HEPWORTH
ACOUSTICS
Noise and Vibration Consultants

ASSESSMENT AND CONTROL OF IMPACT OF ROAD TRAFFIC NOISE ON A PROPOSED RESIDENTIAL DEVELOPMENT AT WHITEACRE LANE, BARROW, CLITHEROE

On behalf of:

Redrow Homes North West

Report No. 22352.01v1
August 2014

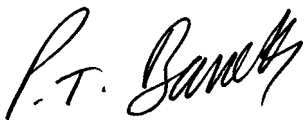
ASSESSMENT AND CONTROL OF IMPACT OF ROAD TRAFFIC NOISE ON A PROPOSED RESIDENTIAL DEVELOPMENT AT WHITEACRE LANE, BARROW, CLITHEROE

Report prepared by:
Hepworth Acoustics Ltd
21 Little Peter Street
Manchester
M15 4PSe

On behalf of:
Redrow Homes North West

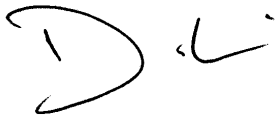
Report Prepared By:

Paul Bassett BSc MSc FIOA
Technical Director



Report Checked By:

Donald Quinn BSc MIOA
Chief Consultant



CONTENTS

		Page
1.0	INTRODUCTION & SITE DESCRIPTION	1
2.0	TRAFFIC NOISE SURVEY	2
3.0	ACOUSTIC DESIGN CRITERIA AND ASSESSMENT	4
4.0	RECOMMENDED OUTLINE NOISE MITIGATION MEASURES	6
5.0	MINIMISING CONSTRUCTION NOISE IMPACT	8
6.0	SUMMARY AND CONCLUSIONS	10
FIGURE 1 – ILLUSTRATIVE SITE LAYOUT & NOISE SURVEY POSITIONS		11
FIGURE 2: OUTLINE NOISE MITIGATION RECOMMENDATIONS		12
APPENDIX I – NOISE UNITS AND INDICES		13
APPENDIX II – TRAFFIC NOISE SURVEY RESULTS		15

1.0 INTRODUCTION & SITE DESCRIPTION

1.1 Hepworth Acoustics Ltd was commissioned by Redrow Homes North West to assess the impact of traffic noise from the A59 on a proposed residential development on land off Whiteacre Lane, Barrow, Clitheroe and, where necessary, to recommend appropriate noise mitigation measures. The noise assessment is required in connection with an application that is to be made to Ribble Valley Borough Council seeking outline planning consent for the development.

1.2 The assessment of traffic noise from the A59 was requested by the Environmental Health Officer in a letter dated 16 December 2013 from the Council's Pre-Planning Advice Officer to Redrow Homes.

1.3 The location of the proposed development site, and an illustrative layout, is indicated in Figure 1 of this report.

1.4 We understand that outline planning permission was granted previously in 2012 for residential development on part of the proposed site and therefore the principle of development in this area of Whiteacre Lane has been established.

1.5 The current proposal is also for outline planning consent, therefore the details of the development, including siting and type of houses, etc, will be a matter for future detailed design i.e. at the reserved matters application stage. Therefore at this outline application stage our recommendations for noise mitigation made in this report are also in outline form and will need to be reviewed and detailed at the reserved matters application stage.

1.6 Whiteacre Lane is a lightly trafficked country lane. However, the A59 dual carriageway is located to the east of the proposed development land. At this location the A59 runs in a deep cutting which helps to reduce the impact of traffic noise across the site. The proposed development land slopes slightly down westwards from the eastern boundary with the road cutting.

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

2.0 TRAFFIC NOISE SURVEY

2.1 Noise monitoring has been carried out at appropriate locations on the development site in order to establish the level of traffic noise from the A59.

2.2 All noise measurements were carried out at a height of 1.4 metres above ground level. Calibration checks were carried out before and after the noise surveys and no drift in levels was observed. A windshield was fitted to the microphone during all noise measurements. Details of the instrumentation used, weather conditions, and survey notes are shown in Appendix II and III.

2.3 The noise monitoring locations were chosen, based upon the illustrative layout, to represent the dwellings nearest to the A59 cutting, and are indicated in Figure 1.

