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Edwards Homes Ltd
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Sent by email only dsjonesandco@live.co.uk

Dear Sirs,

**NOISE IMPACT ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT
LAND TO THE NORTH OF STATION AVENUE, CHIRK, WREXHAM, LL14 5LT**

**WREXHAM COUNTY BOROUGH COUNCIL PLANNING APPLICATION REFERENCE
CHI P/2016/1165**

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Limited has been commissioned by Edwards Homes Ltd to carry out a noise impact assessment for a proposed residential development at land to the north of Station Avenue, Chirk, Wrexham, LL14 5LT (hereafter referred to as the application site).

1.02 Outline Planning Permission (Reference: CHI P/2016/1165) for the development was granted through appeal (22 dwellings) by Wrexham County Borough Council in July 2018, subject to conditions. Condition 7 relates to the control of noise as follows:

7. *As part of the reserved matters application, a scheme of noise insulation and/or attenuation measures shall be submitted to and approved in writing by the local planning authority. Prior to the occupation of the dwelling houses the approved scheme shall be carried out.*

1.03 The objectives of the noise impact assessment were therefore to:

- Determine the ambient noise climate at the subject site during representative periods of the daytime and night time.
- Assess the potential impact of the ambient noise climate on the proposed residential development with reference to Condition 7 of Outline Planning Permission CHIP/2016/1165.
- Provide recommendations for a scheme of sound attenuation works, as necessary, to ensure that the criteria contained within Condition 7 of Outline Planning Permission CHIP/2016/1165 can be achieved.

1.04 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 a new planning application for 24 dwellings to be submitted to Wrexham County Borough Council.

1.05 This report has been prepared for Edwards 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 Edwards Homes Ltd (applicant), D. S. Jones & Co. (applicant's agent) and ENS as to the extent to which the findings may be appropriate for their use.

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

2.00 APPLICATION SITE SETTING & PROPOSED RESIDENTIAL DEVELOPMENT

2.01 For reference, the application site is located in a mixed-use setting. Irregular in shape, it is bound by (see Appendix 2 for location plan):

- Open land to the north (Kronospan Wood Processing considerably further north)
- Station Avenue to the south (residential dwellings opposite)
- Chirk Sports & Social Club to the east
- Open land to the west (Cadbury's UK considerably further west)

2.02 The proposed residential development consists of circa 24 dwelling houses with associated gardens and infrastructure (see Appendix 3 for proposed site's illustrative master plan).

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 Monday 25th and the Tuesday 26th July 2016.

3.02 For the purpose of the assessment, the following noise monitoring positions were adopted in a free field environment at 1.5 metres above ground level (see Appendix 3 for reference):

- MP1 was located along the western boundary at circa 15 metres to Station Avenue
- MP2 was located along the western boundary at circa 30 metres to Station Avenue
- MP3 was located along the western boundary at circa 120 metres to Station Avenue (representative of the northern residential development footprint)

3.03 Noise measurements were undertaken using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. 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.

3.04 Measurements consisted of A-weighted broadband parameters, together with linear third octave band L_{eq} levels. The following table contains a summary of the noise measurement data, rounded to the nearest decibel.

Table 3.1 – Noise Measurement Data

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Position	Date	Time	L _{Aeq,T} (dB)	L _{A90,T} (dB)	L _{A10,T} (dB)	L _{A1,T} (dB)	Comment
MP1	25/07/16	1237–1337	51	44	54	59	Station Avenue traffic (circa 180 vehicles / hour day)
		1337–1437	51	45	54	59	
		1437–1537	51	44	54	59	
		2326–2341	42	39	44	50	
	26/07/16	0056–0111	41	38	43	46	
Daytime ambient noise level circa 51 dB L _{Aeq} Night time ambient noise level circa 42 dB L _{Aeq}							
MP2	25/07/16	1257–1312	48	44	50	53	Station Avenue traffic
Daytime ambient noise level circa 48 dB L _{Aeq} Indicates line source propagation from Station Avenue							
MP3	25/07/16	1346–1446	49	46	50	53	Distant plant Broadband anonymous character (i.e. not tonal, not impulsive)
		2344–2359	44	42	45	46	
	26/07/16	0038–0053	43	41	44	46	
Daytime ambient noise level circa 49 dB L _{Aeq} Night time ambient noise level circa 44 dB L _{Aeq}							

3.05 The ambient noise climate at the southern part of the application site was road traffic on Station Avenue. At MP1 the ambient noise levels were circa 51 dB L_{Aeq} during the daytime and 42 dB L_{Aeq} during the night time.

- 3.06 The ambient noise climate in the central part of the application site (representative of the northern residential development footprint); see Appendix 3) was distant traffic and relatively quiet distant plant (which was anonymous in character i.e. broadband, not tonal nor impulsive).
- 3.07 The ambient noise climate at the proposed residential development footprint is relatively low.
- 3.08 It is understood that noise monitoring was also undertaken by Nick Minshall, Pollution Control Officer, Wrexham County Borough Council on the evening of Monday 23rd January 2017. The following noise levels (rounded to the nearest decibel) were measured at the northern end of the proposed development footprint:
- 2305 to 2320 hours and 2323 to 2338 hours (similar levels for both periods)
 - 52 dB L_{Aeq}
 - 50 dB L_{A90}
 - 53 dB L_{A10}
 - 56 dB L_{AFMax}
- 3.09 Whilst these noise levels are higher than those measured by ENS, in absolute terms such external noise levels from steady continuous sources are not significant.

