Azymuth Acoustics UK

Professional Acoustic Services

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Planning Stage
Environmental Noise Report
Ref: AA0173B

Proposed Residential Development
Phase 3, Petre Wood
Land at Petre Wood Crescent,
Langho
BB6 8FD

For

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Hargraves Contracting Ltd
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Contents

1.0 Introduction

Azymuth Acoustics UK is appointed by Darwen Estates Ltd. to provide a Noise Impact Assessment of a proposed residential development at Petre Wood, Langho. The scheme proposes 31no. affordable houses as a mix of detached and semi-detached dwellings.

The development site is bounded by the A59 to the north, by residences to the West and agricultural land to the East.

This report is intended to provide information relating to potential noise levels affecting the site as required by Ribble Valley Borough Council to support the detailed planning application. In particular, the report sets out the following details:

- The results of a baseline noise survey undertaken at the proposed development site.
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development.
- An assessment of the appropriate level of protection against noise that should be provided as part of the development.

2.0 Baseline Noise Survey

2.1 Measurement Procedures

The instrumentation used for the environmental noise survey consisted of a SvanTek 959 Type 1 precision sound level meter and 01dB calibrator. The meter was calibrated before and after the noise measurements. The sound level meter records A-weighted (fast response) noise levels as well as octave band data for all measurements recorded.

The daytime survey was undertaken on 18th March 2019 during evening peak rush hour 17:00 – 18:30hrs and early night-time 23:00 – 00:20hrs periods.

The ambient noise measurements were undertaken using the sound level meter microphone at the locations shown in Figure 1 below.

The sound level meter was positioned at the following measurement locations on the site:

- Positions 1-3: Perimeter nearest A59 approx. 22-24m from roadside, road visible to microphone
- Positions 4-6: South east perimeter of site, screened from A59
- Position 7: Vicinity of Petre Wood Crescent

Figure 1: Site plan with noise measurement positions marked in red

2.2 Results of Noise Measurements

Full results of the noise levels recorded during the survey are included in Appendix B of this report.

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) statistical noise levels.

Location	Time	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
1. A59 perimeter 1	Day	78.4	69	74.9	72.4	68.9	60.4
	Night	78.1	61	72.9	65.0	46.4	36.4
2. A59 perimeter 2	Day	78.0	69	75.1	72.3	67.5	56.1
	Night	83.3	61	72.7	65.2	45.4	33.1
3. A59 perimeter 3	Day	78.0	71	75.9	73.5	70.2	63.8
4. SE perimeter 1	Day	66.1	56	59.9	58.1	55.8	52.2
5. SE perimeter 2	Day	63.2	53	56.8	54.8	53.0	51.2
6. SE perimeter 3	Day	67.0	55	56.9	55.8	54.5	52.7
7. Vicinity of Petre Wood Crescent	Day	58.0	52	55.9	53.6	51.6	50.1
	Night	55.2	43	51.2	47.1	40.5	33.0

Table 1: Results of Azymuth Acoustics noise measurements, March 2019

2.3 Description of Noise Climate

The noise climate in the area is dominated by road traffic using the A59, a 60mph speed limit bypass connecting Preston and Clitheroe. No other significant noise sources were identified at the time of survey.

The site is elevated as relates the A59 and gently slopes downwards moving away from the main road perimeter. Measurement positions 1-3 are atop the bank overlooking the main road and as such data from these positions would be representative of new façades to the north of the site with visibility of the A59.

Noise levels along the A59 perimeter are typically in the range 68 – 71dB L_{Aeq} during the day and typically 59-63 dB L_{Aeq} during early night-time periods.

Noise levels at the south east (rear) perimeter of the site are typically in the range 54 – 56dB L_{Aeq} during the day; night-time levels at position 7 (rear of site) are typically 42-45dB L_{Aeq}.

