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Proposed Residential Development Barnsley West (Phase One) Land to the South of Barugh Green Road, Barnsley

Noise Impact Assessment

**For:
Strata Homes Limited**

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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by Strata Homes Limited to undertake a noise impact assessment for a proposed residential development at a parcel of land in the north-west area of a wider mixed-use application (known as 'Barnsley West') on land to the south of Barugh Green Road in Barnsley (hereafter referred to as 'the site').

This report details:

- The methodology and results of a baseline noise survey conducted at the site
- The assessment of potential impact with regard to existing and future local noise sources that may affect the proposed development
- Recommendations for building envelope design (fenestration and ventilation) at key locations within the proposed development

The report has been prepared for Strata Homes Limited 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 Strata Homes Limited 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 A.

1.2 Site Description

The site is located to the south of Barugh Green Road (A635) in the Higham / Barugh Green area, approximately 2 km to the north-west of Barnsley town centre, as shown in Appendix B.

The site is bound by:

- Barugh Green Road (A635) to the north with Claycliffe Business Park further beyond
- Higham village (residential area) to the west
- Vacant land to the east (part of the proposed 'Barnsley West' development planning application) with Gawber village (residential area) further beyond
- Vacant land to the south (part of the proposed 'Barnsley West' development planning application) with the M1 motorway further beyond

The proposed development comprises 229 no. new residential units along with a site access road.

2 Policy Context and Assessment Guidance

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)¹ was updated in February 2019 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 170 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 180 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.

Paragraph 182 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.'

2.2 Noise Policy Statement for England

The Noise Policy Statement for England² (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:

¹ National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2019)

² Noise Policy Statement for England. Government Department for Environment, Food and Rural Affairs (2010)

- 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 Guidance³ (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’.

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

2.4 Assessment Guidance

British Standard 8233:2014

British Standard 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ (BS8233)⁴ provides recommendations for the control of noise both in and around buildings and suggests criteria and limits appropriate to their function. For dwellings, the main considerations are:

- Bedrooms - the effect of noise upon sleep
- Other habitable rooms - the effect of noise upon resting, listening and communicating

It is desirable that the internal ambient noise level does not exceed the guideline values as replicated in Table 2.1.

Table 2.1: Indoor Ambient Noise Levels for Dwellings - BS8233:2014

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233 states:

‘If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.’

For traditional external areas that are used for amenity space, such as gardens, BS8233 states that:

‘.....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. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.’

