

Head Office:

Westgate House
39-41 Romsey Road
Winchester
Hampshire
SO22 5BE

Tel: 01962 872130
mail@alansaunders.com

Telford Office:

7 The Dale
Church Aston
Newport
Shropshire
TF10 9JY

Tel: 01952 457407
jhealey@alansaunders.com

London Office:

16 Lower Marsh
London
SE1 7RJ

Tel: 0203 479 7867
london@alansaunders.com

Exeter Office:

1 Emperor Way
Exeter
Devon
EX1 3QS

Tel: 01392 342978
exeter@alansaunders.com

www.alansaunders.com

REPORT AS7013.130404.NIA1.1

HAVANT RETAIL PARK BEDHAMPTON

NOISE EXPOSURE ASSESSMENT REPORT

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Registered in England Company No.
3758093

Registered Office:
Avebury House, St Peter St, Winchester

Alan Saunders Associates is the
trading name of Alan Saunders
Associates Ltd.

Directors:
Alan Saunders
BSc (Hons) CSci CPhys FIOA
Ed Clarke
BEng (Hons) MIOA

**MEMBERS OF THE ASSOCIATION
OF NOISE CONSULTANTS**

**Linden Homes
14 Bartram Road
Totton
Southampton
SO40 9PP**



CONTENTS

1.	INTRODUCTION	I
2.	DESCRIPTION OF SITE	I
3.	SURVEY PROCEDURES & EQUIPMENT	I
4.	RESULTS	2
5.	SITE NOISE EXPOSURE ASSESSMENT	4
6.	INTERNAL AND EXTERNAL NOISE CRITERIA	5
6.1	<i>BS8233:1999 Sound insulation and noise reduction for buildings</i>	5
6.2	<i>World Health Organisation Guidelines for Community Noise (1999)</i>	6
7.	ASSESSMENT	6
8.	CONCLUSIONS	7

List of Attachments

AS7013/SP1	Indicative Site Plan
AS7013/TH1-TH16	Environmental Noise Time Histories
AS7013/TH17	Composite Daytime Time History
AS7013/NC1-3	Noise Contours
AS7013/GS1	Glazing Specification Document
Appendix A	Acoustic Terminology

1. INTRODUCTION

A planning application is being submitted for a residential development scheme on the Havant Retail Park site, Bedhampton, currently occupied by Homebase and AMF bowling.

The two hectare site lies in a chalk pit adjacent to the A3(M) motorway and the southbound off-slip to the 'Rusty Cutter' roundabout.

Alan Saunders Associates has been commissioned by Linden Homes to undertake an assessment of noise exposure levels on site in relation to the proposed residential development, and identify any noise mitigation requirements to be incorporated within this planning application such that it might be considered suitable to Havant Borough Council.

Pre-application discussions with Havant Borough Council's technical officers have assisted in establishing a suitable method for approaching this assessment within the National Planning Policy Framework (NPPF) and with reference to the Noise Policy Statement for England (NPSE).

Reference has also been made to specific concerns raised by local councillors and residents through direct community engagement and through the Development Consultation Forum (DCF).

2. DESCRIPTION OF SITE

The site comprises a chalk pit which is currently used as a retail park with two large buildings and a large car parking area. It lies to the east of, and roughly level with, the A3(M), both it and the motorway being cut into the chalk, whereas Portsdown Hill Road, at the original land level overlooks the site. Refer to the attached Site Plan AS7013/SP1.

3. SURVEY PROCEDURES & EQUIPMENT

Several surveys of the noise levels to which the site is exposed have been carried out, quantifying current road traffic noise exposure and showing the stability of these data over time.

Following pre-application discussions with Havant's Environmental Health department, a methodology was established for using the existence of the large buildings currently occupying the site to determine both direct noise exposure levels (to the south-west of

the retail buildings) and those significantly screened from motorway noise by these buildings, within the car park area.

The attached site plan AS7013/SP1 shows the measurement positions used during the course of the surveys.

The first survey period was from 1350 hours on Monday 12th November to 1400 hours on Friday 16th November 2012. The weather during the survey was mainly dry with short periods of rainfall between 1400 and 1600 hours on Monday 12th November and a shorter period in the early hours of Tuesday 13th November 2012.

The second survey period was from 1120 hours on Thursday 14th February to 1730 hours on Wednesday 20th February 2013. The weather during the survey was mainly dry with short periods of rainfall between around 0900 and 1100 hours on both Friday 15th February and Sunday 17th February 2013.

The third survey period was from 1205 hours on Thursday 21st February to 0820 hours on Tuesday 26th February 2013. The weather during the survey was dry.

Wind speeds were within acceptable limits and overall the conditions were suitable for the measurement of environmental noise throughout all three survey periods.

Measurements were made in general accordance with ISO 1996 2:2007 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels*.

The calibration of the equipment was verified before and after use. No calibration drift was observed.

Descriptions and explanations of the acoustic parameters used in this report are shown in Appendix A.

4. RESULTS

Figures AS7013/TH1-TH16 show the L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} sound pressure levels as time histories at the fixed measurement position A.

A composite time history Figure AS7013/TH17 shows the diurnal traces of all noise monitoring data, demonstrating the day to day consistency of the site noise exposure. A slightly different trace profile can be seen in the weekend monitoring results (orange) as opposed to the midweek data, especially in the less pronounced morning peak at the weekend.

Considering the extended survey period, which included various weather conditions as described in Section 3, the consistency of these data sets is striking.

For comparison, the average daytime and night-time values for each 24 hour period are summarised in Table 4.1.

Date	Day L _{Aeq,16hrs}	Night L _{Aeq,8hrs}
Monday 12/11/2012	74 dB (1350-2300)	67 dB
Tuesday 13/11/2012	75 dB	66 dB
Wednesday 15/11/2012	75 dB	65 dB
Thursday 16/11/2012	75 dB	66 dB
Friday 17/11/2012	76 dB (0700-1400)	-
Thursday 14/02/2013	74 dB (1120-2300)	66 dB
Friday 15/02/2013	75 dB	66 dB
Saturday 16/02/2013	73 dB	65 dB
Sunday 17/02/2013	72 dB	65 dB
Monday 18/02/2013	73 dB	66 dB
Tuesday 19/02/2013	74 dB	66 dB
Wednesday 20/02/2013	74 dB (0700-1730)	-
Thursday 21/02/2013	72 dB (1205-2300)	65 dB
Friday 22/02/2013	73 dB	65 dB
Saturday 23/02/2013	73 dB	65 dB
Sunday 24/02/2013	73 dB	65 dB
Monday 25/02/2013	74 dB	65 dB
Tuesday 26/02/2013	76 dB (0700-0820)	-
Average (partial days excluded)	74 dB	66 dB
Average (rainy days excluded)	74 dB	66 dB

Table 4.1 - Noise level summary longitudinal noise survey

[dB re. 20µPa]

A three dimensional noise map model^[1] has been used to interpolate between simultaneous measurements made around the development site to compile a contour plot which provides a baseline model for the existing scenario.

5. SITE NOISE EXPOSURE ASSESSMENT

The baseline model established from noise survey work includes the screening effect of the retail buildings currently occupying the site. These have been removed from the model to produce a plot showing noise exposure levels across the empty site. For the purposes of this illustration the empty site is modelled as flat with no vegetation.

Finally, the proposed dwellings have been imported into the model and the calculations re-run to show noise exposure across the developed site.

The models have formed part of the site layout design development process, with input from noise map plots informing the evolution of the barrier block design and alignment. A lower level site boundary fence has also been introduced to make up for low level 'drive through' openings in the barrier block, and to limit traffic noise propagation between the barrier block and cliff face. The height of this barrier fence has been optimised (between 2.5 and 3 metres) in relation to the extent that it would make a noticeable improvement to the public realm areas within the development (rather than the drive through roadways themselves).

The fencing should comprise close-boarded timber or similar and be homogenous, continuous and imperforate along the boundary as specified, with a minimum mass per unit area of 10kg/m².

Noise map contour plots are shown in Figures AS7013/NC1-NC3 illustrating the baseline (current), baseline (empty site) and post development noise exposure levels across the site.

¹ Datacoustics CadnaA – EU Harmonised Model

6. INTERNAL AND EXTERNAL NOISE CRITERIA

6.1 BS8233:1999 *Sound insulation and noise reduction for buildings*

The guidance in this document indicates a design range from 'reasonable' to 'good' for noise levels for various activities within residential and commercial buildings. The relevant sections of this standard are shown in the following table:

Criterion	Typical Situations	Design range $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable resting/sleeping conditions	Living Rooms	30	40
	Bedrooms	30	35

Table 6.1 - Excerpt from BS8233: 1999

(dB ref. 20μPa)

A note to this table in the standard also indicates that individual noise events should not normally exceed 45 dB $L_{Amax,fast}$ within bedrooms at night.

Proposed dwellings should be designed to target 'good' noise levels internally whilst ensuring that no rooms would be less than 'reasonable'.

The dwellings would be designed and all elements of the building envelopes specified to ensure that acceptable internal noise levels as shown in Table 6.1 are achieved on that basis.

This will necessitate high performance glazing systems in a number of areas and very high performance glazing for any habitable rooms with a clear line of sight to the motorway².

Where appropriate, to provide for suitable levels of background ventilation while maintaining suitably quiet conditions, alternative means of ventilation will be provided (likely via whole house ventilation / MVHR systems). Noise control measures will also need to be specified to ensure that these systems themselves will be suitably quiet, both in operation and their resistance to external noise intrusion.

It would not be necessary to permanently seal these windows shut, however, as modern operable window seals can achieve the requisite levels of sound insulation while allowing them to be opened for purge ventilation.

At the detailed design stage, spectral noise survey data gathering during the site surveys will be used to specify performance requirements for each glazing zone as a specification against which the glazing systems can be procured.

It is understood that the non-glazed elements of the façade would comprise traditional brick/block construction or cavity brick outer with internal framed system. Performance requirements would be specified at detailed design stage and materials selected in order to achieve compliance with the specification.

Full spectral sound reduction performance values will be provided as per the attached specification document (AS7013/GS1), compliance with which would ensure that reasonable internal conditions are achieved.

