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**PROPOSED RESIDENTIAL DEVELOPMENT
LAND NORTH OF HAVANT ROAD, BEDHAMPTON**

NOISE IMPACT ASSESSMENT

Technical Report: R4960-1 Rev 3

Date: 28th February 2014

For: Barratt David Wilson Homes
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24 Acoustics Document Control Sheet

Project Title: Proposed Residential Development, Land north of Havant Road,
Bedhampton

Noise Impact Assessment

Report Ref: R4960-1 Rev 3

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EXECUTIVE SUMMARY

24 Acoustics Ltd has been retained by Barratt David Wilson Homes (BDW) to undertake a noise impact assessment at land north of Havant Road, Bedhampton. It is intended to apply for planning permission to redevelop the site for residential use which, if planning consent is granted, will comprise the 47 residential dwellings.

The site is located north of Havant Road, Bedhampton and is bounded by existing residential properties to the north and east. The proposed development site is subject to noise from road traffic using Havant Road to the south and the A3 to the east.

Ambient noise surveys and subjective observations have been undertaken to determine noise impact from road noise at the proposed development. The noise assessment has determined mitigation measures to provide suitable internal noise levels for the proposed properties in accordance with criteria given in BS 8233.

An acoustic model has been created to assess the impact of road noise from new access roads at the proposed development site. The assessment has considered noise from the access roads during the busiest hour and compared results against the prevailing ambient noise level and has indicated that whilst noise from the use of the site access roads may be audible there will be no net increase in the ambient noise level in the rear gardens of the nearest existing residential properties.

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1.0 INTRODUCTION & SCOPE OF ASSESSMENT

- 1.1 24 Acoustics Ltd has been retained by Barratt David Wilson Homes (BDW) to undertake a noise impact assessment at land north of Havant Road, Bedhampton. It is intended to apply for planning permission to redevelop the site for residential use which, if planning consent is granted, will comprise 47 residential dwellings.
- 1.2 This report has assessed the impact of noise from existing sources of ambient noise around the site which are dominated by road traffic using both Havant Road and the A3. Assessment has also been undertaken relating to the impact of noise of road traffic associated with the new access roads which will be constructed as part of the scheme.
- 1.3 All noise levels in this report are quoted in dB relative to 20 μ Pa.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

- 2.1 The site is located north of Havant Road in Bedhampton. The existing site comprises arable farm land and a fenced area to the north currently used for grazing horses. The site is bounded by Havant Road to the south and existing residential properties to the north and east. Additional existing residential properties are located to the west of the proposed site separated by arable farmland. The A3 dual carriageway is located to the east at a distance of approximately 220 m from the site. The site is subject to noise from road traffic using Havant Road and the A3.
- 2.2 Figure 1 provides an aerial image of the site and surroundings.
- 2.3 Barratt David Wilson Homes proposes to develop the site for residential use. It is proposed to construct 47 dwellings on the site, providing a mixture of private and affordable houses. A plan showing the proposed development scheme is shown in Figure 2.

3.0 STANDARDS AND GUIDANCE

3.1 The National Planning Policy Framework (NPPF) [Reference 1] was published by the Department for Communities and Local Government in March 2012, and is now effective. This document supersedes PPG 24 [Reference 2] which previously provided 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.

3.2 The NPPF refers to the Noise Policy Statement for England (NPSE) [Reference 3] 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 August 2013 the draft National Planning Practice Guidance (NPPG) was published [Reference 4]. This is 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 the proposed development. The NPPG expands 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 Outcome	Increasing Effect Level	Action
Not enforceable	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, closing windows for some of the time because of the noise. Potential for non-awakening 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. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. 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 ability 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: Draft NPPG Noise Exposure Hierarchy

- 3.5 In general terms it is considered that a noise impact with an effects level which is lower than SOAEL is acceptable (providing the effect is mitigated to a minimum). There is currently, however, a major discontinuity between the above guidance and objective technical criteria for use in planning noise impact assessments. For this site it is considered that the appropriate (technical and objective) standards for use in assessing the noise impact are those of British Standard 8233 [Reference 5] and guidance from the World Health Organisation [Reference 6]. These are described below.
- 3.6 British Standard 8233 [Reference 5] defines a range of ambient noise levels for a number of design criteria for 'good' or 'reasonable' acoustic conditions inside certain habitable rooms. Table 2 shows a summary of the levels recommended in BS 8233 for used for resting and sleeping.

