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LAND AT STATION ROAD, HAYLING ISLAND
NOISE IMPACT ASSESSMENT

Technical Report: R5989-1 Rev 1

Date: 30th October 2015

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Noise Impact Assessment

Report Ref: R5989-1 Rev 1

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EXECUTIVE SUMMARY

24 Acoustics Ltd has been retained by Barratt David Wilson Homes Southampton to assess the impact of noise on the residential development site at Station Road, Hayling Island.

This report presents the results of the assessment and indicates that an acoustic barrier fence should be constructed at the site boundary with Travis Perkins. The assessment also indicates that internal noise levels in all properties will be within acceptable limits at all times and has recommended operational noise limits for the proposed commercial units.

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been retained by Barratt David Wilson Homes Southampton (BDW Southampton) to provide an assessment of the likely noise impact associated with a proposed mixed-use development on land at Station Road, Hayling Island.
- 1.2 This report presents the results of the assessment and is based upon noise surveys undertaken on the site between 23rd and 28th October 2015.
- 1.3 All noise levels in this report are provided in dB relative to 20 μ Pa. A glossary of the acoustic terminology used is provided in Appendix A.

2.0 SITE DESCRIPTION PROPOSED DEVELOPMENT AND BACKGROUND

- 2.1 The proposed development site is located off Station Road in Hayling Island. A Travis Perkins site is located to the immediate south and an existing commercial development to the west. The balance of the surrounding area is primarily residential in nature.
- 2.2 BDW Southampton have applied for planning consent to redevelop the site to comprise 76 private and social- housing units and 8 B1 class light industrial units.
- 2.3 An aerial image showing the approximate location of the proposed development site is provided in Figure 1. A copy of the proposed reserved matters development is provided in Figure 2.

3.0 RELEVANT PLANNING AND NOISE IMPACT ASSESSMENT CRITERIA

National Planning Policy Framework

- 3.1 The National Planning Policy Framework (NPPF) was published by the Department for Communities and Local Government in March 2012. This document supersedes Planning Policy Guidance 24 which previously provided technical guidance on noise relating to planning and new development. For noise, the NPPF policy states that planning policies and decisions should aim to:

- Avoid noise from 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, while recognising that many developments will create some noise;
- 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 on them because of changes in nearby land uses since they were established; and
- 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.

3.2 The NPPF refers to the Noise Policy Statement for England (NPSE) which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to '*promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*' which is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

3.3 The NPSE defines the concept of a '*significant observed adverse effect level*' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL

values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”

- 3.4 In March 2014 the National Planning Practice Guidance (NPPG) [Reference 3] came into effect, following a consultation published in August 2013. The NPPG has been written to support the NPPF with more specific planning guidance. The NPPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of a proposed development. The NPPG expands further upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system. The table is reproduced below.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observable Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extension and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non auditory	Unacceptable Adverse Effect	Prevent

Table 1: NPPG Noise Exposure Hierarchy

- 3.5 In general terms it is considered that a noise level with an effect level which is lower than SOAEL is acceptable (providing the effect is mitigated to a minimum) and indeed an impact greater than SOAEL whilst it should be prevented is not necessarily unacceptable. There is currently, however, no technical criteria for use in planning noise impact assessments that defines NOEL, LOAEL or SOAEL in objective terms. The only exception to this is the World Health Organisation publication 'Night Noise Guidelines for Europe' [Reference 4] which defines NOEL as 30 dB $L_{Aeq, 8 \text{ hour}}$ and LOAEL as 40 dB $L_{Aeq, 8 \text{ hour}}$ (all applied externally). This guidance is, however, based upon research into, and refers to, noise impact from transportation sources and therefore cannot be applied to industrial noise and for this reason has not been considered further in this noise impact assessment.

