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PROPOSED RESIDENTIAL DEVELOPMENT ON LAND OFF WHALLEY ROAD, BARROW

NOISE MITIGATION ASSESSMENT

On behalf of:

Taylor Wimpey North West & Barratt Developments

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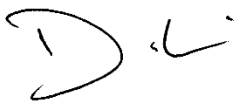

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Taylor Wimpey North West and Barratt Developments to advise on any necessary noise mitigation measures in connection with a planning application for Phase 2 of a residential development on land off Whalley Road, Barrow. Specifically, we were commissioned to carry out a desktop review of the noise survey and assessment work that was carried out at the site in 2012 by Martin Environmental Solutions (MES) on behalf of the vendor and to provide updated advice on appropriate noise mitigation measures taking into account current national guidance.

1.2 Since a doubling in road traffic and railway flows would be necessary in order to equate to any perceptible increase in transportation noise at the site, the measured noise levels as set out in the 2012 MES report are unlikely to have changed significantly in the interim.

1.3 The proposed development area is a Phase 2 of a larger development, with construction of Phase 1 already underway. The site is located to the south west of the village of Barrow in Lancashire. The development land is bounded by Whalley Road to the east, with existing agricultural land to the south. The Phase 1 land bounds the site to the north and wraps around the western boundary. Beyond the Phase 1 land to the west is the Ribble Valley railway line which carries passenger trains. The Phase 2 proposals are for a total of 233 dwellings with a mix of one, two, three and four bedroom dwellings including mews, semi-detached and detached homes.

1.4 The noise assessment has included:

- A review of the proposed layout plans and the MES noise assessment report that has been provided to us;
- Establishing likely road traffic and railway noise levels on the most exposed parts of the Phase 2 development site;
- Assessment of the potential noise impact on the proposed new dwellings; and,
- Recommendation of appropriate mitigation measures.

1.5 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 ACOUSTIC DESIGN CRITERIA FOR NEW DWELLINGS

2.1 The *National Planning Policy Framework* (NPPF) July 2018 states in paragraph 180 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:*

a) 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[60];"

2.2 The *Noise Policy Statement for England* (NPSE) 2010, which is referred to the in NPPF, includes three aims:

i. Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

i. Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

ii. Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

2.3 However, there is as yet no specific guidance on numerical acoustic assessment/design criteria for proposed new housing developments provided in the NPPF and accompanying on-line guidance, nor in the NPSE document.

2.4 Therefore, it is necessary to refer to established national guidance such as the acoustic design goals for residential development that are set out in BS 8233: 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 BS 8233 for daytime periods (07:00 - 23:00) and night-time periods (23:00 - 07:00) are summarised in Table 1 overleaf:

Table 1: BS 8233:2014 Recommended Acoustic Design Criteria

Activity	Location	Daytime (07:00 - 23:00)	Night-time (23:00 - 07:00)
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 $L_{Aeq, 8hr}$

2.5 'ProPG: Planning & Noise – New Residential Development' (2017), whilst it is not official government guidance and has no legal standing, also includes essentially the same acoustic design criteria as recommended in BS8233.

2.6 BS 8233 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. ProPG: Planning & Noise '*Professional Practice Guidance on Planning & Noise'* 2017 states that "*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. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events*". This is broadly consistent with 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*".

2.7 For outdoor amenity spaces of the new dwellings (e.g. rear gardens) 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"*.

2.8 The BS8233 criteria presented in Table 1 and above are for sources of noise that do not have a specific character, such as railway and road traffic noise and so are directly applicable to this development.

2.9 For this development, we therefore recommend the following noise criteria for be adopted with windows closed and trickle ventilation provided:

- Daytime noise below 35 dB $L_{Aeq, T}$ inside living rooms and bedrooms and below 40 dB $L_{Aeq, T}$ in dining rooms;
- Night-time noise levels in bedrooms not exceeding 30 dB $L_{Aeq, T}$ and generally not exceeding 45 dB L_{Amax}; and,

- Daytime noise levels not exceeding 55 dB $L_{Aeq, T}$ for noise in rear private gardens.