Criterion	Typical Situation	Design Range, dB $L_{Aeq, T}$	
		Good	Reasonable
Reasonable resting/ sleeping conditions	Living rooms	30	40
	Bedrooms	30	35

Table 2: Indoor Ambient Noise Levels as Recommended in BS 8233

- 3.7 BS 8233 also states that for 'reasonable' acoustic conditions in bedrooms noise levels should not regularly exceed 45 dB $L_{Amax, f}$.
- 3.8 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 $L_{Aeq, 8hr}$ or regularly exceeding 45 dB $L_{Amax, f}$ for 'a good night's sleep'.
- 3.9 The 2000 WHO document also states that *'To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terrace and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady continuous noise'*. It is relevant to note that the WHO values are aspirational and the WHO has no force in current planning legislation. This is particularly evident from recent planning appeal history and on this basis it is considered that higher noise levels in external amenity spaces are common and widely accepted.

- 3.10 24 Acoustics commonly assesses noise from road traffic using site service roads by comparing the predicted (daytime) $L_{Aeq, 1hr}$ with the prevailing ambient $L_{Aeq, 1hr}$ and calculating the net increase in noise level at (existing residential receptor properties) using standard acoustical theory. This approach has been used at the proposed Bedhampton site to quantify noise impact in the rear gardens of Portsdown Hill Road (which back on to the site).

Summary

- 3.11 Based upon the review of standards described above, noise has been assessed in accordance with the following approach:
- BS 8233 for interior noise levels (of 35 dB $L_{Aeq, 16hr}$ in living rooms and between 30 dB $L_{Aeq, 8hr}$ in bedrooms, and not to exceed and 45 dB $L_{Amax, f}$ in bedrooms at night).
 - Aspirational target noise level of 55 dB $L_{Aeq, 16hr}$ during the day in private gardens with justification provided where this is not possible;
 - Comparison of the increase in daytime $L_{Aeq, 1 hour}$ noise level in the rear gardens of the properties in Portsdown Hill to quantify the change in noise level as a result of vehicular activity on the proposed new site access roads.

4.0 NOISE SURVEYS

Methodology

- 4.1 Environmental noise surveys were undertaken on the undeveloped site between 26th and 28th November 2013 in order to establish existing ambient noise levels across the site. Unattended noise measurements were undertaken at two locations in terms of the overall A-weighted L_{eq} , L_{90} and $L_{Amax, f}$ sound pressure levels and attended measurements were undertaken at other locations on the site in terms of the overall A-weighted and linear octave band L_{eq} and $L_{max, f}$ sound pressure levels. The noise measurement locations are shown in Figure 1.
- 4.2 Ambient noise levels were measured using the following equipment:

Rion (Type 1) precision grade sound level meter (x2)	Type NL31;
Rion (Type 1) precision grade sound level meter	Type NA27;
Brüel and Kjær acoustic calibrator	Type 4231.

- 4.3 The instrumentation at each location was mounted on a tripod and equipped with an environmental microphone. Measurements were made at 1.5 metres above ground level. The calibration of the instrumentation was checked before and after the tests and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards.
- 4.4 Measurements were undertaken at Locations 1 and 2 (as shown in Figure 1) between 26th and 28th November. Location 1 is on the proposed site boundary with Havant Road. Location 2 is representative of ambient noise levels at the site boundary north of the site adjacent to existing residential properties. Attended measurements were undertaken at Locations 3 and 4 (also identified in Figure 1) during 26th November.
- 4.5 Short periods of rain were experienced during 27th November. The noise data corresponding to this has been excluded from the analysis. The weather conditions during the attended surveys undertaken on 26th November were dry and calm (with wind speeds below 5 m/s).

