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# Residential New Build Development

# Land to the Southeast of High Street, Great Houghton, Barnsley, South Yorkshire

# Noise Impact Assessment

**For:**

**Avant Homes Yorkshire**

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# Contents

# 1 Introduction

## 1.1 Overview

1.1.1 Environmental Noise Solutions Ltd (ENS) has been commissioned by Avant Homes Yorkshire to undertake a noise survey and assessment for a proposed residential development on land to the southeast of the High Street in Great Houghton, Barnsley, South Yorkshire (hereafter referred to as 'the site').

1.1.2 The objectives of the noise impact assessment were to:

- Determine external noise levels at the site
- Assess the potential impact of the external noise climate on the proposed residential development with reference to relevant guidelines
- Provide recommendations for a scheme of sound attenuation works, as necessary, to protect future occupants of the proposed residential development from a loss of amenity due to noise

1.1.3 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 Barnsley Metropolitan Borough Council.

1.1.4 The report has been prepared for Avant Homes Yorkshire 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 Avant Homes Yorkshire and ENS as to the extent to which the findings may be appropriate for their use.

1.1.5 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

1.2.1 The site comprises an area of open land to the southeast of the High Street, as shown (highlighted in red) in Figure 1.1.

**Figure 1.1: Location of Proposed Development**

1.2.2 The site is bound by:

- High Street (B62073) to the north-west
- Open fields to the north-east and playing fields to the south-west
- Hawthorne House Farm to the south-east

1.2.3 The ambient noise climate at the site is due to road traffic noise on the High Street, with no other significant sources noted.

1.2.4 Development proposals are for 108 no. detached and semi-detached residential units and associated parking and landscaping. Layout plans indicate that the residential development footprint is set back circa 10 metres from the nearside kerb of High Street.

1.2.5 For reference, the site has been allocated for residential development within the Barnsley Local Plan January 2019 (site reference: HS90, Land off High Street, Great Houghton). The principle of residential development at the site has therefore been established.

# 2 Assessment Guidance

## 2.1 Local Authority Requirements

2.1.1 For reference, a comparable residential development was previously proposed at the site under Planning Application ref: 2021/1149 submitted to BMBC in August 2021. Whilst the application was subsequently withdrawn, the following comments from Pollution Control relate to noise at the site and are considered relevant:

*'A noise impact assessment shall accompany the reserved matters submission which shall have been used to inform the layout and design of the scheme such that mitigation to achieve the following sound levels are achieved within all dwellings;*

- *Bedrooms: LAeq (8 hours) - 30dB (2300 to 0700 hours);*
- *Living Rooms & Bedrooms: LAeq (16 hour) - 35dB (0700 to 2300 hours);*
- *Bedrooms: LAFmax - 45dB (2300 to 0700 hours).*

*Where the above noise criteria cannot be achieved with windows partially open, include a system of alternative acoustically treated ventilation to all habitable rooms. The assessment shall be accompanied by a plan which clearly identifies the different types of mitigation measures proposed, where each type of mitigation is proposed and a programme of implementation. Thereafter the development shall be carried out in accordance with the approved measures.'*

## 2.2 ProPG Planning and Noise: New Residential Development

2.2.1 ProPG Planning and Noise: New Residential Development (ProPG)[1] was published in 2017 by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health.

2.2.2 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'[2] (BS 8233), see Table 2.1.

**Table 2.1: Indoor Ambient Noise Levels in Dwellings**

| Activity | Location | Good 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 $L_{Aeq\ (2300\text{-}0700)}$<br>45 dB $L_{AFMax\ (2300\text{-}0700)}$ |

2.2.3 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.'*

1 '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)

2 British Standards Institution (2014). *British Standard 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.*

2.2.4 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'.*

2.2.5 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 $L_{Aeq\ (2300\text{-}0700)}$ during the night-time
- 45 dB $L_{AFMax}$ not regularly exceeded in bedrooms during the night-time

2.2.6 These criteria are consistent with the requirements of Pollution Control at BMBC.

# 3 Noise Survey

## 3.1 Overview

3.1.1 In order to determine the level of external noise affecting the proposed development, noise monitoring was carried out on Tuesday 19th September and Thursday 21st September 2023.

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

- MP1 was positioned on the western boundary of the site, at 10 metres from the kerb of High Street
- MP1A was positioned at 20 metres from the kerb of High Street
- MP2 was positioned at the south-eastern corner of the site, in the vicinity of the nearby farm

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

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

3.1.5 Measurements consisted of A–weighted broadband parameters including $L_{Aeq}$, $L_{A10}$ $L_{A90}$, and $L_{AFmax}$ together with linear octave and 1/3rd octave band data.

