

**LAND OFF NEW ROAD, RHOSROBIN - OUTLINE APPROVED RESIDENTIAL DEVELOPMENT:
MITIGATION OF TRAFFIC NOISE FROM A483**

On behalf of:
Castle Green Homes Ltd

Report No: P20-525-R01v2
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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Castle Green Homes Ltd to recommend an appropriate road traffic noise mitigation scheme for the outline approved residential development on land off New Road in Rhosrobin near Wrexham.
- 1.2 A noise assessment was carried out by others at the outline planning stage of the development in May 2014 based upon a noise measurement survey that was carried out in November 2013. That assessment included a survey of traffic noise from New Road to the west of the site, the A483 which borders the site to the south and east as well an assessment of railway noise from the Chester to Wrexham line which bounds the site to the north.
- 1.3 Outline planning permission was subsequently granted for the development subject to conditions. Planning Condition 6 states:
- “Construction work shall not begin until a scheme for protecting the proposed dwellings from noise from the A483 trunk road has been submitted to and approved in writing by the local planning authority. All works which form part of the scheme shall be completed before any dwelling on the site is occupied”*
- 1.4 Thus the planning condition is specific to traffic noise from the A483.
- 1.5 The proposed housing layout is shown in Figure 1. Figure 1 shows that the development is focussed on the western end of the site due to the presence of Wat’s Dyke, a protected monument that runs across the eastern part of the site.
- 1.6 The assessment has been based on the layout shown on drawing RHRO-SPO1 as provided by Castle Green Homes dated July 2019.
- 1.7 We understand that since the 2014 noise assessment, the speed limit on the A483 had been reduced from 70mph to 50mph. Therefore, we have carried out a noise measurement survey during the daytime to investigate how noise levels from the A483 may differ to those in the 2014 noise assessment.
- 1.8 The updated noise survey was necessarily undertaken during the national Covid-19 lockdown of January 2021, due to project timescales. During this period, it is possible that road traffic activity on

the A483 may not have been typical of 'normal' conditions. This has been taken into account in our assessment.

1.9 Therefore, the noise assessment has included:

- An inspection of the site and surrounding area;
- Reference to the findings of the previous noise assessment carried out at outline planning application stage;
- Updated measurement of road traffic noise levels from the A483 during a representative period of the daytime; and
- Recommendation of appropriate traffic noise mitigation measures as required by Planning Condition 6.

1.10 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 ROAD TRAFFIC NOISE SURVEY

- 2.1 Updated road traffic noise measurements were carried out at a location selected to match that of the initial November 2013 noise survey. This location was located at the eastern boundary of the site approximately 15m from the nearside carriageway of the A483. The survey location is indicated in Figure 1.
- 2.2 Attended noise monitoring was carried out for a representative period of the daytime on Monday 25th January 2021 between 11:15 and 14:15.
- 2.3 The overall noise level measured at Location 1 over the 3-hour period was 70 dB $L_{Aeq,3hr}$. The measured noise level was similar to that measured during the same period in the 2013 survey which was 71 dB $L_{Aeq,3hr}$.
- 2.4 We understand that the speed limit on the A483 has recently been reduced from 70 mph to 50 mph. Typically, a 20mph reduction in speed limit would equate to an approximately 2 dB reduction in road traffic noise. However, offsetting the reduction in road traffic noise from the speed limit change, traffic flows on the road have risen between 2013 and 2019 by approximately 20%, which would represent a noise level increase of approximately 1 dB. This equates to a net reduction of 1 dB which is borne out by the noise survey results.
- 2.5 However, as noted, the latest survey was undertaken during the national Covid-19 lockdown of January 2021. During this period, it is possible that road traffic activity on the A483 may not have been typical of 'normal' conditions. Therefore, for the purposes of this assessment, to account for any uncertainties and to ensure a robust noise mitigation scheme, we have adopted the marginally higher noise levels measured during the 2013 survey.
- 2.6 On this basis, the daytime and night-time traffic noise exposure values at 10m from the carriageway of the A483 are shown in Table 1.