Noise Survey Results

- 4.6 The noise survey results for the measurements at Locations 1 and 2 are shown graphically Appendix B and are summarised in Tables 3 and 4 below.

Date	Period and Sound Pressure Level, dB		
	Daytime	Night-time	
	$L_{Aeq, 16 \text{ hr}}$	$L_{Aeq, 8 \text{ hr}}$	Typical $L_{Amax,f}^1$
Tuesday 26/11/2013	61.1	54.8	72.4
Wednesday 27/11/2013	62.2	54.6	72.4
Thursday 28/11/2013	62.5	N/A	N/A

Table 3: Summary of Noise Survey Results at Location 1

¹ 24 Acoustics define the typical $L_{Amax,f}$ as the 10th highest value.

Date	Period and Sound Pressure Level, dB		
	Daytime	Night-time	
	$L_{Aeq, 16 \text{ hr}}$	$L_{Aeq, 8 \text{ hr}}$	Typical $L_{Amax,f}^1$
Tuesday 26/11/2013	51.2	48.6	58.7
Wednesday 27/11/2013	56.2	46.3	55.2
Thursday 28/11/2013	51.4	N/A	N/A

Table 4: Summary of Noise Survey Results at Location 2

- 4.7 The noise survey results for the measurements taken at Locations 3-4 are summarised in Table 5 below.

Measurement Survey Location	Noise Level, $L_{Aeq,5 \text{ min}}$	
	Range	Average
Location 3	54 - 56	56
Location 4	49 - 51	50

Table 5: Summary of Attended Noise Survey Results

5.0 NOISE IMPACT ASSESSMENT

Noise Environment at External Amenity Areas

- 5.1 The noise surveys and calculations indicate that daytime ambient noise levels across the site will vary between 50 and 63 dB $L_{Aeq, 16 \text{ hour}}$. In practice, however, the properties will be constructed in areas which are subject to noise levels typically not exceed 55 dB $L_{Aeq, 1 \text{ hour}}$. It is anticipated that in private garden areas noise levels are likely to vary between 50 and 55 dB $L_{Aeq, 16 \text{ hour}}$. This falls below the WHO aspirational target noise level of 55 dB $L_{Aeq, 16 \text{ hour}}$ and is considered acceptable.

Internal Noise Environment

- 5.2 When windows are open the internal ambient noise levels which can be expected inside most of the properties will at times be greater than those recommended by BS 8233 and the World Health Organisation. It will be necessary to provide residents with the option to occupy their properties with open windows (in which case they will chose to tolerate a greater level of ambient noise) or to occupy with windows closed (to achieve satisfactory internal noise levels) and with background ventilation provided by alternative means of ventilation (such as a window mounted trickle vent or acoustically attenuated passive wall vent).
- 5.3 Based on the proposed site layout and when windows are closed, standard thermal glazing (capable of achieving a minimum performance of 31 dB R_w) will provide suitable internal noise levels for all habitable rooms in properties at the site when combined with standard trickle vents.

Noise Impact from Proposed Site Service Roads

- 5.4 An acoustic noise model has been created to determine the noise level generated from vehicles using the proposed access roads during the peak hour at the rear of the nearest existing residential properties in Portsdown Hill Road . The model has used the calculation methodology of CRTN (Calculation of Road Traffic Noise) [Reference 8] and was created using Immi 2011 noise mapping software.
- 5.5 Calculations assume 1.5 vehicle movements per property (travelling at 30 mph) during a 1 hour period along the access roads at the proposed site. This is considered a worst case scenario when vehicle movements are typically at a maximum.
- 5.6 Receptor locations have been selected to identify the nearest existing residential properties to the proposed site. The receptor locations shown in Figure 3 and also described below.
- Receptor 1: 43 Portsdown Hill Road
 - Receptor 2: 35 Portsdown Hill Road
 - Receptor 3: 6 Spinnaker View
 - Receptor 4: 4 Spinnaker View
 - Receptor 5: 2 Spinnaker View
 - Receptor 6: 70 Bedhampton Hill Road

