Business Improvement Services Ltd BiS®

# Environmental Noise Survey Report

**appertaining to the Development of Residential Dwellings of David Wilson Homes East Midlands**

**Mill Hill Road Business Centre, Mill Hill Road, Hinckley, Leicestershire**

BiS/472/151/Status 1

Survey Date:

**15th & 16th September 2009**


Company Office:

Business Improvement Services Limited
Bretby Business Park
Ashby Road
Burton upon Trent
Staffordshire. DE15 0YZ

☎ 01-283-226-487 Fax 08-443-240-883

e-mail: infor@the-bis.com
website: www.the-bis.com

*BSi Company Registration: FS 85080*



DEVELOPMENT SERVICES
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# Executive Summary

An environmental noise survey required by *Hinckley & Bosworth Borough Council*, was commissioned by the Client, *David Wilson Homes East Midlands*, for a proposed residential development, upon land formerly known as the *Mill Hill Business Centre*, Hinckley, to support a Planning Application.

The Site neighboured comical premises and road traffic from Mill High Road and Cleveland Road, which were identified as the main noise sources affecting the Site.

Consideration of the *Department of the Environment's "Planning Policy Guidance: Planning & Noise" document, PPG24 September 1994"* with regards to noise measurements and resultant calculations made, deemed the proposed Site on two of the boundaries as being in the *Noise Exposure Category's (NEC) A and B.*

It is our opinion, that compared with prevailing environment noise conditions within the locality that no significant noise impact would be evident to residents of the proposed development.

Based upon the proposed layout of the Site's dwellings and, the dwellings meeting a minimum building standards of the Building Regulations with, the adoption of several acoustic attenuator devices within the basic development and construction, it is our opinion, that adequate residential protection can be provided to attenuate typical commercial and road traffic emissions envisaged to support the planning permission of the Client's application.

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**APPENDICES**

**Appendix 1:** Location Plans of the Sites & Noise Assessment Locations

**Appendix 2:** Instrument Calibration Certification

**Appendix 3:** Site Weather Record
Noise Result Records: Charts 1 to 10

**Appendix 4:** Assessment Documents

**Appendix 5:** Attenuation Documents

## 1.0 Introduction

1.1 This Report forms the basis of an independent Environmental Noise Impact Survey, undertaken on behalf of *David Wilson Homes East Midland* for their proposed residential development on land previously used for the industrial use of the *Mill Hill Business Centre*, located at *5 Mill Hill Road, Hinckley, Leicestershire.*

1.2 The current status of the land was that the previous industrial buildings that occupied the land had been demolished and the Site cleared.

1.3 The Noise Survey was a requirement of part of the Planning Permission presented by *Hinckley & Bosworth Borough Council.*

1.4 The purpose of the Survey was to assess the level of impact that localised commercial premises would have on the proposed dwellings and what appropriate protection could be provided to the properties, if necessary.

1.5 The Site was visited for a pre-assessment visit on the 20th April 2009, with a 24-hour Survey undertaken on the 15th & 16th September 2009.

1.6 Prior to undertaking the Noise Survey, liaison and discussion was made between the Planning Agent, *David Wilson Homes* and *Hinckley & Bosworth Borough Council's Mr S Smith (Senior EHO)* upon the measurement locations, duration and of any specific concerns of potential local noise sources.

## 2.0 Scope of the Assessment.

2.1 The scope of the assessment was primarily to:

a. identify typical noise emissions that could potentially affect the proposed residential dwelling;

b. measure and quantify the typical ambient noise levels affected by the localised environmental;

c. analyse and present data obtained to quantify the environmental noise and the affect of potential noise generated on the new premises; and,

d. recommend reasonable remedial measures to reduce the effect of any excessive noise emissions upon potential residents on the new residential development, as so identified.

## 3.0 Description of the Localities & Pre-Assessment Noise Observations

3.1 The previous Business Centre was situated at the premises of *5, Mill Hill Road, Hinckley*. *[ Ref: Appendix 1: Location Plan 1 ]*

3.2 The proposed residential properties were to occupy the Site with allocated gardens and carparking facilities. *[ Ref: Appendix 1: Location Plan 2 ]*

3.3 The locality had a mixture of residential and commercial properties, with the closest terraced and semi-detached housing situated directly to the North on *Mill Hill Road,* and to the *West* and *South-Westerly boundaries*, on *Cleveland Road*. *[ Ref: Appendix 1: Location Plan 3 ]*

3.4 To the North-East, on the corner of *Mill Hill Road* and *Trinity Lane* were the retail shops of *Shadewell Blinds* and *Trinity Lane Off-Licence*.