6.2 World Health Organisation Guidelines for Community Noise (1999)

The Document provides guideline values for community noise in specific environments. For outdoor living areas, it is stated that:

‘To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB L_{Aeq} . Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.’

In reality, however, few sites are available in England in which these aspirations can be achieved. In the recent Public Inquiry for the adjacent Scratchface Lane site, the Inspector accepted that external amenity in areas where noise levels were around 65dB L_{Aeq} might not be ideal, but are acceptable.

The Havant Retail Park site, however, with the benefit of the barrier block and acoustic fence screening will provide noticeably quieter public realm and amenity areas, tending towards achieving the aspirational WHO guidance levels.

7. ASSESSMENT

The NPPF states that the aim of decision makers should be to:

- i) Avoid noise from giving rise to significant adverse effects on health and quality of life as a result of new development

² It is noted that the internal layouts in the barrier block have been arranged to minimise rooms to which this would apply

ii) Mitigate and reduce to a minimum other adverse effects on health and quality of life arising from noise from new development including through the use of conditions.

In relation to the first point, this is achieved through design of internal noise levels to comply with BS8233, as in section 6.1 above, and external amenity and public realm conditions, as in section 6.2 above.

The second point is less relevant, as residential use is considered a noise sensitive activity as opposed to a noise generator.

The NPSE introduces the concept of a significant observable adverse effect level (SOAEL), but no formal definition of these concept is currently available (DEFRA research is ongoing). In the absence of central guidance, we can conclude from Havant Borough Council's view that the SOAEL has not been reached and from recent local precedents, that the NPSE requirements are also met.

8. CONCLUSIONS

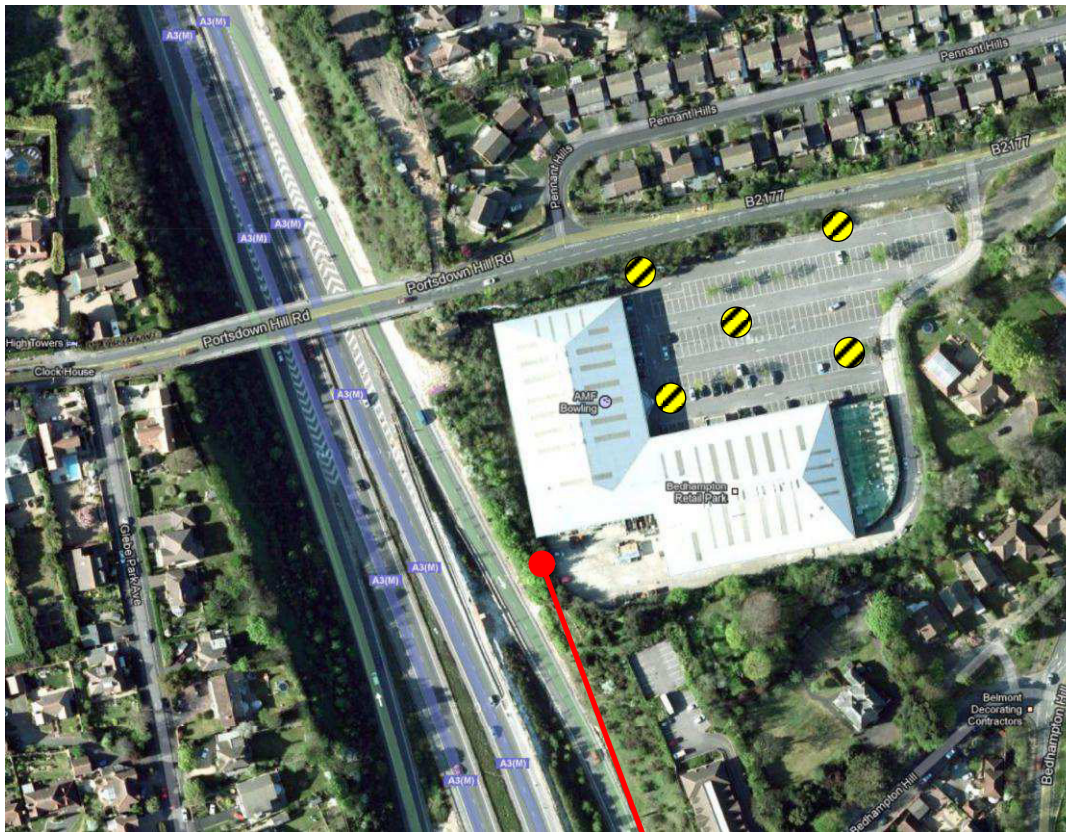
A series of detailed environmental noise surveys have been undertaken at the proposed residential site at Havant Retail Park, and an assessment made of noise exposure of the site both now, and after completion of the proposed residential development.

The assessment includes the consideration of noise mitigation measures which have been included within the outline design development, and as such confirms that no further mitigation is required.

With reference to current planning guidance (NPPF and NPSE), it has been confirmed that the development, as now proposed, is consistent with the stated aims of decision makers.

E H Clarke

ALAN SAUNDERS ASSOCIATES



Manual Noise Monitoring Positions

Automated Noise Monitoring Position



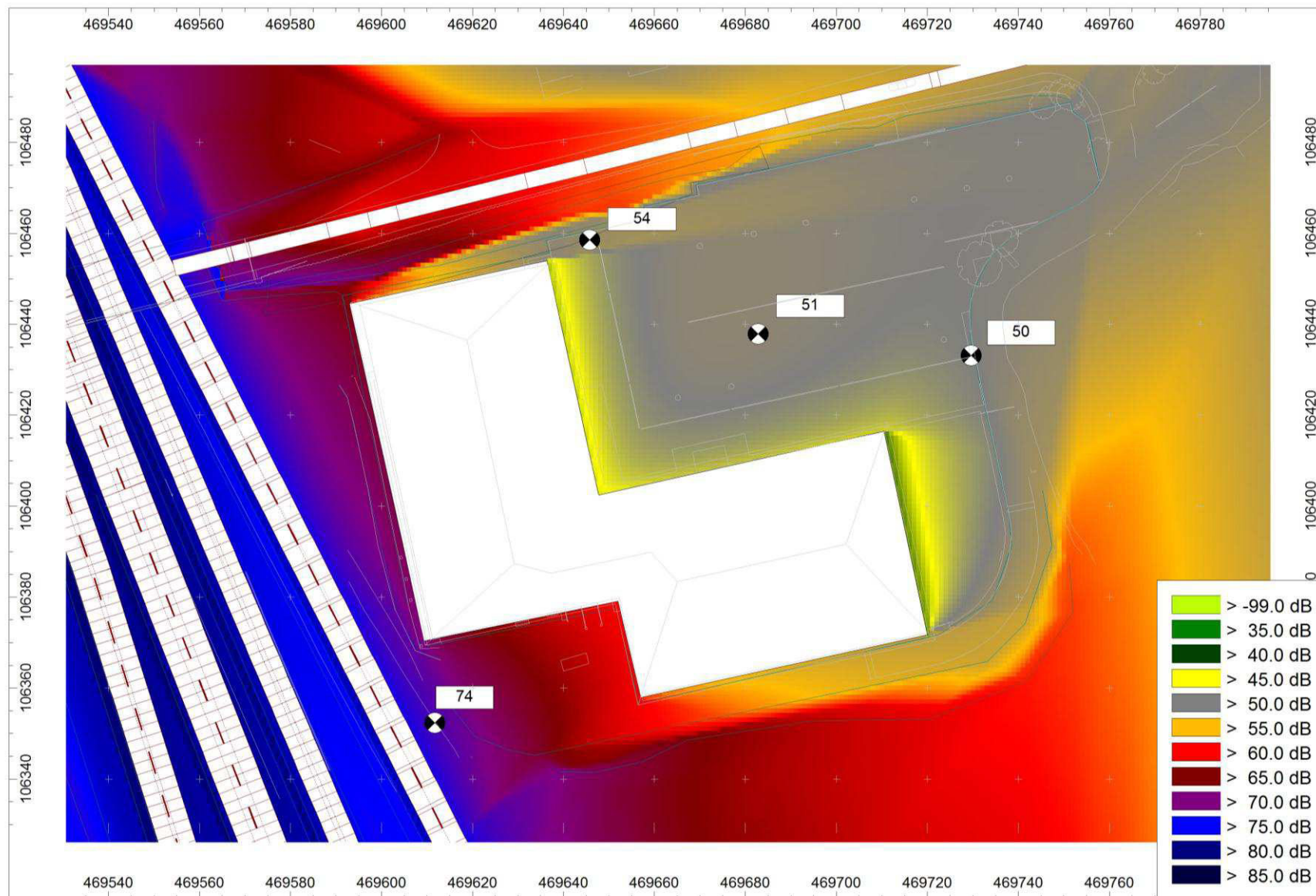
alan saunders associates | acoustics
 mail@alansaunders.com
 www.alansaunders.com
 T+44(0)1962 872130
 F+44(0)1962 872131
 westgate house
 romsey road
 winchester
 SO22 5BE

