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Proposed Residential Development

Land South of West Street, Worsborough, Barnsley

Noise Impact Assessment

For:
Hoober Homes

9th November 2023

Ref: NIA-11068-23-11250-v2 West Street (Final).docx
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1 Introduction

1.1 Overview

Environmental Noise Solutions Limited (ENS) has been commissioned by Hoober Homes to carry out a noise impact assessment for a proposed residential development at land south of West Street, Worsborough, Barnsley (hereafter referred to as 'the site').

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

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 the local planning authority.

The report has been prepared for Hoober Homes 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 Hoober Homes 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 is located to the south of West Street within the village of Worsbrough in Barnsley as shown (highlighted in red) in Figure 1.1.

Figure 1.1: Location of Proposed Development

The site is bound by:

- West Street to the north
- Existing residential dwellings to the west
- Undeveloped parkland to the south
- Galco Industrial Estate with commercial premises to the east

Commercial premises at Galco Industrial Estate include Oakwell Fabrication, Amber Discount Wholesale, Amity International, Nationwide Composite Decking, International Bathrooms Ltd, Nationwide Stone and Shep's Race Fairings (motorbike parts). All companies operate within the hours of 0800 to 1800, with occasional service yard activity observed during the daytime and no activity during the evening or night.

The ambient noise climate at the site is characterised (dominated) by road traffic on West Street. Whilst some limited noise from commercial activities was audible at the eastern boundary during the daytime, road traffic noise remains the dominant noise source throughout.

The proposed residential development consists of 49 no. new build dwellings with associated landscaping and access roads (a site layout is shown in Appendix 3 for reference). The proposed residential footprint is set back circa 6 metres from the nearside kerb of West Street.

For reference, outline planning permission (Ref: 2015/1089) for circa 70 no. dwellings at the site was granted by Barnsley Metropolitan Borough Council in September 2015. It is therefore evident that the principle of residential development at the site has been established.

2 Policy Context and Assessment Guidance

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[1] was updated in 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 174 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 185 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'.

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

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.'

1 National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2023)
2 Government Department for Environment, Food and Rural Affairs. Noise Policy Statement for England. March 2010.

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 although the PPG acknowledges that:

'...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 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'.

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.

3 Planning Practice Guidance on Noise: http://planningguidance.planningportal.gov.uk/blog/guidance/noise/

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'[5] (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 $L_{Aeq\ (2300\text{-}0700)}$ 45 dB $L_{AFMax\ (2300\text{-}0700)}$

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'.

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 residential development and considered to represent good resting and sleeping conditions:

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

With reference to external amenity, BS 8233 states:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external 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.'

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)

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

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 Tuesday 29th August 2023 and the early hours of Wednesday 30th August 2023.

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

- MP1 was located on the northern boundary of the site at 6 metres from West Street
- MP2 was located on the northern boundary of the site at 20 metres from West Street
- MP3 was located on the eastern boundary of the site adjacent to the Galco Industrial Estate
- MP4 was located at the rear of the site

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.

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} together with linear octave band data.

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

Table 3.1 presents a summary of the noise data for each measurement session, 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)	Comment
MP1	29/08/23	1106-1206	68	54	72	Dominated by road traffic on West Street
		1206-1306	68	54	72	
		1306-1406	68	54	71	
		2317-0017	58	37	59	
	30/08/23	0017-0117	57	34	57	
MP2	29/08/23	1113-1128	60	51	64	Dominated by road traffic on West Street
MP3	29/08/23	1209-1344	54	49	56	Dominated by distant road traffic on West Street
		1429-1554	53	48	55	Occasional daytime yard activity noise from Galco Industrial Estate (HGV's / forklifts)
		2312-0012	43	38	47	Dominated by distant road traffic on West Street
	30/08/23	0012-0112	44	37	47	
MP4	29/08/23	1149-1204	53	49	55	Distant road traffic on West Street
		1408-1423	53	47	55	
	30/08/23	0130-0145	38	31	38	

3.3 Analysis

The ambient noise climate at the site is characterised (dominated) by road traffic on West Street. Whilst some limited noise from commercial activities was audible at the eastern boundary during the daytime, road traffic noise remains the dominant noise source throughout.

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:

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

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

Based on the above formulae, the daytime and night-time ambient noise levels at MP1 have been measured / calculated at **68 dB $L_{Aeq\ (0700–2300)}$** and **60 dB $L_{Aeq\ (2300–0700)}$**. Typical maximum noise levels were measured at up to **79 dB L_{AFMax}** during the night time period.