Table 2: Road traffic noise exposure levels at 10m from carriageway (dB)

Location	Daytime $L_{Aeq,16h}$	Night-time $L_{Aeq,8hr}$	Night-time L_{Amax}
Location 1	68	63	75

- 2.7 The calculated noise levels taking into account distance attenuation at the elevations closest to the A483 are such that noise mitigation measures are warranted and have been recommended later in this report.

3.0 ACOUSTIC DESIGN CRITERIA

- 3.1 UK guidance on appropriate acoustic design goals for proposed new residential developments is set out in BS8233:2014, *Guidance on sound insulation and noise reduction for buildings* which carries the full weight of an adopted British Standard. The design criteria recommended in BS8233 for daytime periods (07:00 – 23:00) and night-time periods (23:00 – 07:00) are summarised in Table 2:

Table 2: BS8233 recommended acoustic design criteria inside habitable rooms

Activity	Location	07:00 – 23:00 (Daytime)	23:00 – 07:00 (Night-time)
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

- 3.2 BS8233 also states that, *“where development is considered necessary or desirable ... the internal target levels [i.e. those in Table 2 above] may be relaxed by up to 5dB and reasonable internal conditions still achieved”*.
- 3.3 BS8233 states that if there is a reliance on closed windows to meet the guideline values, *“there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level”*. Further, it is stated that assessments should be based on a room with *“adequate ventilation provided (e.g. trickle ventilators should be open)”*.
- 3.4 BS8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of L_{Amax} values and these can be highly variable and unpredictable such that for design purposes it is usual to take into account the findings of research described in WHO *Community Noise Guidelines* that states *“for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night”*. This is consistent with the recent ‘ProPG: Planning & Noise – New Residential Development’ guidance which suggests that external noise events at night should not normally exceed 45 dB L_{Amax} more than 10 times a night.
- 3.5 For outdoor amenity spaces such as private gardens and patios, BS8233 states that ‘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, the standard also recognises that these guideline values are not achievable in all circumstances where development might be

desirable, in which cases higher values than 55 dB $L_{Aeq,T}$ may be acceptable. Nevertheless, our usual approach in most situations is to adopt 55 dB as the upper limit for gardens wherever practicable.

3.6 For this development we therefore recommend the following noise criteria be adopted in respect of road traffic noise with windows closed and trickle ventilation provided:

- Daytime noise below 35 dB L_{Aeq} inside living rooms and bedrooms, and within 55 dB L_{Aeq} in rear gardens as far as is practicable; and
- night-time noise levels not exceeding 30 dB L_{Aeq} and generally not exceeding 45 dB L_{Amax} in bedrooms.

3.7 Meeting the above adopted noise criteria will provide a good standard of protection of residential amenity for future residents of the proposed development.

3.8 Our recommendations for noise mitigation to achieve the adopted design criteria are described in Section 4.

4.0 NOISE MITIGATION SCHEME

Sound Insulation of Dwellings

- 4.1 Windows of standard well-sealed thermal double glazing (4mm glass – 4mm glass) have a typical sound reduction performance of 25 dB $R_w + C_{tr}$. Therefore, where traffic noise levels exceed 60 dB $L_{Aeq,16hr}$ during the daytime and/or 55 dB $L_{Aeq,8hr}$ and/or 70 dB L_{Amax} at night, higher specification glazing will be necessary. (Note $R_w + C_{tr}$ is sometimes notated as R_{tra})
- 4.2 Given the results of the noise survey, sound insulation measures will be necessary for some residential properties in respect of road traffic noise from the A483.
- 4.3 For exposed elevations of dwellings as indicated in green on Figure 2 we recommend the following scheme of noise mitigation:
- Living rooms fitted with double glazing of at least 32 dB $R_w + C_{tr}$. Typically this would be achieved with a double glazing specification of:

6mm glass – nominal (8-20mm) cavity – 8.4mm Solaglas 'Stadip Silence' laminated glass or equivalent.
 - Bedrooms fitted with double glazing of at least 30 dB $R_w + C_{tr}$. Typically this would be achieved with a double glazing specification of:

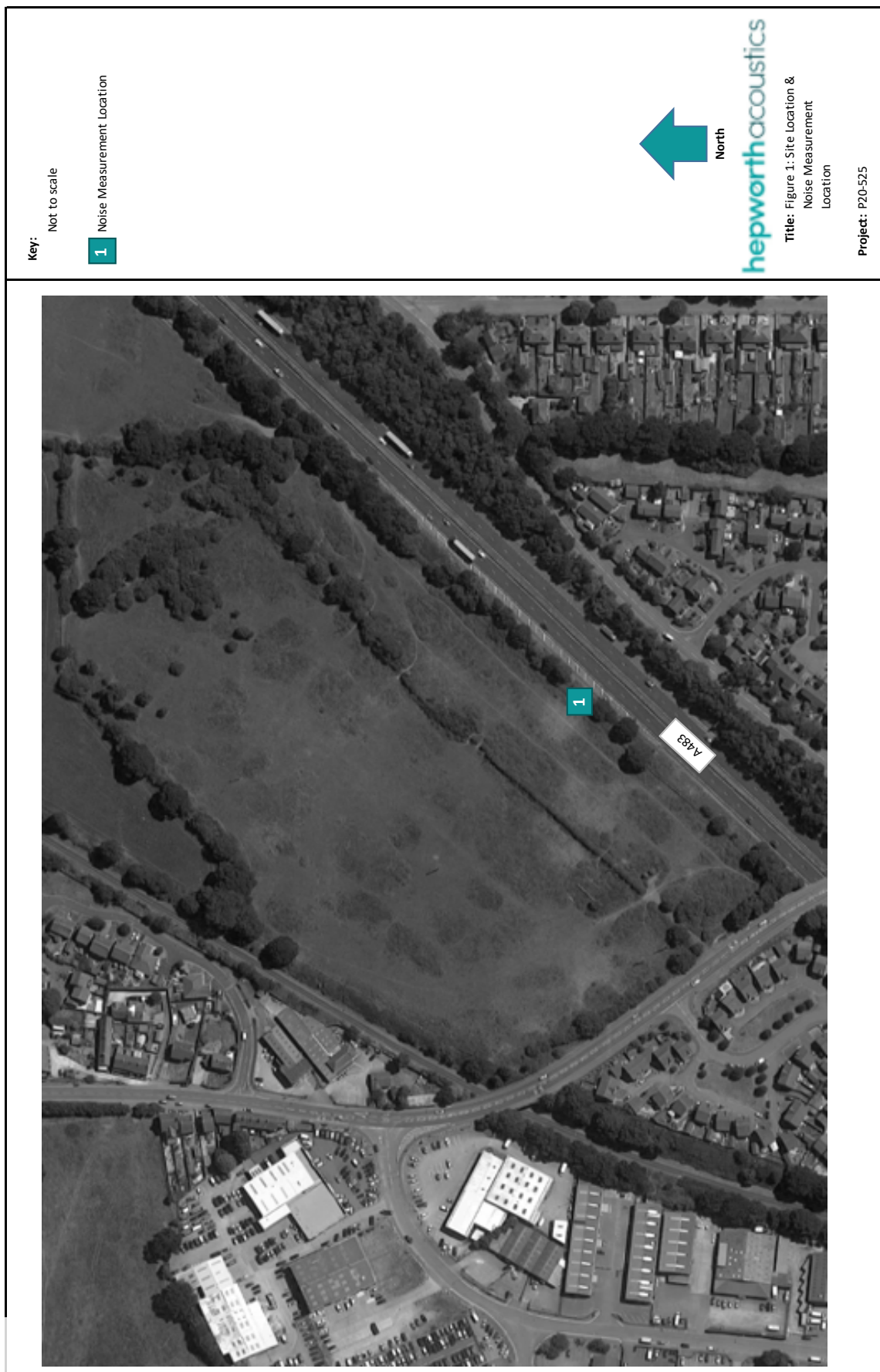
4mm glass – nominal (8-20mm) cavity – 6.4mm Solaglas 'Stadip Silence' laminated glass or equivalent.
- 4.4 For the habitable rooms indicated in green on Figure 2 we recommend that specialist acoustic vents are fitted instead of standard window frame slot vents. Various types of acoustic vents are commercially available. However, in terms of acoustic performance, we would recommend types such as the Greenwood EAR42W 3-part system, comprising humidity sensitive indoor unit, acoustic sleeve, and outdoor acoustic canopy or wall mounted Ryton AAC125HP units, both of which have a good acoustic performance rating of over 40 dB $D_{n,e,w}$.
- 4.5 For all other dwellings, well fitted standard double glazing and standard in-frame trickle ventilation will meet the adopted acoustic design criteria.