Project:
 Homebase Site, Bedhampton

Title:
 Indicative Site Plan

Figure:
 AS7013/SP1

Date:
 27/02/2013



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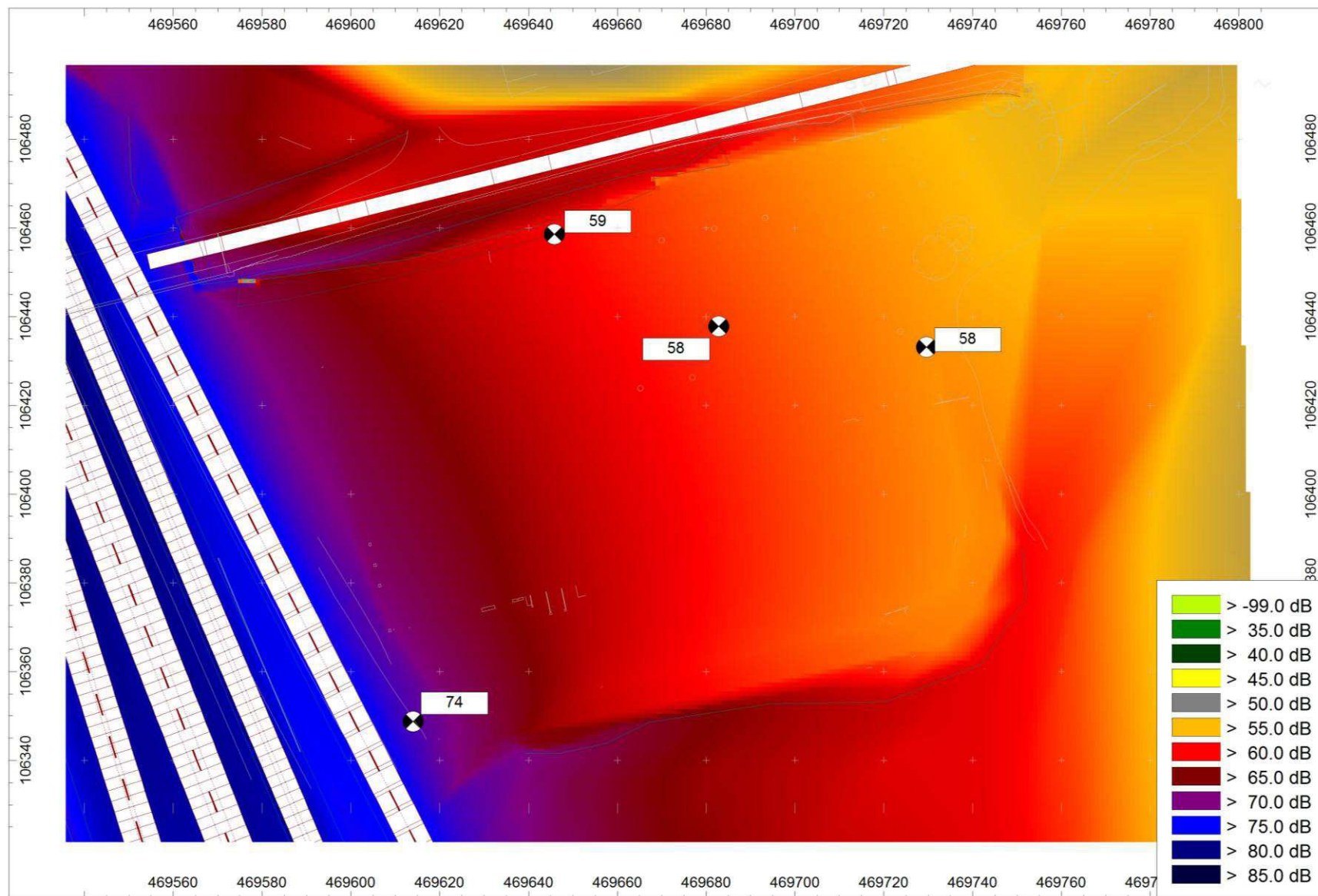
mail@alansaunder.com
www.alansaunder.com
T+44(0)1962 872130
F+44(0)1962 872131
westgate house
romsey road
winchester
SO22 5BE

Project:
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Indicative Site Plan

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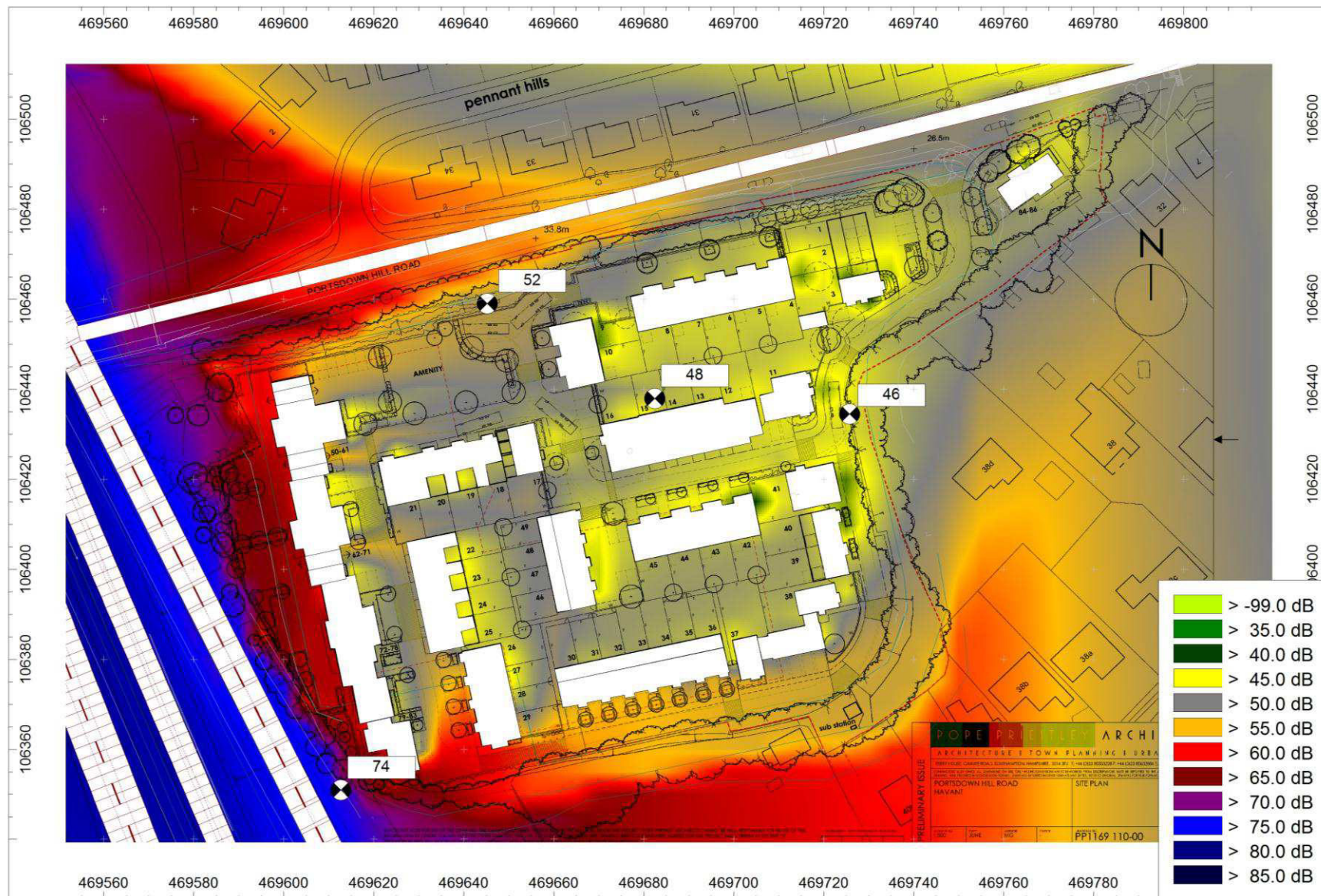
mail@alansaunders.com
www.alansaunders.com
T+44(0)1962 872130
F+44(0)1962 872131
westgate house
romsey road
winchester
SO22 5BE

Project:
Homebase Site, Bedhampton

Title:
Indicative Site Plan

Figure:
AS7013/NC2

Date:
27/02/2013



alan saunders associates | acoustics

mail@alansaunder.com
www.alansaunder.com
T+44(0)1962 872130
F+44(0)1962 872131
westgate house
romsey road
winchester
SO22 5BE

