



Suite 24
Doncaster Business Innovation Centre
Ten Pound Walk
Doncaster
DN4 5HX

Proposed Residential Development Two Land Parcels to the South of Yew Tree Road, Birchencliffe, Huddersfield Noise Impact Assessment

For:

North Park Homes

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Author: R. Habeshaw MSc, MIOA

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1 Introduction

1.1 Overview

1.1.1 Environmental Noise Solutions Ltd (ENS) has been commissioned by North Park Homes to undertake a Noise Impact Assessment for the Proposed Residential Developments covering Two Land Parcels to the South of Yew Tree Road, Birchencliffe, Huddersfield (hereafter referred to as 'the site').

1.1.2 This noise assessment has been requested to fulfil the requirements of the conditions defined in the outline planning permissions for the two adjacent sites south of Yew Tree Road (2018/60/90776/W & 2018/60/90151/W).

1.1.3 Condition 12 and Condition 24 both ask for:

“..a report specifying the measures to be taken to protect the development from noise from road traffic shall be submitted to and approved in writing by the Local Planning Authority. The report shall:-

a) Determine the existing noise climate;

b) Predict the noise climate in gardens (daytime), bedrooms (night-time) and other habitable rooms of the development.

c) Detail the proposed attenuation/design necessary to protect the amenity of the occupants of the new residences (including ventilation if required).

1.1.4 The reason is to ensure the amenity of the occupiers of the development and satisfy Local Planning Policies and guidance in the National Planning Policy Framework

1.1.5 The objectives of the noise impact assessment are to:

- Determine current external ambient and background noise levels at the application site during the daytime and night-time periods.
- Assess the potential impact of the external noise climate on the proposed 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 dwellings from a loss of amenity due to noise.

1.1.6 This report details the methodology and results of the assessment and provides recommendations for the building envelope (fenestration and ventilation). It has been prepared to accompany the planning applications submitted to Kirklees Council for the proposed residential developments at the application sites.

1.1.7 This report has been prepared for North Park Homes for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult the aforementioned and ENS as to the extent to which the findings may be appropriate for their use.

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

2 Proposed Residential Development

- 2.1.1 Birchencliffe is located in the around 2 miles to the northwest from the centre of Huddersfield. The site occupies two parcels of land to the southwest of the intersection of Yew Tree Road and Burn Road. The site is (will be) bordered to the north and east by residential developments with a tennis court to the northeast, and green land and allotments to the south and west.
- 2.1.2 The proposed residential development is understood to consist of approximately 27 dwelling houses across the 2 land parcels.
- 2.1.3 The application site plans are contained in Appendix C and Appendix D for reference. The site boundaries are defined in Figure 2-1.



3 Noise Impact Assessment Criteria

3.1 National Planning Policy Framework

3.1.1 The National Planning Policy Framework (NPPF)¹ was updated in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

3.1.2 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'.

3.1.3 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'.

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

3.2 Noise Policy Statement for England

3.2.1 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

3.2.2 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

3.2.3 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 (2019)

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

3.3 Planning Practice Guidance on Noise

3.3.1 Planning Practice Guidance³ (PPG) is an online resource (last updated 2019) 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

3.3.2 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’.

3.3.3 Table 3.1 summarises the PPG noise exposure hierarchy.

Table 2.**Error! No text of specified style in document.**-1: PPG Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.3.4 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’.

³ Planning Practice Guidance on Noise, 2014: <http://planningguidance.planningportal.gov.uk/blog/guidance/noise/>

3.4 WHO – Guidelines for Community Noise & BS8233:2014

- 3.4.1 The target level for internal and external noise level of residential developments (based on the onset of LOAEL) is commonly accepted within UK standards (such as BS8233:2104) as that defined by the WHO document “Guidelines for Community Noise”.
- 3.4.2 BS8233:2014 “Guidance on sound insulation and noise reduction for buildings” provides the following recommended target levels (**Error! Reference source not found.**).

