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Dear Sir,

**NOISE IMPACT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT,
LAND AT BEECH HOUSE FARM, NO. 3 ROCKLEY LANE, BIRDWELL**

1.00 INTRODUCTION

1.01 Environmental Noise Solutions has been commissioned by Peter Thompson Architectural Design Consultants Ltd, on behalf of Ms Barbara Britton, to carry out a noise impact assessment for a proposed residential development (9 dwelling houses) at land at Beech House Farm, No. 3 Rockley Lane, Birdwell, Barnsley (hereafter referred to as the application site).

1.02 The objectives of the noise impact assessment were to:

- Determine the ambient noise climate at the application site during representative periods of the daytime (and use standard formulae to calculate night time noise levels);
- Assess the potential impact of the ambient noise climate on the proposed development (with reference to the National Planning Policy Framework); and
- Provide recommendations for a scheme of sound attenuation works, as necessary, to ensure that the future occupants of the proposed development do not experience any unacceptable 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 screening. It has been prepared to accompany a planning application to be submitted to Barnsley Metropolitan Borough Council (BMBC) for the proposed residential development.

1.04 This report has been prepared for Ms Barbara Britton 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 Ms Barbara Britton, Peter Thompson Architectural Design Consultant Ltd (Planning Agent) 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 SITE SETTING AND PROPOSED DEVELOPMENT

2.01 For reference, the application site is located in a predominantly residential setting. Approximately rectangular in shape it is bound by:

- Rockley Lane to the west with the M1 motorway (running north-south) further west (note: the M1 central reservation is approximately 75 metres from the western boundary of the application site);
- Open agricultural fields to the north;
- A barn (to be retained) to the east, with existing residential dwellings further east; and
- Rockley Crescent to the south, with existing residential dwellings further south.

- 2.02 The application site is generally flat. To the west of the application site, the M1 motorway is located in a deep cutting (estimated to be circa 8 metres deep), which, subjectively, provides a significant degree of attenuation to road traffic noise.
- 2.03 Rockley Lane to the west of the application site is a moderately trafficked single carriageway (approximately 200 vehicles per hour) with a very low percentage of HGVs. The speed limit on Rockley Lane reduces from 60 to 30 miles per hour at the junction of Rockley Crescent upon entering Birdwell village from the north.
- 2.04 Rockley Crescent is a narrow lane providing access to the existing residential dwellings to the south of the application site.
- 2.05 The proposed residential development (9 dwelling houses) is to be located on land to the west and north of Beech House Farm.

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 Friday 5th April 2013.
- 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 12 metres to Rockley Lane and considered to be representative of the proposed residential dwellings along the western boundary of the application site; and
 - MP2 was located approximately 60 metres to Rockley Lane and considered representative of the proposed residential dwellings along the eastern boundary of the application site.
- 3.03 All noise measurements were made in a free field environment at circa 3 metres above ground level.
- 3.04 Noise measurements were undertaken using a Bruel & Kjaer 2260 Type 1 integrating sound level meter. Measurements consisted of A-weighted broadband parameters, together with linear one-third octave band L_{eq} levels.
- 3.05 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.
- 3.06 The following table 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 Baseline Noise Measurement Data

| Position | Date | Time | L_{Aeq} (dB) | L_{A90} (dB) | L_{A10} (dB) | L_{AF1} (dB) | L_{AFMax} (dB) | Comments |
|--|------------|-------------|-------------------|-------------------|-------------------|-------------------|---------------------|-----------------------------------|
| MP1 | 05/04/2013 | 15:20–15:50 | 62 | 60 | 63 | 67 | 76 | M1 motorway, Rockley Lane traffic |
| MP1 | 05/04/2013 | 16:23–16:53 | 61 | 59 | 63 | 66 | 76 | M1 motorway, Rockley Lane traffic |
| Daytime ambient noise level \approx 60 dB L_{Aeq} (0700–2300) based on CRTN methodology | | | | | | | | |
| Night time ambient noise level \approx 58 dB L_{Aeq} (2300–0700) based on TRL methodology | | | | | | | | |
| MP2 | 05/04/2013 | 15:52–16:22 | 58 | 56 | 59 | 61 | 70 | M1 motorway noise |
| Daytime ambient noise level \approx 56 dB L_{Aeq} (0700–2300) based on CRTN methodology | | | | | | | | |
| Night time ambient noise level \approx 54 dB L_{Aeq} (2300–0700) based on TRL methodology | | | | | | | | |

- 3.07 During the course of the survey, the dominant noise source across the application site was noted to be the M1 motorway, although the peak noise levels (as denoted by the L_{AFMax} parameter) at the application site were due to local road traffic on Rockley Lane.