Project:
Homebase Site, Bedhampton

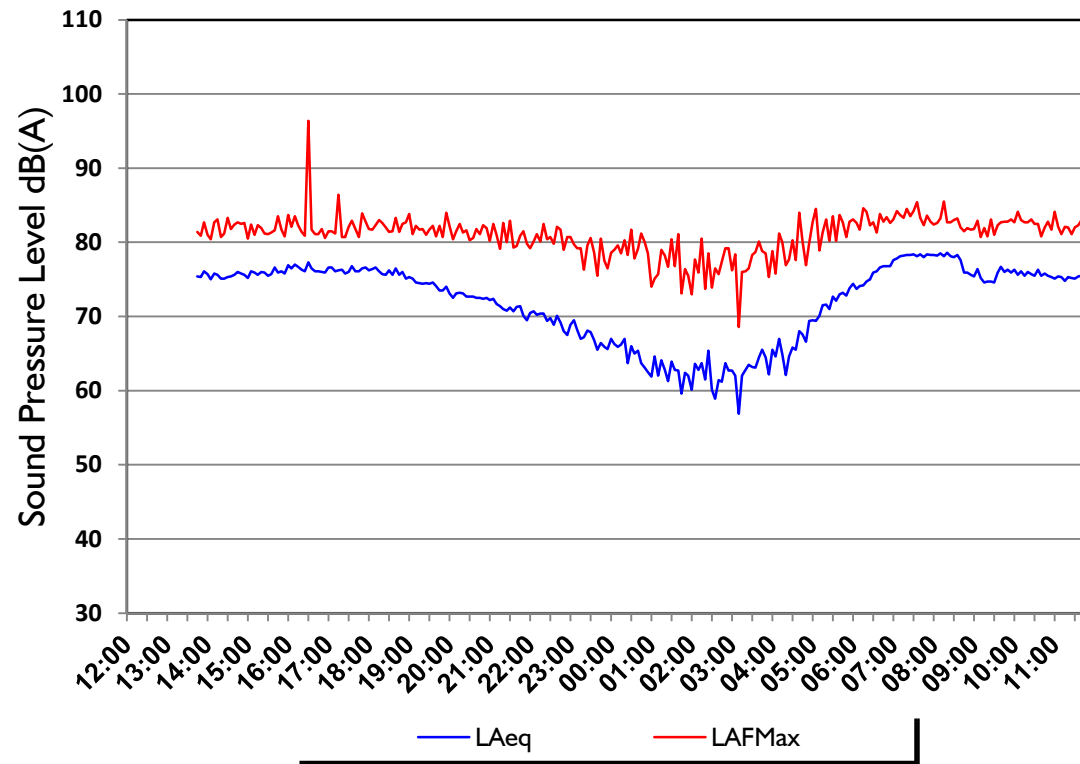
Title:
Indicative Site Plan

Figure:
AS7013/NC3

Date:
27/02/2013

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

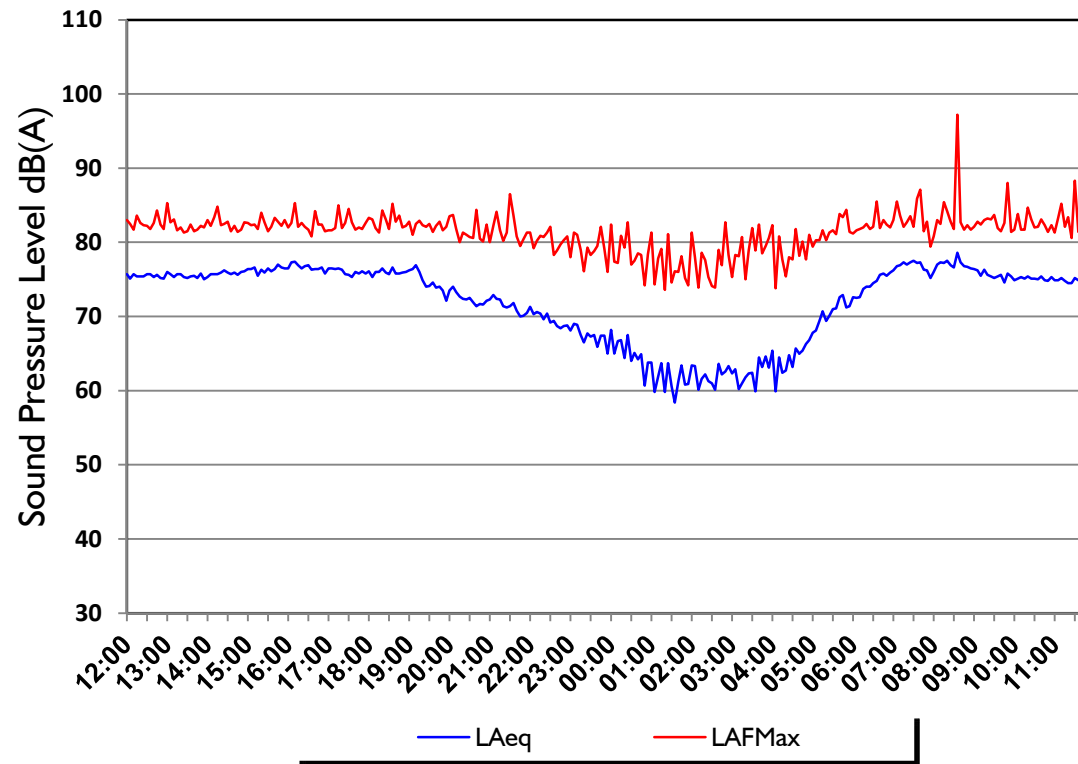


Monday 12 November to Tuesday 13 November

Figure AS7013/TH1

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

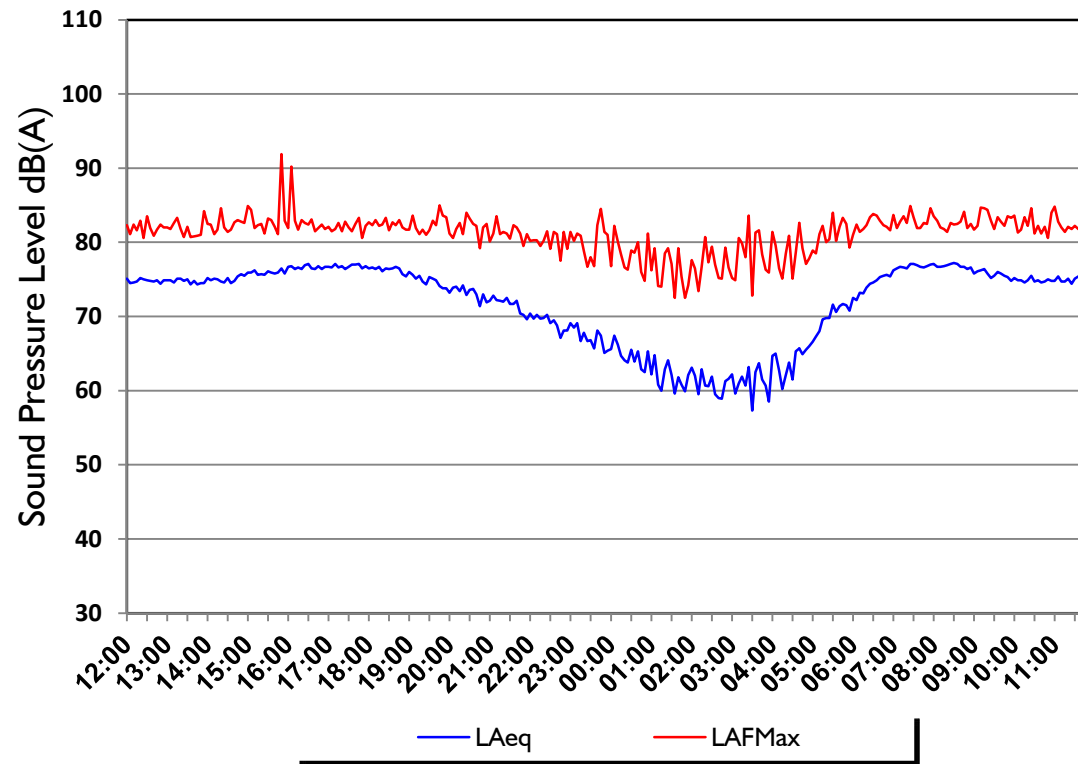


Tuesday 13 November to Wednesday 14 November

Figure AS7013/TH2

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

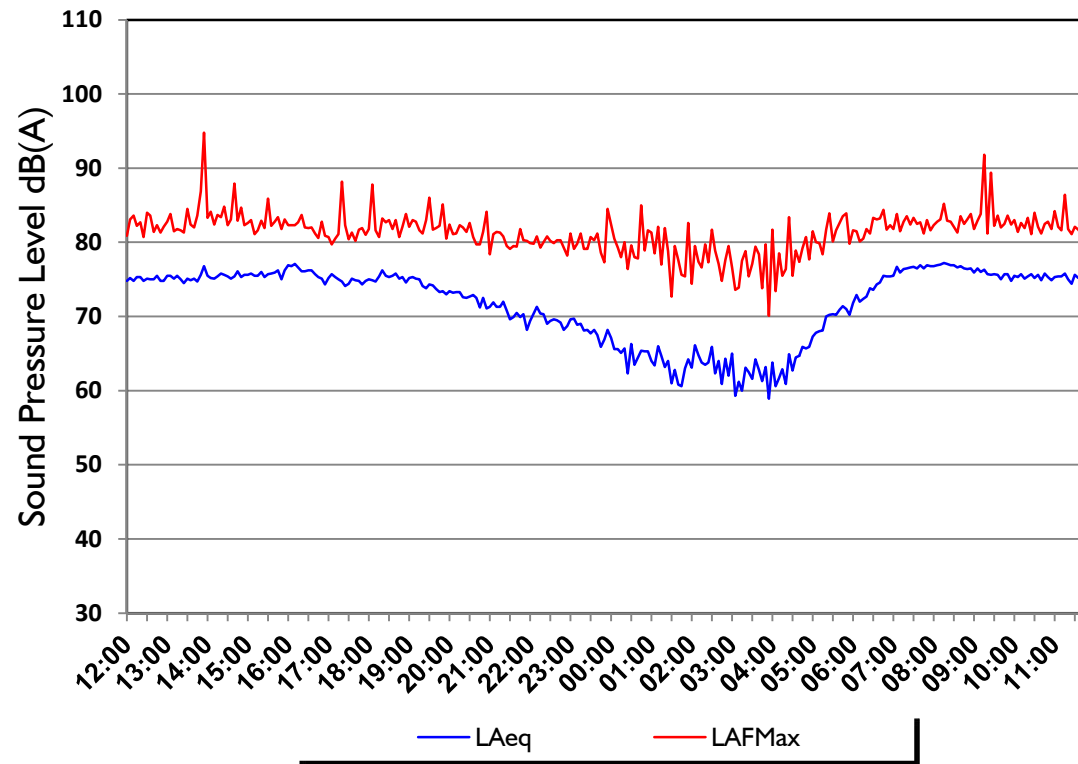


Wednesday 14 November to Thursday 15 November

Figure AS7013/TH3

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

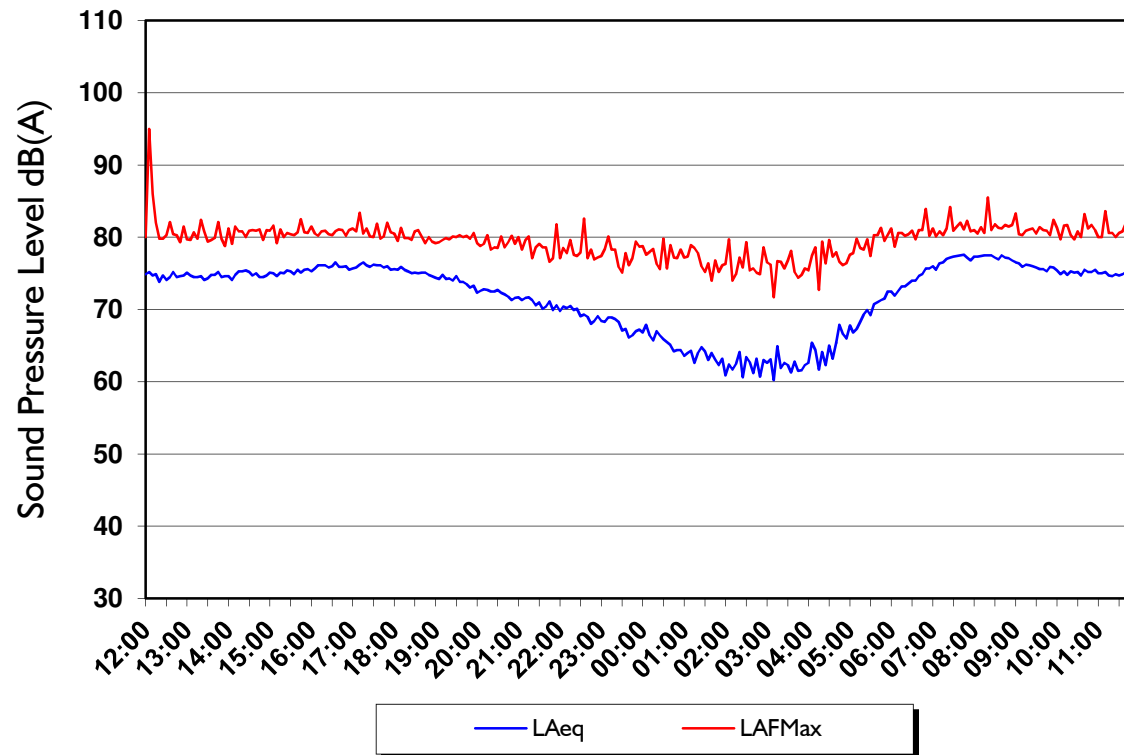


Thursday 15 November to Friday 16 November 2012

Figure AS7013/TH4

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

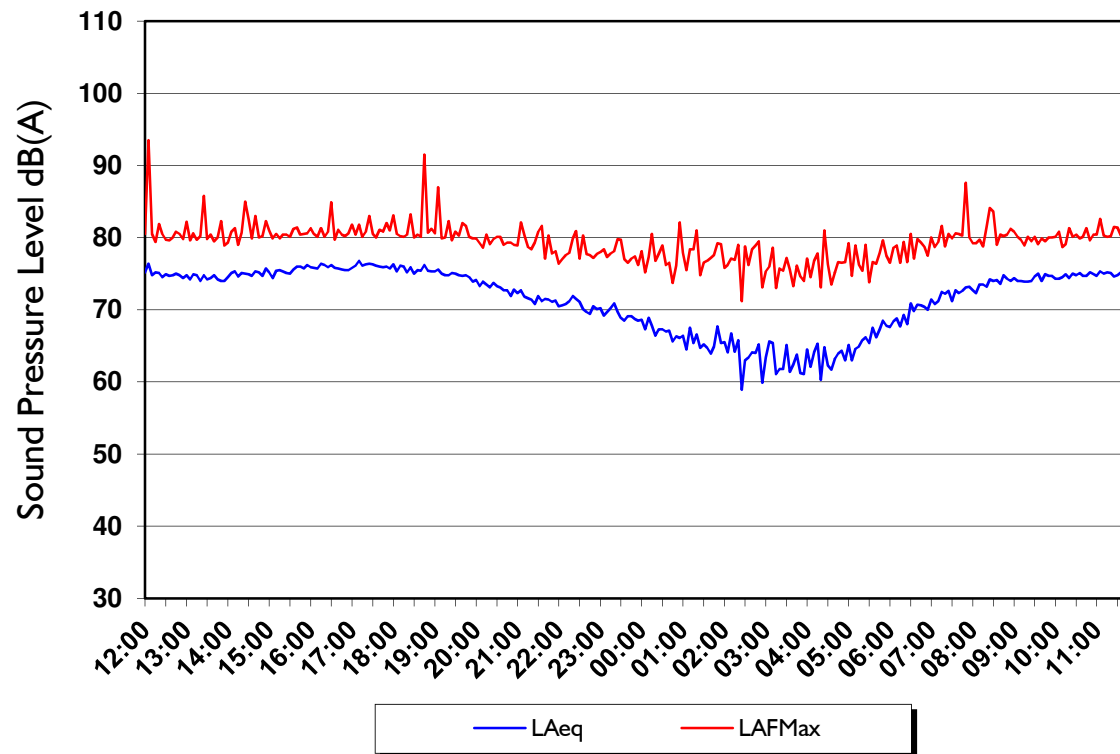


Thursday 14 February to Friday 15 February 2013

Figure AS7013/TH5

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

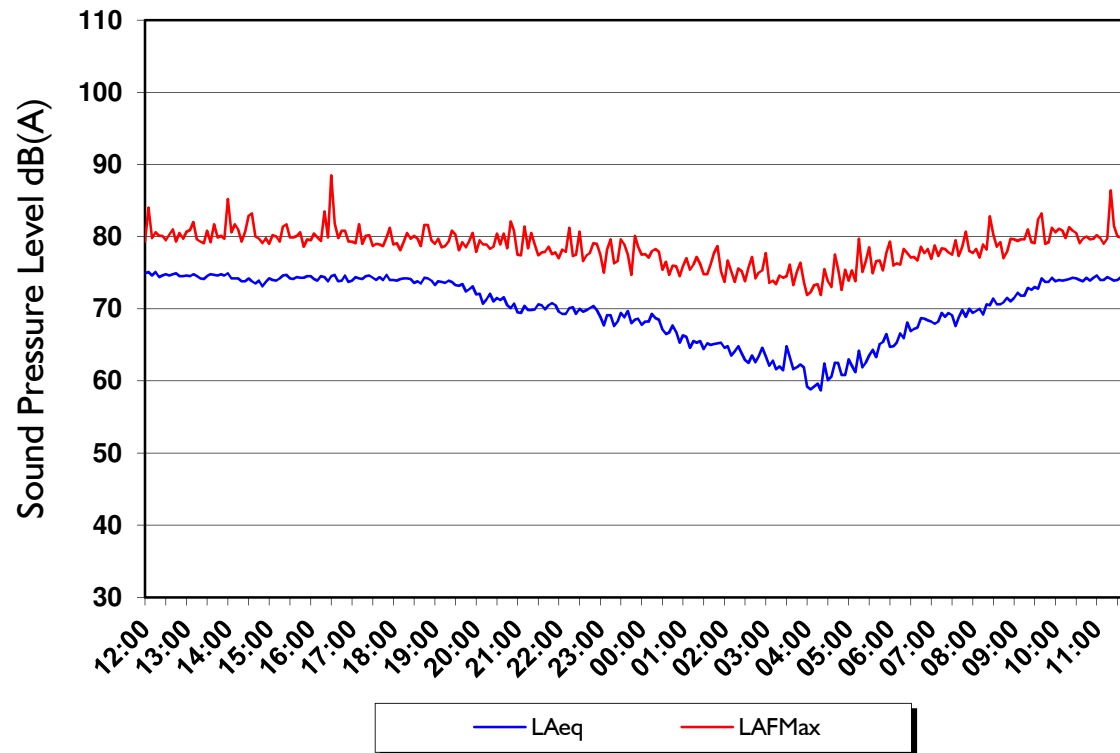


Friday 15 February to Saturday 16 February 2013

Figure AS7013/TH6

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

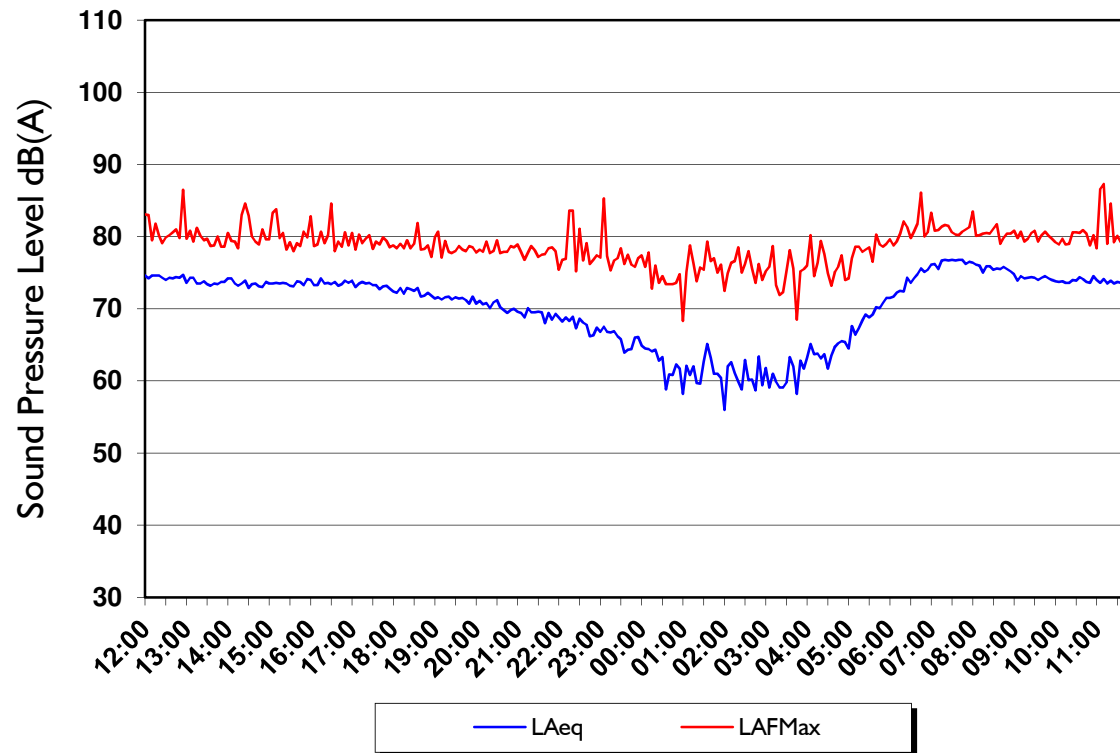


Saturday 16 February to Sunday 17 February 2013

Figure AS7013/TH7

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

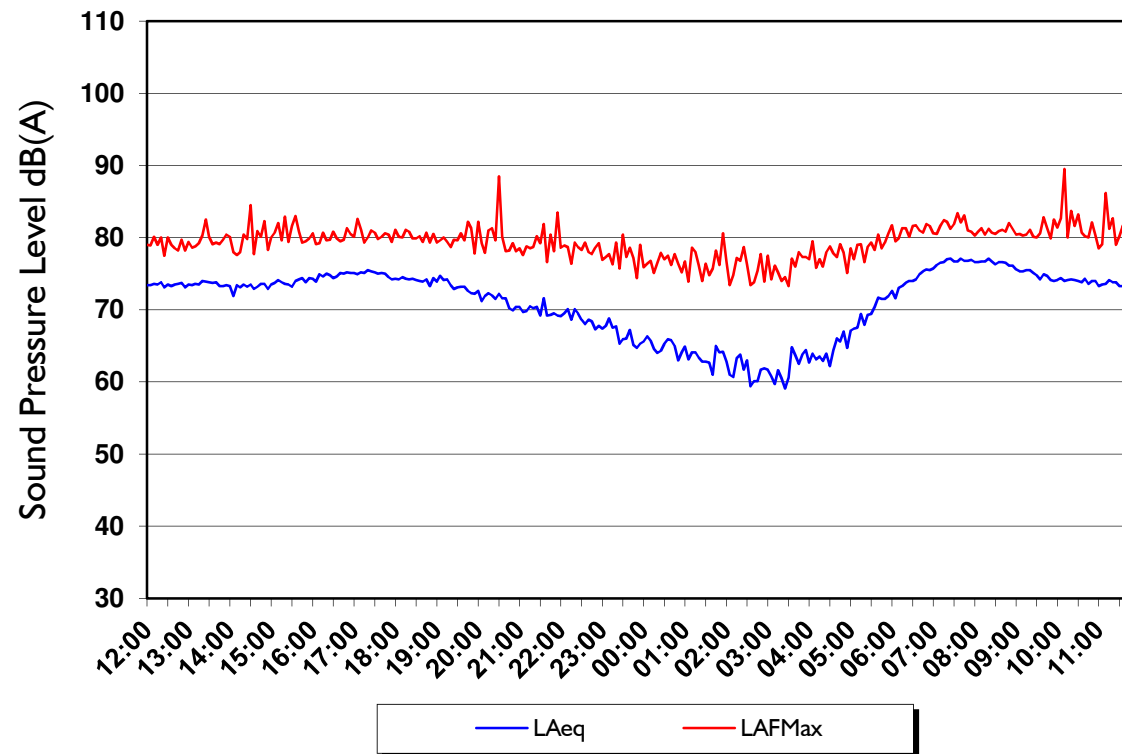


Sunday 17 February to Monday 18 February 2013

Figure AS7013/TH8

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

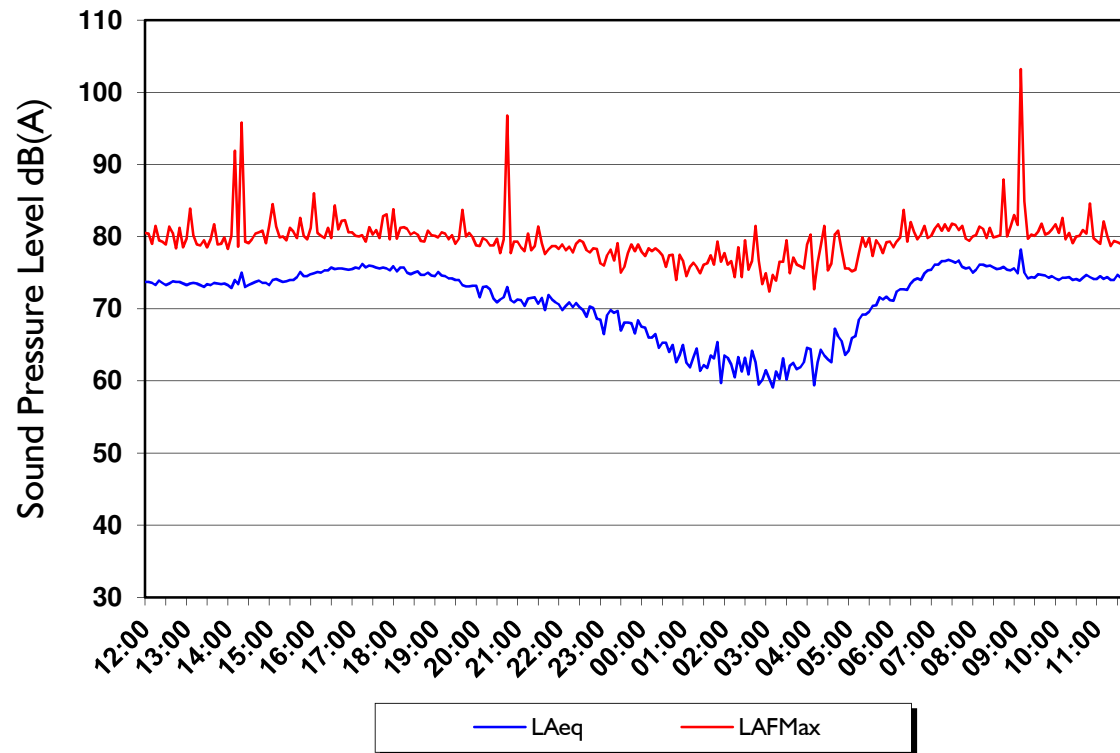


Monday 18 February to Tuesday 19 February 2013

Figure AS7013/TH9

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

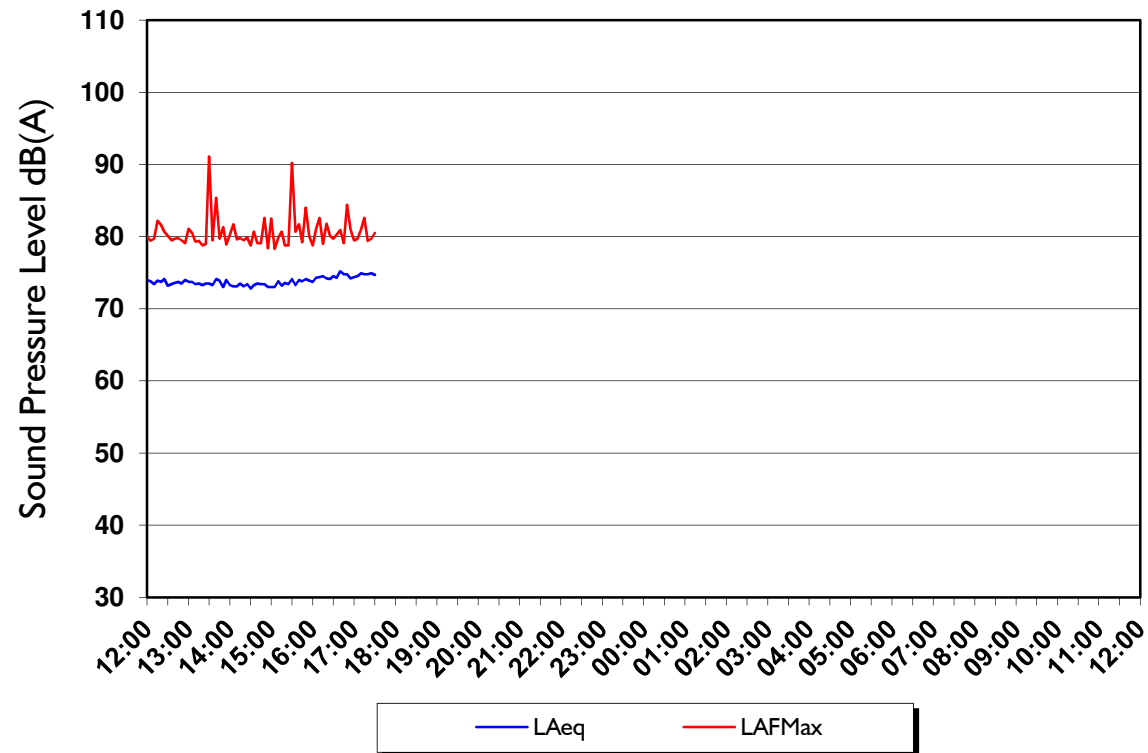


Tuesday 19 February to Wednesday 20 February 2013

Figure AS7013/TH10