British Standard 8233 and World Health Organisation Guidance

- 3.6 BS 8233:2014 provides design guidance for dwelling houses, flats and rooms in residential use and states that it is 'desirable' that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq, 16 \text{ hour}}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq, 16 \text{ hour}}$ in dining rooms during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ in bedrooms at night.
- 3.7 The World Health Organisation (WHO) provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines suggest internal noise levels not exceeding 30 dB $L_{Aeq, 8 \text{ hour}}$ or regularly exceeding 45 dB $L_{Amax, f}$ for 'a good night's sleep' (more than 10- 15 events per night).
- 3.8 The World Health Organisation also provides guidance on the relationship between annoyance and noise levels in external amenity areas (gardens, terraces, balconies etc.). It suggests that in order to prevent the majority of the population being moderately annoyed by noise the noise level in these areas should not exceed 50 dB $L_{Aeq, 16 \text{ hour}}$ between 07:00 and 23:00 and also defines 55 dB $L_{Aeq, 16 \text{ hour}}$ as the onset of significant community annoyance. It should be noted that these values are aspirational and BS 8233:2014 refers to these levels as 'not achievable in all circumstances where development might be desirable'. In such situations development should be designed to achieve the lowest levels practicable in external amenity spaces but development should not be prohibited.

British Standard 4142

- 3.9 BS 4142:2014 has recently been published and replaced BS 4142:1997. The standard provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the typical measured L_{A90} background noise (sound) level and L_{Aeq} (sound) noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction of up to 15 dBA is applied. The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise (sound) level, this is an indication of the specific sound source having a low impact (depending upon the context).

Summary- Acoustic Criteria

- 3.10 Based upon the review of standards and guidance described above the following acoustic criterion have been adopted for use in this project:
- Noise levels in external amenity areas to be as low as possible (preferably below 55 dB $L_{Aeq,16\text{hour}}$), given the constraints of the scheme and on the basis that the concept of housing on the site has already been agreed by virtue of the outline planning consent;
 - Daytime noise level of 35 dB $L_{Aeq,16\text{ hour}}$ in living rooms and bedrooms;
 - Night-time noise level of 30 dB $L_{Aeq, 8\text{ hour}}$ and 45 dB $L_{Amax,f}$ (for 10 events or more) in bedrooms;
 - Acoustic criterion put in place to limit the future noise level from the proposed B1 space to be no greater than the prevailing representative background noise level.

4.0 SITE NOISE SURVEYS

- 4.1 A combination of long-term unattended and attended noise surveys were undertaken on the site between 22nd and 27th October 2015. A long-term survey was undertaken at two locations on the site and unattended surveys undertaken at a further 3 locations. The survey locations are shown in Figure 1.

4.2 The surveys were undertaken using the following instrumentation:

- Rion NL32 Class 1 accuracy precision sound level meter ;
- Rion NL52 Class 1 accuracy precision sound level meter;
- Norsonic Nor-118 Class 1 accuracy precision sound level meter;
- Bruel and Kjaer Type 4231 acoustic calibrator.

4.3 The measurements were undertaken in samples of 5 minutes in terms of the overall A-weighted (unattended survey) and linear octave bands (attended surveys) L_{eq} , $L_{max,f}$ and L_{A90} sound pressure levels. The instrumentation was installed on a microphone at a height of 1.5 m above ground level and an environmental windshield was fitted.

4.4 The instrumentation was calibrated before and after the survey in accordance with the manufacturer's instructions using a Bruel and Kjaer Type 4231 acoustic calibrator. No drift in calibration was recorded.

4.5 The results of the noise surveys are shown in Appendix B in full and the long-term survey results summarised in Tables 2 and 3 below.

