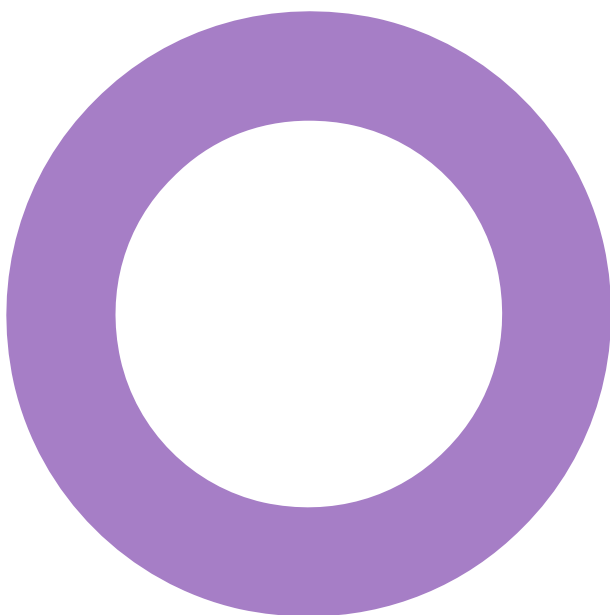


Blythe Vale Phase 2. Blythe Bridge, Staffordshire. St Modwen.

ACOUSTICS

PROPOSED RESIDENTIAL DEVELOPMENT
REPORT ON EXISTING NOISE CLIMATE
REVISION 1 – 08 JUNE 2021



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed
0	17/12/2020	Draft Report	AM	
1	08/06/2021	Issued report	AM	DM

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Document reference: St Modwen - Blythe Vale Phase 2 REP-10126xx-05-AM-20201217-Baseline Noise Assessment-Rev 1.docx

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1. Introduction.

Hoare Lea Acoustics has been appointed by St Modwen Homes to carry out an assessment of the existing weekday noise climate at a site located adjacent to the A50 at Blythe Bridge, Staffordshire. It is proposed that the site be developed for residential use.

This report details the results of site measurements and reviews this data with respect to guidance for new residential development. Recommendations are made for control measures where appropriate.

It is noted that, at the time of preparing this report, the U.K was subject to Government restrictions for Covid 19 which will have affected traffic flows on the A50 adjacent to the site. Given the uncertainty regarding current conditions, the assessment in this report is based upon archive measurement data for the adjacent phase 1 site which were obtained under normal traffic flow conditions.

2. Site Description.

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

The south western site boundary is formed by the A50 which provides a principal traffic route between Stoke-on-Trent to the west and Uttoxeter and Derby to the south east. Beyond the A50 to the south is agricultural land intersected further afield by the Stoke to Derby railway line and the River Blithe.

Traffic flow on the A50 is fairly high during the day with increased flows during the morning and evening peak periods. Traffic speeds adjacent to the site tend to be restricted due to the proximity with the island junction with the A521 Uttoxeter Road to the north west. The road is segregated from the site by a grass verge and existing landscape zone which is densely planted out with trees and shrubs.

To the north west, the site adjoins the Phase 1 residential development and established dwellings on Woodlands Lane.

To the north and east, the site adjoins agricultural land with stables and a menage located toward the north east corner.

An aerial view of the site and surroundings is shown below.



3. Development Proposals.

It is proposed that the site be developed to provide a total of 200 traditional dwellings in terraced, semi-detached and detached format.

Vehicular access into the site will be from the Phase 1 development to the west.

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

The topographical plan for the site indicates that the road surface of the A50 is screened from the site towards the south east corner where the road lies in cutting.

The current proposed site layout is given at Appendix 1.

4. Basis of Assessment.

4.1 National Planning Policy Framework.

The National Planning Policy Framework (NPPF): June 2019 sets out the Government's planning policies for England and how these are expected to be applied. The document seeks to encourage sustainable development subject to all relevant factors.

Section 15: 'Conserving and enhancing the natural environment', paragraph 170, states the following:

'Planning policies and decisions should contribute to and enhance the natural and local environment by:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability'.*

Furthermore, paragraph 180 states *'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:*

- 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;*
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

Paragraph 183, additionally, states *'The focus of planning policies and decisions should be on whether proposed development is acceptable use of land rather than control of processes or emissions (where these are subject to separate pollution control regimes)'.*

NPPF also makes reference to the DEFRA Noise Policy Statement for England (NPSfE) 2010. 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.