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

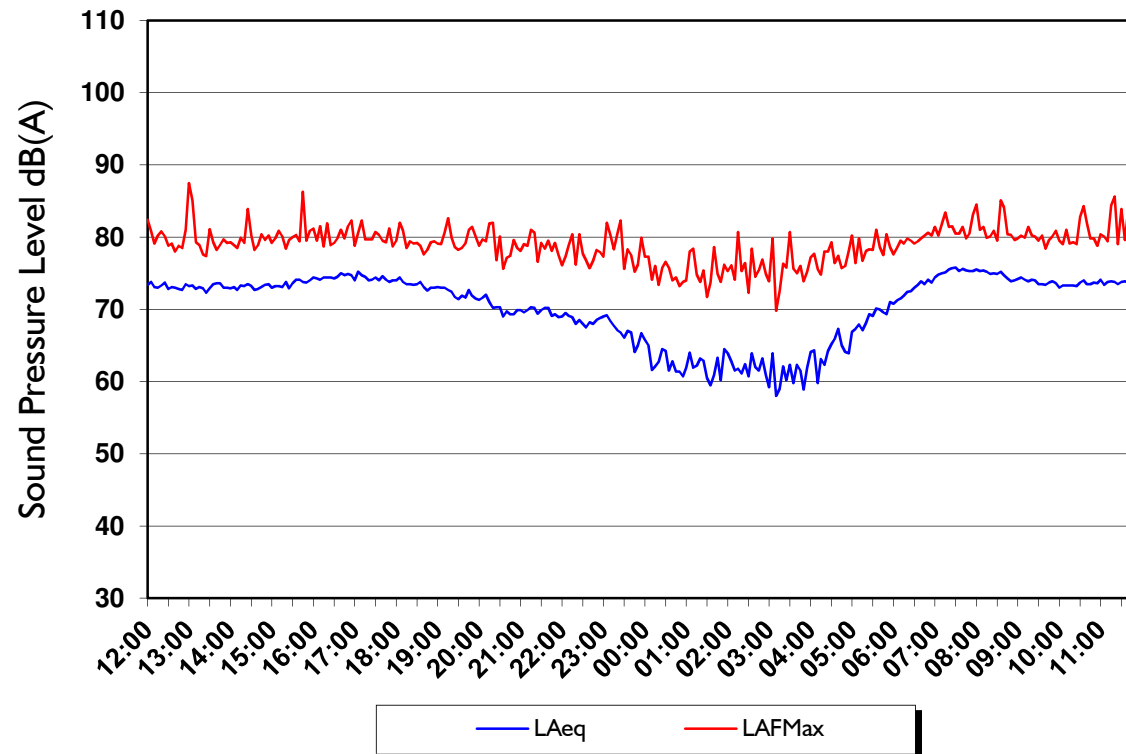


Wednesday 20 February to Thursday 21 February 2013

Figure AS7013/TH11

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

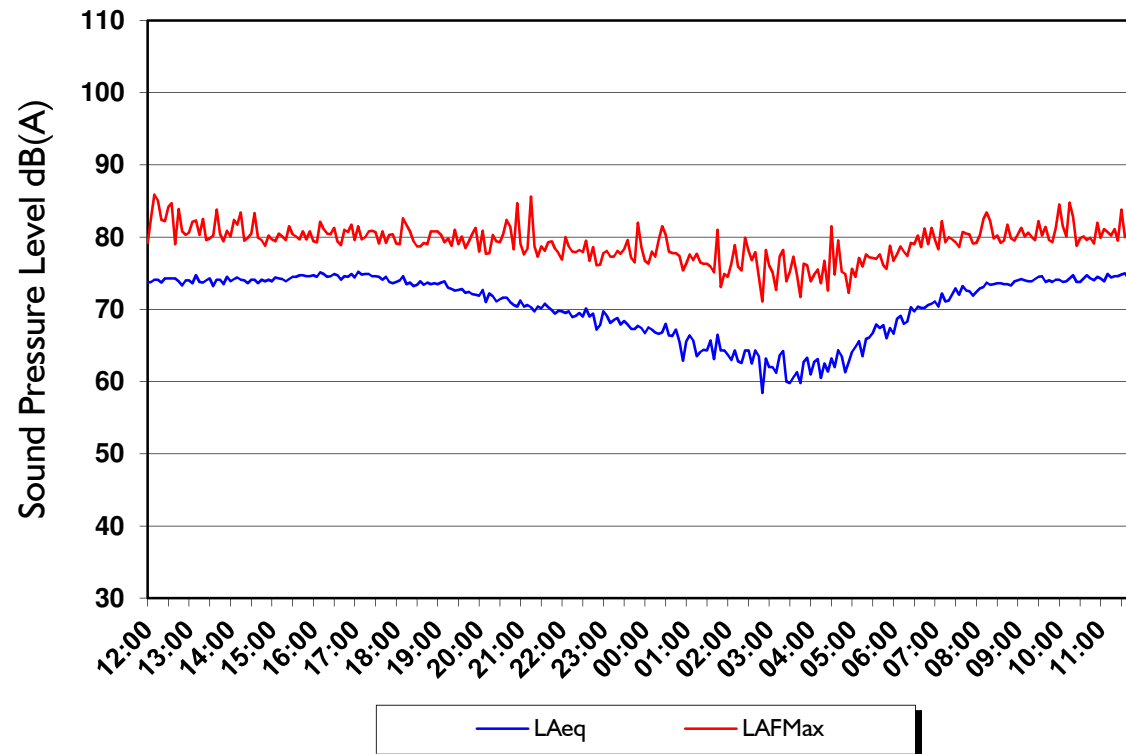


Thursday 21 February to Friday 22 February 2013

Figure AS7013/TH12

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

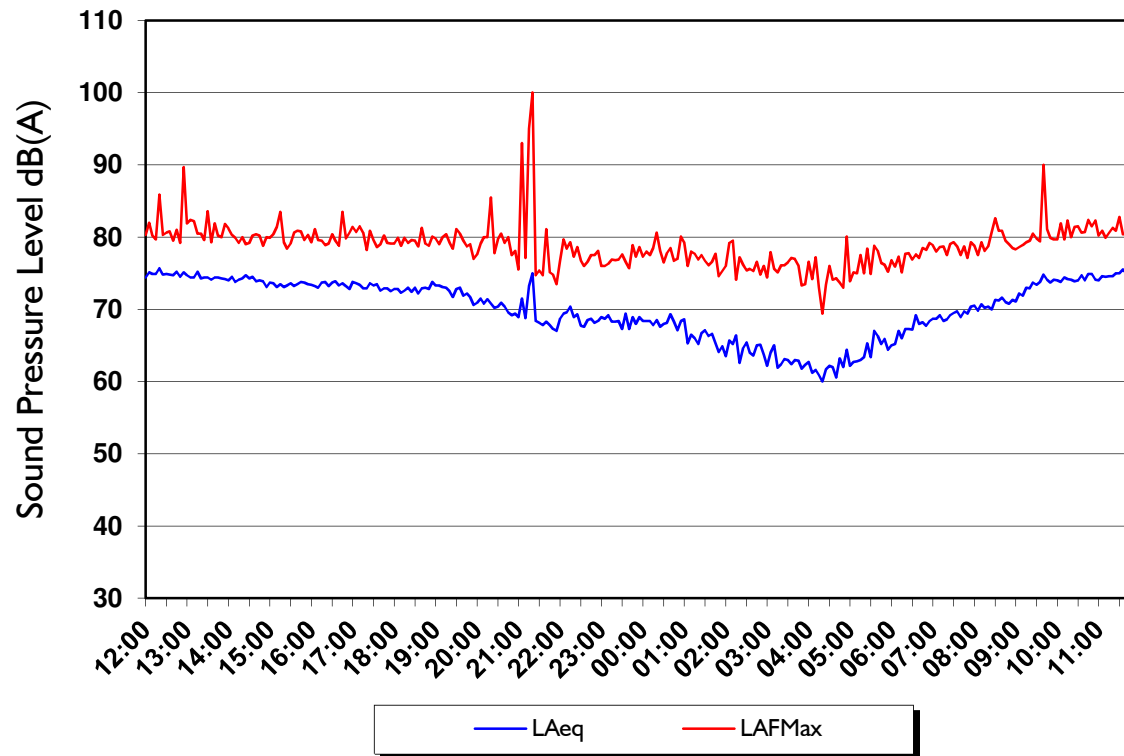


Friday 22 February to Saturday 23 February 2013

Figure AS7013/TH13

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

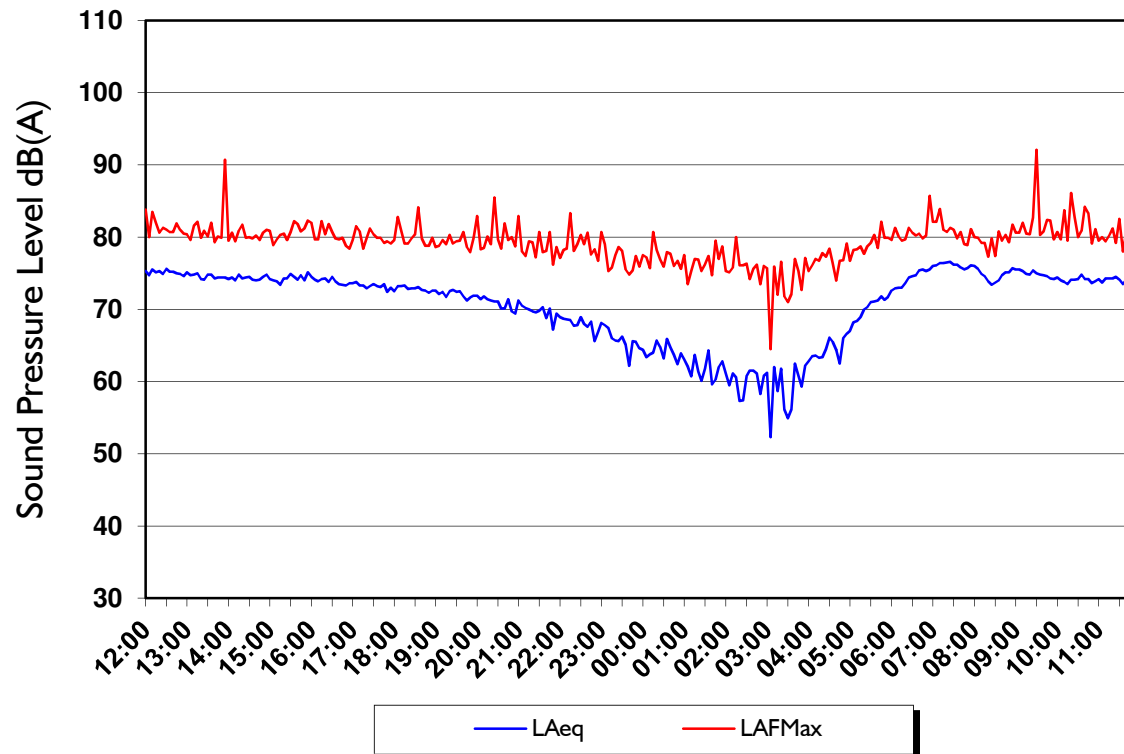


Saturday 23 February to Sunday 24 February 2013

Figure AS7013/TH14

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History

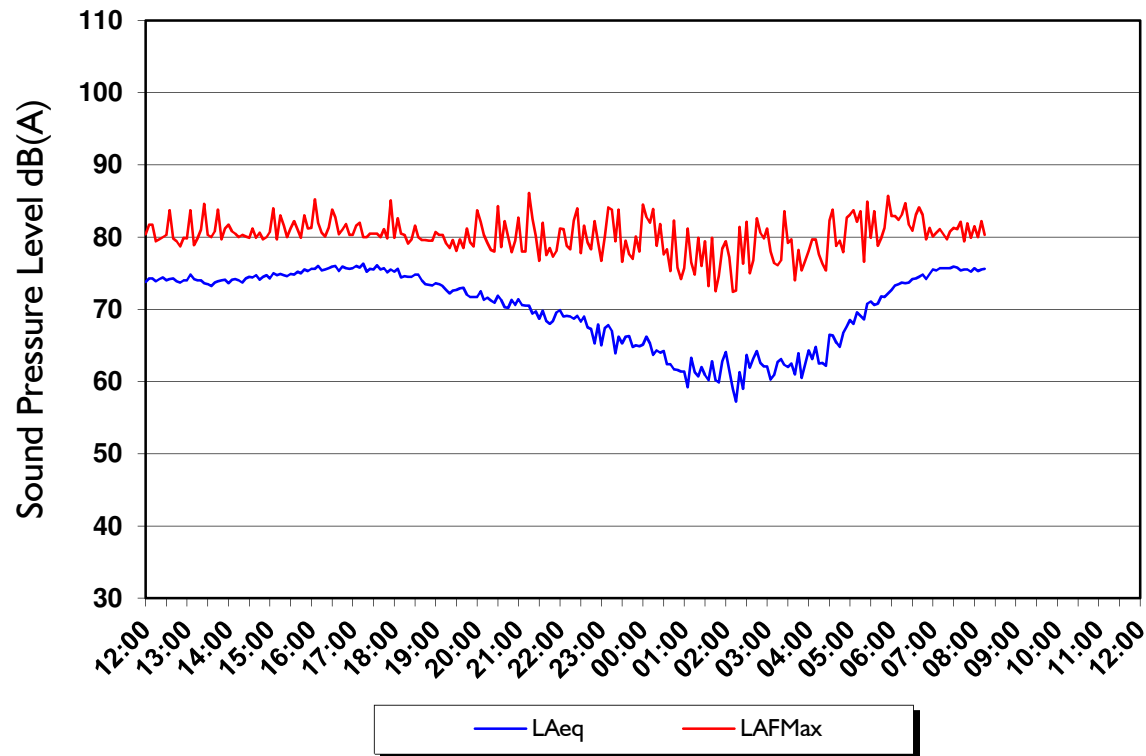


Sunday 24 February to Monday 25 February 2013

Figure AS7013/TH15

Havant Retail Park, Portsdown Hill Road, Bedhampton

Environmental Noise Time History



Monday 25 February to Tuesday 26 February 2013

Figure AS7013/TH16

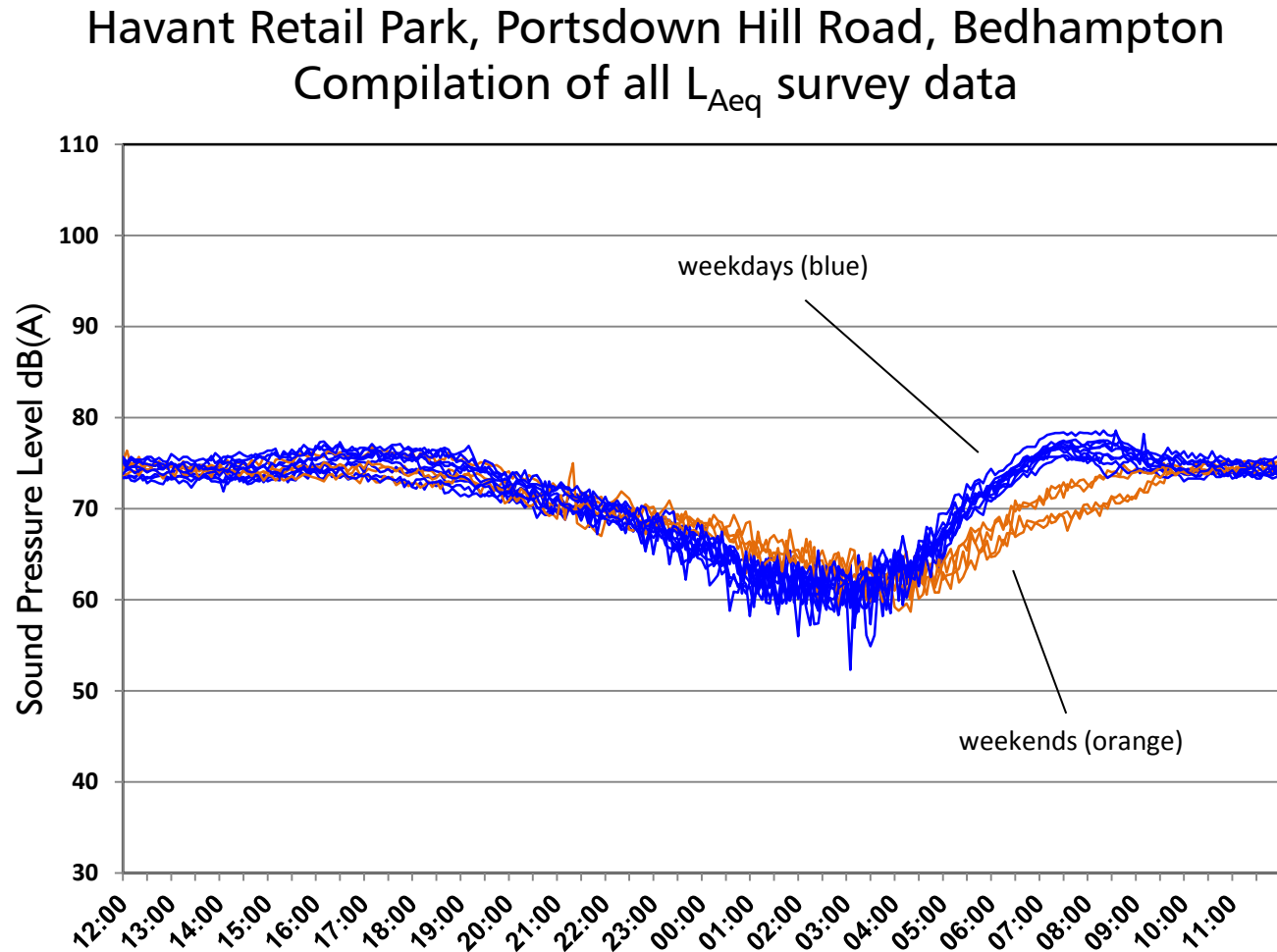


Figure AS7013/TH17

AS7013 – HAVANT RETAIL PARK, BEDHAMPTON

A Glazing Specification

SOUND INSULATION: all proprietary glazing elements of the building fabric shall be tested in accordance with BS EN ISO 10140-2:2010 in a UKAS accredited laboratory.

The quoted minimum sound reduction specifications are met by the panels and windows, including frames, seals, etc. Glass performance is not an acceptable means of demonstrating compliance with the specification for window performance.

This will involve testing in 1/3rd octaves from at least 100Hz to 3150Hz inclusive. The test samples must be representative of the design proposals for the relevant façades as set out in the specifications below. This shall include glass, framing, seals, opening lights, etc. The results from the tests should be converted into octave band values by the method approved in the above test document.