3.0 Assessment Criteria

In order to assess the extent of any measures required in order to comply with suitable conditions relating to potential noise sources, Azymuth Acoustics has reviewed various guidance documents and standards, these include:

- ProPG: Professional Practice Guidance on Planning and Noise (New residential development)
- National Planning Policy Framework (NPPF) 2018
- British Standard 8233: 2014
- World Health Organisation Guidelines on Community Noise

3.1 ProPG: Planning and Noise - May 2017

This Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The National Planning Policy Framework (NPPF) encourages improved standards of design. The CIEH, IOA and the ANC have worked together to produce this guidance which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise.

The Professional Practice Guidance on Planning and Noise States 'The recommended approach is intended to give the developer, noise practitioner, and decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perceptive and the extent of acoustic issues that would be faced'. It is important that acoustic design is reviewed at an early stage of the development process.

3.2 National Planning Policy Framework (NPPF) 2018

The NPPF provides guidance to local authorities taking into account noise in making planning decisions. Paragraph 180 of the National Planning Policy Framework (NPPF) states that planning polices and decisions should aim to:

- Avoid noise 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.

The National Planning Policy Framework states that the planning system should 'prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability'.

3.3 British Standard 8233: 2014

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise. It provides recommendations for control of noise in and around buildings and suggests appropriate internal ambient noise level criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties:

Activity	Room	Good Design Range $L_{Aeq,\,T}$ dB	
		07:00-23:00hrs	23:00-07:00hrs
Resting	Living rooms	35	-
Dining	Dining room / area	40	-
Sleeping (daytime resting)	Bedroom (at night)	35	30

Table 2: Noise Limits for Residential Properties Suggested in BS 8233

3.4 W.H.O. Guidelines on Community Noise

In 1980 the World Health Organisation proposed environmental health criteria for community noise including consideration of noise levels at which sleep disturbance may take place. These guidelines were amended by the World Health Organisation in 1999. The guidance suggests that an internal L_{Aeq} below 30dB is required to preserve the restorative process of sleep. This is equivalent to a free-field level of around 42 to 45dB L_{Aeq} or a façade level of 45 to 48dB L_{Aeq}, assuming open windows.

The WHO guidelines also include guidance on acceptable noise levels in outdoor amenity spaces. A level of 55dB L_{Aeq} is put forward as the limit of annoyance for daytime and evening periods.

3.5 Recommended Noise Assessment Criteria

Based on the guidance above it is recommended that the following criteria would be reasonable with the aim of minimising the impact of the environmental noise on the proposed new residential accommodation:

- Daytime noise levels not to exceed 35dB $L_{Aeq,\,16\,hr}$ in living rooms / bedrooms
- Daytime noise levels not to exceed 40dB $L_{Aeq,\,16\,hr}$ in dining room / kitchen
- Daytime noise levels in bedrooms not to exceed 35dB $L_{Aeq,\,16\,hr}$
- Night-time noise levels in bedrooms not to exceed 30dB $L_{Aeq,\,8\,hr}$

Table 4, Note 5 of BS 8233:2014 states: 'If relying on closed windows to meet the guide values, there needs to be an 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.'

4.0 Assessment of Noise Levels

4.1 Noise Risk Assessment (ProPG)

The risk assessment is based on survey data and incorporates a worst-case approach to potential night time adverse effects. The measured night-time levels across the site were made between 23:00 – 00:20hrs; levels during late night periods would likely be significantly lower.

Adverse effect risk levels affecting the site are summarised in Table 3 and Figure 2 below.

Façade Location	Noise Level Range (free field) dBA		Risk of Adverse Effect
	DAY	NIGHT	
A: Within 15m of A59 perimeter (unscreened)	61-70	59-61	Medium – High
B: Middle of site (partially screened)	60-63	50-52	Low – Medium
C: Rear of site away from A59 (screened)	53-56	42-45	Low

Table 3: Potential adverse risk effects, various locations on Petre Wood Phase 3 site

The noise readings recorded on the site are shown below with the noisiest being Zone A (red zone), followed by Zone B (blue zone) and finally Zone C (green zone). Clearly the Façades facing directly onto the A59 would represent the most significant risk in terms of potential adverse impact. These noise levels represent the undeveloped site. Once the site is developed there will be some noise shading created by the dwellings facing the A59 and therefore the expected noise levels will significantly drop off at the houses furthest from the A59.

