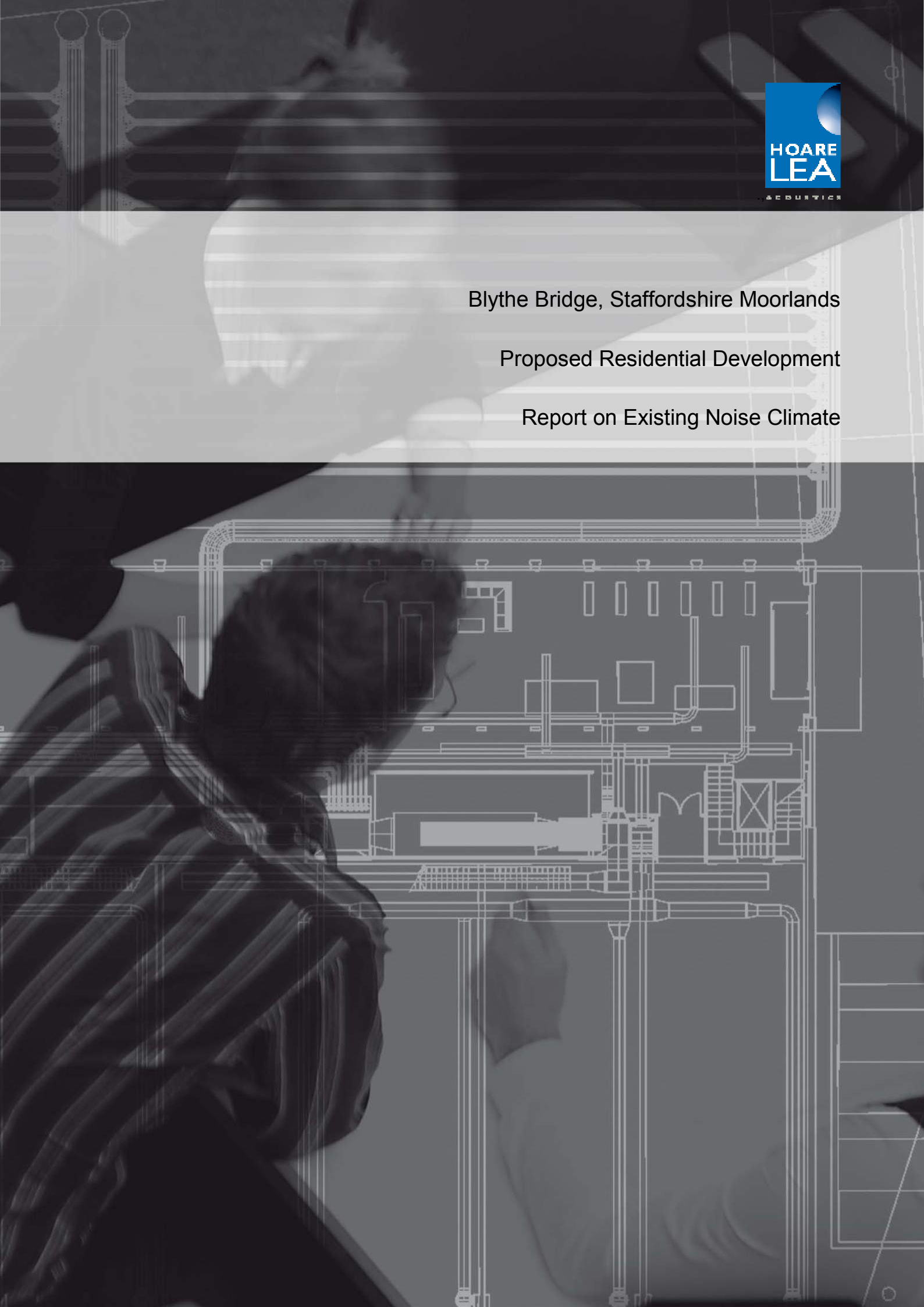

Blythe Bridge, Staffordshire Moorlands

Proposed Residential Development

Report on Existing Noise Climate

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Audit sheet

REVISION	DESCRIPTION	DATE	ISSUED BY	REVIEWED BY
R0 DFC	Noise Impact Assessment	28/07/2016	AM	AM
R1	Updated for site layout	21/06/2017	AM	DM
R2	Client issue	12/07/2017	AM	DM
R3	Design team comments	15/07/2017	AM	DM
R4	Updated Site Layout	25/07/2017	AM	DM

Contents

1. Introduction

This report assesses the noise climate at a development site at Blythe Bridge, located in the Staffordshire Moorlands and approximately six miles south east of Stoke-on-Trent. It is proposed that the site be developed for residential use.