Drawings indicating details of the proposed test samples must be approved by the Client's acoustic consultant prior to the tests being carried out. These tests are to be witnessed by the Client's acoustic consultant.

The following minimum sound reduction indices shall be achieved:

Sound Reduction Index dB	Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Type A	TBC	TBC	TBC	TBC	TBC	TBC
Type B	TBC	TBC	TBC	TBC	TBC	TBC
Type C	TBC	TBC	TBC	TBC	TBC	TBC

AS7013/GT1 – Octave band sound reduction indices

Elevation	Floor	Glazing type required
TBC	TBC	Type A
TBC	TBC	Type B
TBC	TBC	Type C

TBC – To be confirmed at the detailed design stage

B Test Samples

In order to be representative of the proposed site conditions, drawings indicating details of the proposed actual test arrangement for the above building elements must be approved by the Client's acoustic consultant prior to the tests being carried out. These tests are to be witnessed by the Client's acoustic consultant.

C Testing Program

Tests shall be carried out to allow sufficient time after tests to enable any modifications or redesign that may be required by the Contractor so that the construction programme is not affected and results shall be reported in full to the design team and main contractor within three weeks of commencement of the tests. Fabrication of the system shall not commence until acoustic performance has been demonstrated by this testing and results are accepted by the design team.

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND NOISE

1.0 ACOUSTIC TERMINOLOGY

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

dB (A):	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level.
