary of the site
- MP3 was located along the southern boundary
- MP4 was located along the western boundary

Noise measurements were undertaken in free field conditions at 4 metres above ground level using Bruel & Kjaer 2250 Type 1 integrating sound level meter. The meter was connected to a windshield covered microphone positioned at the locations detailed above.

The measurement system calibration was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted.

Measurements consisted of A–weighted broadband parameters including L_{Aeq}, L_{A10} L_{A90}, and L_{AFmax} octave band data.

The noted weather conditions during the surveys were dry with wind speeds < 5 m/s. Weather conditions were therefore considered appropriate for noise monitoring.

3.2 Summary

Table 3.1 presents a summary of the noise data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1: Summary of Noise Measurement Data

Position	Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{A10} (dB)	L_{AFMax} (dB)	Comment
MP1	24/04/2024	1337–1437	59	46	62	-	Road traffic on Headlands Road, distant road traffic
		1437–1537	58	47	62	-	
		1537–1637	58	45	62	-	
	25/04/2024	0615–0715	59	50	63	78	Road traffic on Headlands Road, distant road traffic
MP2	25/04/2024	0959–1159	47	44	49	-	Local and distant road traffic, birdsong
MP3	25/04/2024	1203–1233	50	47	52	-	
MP4	25/04/2024	1236–1306	52	48	54	-	Local and distant road traffic, birdsong, occasional noise audible from school playground

3.3 Analysis

The noise environment at the site was controlled by road traffic on Headlands Road, with noise levels reducing with increasing distance to the road.

For the prediction of daytime road traffic noise, the Department of Transport's Memorandum on the Calculation of Road Traffic Noise (CRTN) explains that the following shortened measurement procedure may be used. Measurements of L_{A10} are made over any three consecutive hours between 10:00 and 17:00 hours. Using $L_{A10\ (3\ hour)}$ as the arithmetic mean of the three consecutive values of hourly L_{A10}, the $L_{A10\ (18\ hour)}$ can be calculated from the equation:

$$L_{A10\ (18\ hour)} = L_{A10\ (3\ hour)} - 1\ dB$$

A study prepared by TRL Limited on behalf of the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10\ (18\ hour)}$ to EU Noise Indices for Noise Mapping' presents a methodology for calculating daytime $L_{Aeq\ (0700\text{-}2300)}$ and night-time $L_{Aeq\ (2300\text{-}0700)}$ ambient noise levels based on the $L_{A10\ (18\ hour)}$ noise levels, as follows:

$$L_{Aeq\ (0700\text{-}2300)} = 10 * \log \frac{([(10^{((0.95 * L_{A10\ (18\ hour)} + 1.44)/10)} * 12] + [10^{((0.97 * L_{A10\ (18\ hour)} - 2.87)/10)} * 4])}{16}$$

$$L_{Aeq\ (2300\text{-}0700)} = 0.90 * L_{A10,\ 18\ hour} - 3.77$$

Based on the above formulae, the daytime and night-time ambient noise levels at MP1 are measured / calculated at **59 dB $L_{Aeq\ (0700–2300)}$** and **51 dB $L_{Aeq\ (2300–0700)}$** respectively. Maximum noise levels at MP1 were measured at up to **78 dB L_{AFMax}** during the night-time (early morning rush hour).

Noise levels decreased with increasing distance from Headlands Road.

4 Noise Assessment

4.1 Design Noise Levels

Design noise levels for habitable rooms adjacent to/fronting towards Headlands Road are as follows:

- ≤ 59 dB $L_{Aeq\ (0700\text{-}2300)}$ during the daytime
- ≤ 51 dB $L_{Aeq\ (2300\text{-}0700)}$ during the night-time
- ≤ 78 dB L_{AFMax} during the night-time

Noise measurements at MP1 were made at 6 metres from Headlands Road, whereas the second row of dwellings is set back at least 34 metres from the road. Robustly assuming line-source propagation for ambient noise levels and point-source propagation for maximum noise levels, the noise levels at 34 metres from Headlands Road are as follows:

- ≤ 52 dB $L_{Aeq\ (0700\text{-}2300)}$ during the daytime
- ≤ 44 dB $L_{Aeq\ (2300\text{-}0700)}$ during the night-time
- ≤ 63 dB L_{AFMax} during the night-time

4.2 Scheme of Sound Attenuation

In order to calculate the sound insulation requirements of the building envelope for habitable rooms throughout the development, the Building Research Establishment (BRE) building envelope insulation calculation spreadsheet was used. This spreadsheet is based on the calculation methodology advocated in BS 8233. The spreadsheet allows input of external noise levels, typical room dimensions and reverberation time together with parameters for the various elements of the building envelope and calculates the internal noise level in terms of the external noise level metric (L_{Aeq} and L_{AFMax} in this case).

Plots Adjacent to Headlands Road

Due to elevated noise levels from Headlands Road, it is recommended that dwellings adjacent to/fronting towards the road (Plots 1–3) are provided with a fully ducted mechanical ventilation system with heat recovery (MVHR). Trickle/wall vents are not required.

Road-fronting bedrooms of these plots should be fitted with enhanced laminated glazing rated at least **34 dB R_w+C_{tr}** (such as 6 mm glass / 12 Argon / 8.8 Pilkington Optiphon).

Road-fronting living rooms of these plots should be fitted with enhanced glazing rated at least **29 dB R_w+C_{tr}** (such as 8 mm glass / 6–20 mm cavity / 4 mm glass).

Habitable rooms on the rears of these plots may be fitted with double glazing rated at least **25 dB R_w+C_{tr}** (such as 6 mm glass / 6-20 cavity / 4 mm glass).

Remaining Plots within 45 metres of Headlands Road

Habitable rooms of remaining dwellings within 45 metres of Headlands Road (Plots 7–8) should be provided with double glazing rated at least **25 dB R_w+C_{tr}** in conjunction with acoustic wall vents rated at least **41 dB $D_{n,e,w}+C_{tr}$** per 8000 mm² EA (vent open) such as the Ryton AAC125HP (1 no. vent required per habitable room).

Remaining Plots

Remaining habitable rooms throughout the site may be fitted with double glazing rated at least **25 dB $R_w+ C_{tr}$** in conjunction with standard trickle vents or wall vents rated at least **32 dB $D_{n,e,w}$** per 8000 mm² EA (vent open) (1 no. vent per habitable room).

General Points

Appendix 3 contains an annotated glazing/ventilation markup plan. For brevity, plots requiring standard glazing/ventilation are not marked. Appendix 4 contains selected BRE calculation spreadsheets.

The ceilings (and side cheeks to the dormer windows) in any room-in-roof bedrooms requiring enhanced glazing should be double boarded, with 100 mm (minimum) mineral wool insulation above. The glazing requirements are also applicable to 'Velux' windows.

The following points should be noted:

- The glazing recommendations apply to the window within a sealed unit. It is the responsibility of the window supplier to ensure that the window frame does not compromise the performance of the glazing.
- When selecting a glazing system to satisfy the requirements outlined above, it is important to ensure that the $R_w + C_{tr}$ value is achieved (rather than simply the R_w value). Published R_w values tend to be higher than corresponding $R_w + C_{tr}$ values; therefore, incorrect selection could result in an overestimation of sound reduction performance which in turn could result in higher internal noise levels.
- The opening and free area of the ventilation units should be checked by a mechanical service engineer before designs are finalised. Should the equivalent open area be insufficient to meet the minimum requirements of ADF, it may be necessary to increase the number of units per habitable room. Where this applies, the required sound reduction of the ventilation units may need to be increased accordingly
- Internal noise levels due to mechanical ventilation plant should not exceed 26 dB(A) in bedrooms and 30 dB(A) in living rooms