	Period and Sound Pressure Level, dB					
	Day		Night			
	$L_{Aeq,16hr}$ Average	$L_{A90, 1 hour}$ Typical	L_{Aeq} Average	$L_{A90, 15 min}$ Typical	$L_{Amax,f}$ Range	$L_{Amax,f}$ Typical
Thursday 22/10/2015	47	31	38	20	28- 66	58
Friday 23/10/2015	46	36	35	28	36- 63	53
Saturday 24/10/2015	46	37	39	28	32- 66	58
Sunday 25/10/2015	44	35	43	35	45- 70	58
Monday 26/10/2015	47	40	40	35	39- 64	58

Table 2: Long-term Noise Survey Results, Location 1 (Western boundary)

	Period and Sound Pressure Level, dB					
	Day		Night			
	$L_{Aeq,16hr}$ Average	$L_{A90, 1 hour}$ Typical	L_{Aeq} Average	$L_{A90, 15 min}$ Typical	$L_{Amax,f}$ Range	$L_{Amax,f}$ Typical
Thursday 22/10/2015	55	33	34	22	29-57	54
Friday 23/10/2015	56	33	34	25	32-59	52
Saturday 24/10/2015	47	36	37	31	33-59	52
Sunday 25/10/2015	43	35	42	32	43-73	54
Monday 26/10/2015	54	38	36	30	34-57	52

Table 3: Long-term Noise Survey Results, Location 2 (Southern boundary)

- 4.6 During the attended noise surveys noise from distant traffic and from the Travis Perkins site was audible at times. Table 4 summaries the attended noise survey results.

Noise Survey Location		Noise Level
Location 1	Western Boundary	44- 51 dB $L_{Aeq, 5 min}$
Location 2	Central site	48- 49 dB $L_{Aeq, 5 min}$
Location 3	Southern Boundary	50- 52 dB $L_{Aeq, 5 min}$

Table 4: Attended Noise Survey Results, 27 October 2015

5.0 NOISE IMPACT ASSESSMENT

Noise Levels in External Amenity Spaces

- 5.1 The noise surveys indicate that the general noise level on the (undeveloped) site does not exceed around 56 dB $L_{Aeq, 16 \text{ hour}}$ during the day. There is potential for a degree of noise impact to occur in the proposed rear gardens that back on to the Travis Perkins site and it is therefore recommended that an acoustic barrier fence is installed along the site southern boundary with Travis Perkins. This should be 2 m in height with a minimum surface density of 10 kg/m². This will reduce the noise level from activity within the Travis Perkins yard by around 12 dBA. An indicative daytime noise impact assessment has been carried out in accordance with the methodology of BS 4142 and this is shown in Table 5 below.

Representative background noise level	37 dB $L_{A90, 1 \text{ hour}}$
Specific Source Noise Level	42 dB $L_{Aeq, 1 \text{ hour}}$
Rating Noise Level	42 dB $L_{Aeq, 1 \text{ hour}}$
Difference between rating and background noise level	+ 5 dBA

Table 5: Indicative Noise Impact Assessment, Rear Gardens of Properties backing on to Travis Perkins' Yard.

- 5.2 The assessment indicates that the noise impact from activity within the Travis Perkin yard may be 'adverse, depending on the context' (as defined within BS 4142). In planning terms, however, this will place the impact in the region between NOAEL and LOAEL (with reference to the Planning Practice Guidance)- meaning that the impact may cause small changes in behaviour but is acceptable providing it is mitigated to a maximum. In this case the provision of the acoustic barrier fence is considered to provide the maximum level of mitigation.
- 5.3 It is worth noting that the daytime ambient noise level in all private gardens will be below 55 dB $L_{Aeq, 16 \text{ hour}}$ and below 50 dB $L_{Aed, 16 \text{ hour}}$ in many gardens (regarded by the World Health Organisation as the onset of significant and moderate community annoyance respectively).