ProPG Planning and Noise: New Residential Development

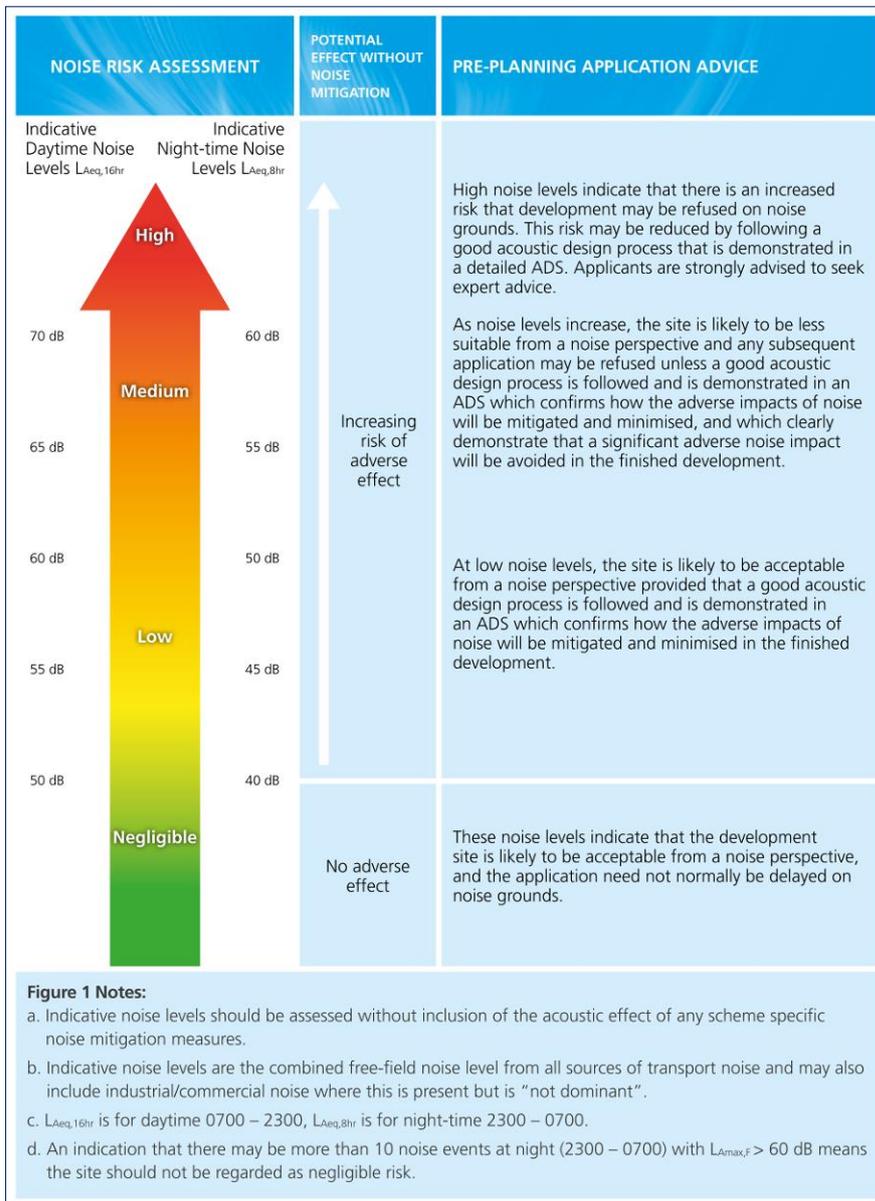
ProPG Planning and Noise: New Residential Development (ProPG)⁵ promotes a systematic two-stage, risk-based approach to noise assessments that inform planning applications for new residential developments.

The ‘Stage 1 Initial Site Noise Risk Assessment’ should be conducted, at the proposed development site, at the earliest opportunity, before any planning application is submitted. The noise risk assessment should provide an indication of the likely risk of adverse effects from noise were no subsequent mitigation to be included as part of the development proposal. It should indicate whether the proposed site is considered to pose a negligible, low, medium or high risk from a noise perspective. Figure 2.1 summarises the initial noise risk assessment and demonstrates how measured site noise levels relate to potential adverse effects from noise.

⁴ British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI

⁵ ‘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)

Figure 2.1: ProPG Stage 1 – Initial Site Noise Risk Assessment



ProPG recommends compliance with indoor noise level targets in residential dwellings based on the guidance contained in BS8233 (see Table 2.2). Additionally, with regard to individual noise events, ProPG states:

‘Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. 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.’

ProPG acknowledges that the internal target noise levels may only be practically achieved with windows closed in certain areas (e.g. in urban areas or sites adjacent to transportation noise sources) and states that:

In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide ‘whole dwelling ventilation’ in accordance with Building Regulations Approved Document F (e.g. trickle ventilators in the open position).

It should also be noted that the internal noise level guidelines are generally not applicable under ‘purge ventilation’ conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).’

ProPG also considers compliance with ambient noise level targets for external amenity areas in line with the recommendation of BS8233. On this issue, ProPG states that:

‘Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e. an enclosed balcony) as part of their dwelling; and/or*
- a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g. a garden, roof garden or large open balcony in a different, protected, location); and/or*
- a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- a relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations.’*

Building Regulations - Approved Document F

Building Regulations Approved Document F ‘Ventilation’ (2010 version incorporating 2013 amendments)⁶ states:

‘For mainly naturally ventilated buildings, it is common to use a combination of ventilators (e. g. for dwellings it is common to use intermittent extract fans for extract ventilation, trickle ventilators for whole dwelling ventilation and windows for purge ventilation). ... Purge ventilation throughout the building to aid the removal of high concentrations pollutants and water vapour released from occasional activities such as painting and decorating and or accidental releases such as smoke and burnt food or spillage of water. Purge ventilation is intermittent i.e. required only when such activities occur. Purge ventilation provisions may also be used to improve thermal comfort, although this is not controlled under Building Regulations.’

It is therefore evident that, whilst ventilation may also provide a means to aid thermal comfort, this is not controlled under Building Regulations.

Table 2.2 presents the four primary types of ventilation strategy described by ADF.