2.4 An attended traffic noise survey was carried out at the site for representative periods of the daytime and night/early morning. The traffic noise monitoring was carried out for a number of 15-minute sample periods in the daytime on Friday 15 August 2014 and in the early hours of Wednesday 20 August 2014.

2.5 The noise survey results are shown in Appendix II and the daytime and night-time traffic noise exposure levels at the monitoring locations are described below.

2.6 The measured daytime noise levels have been evaluated in accordance with the 'shortened measurement method' described in the Department of Transport document 'Calculation of Road Traffic Noise' (CRTN), 1988. The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined, but it is stated in the document, that the guidance is equally appropriate to the calculation of traffic noise for land use planning purposes.

2.7 The CRTN shortened measurement method involves taking traffic noise measurements (L_{A10}) over representative sample periods within any three consecutive hours between 10:00 hours and 17:00 hours. By using the $L_{A10\ (3\ hour)}$, as the arithmetic mean of the measured L_{A10} values, the $L_{A10\ (18\ hour)}$ value can then be calculated. The $L_{A10\ (18\ hour)}$ values have then been converted into the equivalent $L_{Aeq\ (16\ hour)}$ values using the -2 dB correction that is described in BS 8233:2014.

2.8 The measured night/early morning period L_{Aeq} values have been logarithmically averaged to obtain the $L_{Aeq\ (3\ hour)}$ night-time value which has been taken as representative of the $L_{Aeq(8\ hour)}$ night-time value.

2.9 The daytime and night-time road traffic noise exposure levels are shown in Table 1.

Table 1: Road Traffic Noise Exposure Levels

Location		**Daytime** dB $L_{Aeq\ (0700\text{-}2300\ hrs)}$	**Night-time** dB $L_{Aeq\ (2300\text{-}0700\ hrs)}$
1	10m back from eastern boundary fence (Plot 10 in illustrative layout)	57	52
2	3.5m back from eastern boundary fence (Plot 9 in illustrative layout)	63	57
3	7.5m back from A59 boundary fence (Plot 1 in illustrative layout)	60	57

2.10 Peaks of noise from passing vehicles at night were within the range 57 - 63 dB L_{Amax} at Location 1; 65 - 73 dB L_{Amax} at Location 2; and 65 - 69 dB L_{Amax} at Location 3.

2.11 The implications of the traffic noise survey results are discussed in Sections 3 and 4.

3.0 ACOUSTIC DESIGN CRITERIA AND ASSESSMENT

3.1 The National Planning Policy Framework (NPPF) provides some general guidance to local authorities on taking noise in to account in planning policies and decisions. This includes guidance (in paragraph 123) that local authorities should 'aim to avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development'. However, there is as yet no specific guidance on acoustic assessment/design criteria for housing developments provided in the NPPF, nor in the on-line National Planning Practice Guidance 'Noise'.

3.2 Therefore, it is necessary to refer to established national guidance on acoustic design goals for proposed new residential development, preferably which carries the full weight of an adopted British Standard. Therefore we have referred to BS: 8233: 2014, 'Guidance on sound insulation and noise reduction for buildings'. The design criteria recommended in BS8233 are summarised in Table 2.

Table 2: BS 8233 Recommended Acoustic Design Criteria

Location	Noise Design Limit
Inside Living Rooms	35 dB $L_{Aeq(0700\text{-}2300hrs)}$
Inside Bedrooms	35 dB $L_{Aeq(0700\text{-}2300hrs)}$ 30 dB $L_{Aeq(2300\text{-}0700hrs)}$

3.3 BS 8233 does not suggest any specific design criterion for control of peaks of externally generated noise for bedrooms at night (i.e. in L_{Amax}). L_{Amax} values 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 guidelines that *"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"*.

3.4 However, noise levels in gardens also need to be considered. For gardens BS 8233 states that it is 'desirable' that the external noise level does not exceed 50 dB $L_{Aeq(16hr)}$ with an 'upper guideline value' of 55 dB $L_{Aeq(16hr)}$ which would be acceptable in noisier environments. In our experience for many years most local planning authorities adopt, or accept, the 55 dB(A) criterion for gardens. However the latest version of the standard acknowledges that these are only guidelines and some flexibility (i.e. higher noise levels in gardens) may need to be applied for residential developments

in certain areas e.g. in city centres or urban areas near to the strategic transport network. As this site is located in a non-urban area we recommend that the 55dB(A) criterion applies.