Internal Noise Levels

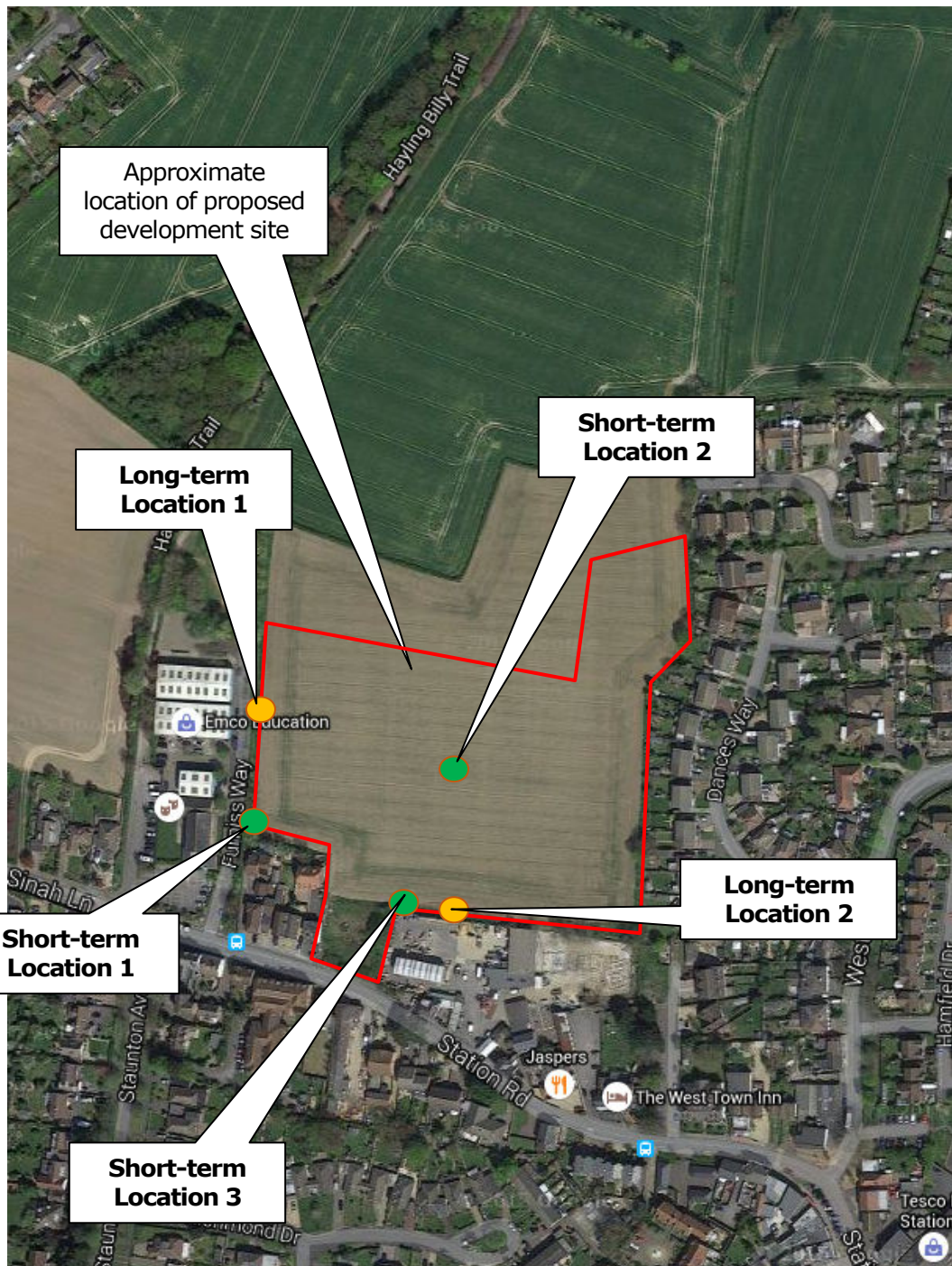
- 5.4 It is evident that it will be possible to engineer all dwellings to ensure that noise levels inside do not exceed 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ / 45 dB $L_{Amax,f}$ at night (for regular events only). This will be feasible in some properties when windows are open for ventilation purposes, however, some will require windows to be closed with alternative means of ventilation specified to facilitate this.
- 5.5 Calculations indicate that standard thermal double-glazing (comprising 4 mm glass, 16 mm airgap, 4 mm glass) will suffice throughout all of the proposed properties. Where it is necessary for windows to remain closed the acoustic attenuation provided by a standard trickle vent (elemental weighted level difference of 31 dB $D_{ne,w}$ or more) will suffice.