⁶ The Building Regulations 2010 Approved Document F ‘Ventilation’ (amended 2013) (ADF)

Table 2.2: ADF Ventilation Options

ADF System	Description
1	Background ventilators and intermittent extract fans
2	Passive stack
3	Continuous mechanical extract (MEV) ^A
4	Continuous mechanical supply and extract with heat recovery (MVHR) ^B
<p>^A 1 no. trickle vent at 2500mm² effective area required per room with System 3 in dwellings where the designed air permeability is tighter than (<) 5m³/(h.m²)</p> <p>^B No trickle vents required with System 4</p>	

3 Noise Survey and Results

3.1 Overview

In order to quantify the level of external noise affecting the site and local vicinity, noise monitoring was carried out between Monday 7th October 2019 and Wednesday 9th October 2019.

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

- 1 – Northern boundary of the site, at a position representative of the nearest proposed dwellings to the Barugh Green Road (at a distance of approximately 18 metres from nearside kerb)
- 2 – North-western boundary of the site
- 3 – Western boundary of the site

3.2 Equipment

Noise measurements were undertaken using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. The meter was connected to a windshield covered microphone positioned at a height of 1.5 metres above ground in free-field conditions at the locations detailed in the foregoing Section 3.1.

The measurement system calibration was verified immediately before and after each 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 and third octave band data.

3.3 Weather

The noted weather conditions during the survey were generally dry / slightly damp, mild and calm (with average wind speeds ≤ 5 m/s). Weather conditions were therefore considered appropriate for noise monitoring.

3.4 Summary of Results

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)	L _{Aeq} (dB)	L _{AFmax} (dB)	L _{A10} (dB)	L _{A90,15min} Range (dB)	Comment
1	07/10/2019	10:02 – 11:02	60	79	63	52 – 53	Road traffic on Barugh Green Road (A635)
		11:02 – 12:02	59	74	62	51	
		12:02 – 13:02	59	73	62	51 – 53	
		23:01 – 23:16	55	79	58	47	
	08/10/2019	00:04 – 00:19	50	64	53	45	
		23:00 – 23:15	56	74	59	50	
09/10/2019	00:00 – 00:16	51	64	54	45		
2	08/10/2019	01:20 – 01:35	46	59	48	43	Distant road traffic on M1 Motorway
		01:35 – 01:50	45	53	48	42	
		11:17 – 11:32	53	65	54	50	
		11:32 – 11:47	53	73	56	49	
	09/10/2019	01:39 – 01:54	48	58	50	45	
		01:54 – 02:09	48	61	50	43	
		11:23 – 11:38	49	61	52	45	
		11:38 – 11:53	47	55	49	46	
3	08/10/2019	12:01 – 12:16	53	62	54	51	Distant road traffic on M1 Motorway
		12:16 – 12:31	53	62	55	51	
	09/10/2019	11:56 – 12:11	51	57	52	49	
		12:11 – 12:26	50	61	52	48	

3.5 Analysis

Northern Boundary

At Position 1, the dominant noise source was observed to be due to road traffic on Barugh Green Road (A635). No contributions from the existing nearby commercial premises (to the north) were observed at any time during the noise survey.

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 - 17:00 hrs.

Using L_{A10, 3hr} as the arithmetic mean of the three consecutive values of hourly L_{A10}, the L_{A10, 18hr} can be calculated from the equation:

$$(i) \quad L_{A10, 18hr} = L_{A10, 3hr} - 1 \text{ dB}$$

$$(ii) \quad L_{Aeq, 16hr} \approx L_{A10, 18hr} - 2 \text{ dB}$$

Substituting (ii) into (i) gives the following approximation:

$$(iii) \quad L_{Aeq, 16hr} \approx L_{A10, 3hr} - 3 \text{ dB}$$

Based on the above formula, the 16-hr daytime ambient noise level is calculated to be 59 dB L_{Aeq,16hr}.

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 night-time road traffic noise levels, based on daytime road traffic noise levels, using the following formulae:

$$(iv) \quad L_{Aeq, 8hr} \approx 0.9 \times L_{A10, 18hr} - 3.77 \text{ (for non-motorway roads)}$$

$$(v) \quad L_{Aeq, 8hr} \approx 0.87 \times L_{A10, 18hr} + 4.24 \text{ (for motorways)}$$

Based on the above formula (iv) for non-motorway roads, the 8-hr night-time ambient noise level is calculated to be 51 dB $L_{Aeq,8hr}$.