3.5 Therefore, for this development we recommend that the following traffic noise criteria be adopted: daytime levels below 35 dB L_{Aeq} inside living rooms and bedrooms and within 55 dB L_{Aeq} in private rear gardens; and night-time noise levels not exceeding 30 dB $L_{Aeq,}$ and generally not exceeding 45 dB L_{Amax}, in bedrooms, with windows closed and trickle ventilation provided.

3.6 Based upon the results of the traffic noise survey it is considered that, with the implementation of appropriate noise mitigation measures, it will be fairly straightforward to achieve the adopted noise criteria at this development site. The necessary noise mitigation measures required to protect residential amenity from the A59 traffic noise will need to be detailed at reserved matters stage when a definitive housing layout is available. However, our outline recommendations are described in Section 4.

4.0 RECOMMENDED OUTLINE NOISE MITIGATION MEASURES

Screening of Gardens

4.1 The measured daytime traffic noise levels at proposed residential locations nearest to the A59 were found to be within the range 57 - 63 dB $L_{Aeq,16hr}$. Since these levels exceed 55 dB $L_{Aeq,16hr}$ it will be necessary to implement appropriate noise screening measures at, or near, the site boundary.

4.2 The higher noise levels were measured at locations from which the A59 road surface and traffic was visible (or obscured only by leaves of trees) i.e. where there is currently no or minimal acoustic screening of traffic noise. A proprietary acoustic fence along the boundary would therefore be very effective at reducing the level of road traffic noise and can be expected to achieve noise levels not exceeding 55dB $L_{Aeq,16hr}$ in the gardens of the houses. We therefore recommend that an acoustic fence is installed in the location indicated in Figure 2.

4.3 The acoustic fencing should be at least 2 metres in height, and of at least 20mm thickness, and have double-rebated boards or joint cover strips. Suppliers of proprietary acoustic timber fences include Jacksons Fencing (www.jacksons-fencing.co.uk), Guardian Fencing (www.guardianfencing.com) and Ransfords (www.ransfords.co.uk).

Sound Insulation of Houses

4.4 We recommend that bedroom windows of the houses nearest to the A59 road cutting are upgraded to double glazing with a performance of at least 30 R_{Tra} e.g. double glazing of 4mm glass – nominal cavity – 6.4mm Saint Gobain Solaglas ‘Stadip Silence’ acoustic laminated glass. For the illustrative layout this would involve any bedroom windows in the exposed elevations of Plots 1, 9, 10 and 11

4.5 For houses slightly further back (Plots 2 and 8) we would recommend upgrading the bedroom windows to double glazing with a performance of at least 28 R_{Tra} e.g. double glazing of 4mm glass – nominal cavity – 4.4mm SG ‘Stadip Silence’ acoustic laminated glass.

4.6 Also for these bedrooms (i.e. in elevations as indicated in Figure 2), instead of standard window frame slot vents, we recommend that an acoustically treated means of ventilation is provided such as the 3-part Aereco EHA acoustic ventilator system with acoustic canopy and sleeve.

4.7 Ground-floor living rooms of the houses nearest to the A59 cutting would generally be adequately screened by the recommended acoustic fence such that standard thermal double glazing (e.g. 4mm

glass – nominal cavity – 4mm glass) will provide adequate sound insulation. However, for the ground floor front elevation of Plot 1 we would recommend upgrading the living room windows to double glazing with a performance of at least 28 R_{Tra} (e.g. double glazing of 4mm glass – nominal cavity – 4.4mm SG 'Stadip Silence' acoustic laminated glass) and fitting of acoustic vents.

4.8 For houses further west no special sound insulation measures would be warranted.

4.9 However, these outline noise mitigation recommendations would need to reviewed at reserved matters stage.

Planning Condition

4.10 The development is currently at outline planning application stage only. A further review of the noise mitigation measures would be necessary at reserved matters stage when a definitive site layout and details of finished ground levels are available. However, the need to ensure that an adequate scheme of mitigation of noise from the A59 is implemented at reserved matters stage can be formalised by an appropriately worded planning condition that requires a detailed scheme of noise mitigation measures to be submitted to, and approved by, the local planning authority prior to commencement of building works.