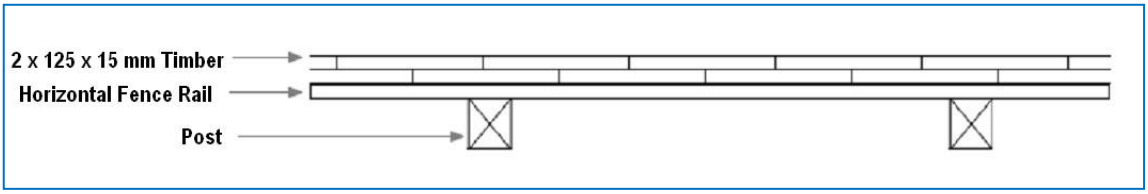
4.3 External Amenity

Daytime ambient noise levels at MP1 (overlooking Headlands Road) have been measured/calculated at circa **59 dB $L_{Aeq\ (0700–2300)}$**. The site layout indicates that Plots 1–3 will 'front onto' the road, such that gardens of these plots will be screened by the dwellings themselves.

Daytime ambient noise levels at Plots 7–10 (set back from Headlands Road, but unscreened) are taken as **≤ 52 dB $L_{Aeq\ (0700–2300)}$.**

In order to reduce garden levels as low as practicable, it is recommended that the gardens of Plot 1 and Plots 7–10 are provided with circa 2-metre-high solid timber fences (see Appendix 3 for barrier locations).

If a solid timber fence is installed, then it should be ensured that it has a mass per unit area of ≥ 10 kg/m^2. The fence should have no gaps or holes and should be fully sealed at the ground (i.e. include a gravel board). An indicative acoustic fence detail is illustrated below. The double-thickness solid timber construction is considered robust and appropriate.



5 Mitigation of Overheating

ADO states that for moderate risk locations (i.e. outside of London) the minimum free area of the open window should be at least 4% of the floor area of the room.

Building in some allowance, this equates to an assumed window opening (S_{open}) area of at least 5% of the floor area. As the open area varies as a function of the floor area, for a typical floor-to-ceiling height of 2.4m, a window open area of 5% of the floor area equates to an external to internal noise reduction of 9 dB.

With reference to the internal targets contained in ADO, it is assumed that open windows can form the overheating mitigation strategy with no additional ventilation or cooling, providing the external noise levels outside bedrooms at night do not exceed **49 dB $L_{Aeq\ (2300\text{-}0700)}$** and **64 dB L_{AFMax}** (more than 10 times).

Based on the external noise levels at the site, it should be assumed that the road-fronting bedroom windows of Plots 1–3 would be kept closed during night-time hours (2300–0700 hours). This information should be provided to the overheating assessor for the site, in order to determine the extent of additional mitigation required to comply with ADO.

For remaining bedrooms, windows may be opened to the minimum open area of 5% of the floor area, meaning that the overheating mitigation strategy is not constrained by acoustics.

6 Summary and Conclusions

A noise impact assessment has been performed for the proposed residential development at land to the west of Headlands Road, Liversedge, WF15 7NT.

Noise monitoring was carried out on Wednesday 24th April through to Thursday 25th April 2024, to determine the level of external noise affecting the proposed development.

Section 4 provides recommendations for a noise mitigation strategy, to protect potential future residential development at the site from the existing noise climate using relevant guidance including BS8233 / ProPG.

Appendix 1 – Abbreviations and Definitions

Sound Pressure Level (L_p)
The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$L_p = 20 \log_{10}(p/p_o)$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_o = reference sound pressure (20 μPa).

A-weighting
A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$
The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$
The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T. $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$
The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\ max}$
The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Single Event Level / Sound Exposure Level (SEL or L_{AE})
The energy produced by a discrete noise event averaged over one second, regardless of the event duration. This allows for comparison between different noise events which occur over different lengths of time.