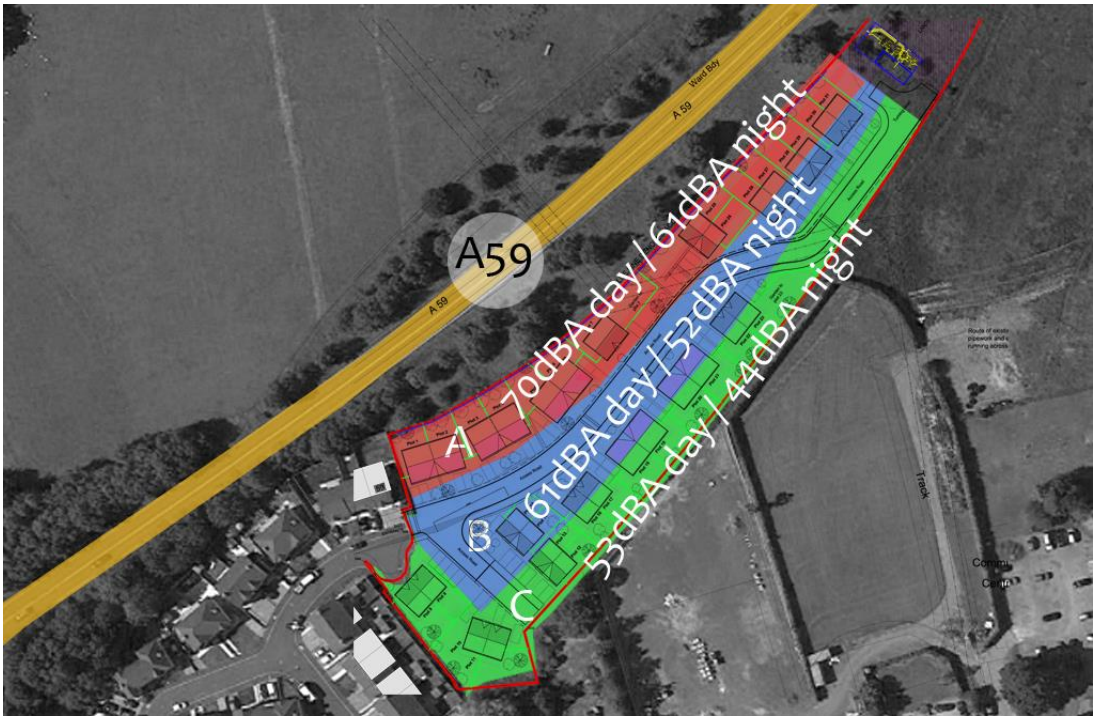

Figure 2: Noise risk assessment zones, Petre Wood Phase 3 site

Areas of the site away from A59 would present a lower risk of adverse noise impact and details of the proposed glazing and ventilation strategies to mitigate noise are shown below.

5.0 Recommendations for Noise Mitigation

This section sets out the recommended minimum noise mitigation measures required to ensure satisfactory acoustic conditions inside habitable rooms throughout the scheme.

On the basis of the measured noise levels it is estimated that an overall noise reduction of 30-35dB will be required through façades in order to achieve satisfactory conditions inside rooms facing and in close proximity to the A59.

5.1 Glazing Specifications

The appropriate glazing specifications for the new dwellings based on the current proposed layout are summarised in Table 7 and Figure 5 below.