Noise levels at MP2 (circa 20 metres from West Street) were circa 8 dB lower, and noise levels across the remainder of the site decrease with increased distance from West Street.

4 Noise Assessment

4.1 Design Noise Levels

The Design noise levels for dwellings fronting onto West Street have been measured /calculated as follows:

- ≤ **68 dB $L_{Aeq\ (0700\text{-}2300)}$** during the daytime
- ≤ **60 dB $L_{Aeq\ (2300\text{-}0700)}$** (and **79 dB L_{AFMax}**) during the night-time

Comparisons made between MP1 (circa 6 metres from the nearside kerb of West Street) and MP2 (circa 20 metres from the nearside kerb of West Street) demonstrate a reduction in noise level of 8 dB. This reduction in noise level is used to determine the design nose levels for the second row of proposed dwellings (set back at least 20 metres from West Street) as follows:

- ≤ **60 dB $L_{Aeq\ (0700\text{-}2300)}$** during the daytime
- ≤ **52 dB $L_{Aeq\ (2300\text{-}0700)}$** (and **71 dB L_{AFMax}**) during the night-time

4.2 Internal Noise Amenity

In order to calculate the sound insulation requirements for habitable rooms 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).

It is understood that all dwellings across the site will be fitted with a decentralised mechanical extract ventilation system (dMEV) combined with ventilators within habitable rooms.

Habitable rooms adjacent to/fronting onto West Street (including the front and rear bedrooms of plots 1 and 2 which are gable facing to the road) should be provided with enhanced double glazing rated at least **33 dB R_w+C_{tr}** (such as 6 mm glass / 6-20 mm cavity / 6.8 mm Optiphon) in conjunction with an acoustic wall vent rated at least **42 dB $D_{n,e,w}+C_{tr}$** per 5000 mm² EA (vent open), such as the Ryton AAC125HPCWL.

Rear-facing habitable rooms of these plots may be fitted with double glazing rated at least **25 dB R_w+C_{tr}** (such as 4 mm glass / 6-20 mm cavity / 4 mm glass) in conjunction with an acoustic trickle vent rated at least **37 dB $D_{n,e,w}+C_{tr}$** per 5000 mm² EA (vent open).

Habitable rooms in the second row of houses (plots 3, 4, 9, 10, 39, 44 and 45) set back from West Street should be provided with double glazing rated at least **25 dB R_w+C_{tr}** in conjunction with an acoustic trickle vent rated at least **37 dB $D_{n,e,w}+C_{tr}$** per 5000 mm² EA (vent open).

As a precaution against occasional noise from the service yard at the Galco Industrial Estate, habitable rooms directly fronting towards the eastern boundary should be provided with double glazing rated at least **25 dB R_w+C_{tr}** in conjunction with an acoustic trickle vent rated at least **37 dB $D_{n,e,w}+C_{tr}$** per 5000 mm² EA (vent open).

The remaining habitable rooms across the site should be provided with standard double glazing rated at least **25 dB R_w+C_{tr}** in conjunction with trickle vents rated at least **33 dB $D_{n,e,w+}$ C_{tr}** per 5000 mm² EA (vent open).

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

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

4.3 External Noise Amenity (Gardens)

Daytime ambient noise levels at the northern development footprint are circa **68 dB $L_{Aeq\ (0700–2300)}$.**

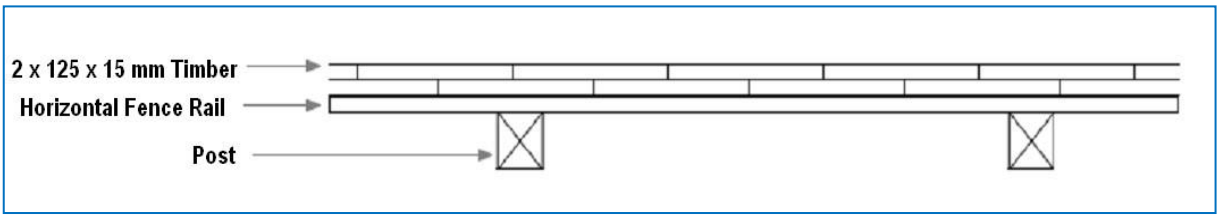
The site layout indicates that the majority of dwellings along the northern boundary of the site will 'front onto' the road, such that gardens of these plots will be screened by the dwellings themselves.

In order to reduce garden levels as low as practicable, where gardens are not situated to the rear (Plots 1, 8, 40 and 41), it is understood that they are to be provided with 1800 mm high brick walls.