4.00 NOISE IMPACT ASSESSMENT

- 4.01 British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233) sets indoor ambient noise levels from residential dwellings (see table below).

Table 4.1 – Indoor Ambient Noise Levels in Dwellings (BS 8233)

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

- 4.02 Note 4 to the above table states '*Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFMax} depending on the character and number of events per night. Sporadic noise events could require separate values.*'
- 4.03 In respect of events, the World Health Organisation's Guideline for Community Noise comment '*If the noise is not continuous, L_{AFMax} or SEL are used to indicate the probability of noise induced awakenings ... 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.*'
- 4.04 It is evident that BS 8233 considers that night time maxima guideline values relate to discrete, individual noise events (such as aircraft or trains, etc) rather than general road traffic noise. In the case of the application site, however, consideration of the night time maximum noise levels does not have a material impact upon the glazing and ventilation specification.
- 4.05 Note 5 to the above table states '*If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.*'
- 4.06 It is evident that BS 8233 considers that adequate ventilation is provided by trickle ventilators in an open position.

4.07 On the basis of the above, the following criteria (with windows closed and trickle vents open) are considered appropriate for the proposed residential development:

- ≤ 35 dB L_{Aeq} (0700-2300) in living rooms and bedrooms during the day
- ≤ 30 dB L_{Aeq} (2300-0700) and 45 dB L_{AFMax} not normally exceeded in bedrooms during the night

4.08 These internal ambient noise levels represent good resting and sleeping conditions.

4.09 ProPG Planning and Noise: New Residential Development (published in May 2017 by the Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health) confirms the position as follows

The internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment.

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

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

4.10 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 and 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 Night time design noise levels are based on the noise levels measured by the local authority at MP3 (considered the worst-case scenario).

- ≤ 52 dB $L_{Aeq,T}$ during the night time.
- ≤ 56 dB L_{AFMax} during the night time.

5.02 Daytime design noise levels are based on the levels measured at MP1 by ENS (considered the worst-case scenario).

- ≤ 51 dB $L_{Aeq,T}$ during the daytime

5.03 Based on measurements taken at numerous sites, a typical standard double-glazed window with trickle vents in a building façade provides circa 27 dB(A) sound insulation from external to internal; see Appendix 4.

5.04 Based on the above design noise levels measured by both the Local Authority (worst case scenario) and ENS the resultant internal noise levels (with windows closed and trickle vents

open as required by BS 8233 and Building Regulations ADF) are shown in the following table.

Table 5.1 – Ambient Noise Levels and Noise Mitigation Measures

Ambient Noise Level	Reduction	Resultant Internal Level	Internal Criteria
≤ 51 dB L _{Aeq} (day)	-27 dB	≤ 24 dB L _{Aeq} (day)	≤ 35 dB L _{Aeq} (0700–2300)
≤ 52 dB L _{Aeq} (night)		≤ 25 dB L _{Aeq} (night)	≤ 30 dB L _{Aeq} (2300–0700)
≤ 56 dB L _{AFMax} (night)		≤ 29 dB L _{AFMax} (night)	≤ 45 dB L _{AFMax} (2300–0700)

- 5.05 It is therefore considered that standard double glazing and standard trickle vents are appropriate throughout the entire application site.

External amenity (gardens)

- 5.06 Daytime ambient noise levels at dwellings fronting towards Station Avenue on the southern boundary were measured at circa 51 dB L_{Aeq, T}. This is below the upper guideline value of 55 dB L_{Aeq, T} within BS 8233. Therefore, there is no issue with respect to garden amenity across the application site.

Noise Associated with Pumping Station

- 5.07 It is assumed that the proposed new pumping station will be used for surface water run-off and also waste. However, details of the proposed type are not available at this stage. It is therefore considered appropriate to specify suitable noise limits to which any such pumping station should conform.
- 5.08 These limits should take account of the background noise level at the nearest noise sensitive receptor. For reference, night time background levels in the vicinity of the nearest noise sensitive receptor (MP1) were measured at circa 38 dB L_{A90, T}.
- 5.09 It is considered that the noise associated with the pumping station can be controlled by a suitably worded planning condition, which would typically be as follows:

The noise rating level associated with the pumping station should not exceed the appropriate background noise level at the nearest existing/proposed residential dwelling.

6.00 CONCLUSIONS

- 6.01 A noise impact assessment has been undertaken for a proposed residential development at land to the north of Station Avenue, Chirk, Wrexham, LL14 5LT.
- 6.02 The ambient noise climate in the southern part of the application site was road traffic on Station Avenue. The ambient noise climate in the central part of the application site (representative of the northern residential development footprint) was distant traffic and relatively quiet distant plant (which was anonymous in character i.e. broadband, not tonal nor impulsive).
- 6.03 The ambient noise levels measured across the site are relatively low. On this basis, the ambient noise climate does not pose a constraint to the proposed residential development. A scheme of sound insulation works has been developed to protect the proposed residential development from the ambient noise climate.

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

A small, rectangular image showing a handwritten signature in blue ink. The signature appears to be 'R. Whitaker'.

Richard Whitaker
AMIOA, Diploma in Acoustics & Noise Control
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 Site Location Plan



Appendix 3
Aerial Image with Proposed Site Illustrative Master Plan and Noise Monitoring Positions