3.08 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 $L_{A10(18 \text{ hour})}$ can be calculated from the equation:

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

3.09 PPG24 further states that for road traffic noise:

$$(ii) \quad L_{Aeq(0700-2300)} \approx L_{A10(0600-0000)} - 2 \text{ dB}$$

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

$$(iii) \quad L_{Aeq(0700-2300)} \approx L_{A10, 3 \text{ hour}} - 3 \text{ dB}$$

3.11 Although the CRTN shortened procedure has not been followed (rather a 30-minute measurement has been taken in each of two-consecutive hours), as expected, the road traffic noise levels from the M1 motorway were relatively constant throughout the survey period (for reference, 63 dB L_{A10}).

3.12 The daytime ambient noise level at the proposed residential dwellings in the western part of the application site was measured / predicted at **60 dB $L_{Aeq(0700-2300)}$** .

3.13 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 LA10 (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 level based on the following formula:

$$(iv) \quad L_{Aeq(23:00-07:00)} \approx 0.87 * L_{A10, 18 \text{ hour}} + 4.24 \text{ (for motorways)}$$

3.14 Based on the above formula, the night time ambient noise level at the proposed residential dwellings in the western part of the application site was measured / predicted at **58 dB $L_{Aeq(2300-0700)}$** .

3.15 The ambient noise levels at the proposed residential dwellings in the eastern part of the application site will be lower due to increased distance and screening (by the other proposed residential dwellings) from the M1 motorway and Rockley Lane.

4.00 NOISE IMPACT ASSESSMENT CRITERIA

4.01 The National Planning Policy Framework (NPPF), came into force on 27 March 2012 and is a material consideration in planning decisions. At the heart of the NPPF is a presumption in favour of sustainable development, and the policies in Paragraphs 18 to 219 of the NPPF, taken as a whole, constitute the Government's view on what sustainable development in England means in practice for the planning system.

4.02 The NPPF states that there are three dimensions to sustainable development, which include an economic role (contributing to building a strong, responsive and competitive economy), a social role (providing the supply of housing required to meet the needs of present and future generations) and an environmental role (which includes minimising waste and pollution).

4.03 The NPPF supersedes Planning Policy Guidance Note 24 (PPG 24). The main policy statement in relation to noise is Paragraph 123 of the NPPF, which states that planning policies and decisions should aim to:

- *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
 - *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
 - *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established (note: subject to the provisions of the Environmental Protection Act 1990 and other relevant law); and*
 - *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*
- 4.04 In relation to 'adverse impacts', the NPPF refers to the Explanatory Note to the Noise Policy Statement for England (NPSE) for guidance.
- 4.05 The Noise Policy Statement for England (NPSE) and associated Explanatory Note were published by DEFRA in 2010 and set out the Government's noise management strategy to enable noise management decisions to be made within the wider context (i.e. guiding principles of sustainable development), in a cost-effective manner and in a timely fashion.
- 4.06 Fundamental to this approach is *'there is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors'*.
- 4.07 The noise policy aims of NPSE are to (i) avoid significant adverse impact on health and quality of life, (ii) mitigate and minimise adverse impacts on health and quality of life, and (iii) where possible, contribute to the improvement of health and quality of life. The policy aims are always to be considered within the context of the Government's policy on sustainable development.
- 4.08 In relation to the mitigation and minimisation of adverse impacts, NPSE considers that *'in reality, although not always stated, the aim has tended to be to minimise noise 'as far as is reasonably practical'.* This is reinforced in Paragraph 2.24 of the Explanatory Note, which requires that *'all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur'*.
- 4.09 In relation to explaining the 'significant adverse' and 'adverse' effects quoted in the NPPF, NPSE uses the two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organisation (WHO), these are:
- 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 noise.
 - LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
- 4.10 The NPSE then extends these concepts to lead to a SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.
- 4.11 No specific criteria are presented in the NPSE, to provide the necessary policy flexibility until further evidence and suitable guidance is available. In lieu of specific criteria, for residential development, ENS makes reference to existing guideline documents, which are summarised in the following paragraph(s).

- 4.12 BS 8233:1999 'Sound Insulation and Noise Reduction for Buildings – Code of Practice' (BS 8233) defines a range of ambient noise levels for design criteria, in order that good or reasonable conditions are achieved in certain internal and external environments. The following table shows a summary of the levels recommended in BS 8233 for habitable rooms in the proposed development. Additionally, the World Health Organisation (WHO) guidelines on Community Noise (1999) considers that for speech intelligibility during the daytime and evening periods, internal living room levels should not exceed 35 dB $L_{Aeq, T}$ (0700-2300)

Table 4.1 – Indoor Ambient Noise Levels as Recommended in BS 8233

| Criterion | Typical Situation | Design Range dB $L_{Aeq, T}$ | |
|--|-------------------|------------------------------|------------|
| | | GOOD | REASONABLE |
| Reasonable resting / sleeping conditions | Living rooms | 30 | 40 |
| | Bedrooms* | 30 | 35 |

* For a reasonable standard in bedrooms at night, individual noise events should not normally exceed 45 dB $L_{AF, max}$.