3.5 Neighbouring the East side boundary was a single-track lane, off *Mill Hill Road* which provided access to several commercial premises, a residential flat and carparking area, these were established to be:

- *Iron Styles Limited* – wrought-iron gate manufacturers;
- *Hi Speed DIY Limited* – warehousing for wood machinists;
- *Dream Homes UK Ltd* – administration offices;
- *Kilpatrick Developments Ltd* – offices & garages; and,
- 5A – first floor (above office) accommodation

Directly behind these commercial premises were the backs of houses on *Trinity Lane* and *Mansion Street.*

3.6 To the South of the Site was a carpark, and the back gardens of housing on *Cleveland Road*. Beyond these was *Trinity Church* and a Shopper's Carpark on *Trinity Vicarage Road*.

3.7 Typical ambient noise events within the locality were noted as:

- road traffic movement;
- delivery lorries;
- motorbikes revving;
- smoke-break Workers chatting;
- skip wagon rubbish collection;
- customer traffic movement to & from commercial premises;
- vehicle traffic movement to & from the offices and flat;
- fabrication & paint spray booth extraction fan emissions;
- builders lorry loading materials & supplies; and,
- birds and tree leaves blowing in the occasional breeze.

3.8 Occasional passing aircraft and roadside unloading of articulated lorries for *Shadewell Blinds* and *Trinity Lane Off Licence* were noted.

## 4.0 Survey Position

4.1 The previous business premises on the Site were demolished and the Site cleared prior to undertaking the Survey. The proposed layout of the dwelling were noted via Drawing no: *S2237/100/001 rev F*, with access from Cleveland Road.

4.2 Baseline noise measurement positions were chosen on the basis of the generalist nature of the ambient conditions, positioning of the proposed housing and, the potential noise events of the neighbouring premises.

4.3 Items that were potentially noise attenuating or, noise reflecting were removed or suppressed to enable noise levels to be representative of the area.

4.4 The noise measurement point, *NMP1*, was positioned on the Site at the Eastern corner, towards the front on *Mill Hill Road*, 2-metres from the pavement and 1.5-metres from adjoining Lane servicing the likes of *IronStyles* premises. *[Ref: Appendix 1: Local Plan 2 ]*

4.5 The noise measurement point, *NMP2*, was at the Southerly corner of the proposed dwelling, placed 2-metres in from the Lane's wall and 9.5-metres from the South facing garden boundary.

4.6 The Offices and 1st floor Flat was measured at 8.5-metres away from the corner of the Workshops, 19.5-metres away.

4.7 The sound meters were positioned on a tripod, 1.5-metres high in free-field conditions. All the boundaries were fenced, this was provided with open-wire security, "Harris" style, temporary fencing. it was considered that no reflective component affected the measurement positions.

## 5.0 Instrumentation & Equipment Used

| | |
|---|---|
| Sound Meter 1: | Norsonic 118 Real Time Analyser, Type 1, No.31341 |
| Modules: | 1, 3, 4, 6, 9, 17 |
| Certification: | Calibrated, 30th October 2008 |
| Sound Meter 2: | Norsonic 118 Real Time Analyser, Type 1, No.32196 |
| Modules: | 1, 4, 5, 67, 68 |
| Certification: | Calibrated, 12th August 2009 |
| Sound Meter 3: | Norsonic 131 Real Time Analyser, Type 1, No.1312934 |
| Certification: | Calibrated, 27th August 2009 |
| Site Calibrator: | Nor 1251, 114dB @1000-Hz, No.30875 |
| Certification: | Calibrated, 27th August 2009 |
| Tripods: | Platform setting at first floor level, 1.5-metres base nominal height |
| Linear Measure: | 10m Stanley, Type 33-443 Grade II & Trumeter Measuring Wheel |
| Climate: | Davis Vantage Pro 2 Weather Station (Factory & Site Calibrated) |

*[ Ref: Appendix 2, Calibration Certification ]*

## 6.0 Weather & Noise Measurement Results

6.1 No adverse conditions were observed or experienced with the weather. Logged parameters indicated temperatures of between 11.5 to 18$^{oc}$ and wind speeds of between 0.9 to 4.0 m/s from a North-East to North-East-Easterly direction. *[ Appendix 3, Chart Weather Data ]*

6.2 Noise measurement components of $L_{AMax}$ & $L_{Aeq}$ were recorded to illustrate the fluctuation over a typically Day-time period, between 07:00 – 23:00hr (16 hours) and Night-time, 23:00- 07:00hrs (8-hours). *[ Appendix 3, Charts 1 to 4 ]*

6.3 The noise levels were further assessed from the occurring maximum levels and due to the use of $L_{AMax(Slow)}$ and $L_{AMax(Fast)}$ in the Authority assessment documents, *Department of Environment's Planning Policy 24*, *PPG 24* and *British Standard BS 8233*, distribution Charts were plotted.
*[ Appendix 3, Charts 5 to 10 ]*

6.4 From the data collected, an accumulative $L_{Aeq}$ values were computed for both Day & Night-time periods at both measurement points, NMP 1 & 2 of the Site.