Gardens

- 4.6 We recommend that proprietary acoustic timber fencing of 2.4m minimum height is installed for the gardens of the plots shown in yellow on Figure 2.
- 4.7 The acoustic fencing must have boards of at least 20mm thickness with double rebated edges or cover strips over the joints and minimum surface mass of 10 kg/m². Gates in the fencing, if/where required, are acceptable as long as they are built to the same specification as the fence.
- 4.8 Suppliers of proprietary acoustic fences include Jacksons Fencing (jacksons-fencing.co.uk), Guardian Fencing (guardianfencing.com) and Ransfords (ransfords.co). The other gardens of dwellings on the development site will be away from potential sources of noise or adequately shielded from noise sources by the houses themselves.

5.0 SUMMARY AND CONCLUSION

- 5.1 A noise mitigation scheme in respect of road traffic noise from the A483 has been devised for a residential development proposed on land off New Road in Rhosrobin. The noise mitigation scheme is required by Condition 6 of the outline planning consent for the development.
- 5.2 The noise mitigation scheme has been informed by an updated noise survey and the findings of a previous (pre-Covid) noise survey.
- 5.3 Recommendations of appropriate noise mitigation measures have been made in order to achieve appropriate acoustic criteria in line with relevant British Standard guidelines, to secure good internal and outdoor acoustic conditions for the future residents.





Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

- C_{tr} This is an A-weighted urban traffic noise spectrum, which can be added to $D_{nT,w}$ or R_w in some standards to take into account different source spectra such as low frequency sound.
- R This is the 'Sound Reduction Index' as measured in a laboratory, and is a measure of the sound insulation properties of an building element in a stated frequency band.
- R_w This is the 'Weighted Sound Reduction Index', and is a single figure quantity of R , the laboratory measured Sound Reduction Index.
- $D_{n,e,w}$ This is the weighted element normalized level difference as measured in a laboratory, and is a measure of the sound insulation properties of small building elements such as ventilators.
- L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.
- L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.
- L_{A10} This is the A-weighted noise level exceeded for 10% of the time period. L_{A10} is usually used as a measure of traffic noise.
- L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

Appendix II: Noise Survey Results

Date(s): Daytime - Monday 25 January 2021

Equipment: B&K 2250 'Type 1' sound analyser (serial no.3011706) with tripod and calibrator

Weather: Daytime – Dry, cold (~2-4°C), clear skies and calm (<2 m/s)

All levels in dB(A)

Location 1:

Time		Measured Noise Levels (dB)				Comments
Start	End	L _{Amax}	L _{A10}	L _{Aeq}	L _{A90}	
11:16	11:31	81.6	70.3	68.8	64.9	Road traffic on A483. Birdsong
11:31	11:46	73.2	70.6	68.3	65.7	
11:46	12:01	73.3	71.6	70.0	67.2	
12:01	12:16	77.0	71.7	70.4	68.6	
12:16	12:31	72.6	70.8	69.8	68.1	
12:31	12:46	75.5	72.5	70.5	67.7	
12:46	13:01	74.1	72.6	70.7	68.4	
13:01	13:16	74.0	71.8	70.4	68.7	
13:16	13:31	73.7	71.6	70.6	68.2	
13:31	13:46	73.7	71.8	70.2	69.1	
13:46	14:01	73.0	71.6	70.4	68.7	
14:01	14:16	74.6	72.0	69.3	68.3	