- 4.13 With reference to BS 8233 guideline levels, by definition, the 'reasonable' design criteria cannot represent a significant adverse impact (the prevention of which is the 1st aim of NPSE). With cognisance to the 2nd aim of NPSE (to minimise noise impact), the WHO criterion of 35 dB $L_{Aeq, T}$ during the daytime and BS 8233 'good' design criterion of 30 dB $L_{Aeq, T}$ during the night time are considered appropriate.
- 4.14 The WHO Guidelines for Community Noise consider that few people are seriously annoyed (a significant effect) by activity with levels below 55 dB L_{Aeq} in the daytime. On this basis, the SOAEL is an unknown value in excess of 55 dB L_{Aeq} . Therefore, utilising 55 dB L_{Aeq} as the target garden criterion achieves the 1st aim of NPSE (avoiding significant impact), whilst utilising 50 dB L_{Aeq} criterion achieves the 2nd aim of NPSE (to minimise noise impact).
- 4.15 In line with the above, it is understood that Barnsley Metropolitan Borough Council normally consider that ambient noise levels in gardens should, where practicable, be limited to 55 dB L_{Aeq} (0700–2300).

5.00 SOUND ATTENUATION SCHEME

- 5.01 Based on external and internal noise measurements undertaken by ENS at other sites, it is considered that a standard double glazed window (for reference typically rated at 29 dB R_w) with standard trickle vents in a building façade will provide of the order of 27 to 30 dB(A) sound insulation (from external to internal) to road traffic noise. This statement is also corroborated by Annex 6 of Planning Policy Guidance 24 'Planning and Noise' (PPG 24).
- 5.02 Based on daytime and night time ambient noise levels of 60 dB L_{Aeq} (0700–2300) and 58 dB L_{Aeq} (2300–0700) at MP1 (western boundary of the application site) and 56 dB L_{Aeq} (0700–2300) and 54 dB L_{Aeq} (2300–0700) at MP2 (eastern boundary of the application site), respectively, 'good' resting and sleeping conditions will be achieved throughout the proposed residential development with standard double glazed windows and standard trickle vents.
- 5.03 Notwithstanding this, in order to control 'peak' noise levels (as denoted by the $L_{AF, Max}$ parameter) from passing traffic on Rockley Lane, it is recommended that bedroom windows in close proximity to and overlooking Rockley Lane should have enhanced double glazing (8 mm glass / (6 – 20 mm cavity) / 4 mm glass; rated at least 33 dB R_w or equivalent) and acoustic trickle vents (i.e. rated at least 37 dB $D_{n,e,w}$ per 4000 mm² in open position).
- 5.04 In terms of garden amenity, the site layout (contained within Appendix 2 for reference) shows that the majority of gardens are to be located to the rear of the proposed dwellings, largely screened from the M1 motorway and Rockley Lane to the west (with the notable exception of Plots 1 and 2).

- 5.05 BS 5228:2009 Part 1 states 'In the absence of spectral data, as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. High topographical features and specifically designed and positioned noise barriers could provide greater attenuation.'
- 5.06 Based on the provision of a circa 2 metre height solid timber fence as shown in Appendix 2, it is considered that the ambient noise level within gardens across the proposed residential development should be less than 55 dB $L_{Aeq}(0700-2300)$.
- 5.07 The solid timber fence (or masonry wall or combination thereof) should have no gaps or holes (cover strips should also be used to prevent gaps forming over time), be fully sealed at the ground and have a minimum height of 2 metres. The timber should have a minimum mass per unit area of 10 kg/m².

6.00 CONCLUSIONS

- 6.01 A noise impact assessment has been undertaken for a proposed residential development at land at Beech House Farm, Rockley Lane, Birdwell, Barnsley.
- 6.02 The ambient noise climate at the application site is due to road traffic noise from the M1 motorway and (locally) also Rockley Lane.
- 6.03 A scheme of sound insulation works has been developed to protect the proposed residential development from the ambient noise climate in accordance with the requirements of the National Planning Policy Framework. On this basis, the ambient noise climate is not considered to represent a constraint to the proposed residential development of the application site.

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



Anthony Harper
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 μ Pa 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 μ Pa).

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).