Weighted Sound Reduction Index (R_W)
Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

Appendix 2 – Proposed Site Layout and Noise Measurement Positions

Appendix 3 – Scheme of Sound Attenuation

Upper Floor Bedrooms

2.4-metre-high acoustic timber fence	
Enhanced glazing rated at 34 dB Rw+Ctr	
Enhanced glazing rated at 29 dB Rw+Ctr	
Double glazing rated at 25 dB Rw+Ctr	
Ventilation:	MVHR
	Acoustic Wall Vents
Note:	Plots requiring standard glazing and standard trickle vents are not marked

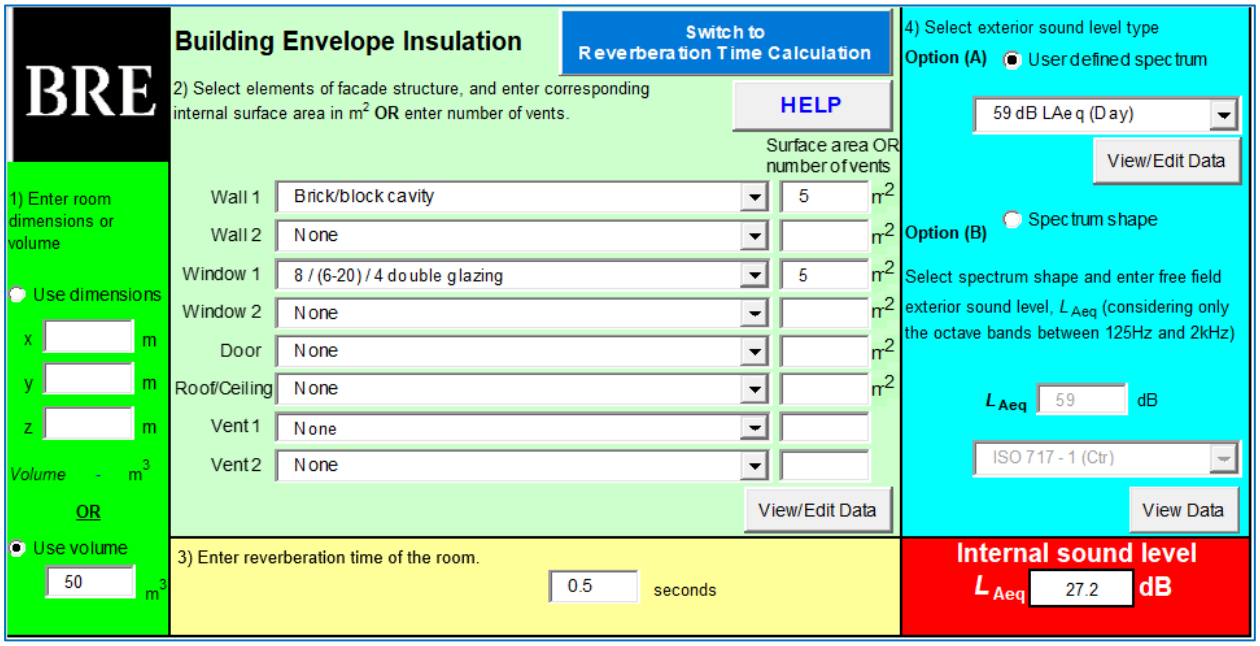
Appendix 3 – Scheme of Sound Attenuation

Ground Floor Habitable Rooms and Boundary Treatments

2.4-metre-high acoustic timber fence	
Enhanced glazing rated at 34 dB Rw+Ctr	
Enhanced glazing rated at 29 dB Rw+Ctr	
Double glazing rated at 25 dB Rw+Ctr	
Ventilation:	MVHR
	Acoustic Wall Vents
Note:	Plots requiring standard glazing and standard trickle vents are not marked

Appendix 4 – Selected BRE Calculation Spreadsheets

Daytime Ambient Noise Levels – Habitable Rooms Fronting Towards/Adjacent to Headlands Road



Night-time Maximum Noise Levels – Bedrooms Fronting Towards/Adjacent to Headlands Road