5.0 MINIMISING CONSTRUCTION NOISE IMPACT

5.1 In the Pre-Planning Advice issued by the Council (as referred to in the introduction to this report) the EHO makes reference to the requirement for a 'Dust and Noise Management Plan' to minimise impact on local residents during the construction phase. However, such a plan should be prepared at a later, more informed, stage (i.e. not at outline planning stage) when reserved matters have been approved, and preferably when a site contractor has been appointed. Only at that stage will full details of the construction programme, specific works, plant and machinery, etc become known. At this outline stage the requirement to provide a dust and noise management plan can be ensured by a suitably worded planning condition.

5.2 However, examples of the types of construction noise control measures that will need to be incorporated into the plan, and which are in accordance with guidance in British Standard 5228-1+A1:2014, are outlined below:-

- Construction site working hours should be limited to the daytime only as agreed with the local planning authority (e.g. 07:00-19:00 hours on Mondays to Fridays and 08:00-13:00 hours on Saturdays), with no working on Sundays and Bank Holidays.

- Deliveries of building materials should only be made to the site during the daytime hours specified above.

- An appropriate speed limit shall be adopted for all traffic on the site and marked with appropriate signs.

- Vehicle routes shall be designed (e.g. with one way systems) so as to minimise use of reversing sirens of vehicles.

- No percussive piling shall be undertaken on the development land without the prior consent of the Council.

- Any spoil that is generated from the development shall be re-used on the site as far as is practicable.

- All excavators, loaders, dumpers, etc, used on the site shall comply with the latest EC noise certification limits

- All machinery shall be operated with their engine covers closed and engines will not be left with engines running unnecessarily.

- The condition of silencers, engine enclosures, acoustic body panels, etc, shall be checked and maintained regularly.

- The construction site compound, and any associated equipment, shall be located away from existing residential areas.

- All personnel (including sub-contactors) shall be instructed on requirements to minimise noise emissions as part of the site induction process.

- The management plan should also include procedures for liaising with local residents, dealing with any complaints, identifying any areas where the type/duration of construction works would warrant the provision of temporary noise barriers, and methods for carrying out noise monitoring if required by the Council.