5.7 The results of the assessment and calculations are provided in Table 6 below.

	Noise Level, dB $L_{Aeq, 1 \text{ hr}}$			
	Typical Prevailing Ambient	Site Access Road	Total Noise Level	Net Increase
1: 43 Portsdown Hill Road	51	31	51	0
2: 35 Portsdown Hill Road	51	32	51	0
3: 6 Spinnaker View	51	35	51	0
4: 4 Spinnaker View	51	32	51	0
5: 2 Spinnaker View	51	28	51	0
6. 70 Bedhampton Hill Road	51	32	51	0

Table 6: Site Service Road Noise Impact Assessment

5.8 The calculations indicate that noise from the use of the site access roads, whilst likely to be audible at times, will not increase the $L_{Aeq, 1 \text{ hour}}$ noise level in the rear gardens of the nearest residential properties.

5.9 On this basis it is considered that noise from the proposed service road at the nearest existing properties will be acceptable.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has been retained by Barratt David Wilson Homes (BDW) to undertake a noise impact assessment at land north of Havant Road, Bedhampton. It is intended to apply for planning permission to redevelop the site for residential use which, if planning consent is granted, will comprise the 47 residential dwellings.

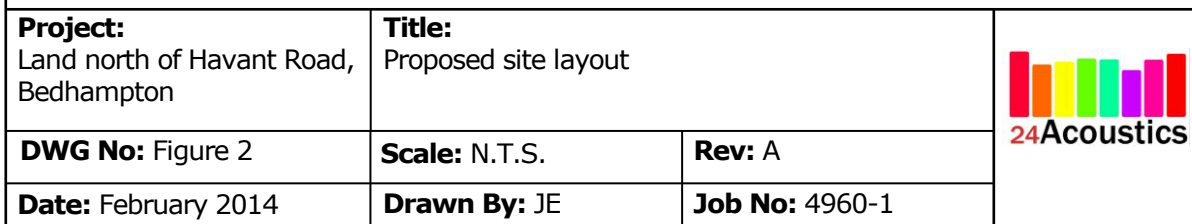
6.2 The site is located north of Havant Road, Bedhampton and is bounded by existing residential properties to the north and east. The proposed development site is subject to noise from road traffic using Havant Road to the south and the A3 to the east.

- 6.3 Ambient noise surveys and subjective observations have been undertaken to determine noise impact from road noise at the proposed development. The noise assessment has determined mitigation measures to provide suitable internal noise levels for the proposed properties in accordance with criteria given in BS 8233.
- 6.4 An acoustic model has been created to assess the impact of road noise from new access roads at the proposed development site. The assessment has considered noise from the access roads during the busiest hour and compared results against the prevailing ambient noise level and has indicated that whilst noise from the use of the site access roads may be audible there will be no net increase in the ambient noise level in the rear gardens of the nearest existing residential properties.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2012.
2. Department of the Environment. Planning Policy Guidance (PPG) 24, Planning and Noise, 1994.
3. DEFRA, Noise Policy Statement for England, 2010.
4. Department for Communities and Local Government, Draft National Planning Practice Guidance, August 2013.
5. British Standards Institution. British Standard 8233: Sound Insulation and Noise Reduction for Buildings, 1999.
6. World Health Organisation. Guidelines for Community Noise, 2000.
7. Department of Transport. Calculation of Road Traffic Noise, 1988.







Project: Land north of Havant Road, Bedhampton	Title: Receptor Locations		
DWG No: Figure 3	Scale: N.T.S.	Rev: A	
Date: January 2014	Drawn By: JE	Job No: 4960-1	

APPENDIX A: NOISE UNITS

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 dB(A) weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB(A). The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB(A) 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 [1] 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.