Table 3.2: Recommended Maximum Residential Target Levels (WHO, BS8233:2014)

Residential Location	Day	Night
Bedrooms	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$ /45 dB $L_{Amax,8h}$
Dining Rooms	40 dB $L_{Aeq,16h}$	-
Living Areas (Indoor)	35 dB $L_{Aeq,16h}$	-
Living Areas (Outdoor)	50 - 55 dB $L_{Aeq,16h}$	-

- 3.4.3 The internal noise level criteria are based on average annual data and do not have to be achieved in all circumstances. It is normal to exclude occasional events. The internal noise level criteria may also be relaxed by up to 5 decibels and reasonable living conditions will still be achieved.
- 3.4.4 British Standard 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ 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. 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.’
- 3.4.5 Based on the above guidance, the following noise level criteria are considered appropriate for the proposed residential development.
 - 55 dB L_{Aeq} (0700–2300 hours) in gardens
 - 35 dB L_{Aeq} (0700–2300 hours) in dwellings
 - 30 dB L_{Aeq} (2300–0700 hours) in dwellings
 - 45 dB L_{Amax} not regularly exceeded in bedrooms during the night-time.

3.5 British Standard BS 4142:2014+A1-2019 ‘Methods for Rating and Assessing Industrial and Commercial Sound

3.5.1 BS 4142⁴ describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to adverse impacts, and states:

‘The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. Typically, the greater this difference, the greater the magnitude of the impact. For example:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
-
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context*

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound.’

3.5.2 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position (NSR) produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment.

3.5.3 The background noise level is the A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting ‘F’ and quoted to the nearest whole number of decibels. BS 4142 is clear that it is the typical background, rather than the lowest background, which should be used.

⁴ British Standard 4142:2014+A1-2019 Methods for rating and assessing industrial and commercial sound, BSI (2014)

3.6 Approved Document O.

- 3.6.1 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.
- 3.6.2 The approved document takes effect on June 15th 2022 but does not apply to a building notice, full plans application or initial notice submitted before that date, provided the work for each building is started before 15th Jun 2023.
- 3.6.3 The approved document has the following relevant guidance in Section 3 regarding noise ingress into buildings:
- 3.6.4 *“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).”*
- 3.6.5 *“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).*
- 3.6.6 *“Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants’ Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use”.*
- 3.6.7 Further guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants’ Acoustics, Ventilation and Overheating: Residential Design Guide (2020).

4 Baseline Noise Survey

- 4.1.1 The noise survey was undertaken on Tuesday 17th May and Wednesday 18th May 2022 and covered daytime and night-time periods at four measurement locations. MP1 and MP2 were taken at heights of 1.5 and 4 metres with the nearest measurement to Yew Tree Road (MP1) taken over an unbroken period of 3 hours in order to comply with the shortened method described in the Department of Transport's Calculation of Road Traffic Noise (CRTN).
- 4.1.2 The following noise monitoring positions were adopted (the approximate locations of the noise monitoring positions are shown in Appendix B for reference):
- MP1 was located at the northwest corner of the sites, set back from Yew Tree Road to the approximate distance of the proposed Façades.
 - MP2 was located to the south west of the proposed sites.
 - MP3 was located at the north eastern corner of site near the corner of Yew Tree Road and Burn Road.
 - MP4 was located at the south eastern corner of the site close to Burn Road.
- 4.1.3 Noise measurements were made in free field conditions using two Bruel & Kjaer 2250 Type 1 integrating sound level meters. A windshield was fitted for all measurements. The calibration of each measurement system was verified immediately before and after the survey using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring.
- 4.1.4 Measurements consisted of A-weighted broadband parameters, together with linear octave band L_{eq} levels. Table 3.1 presents a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.2 – Summary of Noise Measurement Data

