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Dear Sir

**NOISE IMPACT ASSESSMENT FOR PROPOSED NEW RESIDENTIAL DEVELOPMENT
LAND OFF WILLOW ROAD (PHASE 3), THURNSCOE, S63 0PG**

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Limited (ENS) has been commissioned by Keepmoat Homes Ltd to carry out a noise impact assessment for a proposed new build residential development at land off Willow Road (Phase 3), Thurnscoe, S63 0PG (hereafter referred to as the application site).

1.02 The objectives of the noise impact assessment were to:

- Determine external noise levels at the application 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 loss of amenity due to noise.

1.03 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.

1.04 This report has been prepared for Keepmoat Homes Ltd 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 Keepmoat Homes Ltd (applicant) and ENS as to the extent to which the findings may be appropriate for their use.

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

2.00 APPLICATION SITE SETTING AND PROPOSED RESIDENTIAL DEVELOPMENT

2.01 The application site is located within a residential setting within the village of Thurnscoe. Irregular in shape (see Appendix 2 for a site layout) the application site is bound by:

- New residential development (under construction) to the south (Phases 1 & 2) on Blossom Way and Lingamore Leys.
- A railway line to the east.
- An existing residential area to the west on Merrill Road.
- Open fields to the north.

- 2.02 The noise environment at the application site (relatively low throughout) is characterised by passenger and freight train passes on the rail line to the east with no other significant noise sources noted. It should be noted that construction noise from the south was taking place (phase 2), which did not contribute to the noise climate significantly.
- 2.03 The proposed residential development consists of the construction of 357 no. residential dwellings with associated landscaping and car parking (a site layout is contained in Appendix 2 for reference).
- 2.04 Plans indicate that the residential development footprint is set back circa 40 metres from the nearside rail line
- 2.05 Consultation with Realtime Trains shows that during the daytime period (0700–2300 hours), the rail line adjacent to the application site is used by Northern Rail, Cross Country, Trans Pennine Express and freight services with circa 95 trains per day.
- 2.06 Consultation with Realtime Trains also illustrates that during the night time period (2300–0700 hours), the rail line is used less frequently, typically up to 26 trains per night.

3.00 BASELINE NOISE SURVEY

- 3.01 In order to establish the ambient and background noise levels at the application site, a baseline noise survey was undertaken on Wednesday 19th June and Thursday 20th June 2019.
- 3.02 For the purpose of the assessment, the following noise monitoring positions were adopted (the approximate location of the noise monitoring positions is contained in Appendix 2 for reference):
- MP1 was located on the western boundary of the application site at circa 4 metres above ground level (AGL).
 - MP2 was located on the eastern boundary at circa 40 metres back from ten nearside rail head of the adjacent railway line at circa 4 metres AGL.
- 3.03 Noise measurements were made in a free field environment using two Bruel & Kjaer 2250 Type 1 integrating sound level meters. A windshield was fitted for all measurements. The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the survey were appropriate for monitoring.
- 3.04 Measurements consisted of A-weighted broadband parameters, together with linear octave band L_{eq} levels. Table 3.1 contains a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1 – Summary of Noise Measurement Data

Position	Date	Time	L _{Aeq} (dB)	L _{A90} (dB)	L _{A10} (dB)	L _{A1} (dB)	Comment
MP1	19/06/19	1224-1239	46	39	49	56	Distant construction noise
Daytime noise level circa 46 dB L_{Aeq, T}							
MP2	20/06/19	0920-1041	45	39	46	54	3 Express Cross-Country Train passes & 4 local Northern Train passes Distant construction noise
		1043-1105	45	40	46	54	1 Express Cross-Country Train passes & 2 local Northern Train passes Distant construction noise
Daytime noise level (based on 6 trains per hour) circa 45 dB L_{Aeq, T} (eastern boundary of the application site)							
Night time noise level (based on 3 trains per hour) circa 42 dB L_{Aeq, T} (eastern boundary of the application site)							
Maximum noise level of a passing train measured up to 70 dB L_{AFmax} (Express Cross-Country)							

3.05 It is considered that rail use during the course of the survey was representative of the 16-hour daytime period daytime. As discussed, there are circa 26 scheduled passenger and freight services during the 8-hour night time period.

3.06 The rail noise level is measured / calculated to be 45 dB LAeq (0700–2300) and 42 dB LAeq (2300–0700) at MP2¹ (eastern boundary of the application site). The maximum noise level associated with a train pass was measured up to 70 dB LAFMax at MP2 (eastern boundary of the application site).

4.00 NATIONAL PLANNING POLICY FRAMEWORK AND OTHER RELEVANT GUIDANCE

National Planning Policy Framework

4.01 The National Planning Policy Framework (NPPF) was updated in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

4.02 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'.

4.03 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'.

¹ = 45 dB LAeq (Daytime 6 trains in 1 hour)– 10 log (6 trains per hour daytime / 3 train per hour night time)

- 4.04 With regard to extant community noise sources and the potential to affect proposed new developments, 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.'

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

Noise Policy Statement for England

- 4.06 The Noise Policy Statement for England (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.

- 4.07 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.

Planning Practice Guidance – Noise

- 4.08 In December 2014, Planning Practice Guidance (PPG) was updated online 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.

- 4.09 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'.

- 4.10 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest 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'.