2.10 Meeting the above adopted noise criteria will provide an acceptable standard of protection of residential amenity for future residents of the proposed development.

3.0 AMBIENT NOISE LEVELS

3.1 No noise measurements have been carried out by Hepworth Acoustics Ltd as part of this noise assessment. Instead, we have used the measured noise levels that are set out in the MES report of July 2012 (Full title: *Acoustic Survey and Assessment – Proposed residential Development, Whalley Road, Barrow, Clitheroe*) as a basis for adopting road traffic and railway noise exposure values for the site.

3.2 The details and circumstances of the noise survey carried out by MES in December 2011 are shown in Section 4 of the report (ref as noted above). Noise measurements were taken at two locations on the proposed Phase 2 land. One was adjacent to Whalley Road (to measure road traffic noise) and one near to the south western corner of the site closest to the railway line. From a review of Figures 1 and 2 in the MES report, we note that the measurement locations are approximately the same distance back from Whalley Road and the railway line as the closest proposed dwellings as shown in Figure 1 of this report.

3.3 The following noise exposure levels have been obtained from the report:

Table 1: Noise exposure values obtained from MES report

Location	Daytime $L_{Aeq,16hour}$ (dB)
Close to Whalley Road (road traffic noise)	59*
South west corner of the site (railway noise)	50

*Derived from a measured road traffic noise level of 62 dB $L_{A10,3hour}$ using the shortened measurement procedure set out in *Calculation of Road Traffic Noise*

3.4 The noise levels set out above are for daytime periods only, but it is also necessary to consider the likely night-time noise levels at the site.

Night-time Road Traffic Noise Levels

3.5 Based on a study prepared for the Department for Environment, Food and Rural Affairs (DEFRA) entitled 'Converting the UK Traffic Noise Index $L_{A10,18hour}$ 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:

$$L_{Aeq,8hr}\ (23{:}00\text{-}07{:}00\ \text{hours}) \approx (0.90 * L_{A10,18hour}) - 3.77\ (\text{for non-motorways})$$

3.6 The measured $L_{A10,3hour}$ value of 62 dB is equivalent to a $L_{A10,18hour}$ of 61 dB (based upon the guidance set out in CRTN). Therefore, the night-time road traffic noise levels can be estimated as follows::

$(0.9 * 61) – 3.77 = 51$ dB $L_{Aeq,8hr}$

3.7 We note that the speed limit on Whalley Road where it passes the site is 30 mph. As such, we consider that typical peaks of noise at night due to road traffic pass-bys (in terms of L_{Amax}) are unlikely to be excessive and likely to be no more 70 dB outside the most exposed dwellings.

Night-time Railway Noise Levels

3.8 From a review of the train timetables between Blackburn and Clitheroe, we note that no passenger trains travel between the stations between around 23:40 and 06:11 and there are unlikely to be any more than six passenger trains passing the site (in either direction) during the whole of the night-time. As such, railway noise exposure values will be very low. Taking into account the frequency of train pass-bys during the daytime noise survey, and the measured daytime noise levels, we have estimated the corresponding night-time railway noise exposure level to be no more than 44 dB $L_{Aeq,8hour}$.

3.9 Since there are no more than six train pass-bys at night, there is no requirement to consider peaks of noise since they will not occur sufficiently regularly to be significant.

3.10 As such, to summarise, we have adopted the following free-field noise exposure levels for the development:

Table 1: Adopted free-field noise exposure values

Location	Daytime	Night-time	
	$L_{Aeq,16hour}$ (dB)	$L_{Aeq,8hour}$ (dB)	L_{Amax}
Close to Whalley Road	59	51	Up to 70
South west corner of the site	50	44	-

3.11 The implications of the adopted noise exposure values are set out in Section 4.

4.0 RECOMMENDED NOISE MITIGATION SCHEME

Private Gardens

4.1 Except close to Whalley Road, daytime noise levels at the site are within 55 dB $L_{Aeq,16hour}$. Furthermore, we note that the proposed layout is such that the dwellings most exposed to road traffic and railway noise are generally orientated with private gardens on the shielded (far) side of the dwelling to the noise source. As such, noise levels will be within 55 dB $L_{Aeq,16hour}$ in the vast majority of gardens without any specific acoustic screening.