It is noted that NPSfE also advises that the general principle that increases in ambient noise should be 'minimised', needs to be considered in context for each site and, in this regard, states:

'Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical... the application of the NPSfE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular...development or other activity may not have been given adequate weight when assessing the noise implications'.

4.2 BS8233:2014.

BS8233:2014 'Guidance on sound insulation and noise reduction for buildings' is the current British Standard providing guidance on the acoustic design of 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 $L_{Aeq,8hour}$

Section G1 of BS 8233 advises that, where windows are open for ventilation, then sound reduction is limited to 15dB. The Standard does, however, acknowledge that additional sound reduction will result from room furnishings. Available site test data indicates that, for mid-frequencies typical of traffic noise, the overall sound reduction from outside to inside is approximately 20dB for a window open by approximately 100mm. These findings are supported by extensive test data in Napier University report NANR 116:2007 'Sound insulation through ventilated domestic windows' which was prepared on behalf of DEFRA.

With regard to ventilation, BS 8233 section 8.4.5.4 refers to the Building Regulations recommendation that habitable rooms be provided with background ventilation and states '*Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.*'

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. However, BS 8233 states that, '*...it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas...adjoining the strategic transport network, a compromise...may be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.*'

4.3 ProPG Planning and Noise:2017.

ProPG Planning and Noise – 'New residential developments' is the most recent planning guidance with respect to the impact of transportation noise upon new residential development.

Section 2 of the document provides general guidance to achieve 'good design' of new dwellings and advises that site levels above approximately L_{Aeq} 70dB daytime and L_{Aeq} 60dB night time represent a 'high noise risk' whilst levels below approximately L_{Aeq} 55dB daytime and L_{Aeq} 45dB night time represent a 'low noise risk'.

The guidance recommends that new residential developments be designed to achieve the internal and external criteria given in BS 8233:2014 but, additionally, advises that night time maximum sound levels in bedrooms at night should not normally exceed a level of L_{Amax} 45dB more than ten times over the course of the night.

5. Measurements.

Measurements have previously been carried out to determine weekday traffic noise levels from the A50 for the Phase 1 site. These measurements were carried out in July 2016. It is considered that this archive data will provide a more accurate assessment of traffic noise impact for the site compared to current site conditions which are likely to be affected by Government Covid 19 restrictions.

The archive measurements were made at a position at the western corner of the phase 2 site and approximately 16m from the edge of the A50 as indicated in the following image:



Measurements were made over the period 20-22 July 2016. Levels were recorded in 15 minute samples to determine the equivalent continuous level, L_{Aeq} , typical maximum levels, L_{Amax} and the percentile, L_{A90} .