Noise Impact of Proposed B1 Commercial Units

- 5.6 The background noise survey results at the western site boundary have been used to determine operational noise limits from the proposed commercial units. It is not possible to undertake a more detail assessment of the impact as the precise likely nature and use of each unit is not known. Noise limits have been derived on the basis that noise levels should not exceed the prevailing background noise levels during the day and should ensure a noise level internally at the nearest residential property no greater than 20 dB $L_{Aeq, 15 \text{ min}}$ at night when windows are open. The following limits are recommended:
- Daytime (07:00- 23:00 hours): 31 dB $L_{Aeq, 1 \text{ hour}}$
 - Night-time (23:00- 07:00 hours): 30 dB $L_{Aeq, 15 \text{ min}}$
- 5.7 BDW Southampton should be aware that it is likely that specialist acoustic design input will be required to the buildings/ building services plant in order to comply with these noise limits.

6.0 CONCLUSIONS

- 6.1 24 Acoustics Ltd has been retained by Barratt David Wilson Homes Southampton to assess the impact of noise on the residential development site at Station Road, Hayling Island.
- 6.2 This report presents the results of the assessment and indicates that an acoustic barrier fence should be constructed at the site boundary with Travis Perkins. The assessment also indicates that internal noise levels in all properties will be within acceptable limits at all times and has recommended operational noise limits for the proposed commercial units.
- 6.3 The assessment has established that noise levels in private gardens are unlikely to exceed the (aspirational) target noise level suggested by the World Health Organisation of 55 dB $L_{Aeq,16 \text{ hour}}$ during the day and on this basis is considered acceptable. Acoustic specifications for glazing systems and alternative means of ventilation have been provided to ensure that internal noise levels of 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ at night are not exceeded.
- 6.4 On the above basis it has been comprehensively demonstrated that a satisfactory acoustic environment may be achieved within the proposed properties and therefore there is considered to be no reason, on noise grounds, why full planning permission should not be granted.



Project: Station Road, Hayling Island	Title: Approximate Site Location and noise survey locations		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: A	
Date: October 2015	Drawn By: RP	Job No: R5989-1	



Project: Station Road, Hayling Island	Title: Site Masterplan		 24Acoustics
DWG No: Figure 2	Scale: N.T.S.	Rev: A	
Date: October 2015	Drawn By: RP	Job No: R5989-1	