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

## 3.2 Summary

3.2.1 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 (hh:mm) | Length (hh:mm) | $L_{Aeq,T}$ (dB) | $L_{AFmax}$ (dB) | $L_{A90}$ (dB) | $L_{A10}$ (dB) | Comment |
|---|---|---|---|---|---|---|---|---|
| MP1 | 19/09/2023 | 11:29 | 01:00 | 63 | 80 | 48 | 66 | Levels driven by road traffic noise on High Street. No noise noted from other sources. |
| | | 12:29 | 01:00 | 62 | 80 | 47 | 66 | |
| | | 13:29 | 01:00 | 62 | 79 | 47 | 66 | |
| | 21/09/2023 | 05:03 | 01:00 | 61 | 78 | 42 | 66 | |
| | | 06:03 | 01:00 | 64 | 76 | 49 | 68 | |
| MP1A | 19/09/2023 | 14:35 | 00:15 | 59 | 68 | 48 | 62 | |
| MP2 | 19/09/2023 | 14:55 | 00:30 | 48 | 62 | 44 | 51 | Mid-site noise levels, road traffic noise dominant, birdsong |

# 4 Analysis

## 4.1 Road Traffic Noise

4.1.1 The noise environment over the area of the site was controlled by road traffic noise on High Street.

4.1.2 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:

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

4.1.3 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:

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

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

4.1.4 Based on the above formulae, the daytime and night-time ambient noise levels at MP1 are measured / calculated at **63 dB $L_{Aeq\ (0700–2300)}$** and **55 dB $L_{Aeq\ (2300–0700)}$** respectively. Maximum noise levels were measured at up to **78 dB $L_{AFMax}$** during the night-time (early morning) at MP1.

4.1.5 Noise levels reduced with increasing distance from High Street.

4.1.6 Noise levels from the road by the distance of MP2 were considerably lower with a level of **48 dB $L_{Aeq,\ T}$** during the midday period.

4.1.7 No noise was noted from the farm buildings immediately to the south of the site.

## 4.2 Noise Associated with Commercial Activity to South

4.2.1 Noise levels on the site are generally controlled by significant road traffic noise from the High Street and no noise from the farm buildings to the south was noted over the monitoring period. It is expected that noise levels in this area would be approximately equivalent to the levels further to the north in the absence of seasonal farm activity.

4.2.2 Considering noise emitted from the farm area, this would be predominantly due to loading/stacking activity within the courtyards and storage barns. The most exposed barn would lie at a distance of circa 30 metres to the nearest dwellings garden.

4.2.3 It is assumed that activity within any service yards at the site may consist of intermittent loader movements associated with bale stacking or other activities.

4.2.4 ENS has previously measured the noise levels associated with loader operations at up to **65 dB $L_{Aeq\ (15\ min)}$** at 5 metres.

4.2.5 In order to calculate the resultant loading noise levels at the nearest proposed dwelling, the following relationship may be employed:

$SPL_{NSR} = SPL_{REF} - DA - SA$ where

- $SPL_{NSR}$ is the resultant sound pressure level at the nearest noise sensitive receptor (dB)
- $SPL_{REF}$ is the sound pressure level at source (dB)
- DA is the distance attenuation of noise
- SA is the screening attenuation of noise

4.2.6 Distance attenuation (DA) is calculated as follows:

- Distance attenuation = 20 x log ( $D_{source}$ / $D_{rec}$ ) where,
- $D_{SOURCE}$ = distance to source
- $D_{REC}$ = distance to receiver

4.2.7 For the purposes of the assessment the most exposed dwelling to the loading area is used and it is assumed there is a direct line of site from source to receiver.

4.2.8 The noise levels associated with loading operations would therefore be up to **49 dB $L_{Aeq,T}$** at the most exposed southern dwelling.

4.2.9 Although such levels are relatively low, it is advised that noise within external amenity areas is kept as low as possible and therefore it recommended a circa 2.0-metre-noise barrier is erected along the southern boundary with the farm buildings in order to achieve noise levels as low as reasonably practicable.

# 5 Noise Assessment

## 5.1 Design Noise Levels

5.1.1 Design noise levels at the closest facades to High Street are as follows:

- 63 dB $L_{Aeq\ (0700\text{-}2300)}$ during the daytime
- 55 dB $L_{Aeq\ (2300\text{-}0700)}$ during the night-time
- Up to 78 dB $L_{AFMax}$ during the night-time

5.1.2 Noise levels reduced with increasing distance to High Street, with a 4 dB reduction between MP1 (10 metres from the road) and MP1A (20 metres from the road). On this basis, noise levels would be expected to have reduced to ≤ 55 dB $L_{Aeq\ (0700\text{-}2300)}$ at plots set back at least 40 metres from the road.