Maximum noise levels were due to passing vehicle movements and were ≤ 79 dB L_{AFmax} at night.

North-Western Boundary

At Position 2, the dominant noise source was observed to be due to distant road traffic on the M1 Motorway. Daytime ambient noise levels were around 47 – 53 dB $L_{Aeq,T}$ and night-time ambient noise levels were around 45 – 48 dB $L_{Aeq,T}$. Maximum noise levels were ≤ 61 dB L_{AFmax} at night.

Background noise levels ranged from 45 – 50 dB $L_{A90,15min}$ during the day and 42 – 45 dB $L_{A90,15min}$ at night. Typical background noise levels were around:

- 48 dB $L_{A90,15min}$ during the day
- 43 dB $L_{A90,15min}$ at night

Western Boundary

At Position 3, the dominant noise source was observed to be due to distant road traffic on the M1 Motorway with daytime ambient noise levels of around 50 – 53 dB $L_{Aeq,T}$.

4 Noise Assessment

4.1 Initial Site Noise Risk Assessment

Assessment of the measured/calculated ambient noise level data, using the ProPG initial site noise risk assessment diagram shown in Section 2, has determined that the residential areas of the development would be categorised as shown in Table 4.1 in terms of adverse effects from existing noise.

Table 4.1: Risk of Adverse Effects from Noise

Location	Period	External Noise Levels (dB LAeq)	Risk
Northern Boundary	Day (07:00–23:00)	59	Low
	Night (23:00–07:00)	51	Low
North-Western Boundary	Day (07:00–23:00)	53	Low
	Night (23:00–07:00)	48	Low

It can be seen that proposed dwellings will experience a low risk of adverse effects from road traffic noise. At low risk sites, ProPG advises that the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed.

4.2 Proposed Site Access / Link Road

Projected traffic data, associated with the site access / link road, have been provided by Fore Consulting Limited, the transport consultants for the project. 18hr Annual Average Weekday Traffic (AAWT) data has been provided for the forecast year of completion (2033). The data is replicated in Table 4.2.

Table 4.2: Forecast Site Access Road Traffic Data – 2033

Link / Road Name	18hr AAWT With Development and Other Committed Developments	% HGV	Vehicle Speed (kph)
Site Access Road	13423	1	48

The above traffic flow data has been used, along with the methodology outlined in CRTN, to calculate road traffic noise from the proposed site access / link road, along with noise from existing local roads (such as Barugh Green Road) across the site using the proprietary noise modelling software CadnaA, as detailed below.

4.3 Noise Propagation

In order to calculate noise propagation across the site to proposed building facades and within private external areas of proposed residential dwellings, a three-dimensional model of the site and the immediate surrounding area has been created using the proprietary noise modelling software CadnaA. This approach enables the beneficial shielding effects, due to the built form of the proposed development, to be accurately accounted for.

The data files and input parameters used to create the model are presented in Table 4.3.

Table 4.3: CadnaA Model Input Data

Input Parameter	Data Source / Model Settings
Base landline map	Drawing 20-CL4-SEGB-BWP1-02 Rev J by Strata Homes Limited
Topography	Sourced from Environment Agency LIDAR Composite DSM (Digital Surface Model) 2017
Receptor Positions	Living rooms - 1.5m above ground level (agl) Bedrooms - 4m agl Garden receptor locations at a height of 1.5m agl and at least 3.5m from buildings where possible.
Building Heights	Residential buildings - 8m agl Proposed garages – 4m agl
Barriers	None included in preliminary modelling exercise
Ground Absorption	The default ground absorption setting for the site is 0.5 (i.e. mixed ground) 'Soft' areas such as gardens or areas of vegetation have been added with a ground absorption setting of 1
Reflections	Maximum order of reflection is 2 Building facades classified as 'structured' for reflections
Existing Noise Sources	Barugh Green Road is the primary existing noise source Source verified with L_{Aeq} noise level monitoring data acquired on site
Proposed Noise Sources	Contributions from proposed site access / link road calculated using CRTN module within CadnaA based on forecast traffic flow data detailed in Section 4.2
Relative Humidity (%)	70
Temperature (°C)	10

4.4 External Noise Levels

Noise propagation across the site is shown in contour plots presented in Appendix D for illustrative purposes.