Location (Bedrooms, Living Rooms, Dining Rooms)	Glazing Acoustic Specifications	Suggested Glazing Types
Zone G1 (fig 5): 15no.dwellings nearest A59, façades facing and sides (at right angle to A59)	Airborne sound insulation min. R_W 37dB and R_W+C_{tr} 32dB	Acoustically rated double glazing (e.g. 6mm float glass /16mm argon filled cavity / 10mm float glass)
Zone G2 (fig 5): The rear of all Houses fronting A59 and the front (and some sides) of houses behind this frontage	Airborne sound insulation min. R_W 32dB and R_W+C_{tr} 29dB	Acoustically rated double glazing (e.g. 6mm float glass /16mm cavity / 4mm float glass)
Zone G3 (fig 5): Rear and sides of most houses which sit behind the front row away from A59	Airborne sound insulation min. R_W 29dB and R_W+C_{tr} 26dB	Standard good quality double glazing with robust acoustic test data to prove SI performance

Table 7: Recommended glazing specifications for new houses, Petre Wood Phase 3

Figure 5: Petre Wood Phase 3 Glazing Zones

5.2 Ventilation Specifications

The recommended ventilation strategy based on the current proposed layout are summarised in Table 8 and Figure 6 below.

Location (Bedrooms, Living Rooms, Dining Rooms)	Suggested Ventilation Specifications	Window slot vent trickle ventilation (where applicable)
Zone V1 (Fig. 6): All houses nearest A59	System 3 continuous running extract ventilation supplemented with additional purge ventilation (i) **OR** System 4 MVHR balanced whole house ventilation	$D_{n,e,w}$ (open) ≥50dB via acoustic wall vent (i) **OR** NO trickle vents (depending on vent system)
Zone V2 (fig 6): Middle of site, affecting the front (and some sides) of the houses generally facing A59	System 3 mechanical extract ventilation Acoustically rated trickle vents Opening windows for purge ventilation is deemed to be generally acceptable	$D_{n,e,w}$ (open) ≥33dB
Zone V3 (fig 6): Rear and sides of houses facing away from A59	Any vent system to meet Approved Document F incl. Natural ventilation via opening windows Basic acoustically rated trickle vents Typically will use same system 3 mech vent extract as Zone V2	$D_{n,e,w}$ (open) ≥30dB

Table 8: Recommended ventilation strategy for the Petre Wood Phase 3 site

Figure 6: Petre Wood Phase 3 Ventilation Zones

5.3 Other Elements of Building Envelope

Other elements of the building envelope should have the following minimum sound insulation performance:

- External Walls: minimum sound insulation R_W 50dB. This minimum is likely to be significantly exceeded by a normal brickwork façade.
- Roof: minimum sound insulation R_W 45dB. This minimum would likely be exceeded with a traditional slate tile roof with mineral wool loft insulation above plasterboard ceilings.

5.4 External Barrier Screening

The A59 sits below the level of the proposed site but nonetheless in order to reduce road traffic noise levels in outdoor amenity areas and provide screening to habitable rooms within the scheme, an acoustic barrier fence would be recommended along the north west perimeter near the A59.

Figure 6 below denotes the general recommended location of the fence (marked in blue).

Figure 6: Location of recommended boundary acoustic screening fence

The perimeter fence should be of a minimum height 1.8m (6 feet) and be close boarded (i.e. no gaps between boards) made from substantial timber plank.

6.0 Conclusions

Azymuth Acoustics has undertaken a noise impact assessment of the proposed residential development at Petre Wood Crescent, Langho.

The noise climate in the area is dominated by road traffic using the A59, a busy route during daytime and evening periods. Proposed development near the A59 perimeter would present a Medium – High risk of adverse effect as relates ProPG assessment methodology.

The residential development should be protected by noise mitigation measures including:

- Acoustic double glazing to rooms on all elevations exposed to road traffic noise as item 5.1.
- Zone V1 - Care taken with chosen mechanical ventilation system 3 or 4, acoustic trickle vents (background vent) and acoustically rated purge vents for the areas requiring the highest levels of noise protection.
- Zone V2 and typically V3 - System 3 continuously running mechanical extract ventilation with acoustic trickle vents where road traffic noise would potentially be an issue if openable windows were relied upon as the sole method of ventilation.
- An acoustic barrier fence along the north west A59 perimeter should be considered. This would be a means to protect new residents from road traffic noise within outdoor amenity areas and provide screening to upper floor habitable rooms in dwellings further away from the A59.