6.0 SUMMARY AND CONCLUSIONS

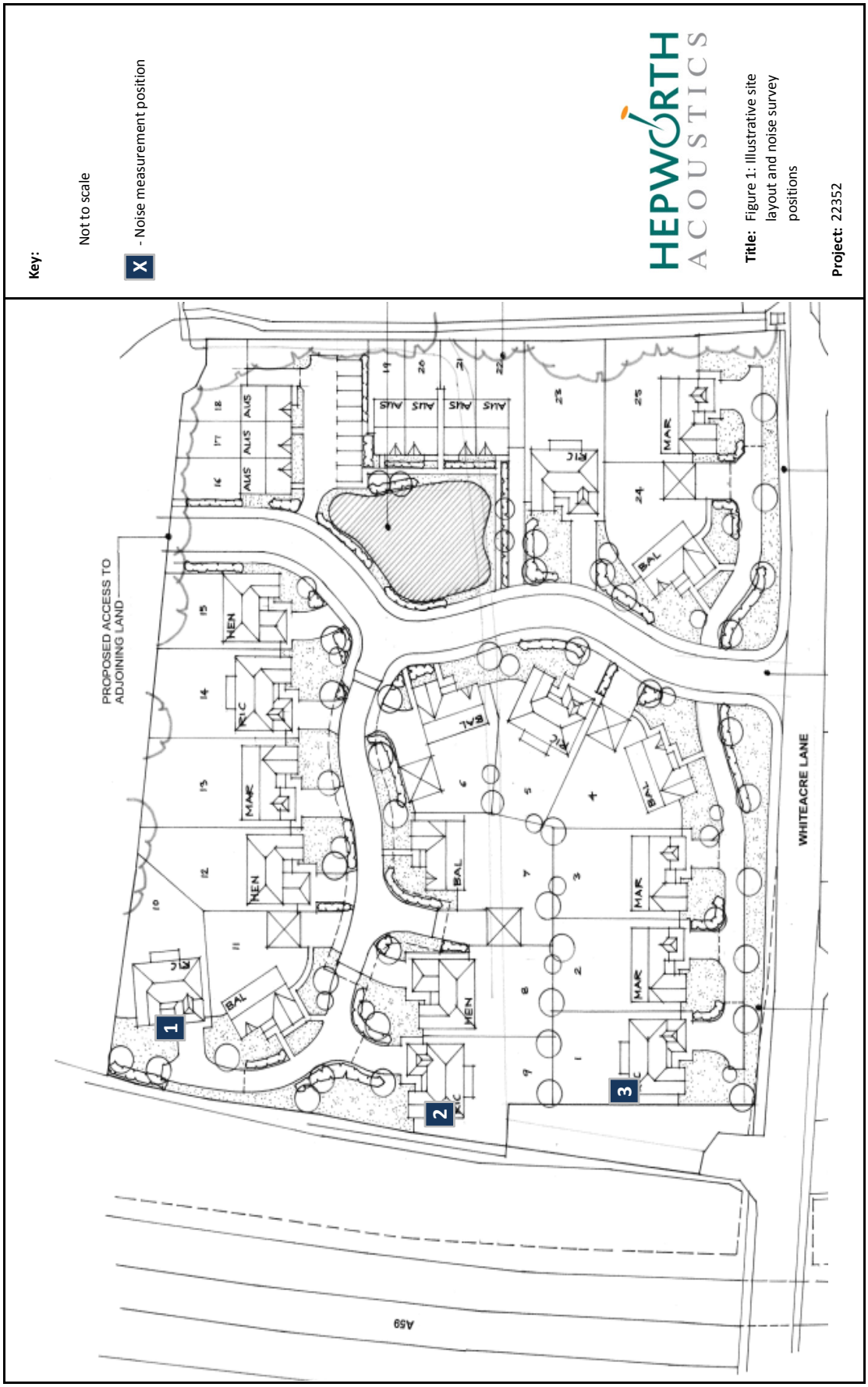
6.1 Hepworth Acoustics was commissioned by Redrow Homes North West to carry out a traffic noise assessment in connection with an outline planning application for a proposed residential development on land at Whiteacre Lane, Barrow, Clitheroe.