L_{10} & L_{90}:	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise, as being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic noise.
L_{eq}:	The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise. L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The use of digital technology in sound level meters now makes the measurement of L_{eq} very straightforward. Because L_{eq} is effectively a summation of a number of noise events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute noise limit.
L_{max}:	L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.
D	The sound insulation performance of a construction is a function of the difference in noise level either side of the construction in the presence of a loud noise source in one of the pair of rooms under test. D , is therefore simply the <i>level difference</i> in decibels between the two rooms in different frequency bands.
D_w	D_w is the <i>Weighted Level Difference</i> The level difference is determined as above, but weighted in accordance with the procedures laid down in BS EN ISO 717-1.
$D_{nT,w}$	$D_{nT,w}$ is the <i>Weighted Standardised Level Difference</i> as defined in BS EN ISO 717-1 and represents the <i>weighted level difference</i> , as described above, corrected for room reverberant characteristics.
C_{tr}	C_{tr} is a spectrum adaptation term to be added to a single number quantity such as $D_{nT,w}$, to take account of characteristics of a particular sound.
$L'_{nT,w}$	$L'_{nT,w}$ is the <i>Weighted Standardised Impact Sound Pressure Level</i> as defined in BS EN ISO 717-2 and represents the level of sound pressure when measured within room where the floor above is under excitation from a calibrated tapping machine, corrected for the receive room reverberant characteristics.

APPENDIX A

ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND NOISE

2.0 OCTAVE BAND FREQUENCIES

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation have agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, eg. 250 Hz octave band runs from 176 Hz to 353 Hz. The most commonly used bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000
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3.0 HUMAN PERCEPTION OF BROADBAND NOISE

Because of the logarithmic nature of the decibel scale, it should be borne in mind that noise levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) is not twice as loud as 50 dB(A) sound level. It has been found experimentally that changes in the average level of fluctuating sound, such as traffic noise, need to be of the order of 3dB(A) before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10 dB(A) is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in traffic noise level can be given.

INTERPRETATION

Change in Sound Level dB(A)	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

4.0 EARTH BUNDS AND BARRIERS - EFFECTIVE SCREEN HEIGHT

When considering the reduction in noise level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a 3 metre high barrier exists between a noise source and a listener, with the barrier close to the listener, the listener will perceive the noise source is louder, if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the noise source would seem quieter than it was if he were standing. This may be explained by the fact that the "effective screen height" is changing with the three cases above, the greater the effective screen height, in general, the greater the reduction in noise level.

Where the noise sources are various roads, the attenuation provided by a fixed barrier at a specific property will be greater for roads close to the barrier than for roads further away.