Location	Date	Height (m)	Time (hh:mm)	Length (hh:mm)	$L_{Aeq,T}$ (dB)	L_{Amax} (dB)	$L_{A90,T}$ (dB)	$L_{A10,T}$ (dB)	Comment
MP1	17/05/2022	1.5	11:18	03:00	49	70	44	51	Noise - Building Site to East - A629 Contributing during daytime
	17/05/2022	4	11:18	03:00	51	71	46	53	
	17/05/2022	1.5	21:01	00:15	45	62	42	46	Background Driven by A629 Evening
	17/05/2022	4	20:58	00:30	46	65	43	47	
MP2	17/05/2022	1.5	14:22	00:20	50	67	45	53	Survey truncated due to noise from diggers on building site
	17/05/2022	4	14:20	00:20	49	62	46	51	
	17/05/2022	4	21:30	01:30	45	64	42	47	Rain @ 22:15-23:00
	17/05/2022	4	23:00	02:00	43	56	40	46	Night-time Period
	18/05/2022	1.5	12:28	00:30	48	67	43	50	Quieter Period for Building Site to East
MP3	17/05/2022	1.5	21:18	00:15	45	61	41	46	Background Driven by A629 Evening
	18/05/2022	1.5	11:55	00:15	55	79	46	58	Quieter Period for Building Site to East
MP4	17/05/2022	1.5	21:35	00:15	43	60	41	44	Background Driven by A629 Evening
	18/05/2022	1.5	12:11	00:15	51	70	45	51	Quieter Period for Building Site to East

- 4.1.5 The ambient and background noise levels were considered to be commensurate to the application site setting with noise from passing traffic on Yew Tree and Burn Road being the principal noise source during the day with background dominated by noise from the A629 in the evening.
- 4.1.6 Afternoon Measurements on Tuesday 17th may at MP2 to MP4 were cut short due to interfering noise from construction machinery activity on the building site to the east. Measurements were conducted in the evening and then during the daytime on Wednesday 18th May while there was no significant noise from the building site.
- 4.1.7 An unbroken 3-hour period was obtained for MP1 at heights of 1.5 and 4 metres, the $L_{A10,3hr}$ was measured as 51 dBA and 53 dBA respectively.

4.1.8 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 $L_{A10(3\text{ hour})}$ as the arithmetic mean of the three consecutive values of hourly L_{A10} , the $L_{A10(0700-2300)}$ can be calculated from the equation:

Equation 1

$$L_{A10,(0700-2300)} = L_{A10,3hr} - 1 \text{ dB}$$

4.1.9 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 $L_{A10(0700-2300)}$ to EU Noise Indices for Noise Mapping’ presents a methodology for calculating daytime $L_{Aeq(0700-2300)}$ and night-time $L_{Aeq(2300-0700)}$ ambient noise levels based on the $L_{A10(18\text{ hour})}$ noise levels, as follows:

Equation 2

$$L_{Aeq,(0700-2300)} = 10 \log \left(\frac{12 \times 10^{\left(\frac{0.95L_{A10,(0700-2300)} + 1.44}{10}\right)} + 4 \times 10^{\left(\frac{0.97L_{A10,(0700-2300)} - 2.87}{10}\right)}}{16} \right) \text{ dB}$$

Equation 3

$$L_{Aeq,(2300-0700)} = 0.9 \times L_{A10,(0700-2300)} - 3.77 \text{ dB}$$

4.1.10 Using formulas 1 to 3, the daytime and night-time ambient noise levels at MP1 are predicted as shown in Table 4-2. The noise levels at MP1 are no greater than 50 dB $L_{Aeq,(0700-2300)}$ for the full daytime period and 43 dB $L_{Aeq,(2300-0700)}$ over the night at the 1st floor.

Table 4-2: Predicted Day and Night-time $L_{Aeq,T}$ for MP1

MP1 (Height)	Daytime $L_{Aeq,(0700-2300)}$	Night-time $L_{Aeq,(2300-0700)}$
1.5 metres	49	41
4 metres	50	43

4.1.11 Measurements taken in the evening over the 2100-2300 period were approximately 45 dB $L_{Aeq,T}$ at all 4 positions, with background noise level noted as being due to the A629.

4.1.12 The highest L_{Amax} measurements during this period (out-with commercial activity during 0700 to 1700) were in the range of 60-65 dBA. Measurements continued into the night-time hours (2300-0100) at MP2 showed an average $L_{Aeq,T}$ of 43 dBA and no L_{Amax} events greater than 56 dBA.