Analysis of the model outputs has determined the following external noise levels at various building elevations on site.

Table 4.4: External Noise Levels

Location	Elevations	External Noise Levels (dB)		
		$L_{A10,18hr}$	$L_{Aeq,16hr}$ Day	$L_{Aeq,8hr}$ Night
Plots 3, 4 and 10 – 13 (Nearest to Barugh Green Road)	Facing Barugh Green Road	≤ 62	≤ 60	≤ 52
	Shielded from Barugh Green Road	≤ 56	≤ 54	≤ 47
Plots 1 – 2 and 5 (Nearest to Proposed Site Access / Link Road)	Facing Site Access / Link Road	≤ 66	≤ 64	≤ 56
	Shielded from Site Access / Link Road	≤ 58	≤ 56	≤ 48
Plots 45 – 70 and 161 - 165 (Eastern Boundary)	Facing Site Access / Link Road	≤ 60	≤ 58	≤ 50
	Shielded from Site Access / Link Road	≤ 53	≤ 51	≤ 44
Plots 168 – 172, 210 and 219 – 228 (South-Eastern Corner)	Facing Site Access / Link Road	≤ 63	≤ 61	≤ 53
	Shielded from Site Access / Link Road	≤ 55	≤ 53	≤ 46
Remainder of Site	All	≤ 57	≤ 55	≤ 48

4.5 External Amenity

With regard to external noise levels during the day, external noise levels in most proposed gardens are expected to satisfy the lower 'desirable' guideline value of ≤ 50 dB $L_{Aeq,T}$ for external amenity areas, as recommended by BS8233 / ProPG. However, gardens associated with the following plots have been identified as areas where external noise levels are expected to exceed the guideline value:

- Plots 1, 2, 5 and 6 (54 – 59 dB $L_{Aeq,T}$)
- Plots 10 – 12 (55 – 57 dB $L_{Aeq,T}$)
- Plot 222 (54 dB $L_{Aeq,T}$)

For the above plots, it is recommended that gardens are protected by 1.8m high imperforate acoustic barrier e.g. solid masonry wall or fencing (close-boarded timber, mass per unit area $\geq 10\text{kg/m}^2$) at garden perimeters.

4.6 Indoor Noise Levels

Feasibility of Open Windows

With regard to internal noise levels when windows are open, the World Health Organisation (WHO) Guidelines for Community Noise (1999) states:

'the noise reduction from outside to inside with the window partly open is 15 decibels'.

On this basis, internal noise levels with dwelling windows open have been calculated, as set out in Table 4.5.

Table 4.5: Internal Ambient Noise Levels (Windows Open)

Location	Elevations	Period	Internal Noise Levels (dB LAeq)	Criteria (dB LAeq)	Criteria Satisfied?
Plots 3, 4 and 10 – 13 (Nearest to Barugh Green Road)	Facing Barugh Green Road	Day (07:00–23:00)	≤ 45	35	No
		Night (23:00–07:00)	≤ 37	30	
	Shielded from Barugh Green Road	Day (07:00–23:00)	≤ 39	35	No
		Night (23:00–07:00)	≤ 32	30	
Plots 1 – 2 and 5 (Nearest to Proposed Site Access / Link Road)	Facing Site Access / Link Road	Day (07:00–23:00)	≤ 49	35	No
		Night (23:00–07:00)	≤ 41	30	
	Shielded from Site Access / Link Road	Day (07:00–23:00)	≤ 41	35	No
		Night (23:00–07:00)	≤ 33	30	
Plots 45 – 70 and 161 - 165 (Eastern Boundary)	Facing Site Access / Link Road	Day (07:00–23:00)	≤ 43	35	No
		Night (23:00–07:00)	≤ 35	30	
	Shielded from Site Access / Link Road	Day (07:00–23:00)	≤ 36	35	No
		Night (23:00–07:00)	≤ 29	30	
Plots 168 – 172, 210 and 219 – 228 (South-Eastern Corner)	Facing Site Access / Link Road	Day (07:00–23:00)	≤ 46	35	No
		Night (23:00–07:00)	≤ 38	30	
	Shielded from Site Access / Link Road	Day (07:00–23:00)	≤ 38	35	No
		Night (23:00–07:00)	≤ 31	30	
Remainder of Site	All	Day (07:00–23:00)	≤ 26	35	Yes
		Night (23:00–07:00)	≤ 20	30	

It can be seen that internal noise levels would exceed the criteria with open windows for plots on:

- Northern boundary
- Eastern boundary
- South-eastern corner

On this basis, it is not recommended that permanently open windows are relied upon as the primary means of ventilation for proposed dwellings.