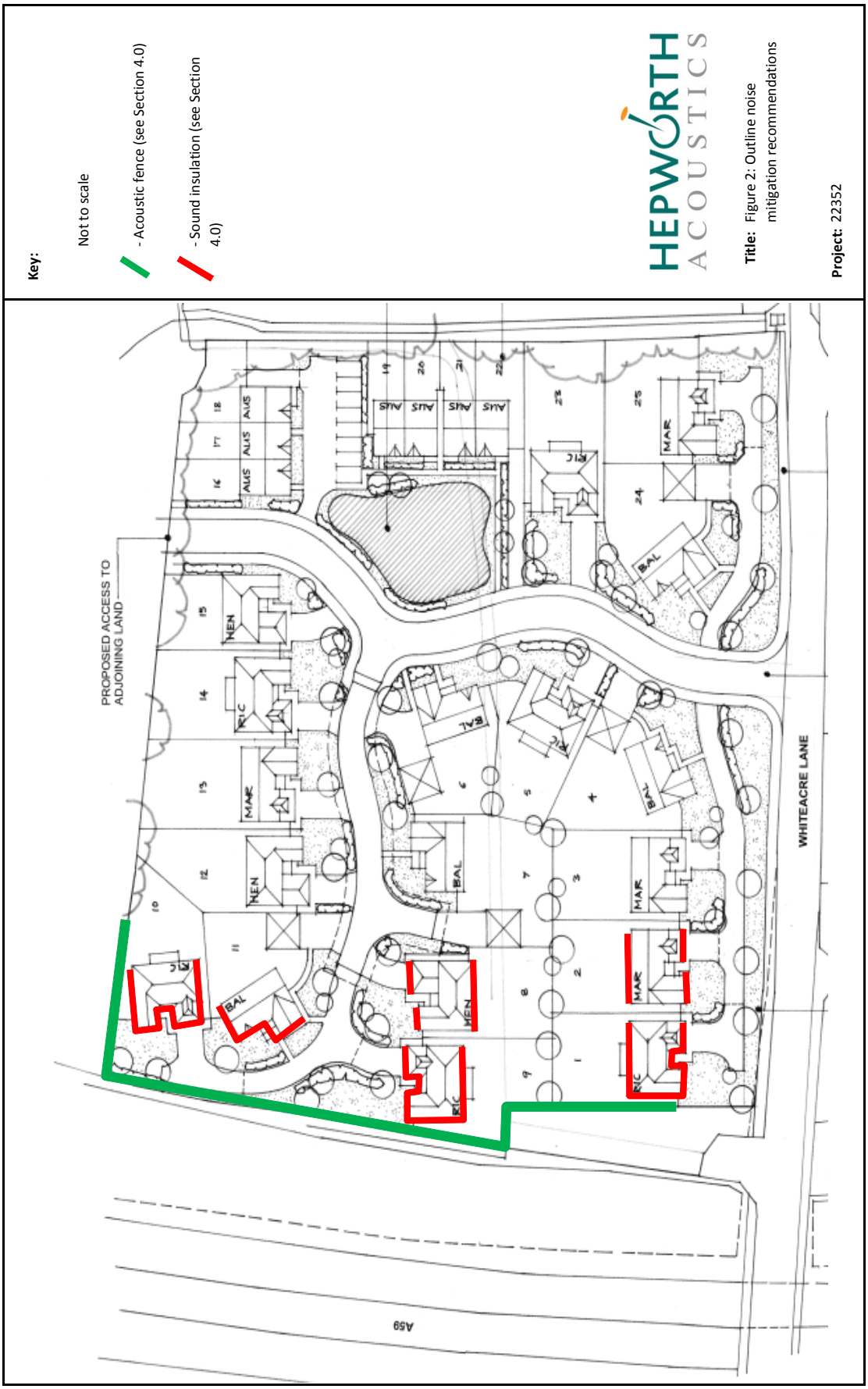
6.2 A measurement survey of traffic noise from the A59 has been carried out at a number of locations on the site for representative periods of the daytime and night/early morning.

6.3 The A59 is screened (visually and acoustically) from the majority of the site by the edge of the deep road cutting. However, there is no or less acoustic screening of traffic noise in the easternmost area of the site. The traffic noise levels measured in this area are such that, in order to achieve acceptable noise levels inside habitable rooms and in the gardens of the proposed houses, as defined in BS8233:2014, some noise mitigation measures will be necessary.

6.4 Currently the development proposals are at outline stage only. However, outline recommendations have been made which include provision of noise screening measures for gardens and sound insulation of dwellings in the area nearest to the A59.

6.5 The noise mitigation scheme will need to be reviewed and detailed at reserved matters stage. However, at this outline stage, the implementation of an adequate scheme of noise mitigation for the development can be ensured by an appropriately worded planning condition.


Key:
Not to scale
X - Noise measurement position
HEPWORTH ACOUSTICS
Title: Figure 1: Illustrative site layout and noise survey positions
Project: 22352
PROPOSED ACCESS TO ADJOINING LAND
WHITEACRE LANE
A59
1
2
3
BAL
MAR
MEN
WC
AUS


Key:
Not to scale
- Acoustic fence (see Section 4.0)
- Sound insulation (see Section 4.0)
HEPWORTH ACOUSTICS
Title: Figure 2: Outline noise mitigation recommendations
Project: 22352
PROPOSED ACCESS TO ADJOINING LAND
WHITEACRE LANE
A59

Appendix I – Noise Units and Indices

a) Description of Noise Characteristics

Sound Pressure Level and the decibel (dB)

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 120 dB (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) = 63dB(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.

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.

A-weighting

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 dB L_A.

b) Description of Noise Indices

When a noise level is constant and does not fluctuate over time, 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, including statistical parameters, are used. The indices used in this report are described below.

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.

L_{A10} This is the A–weighted noise level exceeded for 10% of the time period. LA10 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. LA90 is used as a measure of background noise.