As a precaution against occasional noise from the service yard at the Galco Industrial Estate, it is understood that an 1800 mm high solid timber fence is to be installed along the eastern site boundary.

The acoustic fence should be built from close-boarded timber fencing (mass per unit area $\geq$ 10kg/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 Summary and Conclusions

A noise impact assessment has been undertaken for the proposed residential development at land south of West Street, Worsborough, Barnsley.

The ambient noise climate at the site is characterised (dominated) by road traffic on West Street, with no significant noise noted from the adjacent commercial estate.

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.

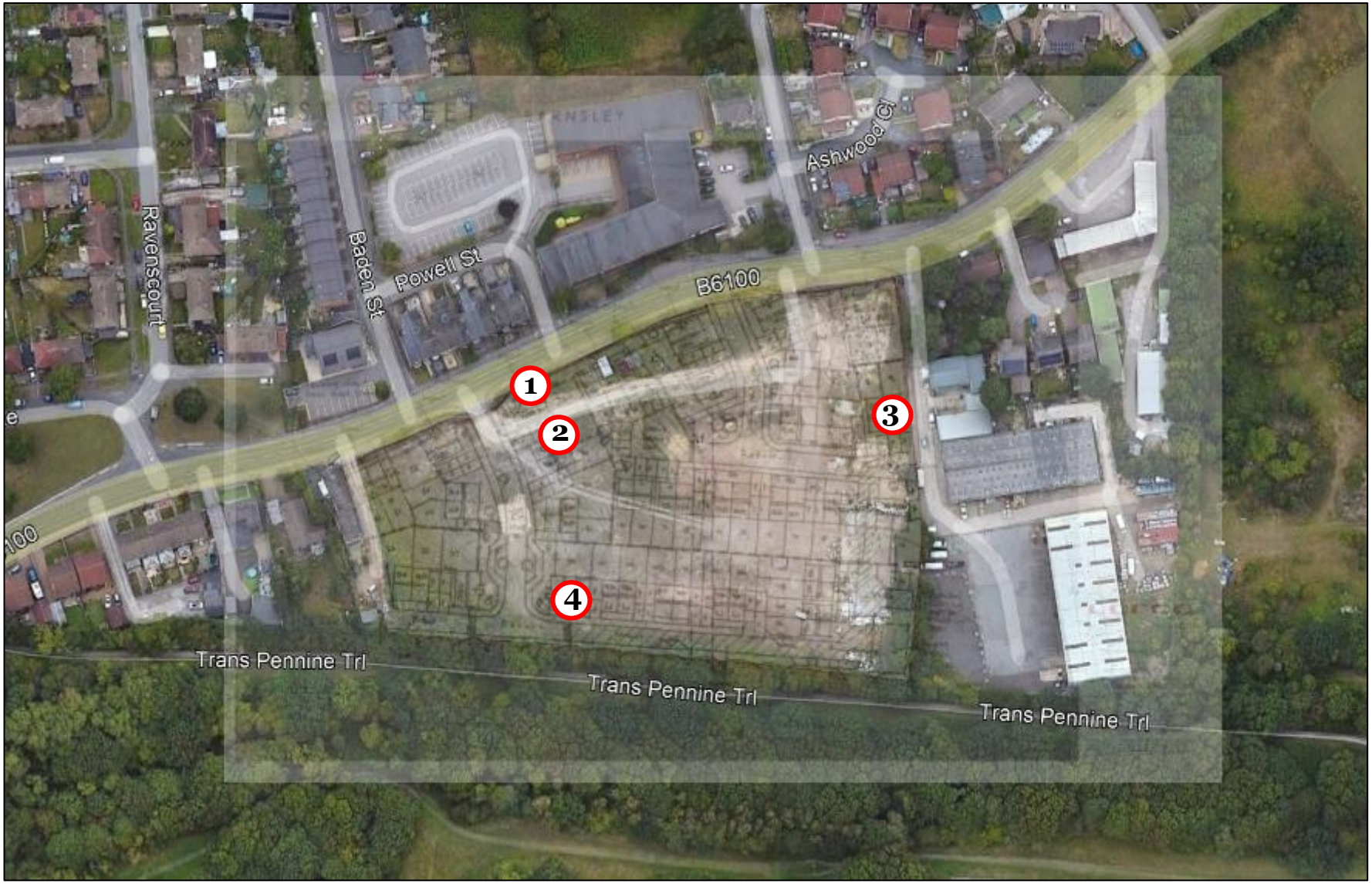
$L_{A90, T}$
The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

$L_{AF\ max}$
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