The application site lies adjacent to the A50 Stoke-on-Trent to Derby trunk road, and the A521 Uttoxeter Road.

This report assesses the existing noise climate at the site with respect to guidance for new residential development. Recommendations are made for control measures where appropriate.

2. Site description

The site is located approximately 1km east of Blythe Bridge village centre adjacent to the junction of the A521 Uttoxeter Road and the A50 dual carriageway.

The A521 forms the north west site boundary and provides a link road between the A50 and Draycott in the Moors and Tean to the east. Beyond the A521 to the north west is a large area of existing residential development.

The south western site boundary is formed by the A50 which provides a principal traffic route between Stoke-on-Trent to the west and Derby to the east. Beyond the A50 to the south is a large area of open farm land and associated farm buildings.

Traffic flow on both of these roads is fairly high during the day with increased flows during the morning and evening peak periods. The roads are segregated from the site by an existing landscape zone which is densely planted out with trees and shrubs.

To the east of site are several existing dwellings along Woodlands Lane. Also located on Woodland Lane between these dwellings is Edwin Lawton Limited, a manufacturer of pallets and cases. These works do not immediately adjoin the development site and lie beyond an existing farm yard.

The remaining southern boundary is formed by open land.

A site location plan of the site and surroundings is shown below.

3. Development proposals

It is proposed that the site be developed to provide 118 dwellings in terraced, semi-detached and detached format together with a single block of 4no apartments at the south corner of the site.

Vehicular access into the site will be from the A521 at the approximate mid-point of the north western boundary.

The current proposed site layout is given at Appendix 1.

It is noted from the layout that dwellings will be set back approximately 30m from the edge of the A521 and approximately 40m from the edge of the A50 beyond the retained tree line and beyond access drives.

The topographical plan for the site indicates that the A521 road surface will be partially screened from the site by ground levels in the retained landscape zone which range between 2m and 6m above the road surface along the northern boundary. The plan indicates that the road surface of the A50 will also be partially screened from the site by the landscape zone which ranges between 2m and 3m above the road surface along the south western boundary.

4. Basis of assessment

4.1 National Planning Policy Framework

The National Planning Policy Framework 2012 (NPPF) sets out the Government's planning policies for England and how these are expected to be applied.

Section 11, '*Conserving and enhancing the natural environment*', paragraph 123 of NPPF states:

'Planning policies and decisions should aim to:

- *Avoid noise from new developments 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 developments, including through the use of conditions*
- *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put upon them because of changes in nearby land uses since they were established*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

Reference is made to the DEFRA Noise Policy Statement for England (NPSfE) 2010 within the NPPF. This latter document is intended to apply to all forms of noise other than that which occurs in the workplace. It includes environmental noise and neighbourhood noise in all forms.

NPSfE advises that the impact of noise should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or limit sound levels. Moreover, the document advises that it is not possible to have *'a single objective noise-based measure…that is applicable to all sources of noise in all situations'*. It further advises that the sound level at which an adverse effect occurs is *'likely to be different for different noise sources, for different receptors and at different times'*.

In the absence of specific guidance for assessment of environmental noise within NPPF and NPSfE, it is considered appropriate to base this assessment on current British Standards and appropriate local or national guidance.

4.2 BS8233: 2014

BS8233:2014 'Guidance on sound insulation and noise reduction for buildings' is the current British Standard providing guidance for acoustic requirements within buildings. The Standard advises appropriate criteria and limits for different building types including dwellings.

BS8233 provides guidance regarding acceptable internal and external noise level criteria for dwellings but does not form any statutory requirement to achieve the guidance values provided therein.

The BS8233 internal design criteria for dwellings are as follows:

Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining Room / Area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS 8233 Section 7.2.2 Note 7 states that '*Where development is considered necessary or desirable… the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved'.*

Section G1 of BS 8233 advises that sound reduction is limited to 15dB where windows are open.

For gardens and terraces, the Standard states that it is desirable that the steady noise level does not exceed $L_{Aeq,T}$ 50dB whilst a level of $L_{Aeq,T}$ 55dB would be acceptable in noisier environments. BS 8233 also states that, *'it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable…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. Measurements

Survey work has been carried out to determine the existing noise climate at the site along the northern and south western boundaries.