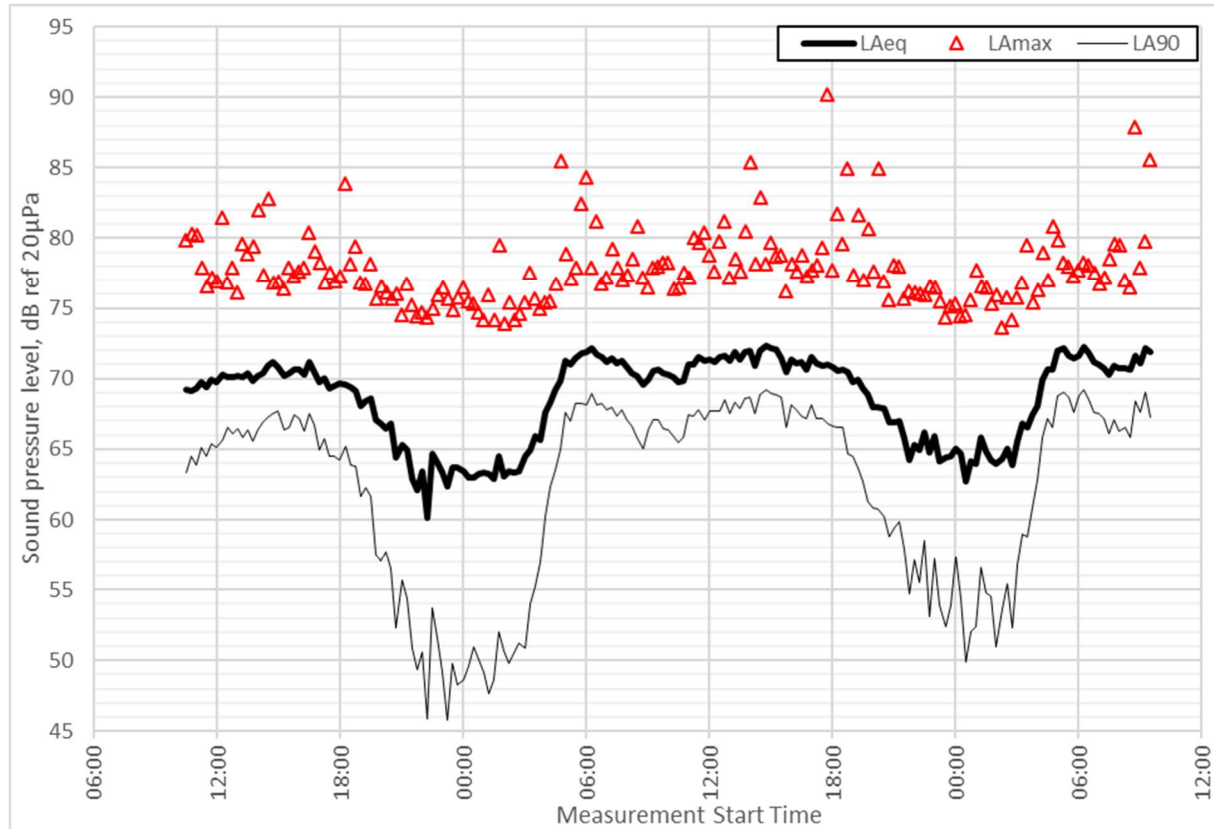
Weather conditions over the survey period were mixed with periods of rain and strong breeze and temperatures ranging between 13° and 17° Celsius. It is considered that the measurement data obtained is representative of the overall noise climate at this part of the site.

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 4 – List of Measurement Equipment. All equipment was calibration-checked before and after the survey; no significant drift was observed.

6. Results.

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

The variation in sound levels over the survey period is shown in the following graph:



The overall daytime and night time sound levels are summarised in the following table:

Period	Mean L_{Aeq}	L_{Amax}	Mean L_{A10}	Mean L_{A90}
Wednesday (11:00 – 23:00)	69.1	76 – 84	71.1	62.2
Wednesday night	67.8	75 – 86	69.3	56.4
Thursday	70.4	77 – 90	72.3	65.3
Thursday night	68.4	76 – 81	69.9	59.6

The derived mean daytime sound level was L_{Aeq} 69.8dB with a night time level of L_{Aeq} 68.1dB.

Typical maximum levels at the measurement position during the night were in the range L_{Amax} 74-78dB with just five events on each night in the range L_{Amax} 78-85dB.

It is noted that the proposed building line is 30-35m from the road compared to 16m for the measurement position and, consequently, the corrected sound levels for the nearest facades are as follows:

period	L_{Aeq}	L_{Amax}
Day	66dB	-
Night	65dB	68-72dB

7. Discussion.

7.1 Existing Noise Climate.

The existing noise climate across the site is determined by traffic flows on the A50.

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

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 stables to the north east but there was no noticeable noise from these premises over several separate visits.

7.2 ProPG Assessment.

Given that the predominant noise across the site is attributable to road traffic, ProPG 2017 guidance indicates that the southern building line nearest to the A50 would have a 'medium noise risk' assessment during the day and a 'high noise risk' assessment during the night. This assessment is based upon data for the current, open, site and with development there will be a screening effect for traffic noise and it is considered that the majority of the development site away from the road frontage would, upon completion, have a 'low-medium noise risk' assessment once distance and screening factors are taken into consideration.