4.1.13 Given the maximum noise levels measured during the day, there is the potential for peak events of 79 dB L_{Amax} , however these are related to HGV traffic and so would not be frequent occurrence during the night-time hours. The evening measurements showed no events above 65 dB L_{Amax} occurring at any roadside position during the evening hours so it assumed 65 dBA is a appropriate representative level for night-time L_{Amax} .

5 Noise Impact Assessment

5.1.1 In accordance with British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' methodology the following criteria are considered appropriate:

- ≤ 55 dB $L_{Aeq(0700-2300)}$ in external amenity areas
- ≤ 35 dB $L_{Aeq(0700-2300)}$ in habitable rooms during the daytime.
- ≤ 30 dB $L_{Aeq(2300-0700)}$ in bedrooms during the night-time.
- 45 dB L_{Amax} not regularly exceeded in bedrooms during the night-time.

5.1.2 It was noted Yew Tree Road was the dominant noise source in the local area. The daytime and night-time noise levels at the nearest façade of any dwelling (corresponding to MP1 at a distance of 12 m from Yew Tree Road) have been calculated according to the shortened CRTN method as follows:

- ≤ 50 dB $L_{Aeq(0700-2300)}$ during the daytime
- ≤ 43 dB $L_{Aeq(2300-0700)}$ during the night-time

5.1.3 The highest short-term $L_{Aeq,T}$ taken in proximity to the road at the intersection of Yew Tree Road and Burn Road was 55 dB $L_{Aeq,15min}$ and is assumed to be a combination of midday traffic including access to the building site.

5.1.4 It is therefore assumed no garden are would have noise levels greater than 50 dB $L_{Aeq(0700-2300)}$ with short term measurements still within the guidance of < 55 dBA, the remaining plots set back further from the road, particularly those areas which benefit from shielding by other properties, would be safely within the limit of acceptable external noise levels for garden areas during daytime periods.

5.1.5 External night-time levels (2300-0700) are expected to be no greater than 43 dB $L_{Aeq(2300-0700)}$ for all properties with exposure to L_{Amax} events of approximately 60-65 dBA for those dwellings bordering the roads.

5.1.6 Regarding internal noise levels during the daytime period, an assessment can be made based on partially open windows. The noise insulation of an open window has been generally accepted as being 10 to 15 dB(A) although the precision of this affect due to opening style, open area and window size, are not readily available.

5.1.7 A programme of laboratory measurements undertaken by the Building Performance Centre at Napier University on behalf of the Department for Environment, Food and Rural Affairs, quantified the sound insulation provided by a variety of window types, opening styles, areas of opening and ventilator devices (NANR116: 'Open / Closed Window Research Sound Insulation Through Ventilated Domestic Windows).

5.1.8 The test regime measured the sound insulation provided by seven separate windows, with a combination of twelve different opening styles. The variation in weighted level difference, D_w , across the different opening styles for approximately equivalent area openings has been consistently measured as between 4 and 6 dB. The range of measured insulation ratings, for window with a free open area of 0.05 m² is 14 to 20 dB D_w .

5.1.9 This was translated to the following dB(A) level differences, due to variations in the source noise characteristics:

- Road Traffic Noise 12 to 18 dBA
- Railway Noise 12 to 18 dBA
- Aircraft Noise 14 to 19 dBA
- Amplified Music 15 to 20 dBA

5.1.10 The window results do not show any one opening style which provides significantly better insulating characteristics.