The measurement locations are marked on the site plan in Appendix A attached to this report and are as described below:

Location Reference:	Description
L1 – Automated noise logging meter	Continuous logging position on the site boundary closest to the A50 dual carriageway – approximately 16m from the edge of the road
L2 – Automated noise logging meter	Assessment of daytime traffic noise levels on the site boundary closest to the A521 – approximately 17m from the edge of the road

Survey work was carried out between Wednesday 20th and Friday 22nd July 2016.

Weather conditions over the survey period were dry with temperatures ranging between 13º and 17º Celsius. It is considered that the measurement data obtained is representative of the overall noise climate at site.

All measurements were made with calibrated, precision grade sound level meters in accordance with BS EN 60651 and BS 7445:1993. Details of the equipment used are provided in Appendix 3 – List of Measurement Equipment. All equipment was calibration-checked before and after the survey with no significant drift observed.

A site noise assessment was previously carried out in 2011 and the findings detailed in the Halcrow Technical Note dated October 2011. Reference is made to this previous survey data in this current report.

6. Results

The results of all diurnal site measurements at position L1 are tabulated in Appendix 1. Levels are shown as hourly values derived from the measured 5 minute sample results.

6.1 Position L1 – A50 boundary

Sample levels ranged between $L_{Aeq(5min)}$ 73.0dB during the daytime and $L_{Aeq(5min)}$ 59.0dB during the night time. The Table below shows the extrapolated mean noise levels for both day and night-time.

Period	Mean L_{Aeq}	Mean L_{A90}
Wednesday daytime (10:00 – 23:00)	68.9	63.3
Wednesday night time (23:00 – 07:00)	67.8	54.2
Thursday daytime (07:00 – 23:00)	70.4	66.1
Thursday night time (23:00 – 07:00)	68.4	58.0

Previous measurement data for this location indicated levels of L_{Aeq} 68.6dB daytime and L_{Aeq} 64.2dB night time.

Typical maximum noise levels during the night time period were in the range L_{Amax} 75 – 82dB.

It is noted that the proposed building line is approximately 40m from the road compared to 16m for the measurement position and, consequently, the corrected sound levels at the nearest facades are as follows:

period	L_{Aeq}	L_{Amax}
Day	67dB	-
Night	65dB	68-75dB

6.2 Position L2 – A521 boundary

Sample levels measured during the middle of the day were in the range L_{Aeq} 65-67dB with an overall mean level of $L_{Aeq,3hr}$ 66.1dB and $L_{A10,3hr}$ 69.5dB. From CRTN:1988 the overall daytime sound level is $L_{Aeq,18hr}$ 68.5dB and BS 8233 advises that this equates to a mean daytime level of $L_{Aeq,16hr}$ 66.5dB which correlates well with the survey data. Typical maximum levels were in the range L_{Amax} 76-78dB.

It is noted that the proposed building line is approximately 25m from the road compared to 17m for the measurement position and, consequently, the corrected sound level at the nearest facades is $L_{Aeq,16hr}$ 65dB. The corrected maximum levels are L_{Amax} 73-75dB.

Previous measurement data for this location indicated levels of L_{Aeq} 66.5dB daytime and L_{Aeq} 62.1dB night time.

7. Discussion

7.1 Existing noise climate

The existing noise climate across the site is determined by traffic flows on the A521 and the A50 with slightly higher levels for the A50.

Noise from road traffic is primarily attributable to tyre 'roar' which has a characteristic mid-frequency tonal peak.

No other sources of noise were noticeable at the site other than that of traffic noise. During the site visits, observations were made adjacent to the site boundary with the farm yard and Edwin Lawton Limited but there was no noticeable noise from these premises during extended periods of site attendance over four separate visits.

7.2 BS8233 Assessment

7.2.1 Internal

From the site survey data, it may be extrapolated that, for the building line nearest to the A50, the building fabric would need to provide a minimum composite sound reduction of 32dB for daytime resting and 35dB for night time sleeping. For the building line nearest to the A521, the building fabric would need to provide a minimum composite reduction of 30dB for daytime resting.

For building lines further from the road, the sound reduction requirements will be lower due to increased distance and the screening effect of intervening buildings.

In practice, the structural components of the building envelope can be expected to provide a sound reduction in excess of 45 dB and will not provide a significant pathway for noise break-in and greatest sound break-in can be expected to occur via windows.