Appendix A – Glossary of Terms

Decibel (dB)
this is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascal).

dB (A)
This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound of different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level
The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{Aeq}
this is the equivalent steady sound level in dB (A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or sometimes T_{30} or T_{60})
This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60 dB, after the source has been switched off, is known as the reverberation time. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)
Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy flowing towards the wall in the source room and the total amount of energy entering the receiving room (usual range 100 - 3150 Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory in either octave or one-third octave bands.

SRI = L1 - L2 + 10 log (S/A)

Where: L1 = Noise level in the source room
L2 = Noise levels in the receiving room
S = Surface area of test specimen
A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)
this is a weighted single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.
Appendix B – Graphical Results of Sound Insulation Tests

Appendix B – Full Tabulation of Noise Survey Results

Start	Position	Time	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A50}	L_{A90}
17:05	1	00:05'00	78.4	69.8	76.1	72.7	69.0	61.3
17:10	1	00:05'00	78.3	70.0	75.9	72.7	69.4	62.6
17:15	1	00:05'00	76.2	68.8	73.8	71.6	68.4	61.4
17:20	1	00:05'00	75.2	69.1	73.5	72.0	68.9	59.9
17:25	1	00:05'00	75.2	69.2	74.0	72.1	69.0	57.6
17:30	1	00:05'00	77.1	69.8	76.2	73.2	68.4	59.7
17:36	3	00:05'00	78.0	70.3	76.7	73.0	69.6	62.6
17:41	3	00:05'00	77.6	71.0	76.0	74.0	70.4	63.3
17:46	3	00:05'00	75.9	70.8	74.9	73.4	70.6	65.5
17:52	4	00:05'00	66.1	56.0	59.9	58.1	55.8	52.2
17:57	5	00:05'00	63.2	53.2	56.8	54.8	53.0	51.2
18:02	6	00:05'00	67.0	54.5	56.9	55.8	54.5	52.7
18:07	7	00:05'00	58.0	52.0	55.9	53.6	51.6	50.1
18:13	2	00:05'00	77.5	70.0	75.8	73.2	69.0	58.3
18:18	2	00:05'00	74.1	68.4	73.3	71.8	67.6	56.9
18:23	2	00:05'00	77.0	68.6	74.9	72.2	66.8	55.9
18:28	2	00:05'00	78.0	68.4	76.3	72.0	66.5	53.4
22:57	1	00:05'00	75.4	60.2	72.4	64.7	43.5	35.5
23:02	1	00:05'00	78.1	61.4	75.2	64.4	44.9	34.3
23:07	1	00:05'00	76.9	60.6	74.4	64.3	45.0	36.0
23:12	2	00:05'00	72.4	59.3	70.6	63.7	44.3	30.8
23:17	2	00:05'00	83.3	62.1	74.1	66.1	48.7	30.5
23:22	2	00:05'00	76.6	61.2	73.5	65.0	43.0	34.5
23:27	2	00:05'00	74.6	61.1	72.7	66.1	45.4	36.7
23:32	1	00:05'00	74.8	62.6	73.3	68.6	49.2	38.4
23:37	1	00:05'00	73.0	59.3	71.4	63.1	47.4	37.6
23:42	1	00:05'00	74.7	62.1	72.9	67.0	50.7	36.8
23:47	1	00:05'00	71.8	58.8	70.5	63.2	44.2	36.0
23:54	7	00:05'00	54.3	43.9	50.3	47.3	41.8	37.1
23:59	7	00:05'00	55.2	44.4	53.2	49.0	40.3	30.6
00:04	7	00:05'00	50.8	42.0	49.6	46.3	39.4	31.0
00:09	7	00:05'00	53.0	44.5	51.6	47.8	42.9	37.0
00:14	7	00:05'00	52.6	41.6	51.3	45.2	38.2	29.5