- 5.1.11 Assuming the external noise levels stated above, and sound attenuation of 12-18 dB thru partially open windows, the most exposed properties on the site will have internal noise levels predicted to be between 32 to 38 dB $L_{Aeq,(0700-2300)}$ during daytime periods and between 25 and 31 dB $L_{Aeq,(2300-0700)}$ at night with a potential for night-time L_{Amax} events between 42 and 53 dBA.
- 5.1.12 As windows would be expected to be closed at night, as stated in Approved Document O, and with a standard closed modern window unit achieving at least 25 dBA of attenuation, then the night-time internal noise criteria would be expected to be safely achieved for all houses.
- 5.1.13 Daytime noise levels in living areas in houses bordering the road have the potential to exceed the target of 35 dBA so it is recommended that a system is implemented that will provide adequate ventilation during daytime while maintaining acoustic isolation. If this is to be achieved through tricklevents then units would be required to provide a minimum of 25 dB D_{new} in the open position.
- 5.1.14 A minimal glazing and tricklevent specification (>25 dB R_w / >25 dB D_{new}) will safely achieve internal noise levels below 35 dB $L_{Aeq,(0700-2300)}$ and 30 dB $L_{Aeq,(2300-0700)}$.
- 5.1.15 It is expected mitigation could be applied to achieve improved noise levels in the garden areas to the east of the site which do not have any partial shielding from Burn Road, this would achieve noise levels significantly below 50 dB $L_{Aeq,(0700-2300)}$.

6 Sound Attenuation Scheme Proposals

6.1 External Noise Levels

- 6.1.1 Free field measurements show external levels are predicted to be within the limit of the acceptable criteria for external amenity areas, and as such no mitigation will be required to achieve an average of 50 dB $L_{Aeq(0700-2300)}$ within any garden area.
- 6.1.2 Nearly all garden areas will be further shielded from road noise by the development. The only area of potential improvement would be gained by forming an acoustic barrier at the edge of the most southwestern plot's garden area.
- 6.1.3 As minimum, blocking the line of sight of a listener to a noise source by a barrier will provide at least 10 dB of attenuation and achieve external noise levels significantly below 50 dBA. This would also benefit the ground floor habitable rooms of the development shielded by any barrier.
- 6.1.4 Any barrier may be composed of unbroken bunding or fencing, or a combination of both. Any barrier would require a minimal mass per unit area of 5 kg/m².

6.2 Internal Noise Levels

- 6.2.1 Internal noise criteria for the houses closest to the roads can only be met by assuming closed windows. This is an assumption given in Approved Document O for night-time periods, however cooling during daytime periods will require an alternative ventilation solution to open windows.
- 6.2.2 If this is achieved through the use of tricklevents, then good living conditions can be achieved for all houses on the site(s) with a minimal acoustic attenuation performance of glazing and tricklevents.
- 6.2.3 For all houses it is recommended that glazing with a minimum performance of 25 dB R_w is fitted.
- 6.2.4 If trickle ventilation is planned then each unit should have a minimum performance of 25 dB D_{new} in the open position. If a room has more than one tricklevent, an increase of $10 \cdot \log(N)$ dB is added to the D_{new} requirement, where N is the number of tricklevents fitted within any one room.
- 6.2.5 Other measures such as the layout definition for the positioning of livingrooms and bedrooms with limited window exposure to the roadways can further reduce the predicted internal day and night-time noise levels.

7 Summary and Conclusions

- 7.1.1 A noise survey and assessment has been conducted for the Proposed Residential Development at Two Land Parcels to the South of Yew Tree Road, Birchencliffe, Huddersfield.
- 7.1.2 Section 4 details the relevant guidance regarding recommended noise limits for residential dwellings while Section 5 assesses the measured levels against the guidance criteria.
- 7.1.3 Section 3 details the external noise levels measured over the site which were established during noise monitoring carried out on Tuesday 17th May and Wednesday 18th May 2022. Levels were found to be commensurate with the setting, with higher levels measured in proximity to the passing roads of Yew Tree and Burn Road.
- 7.1.4 The findings can be summarised as noise is not a significant issue for the site, with external noise levels within the criteria without any requirement for mitigation, and internal noise levels only expected to potentially exceed criteria (by +3 dB in the worst case) during the day for houses directly next to the roads with windows partially open for ventilation.
- 7.1.5 Section 6 defines the façade performance required to achieve satisfactory internal noise levels (with ventilation) for all houses over the daytime period.

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.

$L_{AF \max}$

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 B – Noise Measurement Positions



Appendix C – Proposed Site Plan

Application No: 2018/60/90151/W



Appendix D – Proposed Site Plan

Application No: 2018/60/90776/W