Data given in BRE IP 12/89 and BS 8233 indicates that, for road traffic noise, standard thermal double glazing provides a typical sound reduction of the order of 33dB(A). This order of reduction would enable the BS 8233 internal criteria to be achieved for living rooms nearest to the A521 and A50. For bedrooms on the building line nearest to the roads, a slightly improved glazing performance will be required to achieve the good standard for night time sleeping.

The sound reductions discussed above apply to closed windows and BS8233 advises that sound reduction across a partially open window will be limited to 15dB. Under these conditions the BS 8233 internal criteria will be exceeded for habitable rooms when windows are open and it will be necessary for these rooms to be provided with alternative means of ventilation. Background ventilation in accordance with Building Regulations requirements can be achieved with proprietary window or wall mounted trickle vents.

7.2.2 External

The proposed site layout indicates that all gardens nearest to the A50 are screened from the road by intervening dwellings. This arrangement will result in increased distance attenuation together with screening attenuation from the dwelling. It is considered that these factors will enable the BS 8233 limit level of L_{Aeq} 55dB to be achieved for gardens to these plots (plots 47-54 and 95-110)

For plots 91-94 adjacent to the A521 the gardens will again benefit from the separation and screening effect of dwellings to achieve the BS 8233 criteria. For plots 1, 12, 16, 111 and 118, gardens are exposed to the road and it will be necessary for boundaries facing the road to be provided with solid barrier fencing. It is calculated that a barrier of height 2m would provide a screening effect of 7dB for standing height 8dB for seated positions. These orders of reduction would enable the BS 8233 criteria to be achieved.

Gardens away from the roadside boundaries will benefit from increased distance attenuation and screening.

7.3 Boundary to commercial premises

As noted in section 7.1 above, there was no noticeable noise at the eastern boundary from activities associated with Edwin Lawton Limited and the farm yard any low level noise emissions would have been masked by traffic noise from Uttoxeter Road.

It is noted that the workshop building on the Edwin Lawton site is located towards the south and away from the development site at approximately 60m from the nearest proposed dwelling (plot13). This latter dwelling is within 30m of Uttoxeter Road and, consequently, traffic noise is likely to be more significant than noise from the commercial premises.

Notwithstanding these findings, it is considered that the dwellings should be protected from any future increase in noise levels at these sites and this would best be achieved by provision of a solid barrier along this section of the site boundary.

8. Recommendations

It is recommended that bedroom windows to plots 43-46, 47-55 and 95-110 which face the A50 and plots 1, 12-16, 91-94, 111 and 118 which face the A521 have a minimum manufacturer's rating of R_w 35. All remaining habitable rooms throughout the development should be fitted with window systems having a minimum manufacturer's rating of R_w 33.

The sound reductions should be from the window units as a whole, including the frame and any associated furniture.

All habitable rooms should be provided with propriety wall or window mounted trickle vents to achieve background ventilation in accordance with the Building Regulations. All such vents should, when open, achieve a sound reduction comparable to that of the glazing system.

It is recommended that the roadside boundary of gardens to plots 1, 12, 13, 16, 91, 111 and 118 be provided with solid barrier fencing or masonry walls of minimum height 2m.

It is recommended that site boundary of plots 13 and 23, which adjoin commercial premises to the east, be provided with solid barrier fencing to a minimum height of 2.4m.

Where barrier fencing is provided, it should have a minimum mass of 10kgm^{-2} and be continuous to ground level without any significant gaps. In practice, this requirement can be achieved with close-boarded panels and gravel boards.

9. Conclusions

Measurements and observations made at this site indicate that the noise climate primarily is determined by traffic flows on the A50 and A521 dual carriageways bordering the site.

Control measures in the form of acoustic rated windows will be required to all habitable rooms to the residential dwellings in order to achieve the BS8233 internal criteria.

Where gardens to plots adjacent to the roads are not screened by intervening dwellings, it will be necessary to provide solid barrier fencing or walls to reduce traffic noise in these gardens.

It is considered that noise levels on site are not excessive and applicable design criteria for the residential dwellings can be achieved with normal construction techniques.

There was no observed noise at the site from commercial premises to the east over several site visits and, consequently, there does not appear to be any significant noise impact upon the site from these premises. Notwithstanding these findings, it would be prudent to allow for possible future increases in sound levels from these premises and this could be achieved by provision of solid barrier fencing along the affected area of the site boundary.