The assessment has therefore assumed that windows will be closed, as part of the noise mitigation strategy for the site. Windows can be opened for temporary purge ventilation (to enable discretionary rapid air changing) with resultant internal levels as per the values shown in Table 4.2; however, this would be on a temporary basis.

Closed Windows

External and internal noise measurements undertaken by ENS at other sites have determined that a standard double-glazed window with standard trickle vents in a building façade will provide at least 27 dB(A) sound insulation from a free-field external noise level. On this basis, internal noise levels with dwelling windows closed (and ventilation provided via standard trickle vents) have been calculated, as set out in Table 4.6.

Table 4.6: Internal Noise Levels in Residential Units – Windows Closed (Ventilation via Standard Trickle Vents)

Location	Elevations	Period	Internal Noise Levels (dB LAeq)	Criteria (dB LAeq)	Criteria Satisfied?
Plots 3, 4 and 10 – 13 (Nearest to Barugh Green Road)	Facing Barugh Green Road	Day (07:00–23:00)	≤ 33	35	Yes
		Night (23:00–07:00)	≤ 25	30	
	Shielded from Barugh Green Road	Day (07:00–23:00)	≤ 27	35	Yes
		Night (23:00–07:00)	≤ 20	30	
Plots 1 – 2 and 5 (Nearest to Proposed Site Access / Link Road)	Facing Site Access / Link Road	Day (07:00–23:00)	≤ 37	35	No
		Night (23:00–07:00)	≤ 29	30	Yes
	Shielded from Site Access / Link Road	Day (07:00–23:00)	≤ 29	35	Yes
		Night (23:00–07:00)	≤ 21	30	
Plots 45 – 70 and 161 - 165 (Eastern Boundary)	Facing Site Access / Link Road	Day (07:00–23:00)	≤ 31	35	Yes
		Night (23:00–07:00)	≤ 23	30	
	Shielded from Site Access / Link Road	Day (07:00–23:00)	≤ 24	35	Yes
		Night (23:00–07:00)	≤ 20	30	
Plots 168 – 172, 210 and 219 – 228 (South-Eastern Corner)	Facing Site Access / Link Road	Day (07:00–23:00)	≤ 34	35	Yes
		Night (23:00–07:00)	≤ 26	30	
	Shielded from Site Access / Link Road	Day (07:00–23:00)	≤ 26	35	Yes
		Night (23:00–07:00)	≤ 20	30	
Remainder of Site	All	Day (07:00–23:00)	≤ 20	35	Yes
		Night (23:00–07:00)	≤ 20	30	

It can be seen that, in most instances, internal noise levels would satisfy the criteria with closed windows (and a basic configuration of standard double glazing and trickle ventilation).

The anticipated non-compliances occur where proposed dwellings would be in close proximity to the proposed site access / link road at the eastern boundary. Acoustic trickle vents (coupled with standard double glazing) would therefore be required for the most exposed dwelling facades in that area.

5 Summary and Conclusions

A noise survey and assessment has been performed for a proposed mixed-use development on land to the south of Barugh Green Road in Barnsley.

Noise monitoring was carried out between Monday 7th October 2019 and Wednesday 9th October 2019 to quantify the level of external noise affecting the site. The results of the baseline noise survey are presented in Section 3.

Section 4 presents an initial site noise risk assessment using ProPG guidance. Proposed dwellings will experience a low risk of adverse effects from road traffic noise.

Section 4 also presents recommendations for a noise mitigation strategy to protect future residents at the site using relevant criteria and guidance including BS8233 / ProPG.

Appendix A – 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:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = 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_{AFmax}

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 B – Site Location Plan



Appendix C – Noise Measurement Positions



Appendix D – Noise Contour Plot

Figure D1: $L_{A10,18hr}$ (1.5m high grid)