ProPG Planning and Noise: New Residential Development

- 4.11 ProPG Planning and Noise: New Residential Development (ProPG) was published in May 2017 by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health.
- 4.12 Stage 1 of ProPG comprises an initial site noise risk assessment which correlates external noise levels at the site with the risk of an adverse impact. For reference, Figure 1 of ProPG indicates that daytime noise levels of ≤ 50 dB L_{Aeq} (0700-2300) are assessed as **negligible risk** in terms of adverse impacts.
- 4.13 Stage 2: Element 2 of ProPG sets indoor ambient noise levels for residential dwellings based on the guidance contained in British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233) (see table below).

Table 4.1 – Indoor Ambient Noise Levels in Dwellings

Activity	Location	Good Indoor Ambient Noise Levels	
Resting	Living Room	35 dB L_{Aeq} (0700–2300)	-
Dining	Dining Room/Area	40 dB L_{Aeq} (0700–2300)	-
Sleeping (daytime resting)	Bedroom	35 dB L_{Aeq} (0700–2300)	30 dB L_{Aeq} (2300–0700) 45 dB L_{AFMax} (2300–0700)

- 4.14 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.'
- 4.15 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'.
- 4.16 This is consistent with the guidance contained within the PPG, which states that:
- '... consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations'.*
- 4.17 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} (0700-2300) during the daytime.
 - ≤ 30 dB L_{Aeq} (2300-0700) and 45 dB L_{AFMax} not regularly exceeded during the night time.
- 4.18 With respect to external amenity, ProPG reflects the advice contained in BS 8233, as follows:
- 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.'*

5.00 SOUND ATTENUATION SCHEME PROPOSALS

5.01 A typical standard double-glazed window partially open provides circa 15 dB(A) reduction in level (from external to internal). Daytime noise levels are sufficiently low enough to allow partially open windows to form the ventilation requirements for living rooms.

5.02 The resultant internal noise levels are set out in the table below:

Table 5.1 – Ambient Noise Levels and Noise Mitigation Measures (Living Rooms)

Ambient Noise Level	Reduction	Resultant Internal Level	Internal Criteria
≤ 45 dB L _{Aeq} (day)	-15 dB	≤ 30 dB L _{Aeq} (day)	≤ 35 dB L _{Aeq} (0700-2300)

5.03 It is therefore considered that standard double glazing is appropriate for Living rooms throughout the application site (Phase 3).

5.04 The scheme of sound attenuation for bedrooms is governed by the night time L_{AFMax} levels associated with a passing train (note: 70 dB L_{AFMax} Cross-Country express train measured during the day).

5.05 In order to calculate the sound insulation requirements of the new glazing, 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, 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).

5.06 Internal noise levels within proposed living rooms and bedrooms have been calculated with closed windows. Calculations have incorporated:

- The measured/calculated external noise level data acquired on site.
- The noise ingress calculation methodology outlined in Annex G.2 of BS8233:2014.
- An assumed room volume of 50 m³ with a glazing area of 3 m² for living rooms.
- An assumed room volume of 25 m³ with a glazing area of 1.5 m² for bedrooms.
- An assumed typical masonry external wall construction (e.g. 250mm – 300mm solid masonry or 100mm brick / 100mm cavity / 100mm block).
- An assumed reverberation time of 0.5 seconds for living rooms and bedrooms.

5.07 The scheme of sound insulation is set out in the following table.

Table 5.2 – Scheme of Sound Insulation Works (Bedrooms, See Appendix 3 for scheme)

Location	Noise Level	Internal Criteria	Glazing and Ventilation
Bedrooms on the eastern boundary of the application overlooking the railway line (Plots 97-104, 66-69,31-34 & 29) Including bedrooms with a 90°-degree angle of view	≤ 45 dB L _{Aeq, day} ≤ 42 dB L _{Aeq, night} ≤ 70 dB L _{AFMax}	≤ 35 dB L _{Aeq} (0700-2300) ≤ 30 dB L _{Aeq} (2300-0700) ≤ 45 dB L _{AFMax} (2300-0700)	Standard glazing rated at 25 dB R _w +C _{tr} i.e. 4 / (6-20) / 4 and Acoustic trickle vents*
Remaining bedrooms across the application site.	Standard double glazing rated at 25 dB R _w +C _{tr} i.e. 4 / (6-20) / 4 and standard trickle vents		

* Acoustic trickle vents rated at least 37 dB D_{n,e,w}+C_{tr} per 5000 mm² EA in open position, such as the Greenwood 5000EAW.AC1 (note: 1 no. required per habitable room) – ventilation requirements to be confirmed by developer.

External Amenity

5.08 Daytime garden levels were measured at up to 46 dB $L_{Aeq, T}$ across the application site, this readily satisfies the upper guideline value for external amenity areas, as recommended by BS8233 / ProPG. Therefore, no specific measures are required to protect garden amenity.

6.00 CONCLUSIONS

6.01 A noise impact assessment has been undertaken for a proposed residential development at Land off Willow Road (Phase 3), Thurnscoe, S63 0PG.

6.02 The noise environment at the application site (relatively low throughout) is characterised by passenger and freight train passes on the rail line to the east with no other significant noise sources.

6.03 A scheme of sound attenuation works has been developed to protect the proposed residential development from the ambient noise climate in accordance with pertinent guidelines. On this basis, the ambient noise climate is not considered to pose a constraint to the proposed residential development.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely

Richard Whitaker
AMIOA, Diploma in Acoustics & Noise Control
For Environmental Noise Solutions Limited

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Appendix 1 Glossary of Acoustic Terms

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 Network

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.

Sound Exposure Level (SEL or L_{AE})

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. 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
Drawings (Site Plan / Noise Monitoring Positions)



Appendix 3 Glazing Scheme – Bedrooms overlooking the railway line

— = Acoustic trickle vents rated at least 37 dB $D_{n,e,w} + C_{tr}$