Appendix 1 – Proposed site layout

Appendix 2 – measured sound pressure levels

Position L1: A50 Boundary

	From:	To:	Leq,1hr	Lmax,1hr	L10,1hr	L90,1hr
Day 1	10:00	10:59	66.4	85.2	72.0	64.2
	11:00	11:59	69.6	80.2	72.1	64.7
	12:00	12:59	70.1	81.5	72.4	65.8
	13:00	13:59	70.1	79.6	72.4	66.1
	14:00	14:59	70.7	82.8	72.8	67.0
	15:00	15:59	70.5	77.9	72.6	67.0
	16:00	16:59	70.7	80.4	72.8	66.9
	17:00	17:59	69.7	78.3	72.0	64.9
	18:00	18:59	69.4	83.9	71.9	64.3
	19:00	19:59	68.1	78.2	71.0	60.8
	20:00	20:59	66.2	76.6	69.7	55.9
	21:00	21:59	64.0	76.7	67.3	52.6
	22:00	22:59	63.4	75.9	66.7	50.5
	23:00	23:59	63.3	76.5	67.0	48.3
Day 2	00:00	00:59	63.1	76.5	66.8	49.8
	01:00	01:59	63.5	79.5	66.3	49.4
	02:00	02:59	63.3	75.4	66.8	50.6
	03:00	03:59	65.3	77.5	68.7	54.3
	04:00	04:59	68.8	85.5	71.4	62.8
	05:00	05:59	71.4	82.4	73.5	67.8
	06:00	06:59	71.8	84.3	73.8	68.4
	07:00	07:59	71.2	79.2	73.2	67.7
	08:00	08:59	70.3	80.8	72.5	66.2
	09:00	09:59	70.4	78.3	72.5	66.8
	10:00	10:59	70.0	78.3	72.2	65.9
	11:00	11:59	71.2	80.4	73.2	67.4
	12:00	12:59	71.4	81.2	73.5	67.9
	13:00	13:59	71.6	80.5	73.6	68.1
	14:00	14:59	71.8	85.4	73.6	68.6
	15:00	15:59	71.6	79.7	73.4	68.3
	16:00	16:59	71.1	78.8	73.1	67.6
	17:00	17:59	71.1	90.2	73.2	67.3
	18:00	18:59	70.6	84.9	72.9	66.1
	19:00	19:59	69.5	81.6	72.1	63.1
	20:00	20:59	67.7	84.9	70.6	60.2
	21:00	21:59	66.1	78.1	69.1	58.0
	22:00	22:59	65.3	76.6	68.3	56.1
	23:00	23:59	64.8	76.5	67.9	54.3
Day 3	00:00	00:59	64.2	75.6	67.1	53.4
	01:00	01:59	64.8	77.7	67.8	54.6

	02:00	02:59	64.3	75.9	67.4	53.1
	03:00	03:59	66.6	79.5	69.5	58.8
	04:00	04:59	69.9	80.8	71.9	65.6
	05:00	05:59	71.8	79.9	73.8	68.5
	06:00	06:59	71.7	78.3	73.6	68.5
	07:00	07:59	70.7	79.6	72.8	67.0
	08:00	08:59	70.9	87.9	73.0	66.8
	09:00	09:59	69.4	85.6	73.7	68.2

APPENDIX 3 – GLOSSARY OF TERMS

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm is taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted sound level is written as dB(A).

$L_{Aeq,T}$

The A-weighted equivalent continuous sound level – the level of a notionally steady sound having the same energy as the true fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter. It is the preferred descriptor for environmental noise in accordance with BS 7445:1993.

$L_{A90,T}$

The A-weighted noise level exceeded for 90% of the specified measurement period (T). This is generally taken to indicate the prevailing background noise level.

$L_{A10,T}$

The A-weighted sound level exceeded for 10% of the specified measurement period (T). This parameter is indicative of the average maximum sound level

L_{Amax}

The highest short duration A-weighted sound level recorded during a noise event.

APPENDIX 4 – LIST OF MEASUREMENT EQUIPMENT

Measurements

Rion type NL-32 Sound Level Meter	S/N 01161940
Rion type NH-21 pre-amplifier	S/N 21975
Rion type UC-53A Microphone	S/N 311042
Rion NA-28 Sound Level Meter	S/N 01260202
Rion - Pre-amplifier: NH-23	S/N 60105
Rion - Microphone: UC-59	S/N 282

Additional Equipment

Rion Type NC-74 Calibrator	S/N 34172706

The above equipment fulfils IEC 61672 Class 1 and is traceable to calibration under BS7580: Part 1:1997.

The equipment was calibration-checked before and after measurement – no adverse deviation was observed.