APPENDIX A – Acoustic Terminology

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

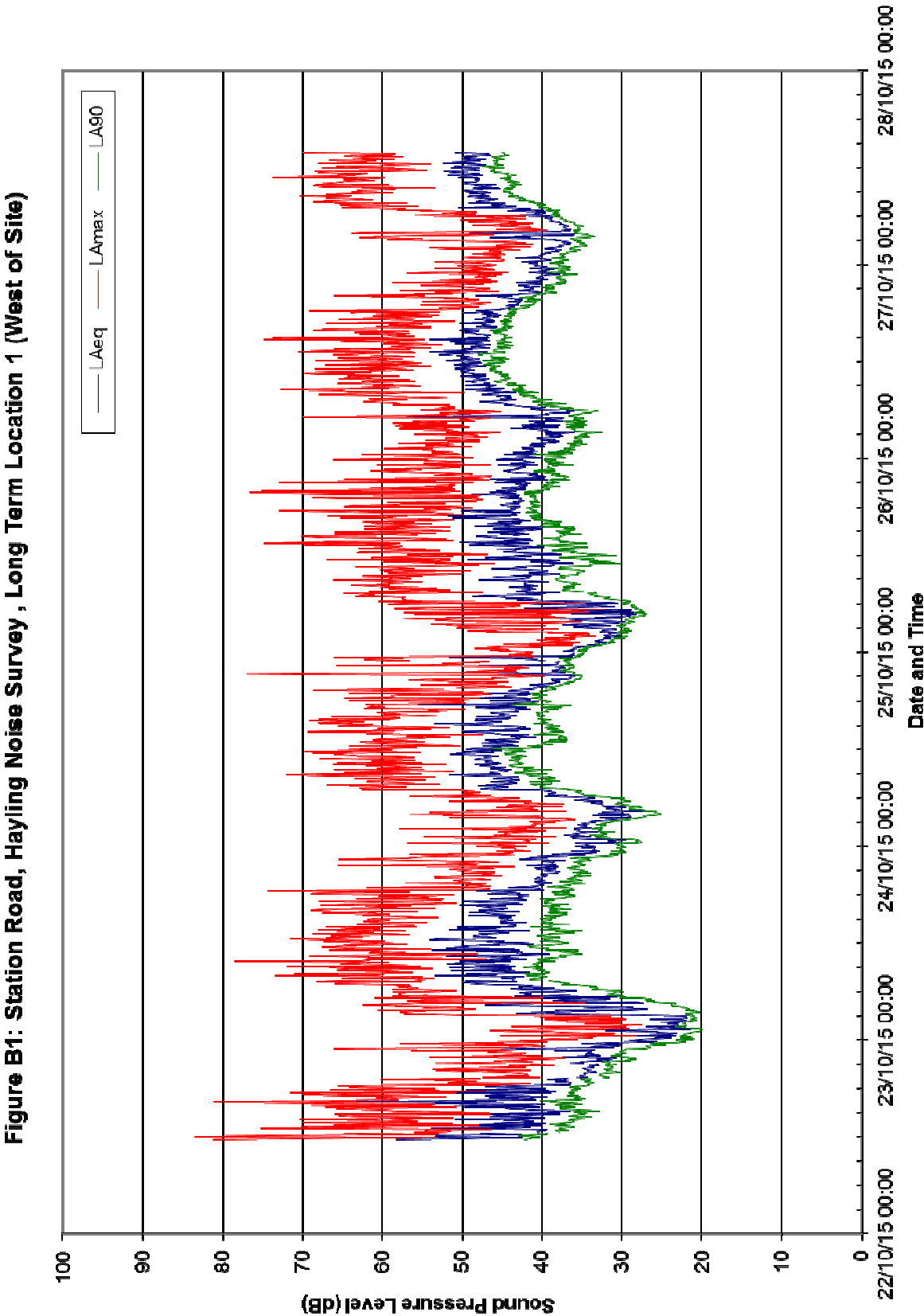
iii) The L_{A10} noise level

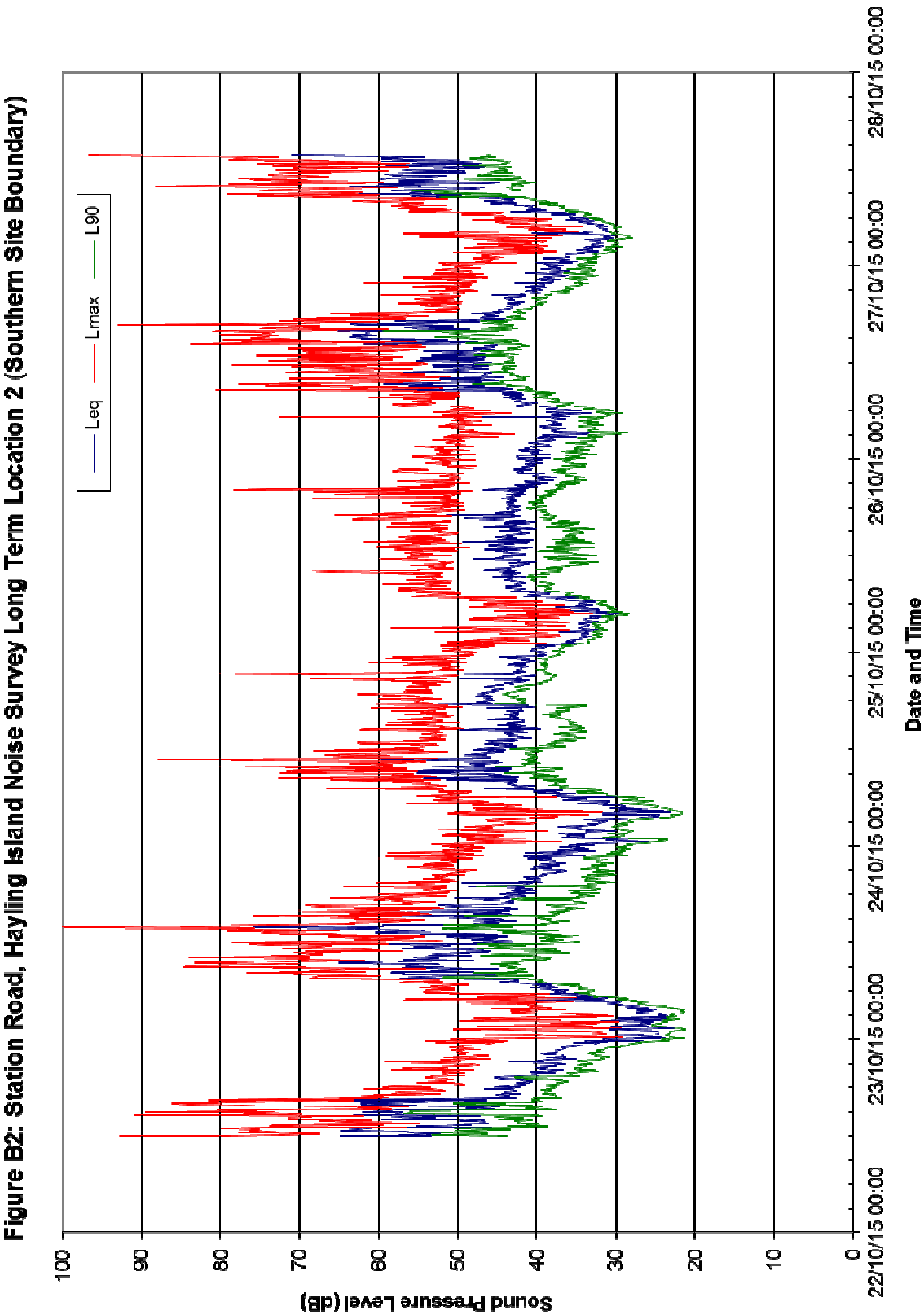
This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: Noise Survey Results





Time	Sound Pressure Level, dB											
	Overall			Octave Band $L_{eq, 5 \text{ min}}$ Sound Pressure Level								
	$L_{Aeq, 5 \text{ min}}$	$L_{A90, 5 \text{ min}}$	$L_{Amax, f}$	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Short term Location 1												
10:35	50	45	60	65	59	56	51	46	43	40	37	34
10:43	49	46	58	61	56	51	45	45	43	40	39	37
10:49	47	45	53	61	58	50	43	43	42	38	37	34
10:54	47	44	61	59	61	51	45	43	43	38	36	32
11:01	49	45	65	60	58	51	43	44	44	40	39	37
11:11	51	46	65	59	59	58	53	49	46	40	36	33
Short term Location 2												
11:25	49	46	58	66	61	53	45	45	43	41	40	38
11:31	48	46	59	64	60	52	42	44	43	40	37	34
11:37	49	46	60	65	61	58	48	45	43	41	37	34
11:43	49	47	70	63	58	53	45	45	44	42	39	35
11:49	49	46	64	63	59	50	41	44	44	42	39	35
11:56	49	46	62	62	58	53	47	44	44	42	38	34
Short Term Location 3												
12:07	52	46	82	63	60	54	45	45	47	42	37	33
12:13	51	45	71	65	63	55	47	46	46	43	39	34
12:18	51	48	61	65	63	56	49	45	47	43	37	34
12:26	50	45	63	61	61	53	43	44	47	42	36	30
12:31	50	47	63	63	63	54	44	44	46	42	37	31
12:38	51	46	70	66	65	55	44	45	47	43	37	30

Table B1: Attended Noise Survey Results, 27 October 2015