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6th June 2013

Ms Lisa Allison
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Sent by email only: Lisa.Allison@walton-co.co.uk

Dear Ms Allison,

**NOISE IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
LAND OFF SHEFFIELD ROAD, PENISTONE, SHEFFIELD**

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Ltd (ENS) has been commissioned by Walton & Co on behalf of its client Yorkshire Land Ltd to carry out a noise impact assessment for a proposed residential development at land off Sheffield Road, Penistone.

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 (use of standard formulae to predict 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 Council (BC) for the proposed residential development of the application site.

1.04 This report has been prepared for Walton & Co and its client Yorkshire Land 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 the parties above 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 The application site is located in a mixed-use environment comprising residential, commercial and light industrial premises as well as a train station to the north west. The application site is bound by:

- Open fields to the north, currently the subject of a planning application for residential development. Sheffield Road lies beyond this, running east to west;
- The Penistone-Silkstone Common railway track to the south west, with Penistone Station located approximately 80 metres to the north west;

- An open tract of land to the north west, noted to be unoccupied, but contain a rusting unclad steel portal frame structure); and
 - Existing residential properties to the east/south east.
- 2.02 Lying to the north of the application site, beyond Sheffield Road is a small commercial/light industrial park containing a fire station, ambulance station and a grit store. A children's nursery is also situated to the north east of the application site. A number of existing residential properties are located either side of this industrial park.
- 2.03 In addition to the above, Penistone Church Football Club is located approximately 175 metres to the south west of the application site.
- 2.04 The south western boundary of the application site runs parallel with the railway tracks and it is understood that current proposals are for a 7 metre deep landscaped buffer between the nearest residential curtilage and this boundary. This buffer should result in a separation distance of approximately 13 metres between the residential curtilage and the nearside railway track.

3.00 BASELINE NOISE SURVEY

- 3.01 A noise survey has previously been undertaken by ENS in relation to the residential development of the tract of land to the north of the application site. The noise levels previously measured are considered to be suitable for assessing the noise impact of road and rail traffic on the application site. The original baseline noise survey was undertaken on Monday 26th November 2012.
- 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 a tract of land to the north of the application site, approximately 10 metres from the nearside carriageway of Sheffield Road. Measurements made at this position were taken at a position with a direct line of sight to the road surface of Sheffield Road;
 - MP2 was located an additional 3 metres from Sheffield Road, located behind an earth bund. This position was chosen to assess the level of attenuation provided by the topography of the tract of land to the north of the application site (with Sheffield Road sitting in a cutting); and
 - MP3 was located at a distance of approximately 25 metres from the nearest track of the train line.
- 3.03 Noise measurements were undertaken using a Bruel & Kjaer 2260 Type 1 integrating sound level meter. A windshield was fitted for all measurements. Measurements were made in a free field environment at 1.5 metres above local ground level. 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, however, due to heavy rain on the night before the survey, roads were wet.
- 3.04 Measurements consisted of A-weighted broadband parameters, together with linear one-third octave band L_{eq} levels. The following table contains a summary of the measurement data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 1 – Summary of Noise Measurement Data

Position	Date	Time	L _{Aeq} (dB)	L _{A90} (dB)	L _{A10} (dB)	L _{AFmax} (dB)	Comment
MP1	26/11/2012	10:46-11:46	60	47	63	74	Road traffic on Sheffield Road, break time at the nursery
MP1	26/11/2012	11:46-12:46	59	48	63	72	Road traffic on Sheffield Road, movement within the industrial estate associated with grit store
MP1	26/11/2012	12:46-13:46	59	50	64	74	Road traffic on Sheffield Road
MP2	26/11/2012	13:52-13:58	53	47	56	62	Road traffic on Sheffield Road
MP3	26/11/2012	14:40-15:40	52	45	51	75	Rail movements and distant road traffic. Two trains passes were included in the measurement
Daytime noise level 60 dB L_{Aeq} (0700-2300) at MP1 based on CRTN methodology (typical traffic L_{AFmax} < 70 dB) Daytime noise level of 52 dB L_{Aeq}(1 hour) at MP3 with a maximum noise level of 75 dB L_{AFmax} associated with a train pass Night time noise level 52 dB L_{Aeq} (2300–0700) at MP1 based on TRL methodology							

- 3.05 During the course of the daytime noise survey the dominant noise source was noted to be local road traffic on Sheffield Road at MP1, and noise associated with train pass-bys at MP3.

Road Traffic

- 3.06 For the prediction of daytime road traffic noise, the Department of Transport's Memorandum on the Calculation of Road Traffic Noise (CRTN) explains that the following shortened measurement procedure may be used. Measurements of L_{A10} are made over any three consecutive hours between 10:00 and 17:00 hours. Using L_{A10} (3 hour) as the arithmetic mean of the three consecutive values of hourly L_{A10}, the L_{A10} (18 hour) can be calculated from the equation:

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

- 3.07 PPG24 further states that for road traffic noise:

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

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

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

- 3.09 For reference the daytime ambient noise level at MP1 is calculated at 60 dB L_{Aeq} (0700-2300).

- 3.10 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 level based on the following formula:

$$(iv) \quad L_{Aeq} (23:00-07:00) \approx 0.90 * L_{A10, 18 \text{ hour}} - 3.77 \text{ (for non-motorways)}$$

- 3.11 Based on the above formula, the night time ambient noise level is calculated at 52 dB L_{Aeq} (2300-0700) at MP1 which is circa 8 decibels lower than the daytime ambient noise level at this location.