Appendix II – Traffic Noise Survey Results

Date:	Daytime – Friday 15 August 2014
	Night/Early Morning – Wednesday 20 August 2014
Weather:	Daytime - Dry, sunny periods ,warm 18-20^{o}C, calm or slight variable breeze. Night/ Early Morning : Dry, cool 6-7^{0}C, calm, mainly clear sky.
Equipment:	Rion NA-27 'Type 1' sound level meter (s/n: 00590966), tripod, calibrator.
Results:	All levels shown are in dB(A)

Location 1: 10m back from eastern site boundary (Plot 10 in illustrative layout)

Daytime

Start	End	L_{Amax}	L_{A10}	L_{Aeq}	L_{A90}	Comments on Noise Sources
10:07	10:22	63.3	59.4	56.9	52.3	A59 road traffic.
11:02	11:17	63.4	59.5	56.8	51.0	A59 road traffic, birds.
11:59	12:14	63.6	59.7	57.4	53.3	A59 road traffic.

L_{A10} (3 hr) = 59.5 dB
L_{A10} (18 hr) = L_{A10} (3 hr) -1 = 58.5 dB
L_{Aeq} (16 hr) = L_{A10} (18 hr) -2 = 56.5 dB

Night/Early Morning

Start	End	L_{Amax}	L_{A10}	L_{Aeq}	L_{A90}	Comments on Noise Sources
03:50	04:05	57.1	51.1	45.7	28.3	Occasional A59 road traffic, owl.
04:51	05:06	58.7	53.7	49.2	39.8	Intermittent A59 road traffic
05:57	06:12	62.9	58.2	54.8	47.0	A59 road traffic, birds.

Log Average L_{Aeq} = 51.5 dB $L_{Aeq(3\ hr)}$

Location 2: 3.5m back from eastern site boundary (Plot 9 in illustrative layout)

Daytime

Start	End	L_{Amax}	L_{A10}	L_{Aeq}	L_{A90}	Comments on Noise Sources
10:25	10:40	71.1	66.1	63.3	57.1	A59 road traffic.
11:22	11:37	69.8	65.7	62.9	56.9	A59 road traffic.
12:16	12:31	69.4	65.7	62.9	57.4	A59 road traffic.

L_{A10} (3 hr) = 65.8 dB
L_{A10} (18 hr) = L_{A10} (3 hr) -1 = 64.8 dB
L_{Aeq} (16 hr) = L_{A10} (18 hr) -2 = 62.8 dB

Night/Early Morning

Start	End	L_{Amax}	L_{A10}	L_{Aeq}	L_{A90}	Comments on Noise Sources
04:10	04:25	65.0	54.0	50.6	27.3	Intermittent A59 road traffic.
05:14	05:29	72.8	61.3	56.5	43.5	Intermittent A59 road traffic, birds.
06:16	06:31	68.7	64.2	59.9	50.1	A59 road traffic.

Log Average L_{Aeq} = 57.1 dB $L_{Aeq(3\ hr)}$

Location 3: 7.5m back from boundary of A59 cutting (Plot 1 in illustrative layout)

Daytime

Start	End	L_{Amax}	L_{A10}	L_{Aeq}	L_{A90}	Comments on Noise Sources
10:44	10:59	69.3	62.7	59.8	53.9	A59 road traffic.
11:40	11:55	70.4	63.0	60.4	55.2	A59 road traffic, distant aircraft.
12:37	12:52	66.7	62.8	60.1	55.0	A59 road traffic.

L_{A10} (3 hr) = 62.8 dB
L_{A10} (18 hr) = L_{A10} (3 hr) -1 = 61.8 dB
L_{Aeq} (16 hr) = L_{A10} (18 hr) -2 = 59.8 dB

Night/Early Morning

Start	End	L_{Amax}	L_{A10}	L_{Aeq}	L_{A90}	Comments on Noise Sources
04:31	04:46	65.5	56.2	52.1	38.5	Occasional A59 road traffic, owl.
05:35	05:50	66.2	60.0	55.9	46.8	Intermittent A59 road traffic
06:35	06:50	68.9	62.9	59.5	52.0	A59 road traffic, birds.

Log Average L_{Aeq} = 56.8 dB $L_{Aeq(3\ hr)}$