4.2 We would however recommend that the rear garden of the northernmost dwelling adjoining Whalley Road (where the garden wraps around the north of the dwelling and is not fully screened from the road by the dwelling itself) is screened from road traffic noise on Whalley Road by an acoustic fence of minimum 1.8m height as shown in Figure 2.

4.3 Acoustic timber fencing should be of at least 20mm thickness and have double-rebated boards or joint cover strips. Some suppliers of proprietary acoustic fences include Jacksons Fencing (www.jacksons-fencing.co.uk), Guardian Fencing (www.guardianfencing.com), GRAMM barriers (www.grammbarriers.com) and Ransfords (www.ransfords.co.uk). Alternatively, a solid brick wall would suffice.

Sound Insulation Measures for Dwellings

4.4 Windows of standard well-sealed thermal double glazing (4mm glass – 4mm glass) have a typical sound reduction performance of 25 dB R_{tra} (note R_{tra} is sometimes notated as $R_w + C_{tr}$). Therefore, where noise levels are within façade levels (which are typically 3 dB higher than the equivalent free-field values) of 60 dB $L_{Aeq,16hr}$ during the daytime and/or 55 dB $L_{Aeq,8hr}$ and/or 70 dB L_{Amax} at night, no specific sound insulation measures are warranted.

4.5 As such, the adopted noise criteria will be achieved for the vast majority of dwellings, including those closest to the railway line, without any special sound insulation measures.

4.6 For the first row of dwellings facing Whalley Road, façade noise levels could be marginally in excess of 60 dB $L_{Aeq,16hour}$ in the daytime and above 70 dB L_{Amax} at night. We would therefore recommend the following modestly upgraded sound insulation scheme for living rooms and bedrooms of these dwellings that have a view towards the road as highlighted in Figure 2:

- Bedrooms and living rooms - double-glazing formed of 6mm glass - nominal (12-20mm) cavity - 4mm glass (or other double-glazing specification within a minimum sound insulation performance of 29 dB $R_w + C_{tr}$) and acoustic trickle ventilation such as Aereco EHA - Acoustic Trickle Ventilator with external acoustic canopy and acoustic sleeve (or other acoustic trickle ventilation with minimum sound insulation performance of 42 dB $D_{n,e,w} + C_{tr}$). Alternatively, a loft mounted PIV (positive input ventilation) system with duct connections to a non-habitable room (e.g. a landing) would be appropriate and avoid the need for trickle vents.

5.0 SUMMARY AND CONCLUSION

5.1 Hepworth Acoustics Ltd was commissioned by Taylor Wimpey North West and Barratt Developments to review noise mitigation requirements in connection with a planning application for Phase 2 of a residential development on land off Whalley Road, Barrow. The assessment has been carried out using the results of a noise survey carried out at the site in 2012 by Martin Environmental Solutions (MES) on behalf of the vendor and the proposed housing site layout.

5.2 We have determined the daytime and night-time noise exposure values for the dwellings most exposed to road traffic and railway noise.

5.3 We calculate that noise levels within the vast majority of private gardens will be within acceptable levels without any specific acoustic screening measures. We have however recommended acoustic screening for the private garden of one dwelling, as identified in the report.

5.4 Similarly, acceptable noise levels will be achieved within habitable rooms of the vast majority of dwellings without any special sound insulation measures. We have nevertheless recommended modestly upgraded sound insulation for habitable rooms of the dwellings that will be most exposed to traffic noise from Whalley Road.

Key:

Not to scale

X - MES noise measurement locations

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Title: Figure 1: Site layout and MES noise measurement locations

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Key:

Not to scale

- Sound insulation measures as noted in para 4.6

- Acoustic screening as noted in paras 4.2 and 4.3

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Title: Figure 2: Noise mitigation measures

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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_w This is the 'Weighted Sound Reduction Index' (L_w), and is a single figure quantity of R, the laboratory measured Sound Reduction Index.

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, LAeq 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.

Appendix II: MES Noise Assessment Report