## 5.2 Scheme of Sound Attenuation

5.2.1 In order to calculate the sound insulation requirements of the building envelope for habitable rooms throughout the development Calculations incorporate the measured external noise level data and the noise ingress calculation methodology outlined in Annex G.2 of BS 8233:2014.

5.2.2 Room and façade dimensions are speculative, assuming a façade area of 9 $m^2$ with 1.2 $m^2$ of glazing and a total volume of 29 $m^3$.

5.2.3 Due to elevated noise levels from the High Street, it is recommended that within 40 metres of the road are provided with a mechanical ventilation strategy. Appropriate ventilation solutions include:

- A fully ducted mechanical ventilation system with heat recovery (MVHR)
- A System 3 mechanical extract ventilation (MEV) system

5.2.4 In dwellings where the air permeability is tighter than (<) 5$m^3/(h.m^2)$, 5000 $mm^2$ EA background ventilators may be required where MEV are proposed. Trickle vents are not required where an MVHR system is used.

5.2.5 Habitable rooms adjacent to and fronting High Street should be fitted with enhanced laminated glazing rated at least **33 dB $R_w+C_{tr}$** (such as 6 mm glass / 6-20 Argon / 6.8 Pilkington Optiphon) in conjunction with acoustic wall vents rated at least **41 dB $D_{n,e,w}+C_{tr}$** per 8000 $mm^2$ EA (vent open) such as the Ryton AAC125HP.

5.2.6 Remaining habitable rooms within 40 metres of High Street should be fitted with enhanced glazing rated at least **28 dB $R_w+C_{tr}$** (such as 8 mm glass / 6-20 cavity / 4 mm glass), in conjunction with acoustic trickle vents rated at least **33 dB $D_{n,e,w}$** per 5000 $mm^2$ EA (vent open), such as the Titon SFX4000EA/C25 or equivalent (1 no. vent per habitable room).

5.2.7 Remaining plots at the development may be fitted with standard double glazing rated at least **25 dB $R_w+C_{tr}$** (such as 4 mm glass / 6-20 cavity / 4 mm glass) in conjunction with standard trickle vents rated at least **33 dB $D_{n,e,w}$** per 5000 $mm^2$ EA (vent open).

5.2.8 Appendix 3 contains an annotated glazing markup plan. Plots requiring standard glazing/ventilation are not marked.

5.2.9 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

## 5.3 External Amenity

5.3.1 The site layout indicates that the majority of dwellings along the western boundary of the site will 'front onto' the road, such that gardens of these plots will be screened by the dwellings themselves.

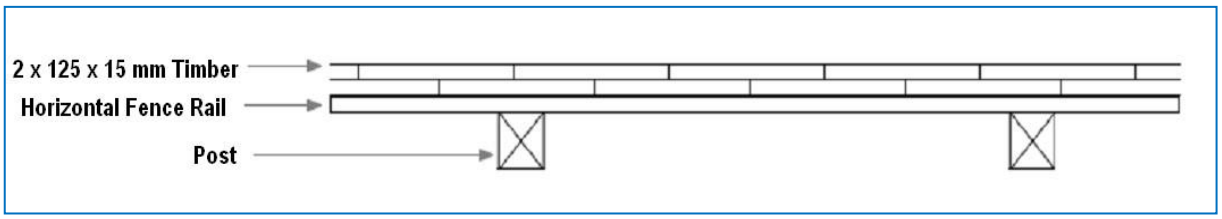
5.3.2 In order to reduce garden levels as low as practicable, where gardens are not situated to the rear, it is recommended that they are provided with circa 2000 mm high solid timber fences or brick walls (see Appendix 3 for barrier locations).

5.3.3 As a precaution against potential noise associated with the farm to the south, it is recommended that gardens along the southern boundary are also provided with acoustic screening.

5.3.4 A brick wall of any construction is appropriate, providing there are no gaps in the construction.

5.3.5 If a solid timber fence is installed, then it should be ensured that it has a mass per unit area of ≥ 10 kg/m2. The fence should have no gaps or holes and should be fully sealed at the ground (i.e. include a gravel board).

5.3.6 An indicative acoustic fence detail is illustrated below. The double-thickness solid timber construction is considered robust and appropriate.



# 6 Summary and Conclusions

6.1.1 A noise impact assessment has been undertaken for the proposed residential development on land to the southeast of the High Street in Great Houghton, Barnsley, South Yorkshire.

6.1.2 The noise environment at the site is due to road traffic noise on the High Street.

6.1.3 A scheme of sound insulation works has been developed to protect the proposed residential development from the ambient noise climate.

# 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 – Noise Measurement Positions

# Appendix 3 – Site Layout and Scheme of Sound Attenuation