From the survey data for maximum sound levels during vehicle pass-by, internal maximum sound levels below L_{Amax} 45dB during night time would be achieved for all vehicle movements with a reduction of 34dB from the building fabric for bedrooms overlooking the A50.

Where screening measures are provided adjacent to the boundary with the A50 the noise risk will reduce and the sound reduction requirement for dwellings nearest to the road will be lower.

7.3 BS8233 Assessment.

7.3.1 Internal sound levels.

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 31dB for daytime resting and 35dB for night time sleeping.

For facades further from the road and/or screened from the road, the sound reduction requirements will be lower due to increased distance and the screening effect of intervening buildings. For the majority of the dwellings on the development, it is considered that the sound reduction for both daytime and night time would be less than 30dB.

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 to habitable rooms will 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 A50. For bedrooms on the building line nearest to the road, an improved glazing performance will be required to achieve the good standard for night time sleeping.

BS 8233 notes that regular individual noise events can cause sleep disturbance whilst ProPG advises that night time maxima within bedrooms should not exceed L_{Amax} 45dB more than ten times during the course of the night. Windows providing a sound reduction of 35dB would enable all night time maxima for vehicle movements to achieve L_{Amax} 45dB.

The sound reductions discussed above apply to closed windows. Available test data indicates that sound reduction across a partially open window onto a furnished room at traffic noise frequencies will be limited to 20dB. Based upon the measurement data, the BS 8233 internal criteria will be exceeded for habitable rooms

which overlook the A50 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.

It is noted that the majority of dwellings are set back and screened from the road and BS 8233 internal criteria can be achieved with open windows.

Given the traffic noise levels generated by the A50 with the current open aspect to the road, it will be beneficial to provide screening measures within the landscape zone along the A50 boundary.

It is estimated (from CRTN 1988) that a barrier of height 3m above the road surface located approximately 15m from the edge of the road would provide a screening effect of 5dB for 1st floor windows and 10.5dB for ground floor windows. These reductions would be noticeable at the nearest dwellings and would enable 'reasonable' conditions (BS 8233 section 7.7.2 Note 7) to be achieved within habitable rooms for the majority of time with open windows.

The screening effect noted above would, on the basis of the survey data, also enable night time maxima within bedrooms to achieve the ProPG target criterion when windows are open.

7.3.2 External sound levels.

The extrapolated daytime sound level for the building line nearest to the A50 indicate that a sound reduction of the order of 12dB would be required to achieve BS 8233 limit criteria for gardens.

The proposed site layout indicates that almost all gardens nearest to the A50 are screened from the road by intervening dwellings. This arrangement will result in slightly increased distance attenuation together with screening attenuation from the dwelling. Allowing for provision of screening measures adjacent to the A50 together with the screening effect of dwellings, it is considered that the BS 8233 limit level would be achieved for gardens to plots nearest to the A50.

For plots 135 and 148, there is a line of sight from the gardens to the A50 and it will be necessary to provide localised screening measures to these plots in the form of solid fencing on the garden boundary that overlooks the A50. A fence height of 2m at these locations would screen all seated and standing positions within the garden and enable the BS 8233 criteria to be achieved.

All plots beyond the first line of development will benefit from increased distance and screening attenuation.

8. Recommendations.

It is recommended that bedroom windows which face the A50 to plots 135-148 inclusive 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 on elevations facing the A50 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 room glazing system.

It is recommended that the boundary of gardens to plots 135 and 148 which overlook the A50 be provided with solid barrier fencing of minimum height 2m.

It is recommended that consideration be given to screening measures within the landscape zone adjacent to the A50 to reduce traffic noise across the site. Such measures should comprise a solid barrier to a minimum height of 3m above road level. This could be achieved with earth bund or barrier fencing or a combination of both.

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 dual carriageway 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 traffic noise levels across the site can be reduced significantly by provision of screening within the landscape zone adjacent to the A50. Such screening measures would enable BS 8233 internal criteria to be achieved within rooms nearest to the road when windows are open.

Appendix 1 – Proposed Site Layout.



Appendix 2 – Measured Sound Pressure Levels.

Date	Day	From:	To:	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}
20/07/2016	Wednesday	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	69.6	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
21/07/2016	Thursday	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
22/07/2016	Friday	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

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 Monitoring 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
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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.



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