- 3.12 As detailed in Section 2 above, MP1 is set at a distance of 10 metres from the nearside kerb of Sheffield Road. At its closest point, the northern boundary of the application site is set at a distance of approximately 75 metres from this highway.

- 3.13 Based on line source attenuation of 3 dB per doubling of distance ($10 * \log (d1/d2)$), an additional 9 dB of attenuation may be assumed. Furthermore, measurements at MP2 indicate

that an additional 7 dB of attenuation may be assumed due to screening provided by the topography of the land to the north of the application site, resulting in a noise level of 44 dB $L_{Aeq(0700-2300)}$ at the northern site boundary. This is in line with guidance contained within BS 5228:2009 Part 1, which 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'*.

- 3.14 In practice, such a low noise level is unlikely due to the contribution of other noise sources such as distant road traffic and air traffic, however it is predicted that the ambient noise level along the northern boundary of the application site will be ≤ 50 dB $L_{Aeq(0700-2300)}$.

Rail Movements

- 3.15 Two train passes were noted during measurements made at MP3. Consultation with train timetables for this section of track indicate that this is representative of hourly rail traffic throughout the day.
- 3.16 As stated above, MP3 was located at a distance of approximately 25 metres to the near side railway track. Due to the nearest residential boundary being located approximately 13 metres from the tracks, it is considered that an additional 4 dB should be added to the measured noise levels at MP3 (based on 6 dB per halving of distance due to the train acting as a point source).
- 3.17 Therefore, the contribution of rail traffic on the ambient noise source at the southern site boundary is predicted to be 56 dB L_{Aeq} , with peak levels of up to 79 dB L_{AFmax} .
- 3.18 No freight trains were noted to use the line during the daytime noise survey and it is understood that the line is used exclusively for passenger trains.
- 3.19 Passenger train timetables indicate that there are generally no train passes past the application site during the night time period (23:00-0700 hours), with the exception of 2 trains between the hours of 06:00 and 07:00. It is therefore considered robust to use the predicted daytime noise level for the night time assessment.

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:

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} (0700-2300)

Table 2 – 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_{AFmax} .

- 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 As well as the protection afforded by the new building for occupiers of the internal area, BS 8233 states that barriers or bunds should be considered to protect the gardens. In gardens and balconies etc. it is considered desirable that the steady noise level does not exceed 50 dB L_{Aeq} (0700–2300) and 55 dB L_{Aeq} (2300–0700) should be regarded as the upper limit.
- 4.15 Furthermore, WHO Guidelines for Community Noise considers 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).

5.00 INDICATIVE SOUND ATTENUATION SCHEME

- 5.01 Based on external and internal noise measurements undertaken by ENS at other sites, it is considered that a typical thermal double glazed window with 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 Although the ambient noise climate at the application site also consists of rail movements, it is considered that at worst case, a similar level of sound insulation (from external to internal) would be expected to these noise sources in comparison to road traffic noise.
- 5.03 It is considered that 'good' resting and sleeping conditions will be achieved throughout the proposed residential development with a typical thermal double glazed window with standard trickle vents.
- 5.04 As detailed in Section 3 above, 2 scheduled rail movements are understood to occur during night time hours (2300-0700 hours), resulting in a predicted maximum noise level of 79 dB L_{AFmax} . It is therefore recommended that a 2.8 metre barrier is provided along the south western boundary of the application site (i.e. at the at a distance of approximately 6 metres to the nearest railway track). This could consist of a fence, bund or combination of the two.
- 5.05 Any timber fence 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 2.8 metres. The timber should have a minimum mass per unit area of 10 kg/m².
- 5.06 It is calculated that such a barrier would provide between 5 and 10 dB of attenuation to noise associated with rail movements at 1st floor level, resulting in an external maximum noise level of 69-74 dB L_{AFmax} and an internal maximum noise level of approximately 45-50 dB L_{AFmax} . Although in excess of the 45 dB L_{AFmax} criteria detailed in Section 4, WHO guidelines state '*For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night*'. Therefore occasional exceedance (in this case, twice towards the end of the night time period) of the 45 dB L_{AFmax} criterion is considered to be

acceptable.

- 5.07 Alternatively, a lower boundary fence could be provided (of the order of 1.8 metres) along the southern boundary, along with an enhanced glazing and ventilation specification to bedrooms overlooking the railway line.

External amenity areas / gardens

- 5.08 Predicted external noise levels within gardens are up to 56 dB $L_{Aeq(0700-2300)}$. Based on a 2.8 metre high barrier being provided along the southern boundary of the application site, approximately 10 dB of attenuation to noise associated with rail movements may be assumed, based on this barrier fully breaking the line of site to the tracks. Noise levels within the proposed gardens across the application site should therefore be reduced to ≤ 50 dB $L_{Aeq(0700-2300)}$.

6.00 CONCLUSIONS

- 6.01 A noise impact assessment has been undertaken for a proposed residential development site on land off Sheffield Road, Penistone, Sheffield.
- 6.02 The ambient noise climate across the majority of the application site is due to road traffic and rail noise.
- 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

cc File

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).

Appendix 2
Drawings (Site Plan / Noise Monitoring Positions)