APPENDIX B: Noise Survey Results

Figure B1: Location 1, Environmental Noise Survey - Land north of Havant Road, Bedhampton
26th to 28th November 2013

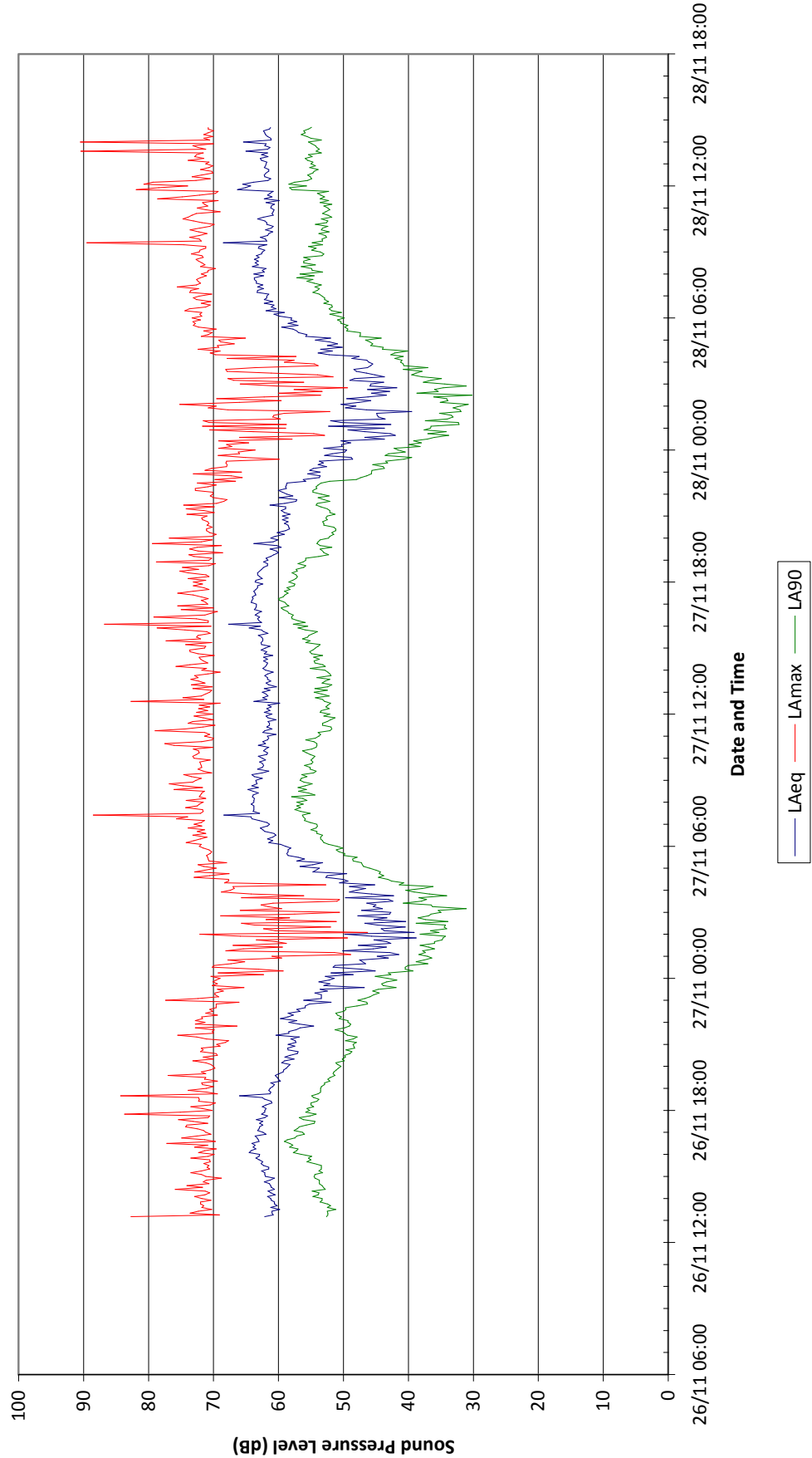


Figure B2: Location 2, Environmental Noise Survey - Land north of Havant Road, Bedhampton
26th to 28th November 2013