## 7.0 Noise Level Measurement Summary

7.1 The ambient noise levels at the Site between 07:00 & 23:00-hr were evaluated to be:

NMP 1 $L_{Aeq\ (16\text{-}hour)}$ was evaluated to be 58dB
NMP 1 $L_{AMax\ fast\ (5\text{-}min)}$ ranged from 62 to 87 with a typical level at 72dB

NMP 2 $L_{Aeq\ (16\text{-}hour),}$ was evaluated to be 54dB
NMP 2 $L_{AMax\ fast\ (5\text{-}min)}$ ranged from 52 to 94 with a typical level at 72dB

7.2 The ambient noise levels at the Site between 23:00 & 07:00-hr were evaluated to be:

NMP 1 $L_{Aeq\ (8\text{-}hour),}$ was evaluated to be 47dB
NMP 1 $L_{AMax\ fast\ (5\text{-}min)}$ ranged from 46 to 70 with a typical level at 63dB
NMP 1 $L_{AMax\ slow\ (5min)}$ ranged from 41 to 66 with a typical level at 60dB

NMP 2 $L_{Aeq\ (8\text{-}hour),}$ was evaluated to be 42dB
NMP 2 $L_{AMax\ fast\ (5\text{-}min)}$ ranged from 41 to 73 with a typical level at 54dB
NMP 2 $L_{AMax\ slow\ (5min)}$ ranged from 40 to 68 with a typical level at 54dB

## 8.0 Discussion

8.1 The commercial properties around the Site all had vehicle deliveries over the measurement periods, which attributed to various significant noise events occurring;

*NMP 1*

- delivery lorry (TNT) reversing bleepers in Mill Hill Road @ 10:00hr = 89dB$L_{AMax}$
- dustbin wagon in Mill Hill Road @ 07:10hr = 85dB$L_{AMax}$
- delivery lorry (DHL) slamming door @ 11:55hr = 83dB$L_{AMax}$
- delivery lorry (bread) unloading @ 04:40hr = 68dB$L_{AMax}$

*NMP 2*

- skip wagon loading rubbish at the Offices @ 14:50hr = 91dB$L_{AMax}$
- 4x4 vehicle loading at Builder's garages @ 11:50hr = 86dB$L_{AMax}$
- work's van at workshop slamming door @ 07:55hr = 82dB$L_{AMax}$

8.2 However, because of their infrequency and short periods (less than 5-minutes) these were not judged to be of concern. Likewise, barking dogs at 07:30hr, 12:45hr, 13:10hr amounting to 83, 87 and 83dB$L_{AMax}$ respectively, police sirens at 09:10hr rated at 85dB$L_{AMax}$ and residents shouting and closing windows at 11:00hr and 23:30hr raising to 82 & 73 dB$L_{AMax}$ were all considered to be specific events and not depictive of the general environment.

8.3 The Workshops of *Ironstyles* opened, as did the premises, at about 08:00 and closed before 18:00hr. Whilst welding, grinding and spray painting were evident throughout the Day-time period (not Night-time) these were moderately based:

*NMP 2*

- grinding events @ 11:18, 12:43, 13:10 & 13:30hr = 70, 70, 77, 69dB$L_{AMax}$
- welding, fettling & spray booth fans @ 15:35hr = 80dB$L_{AMax}$

8.4 The loudest noise event that was produce from the Workshop occurred outside when a gate assembly was dropped outside onto the tarmac surface which generated 93dB$L_{AMax}$ at 14:45hrs. Apart, from this singular event the Works noise integrated into the generalised Daytime noises of the neighbourhood.

8.5 Over the Night-time period (23:00-hr to 07:00-hr) none of the commercial outlets were open although, *Trinity Lane Off Licence* did have early morning shop deliveries with a bread wagon unloading in Mill Hill Road @ 04:40hr equalling 68dB$L_{AMax.}$ With such low background levels obtained, this was very noticeable although, it was judged that the likelihood of complaint unlikely.

8.6 The generalised noise events, once the traffic flow had ceased, were identified as cooling fans operated at the *British Telecom Phone Exchange* situated off *Mansion Street*. Whilst this particular noise source could be traced, levels between 35-40dB$L_{Aeq}$ this would not cause a nuisance to the potential residents.

8.7 From the *NMP 1*, Day-time noise of 58dB$L_{Aeq\text{-}16hour}$, was established.

8.8 From the *NMP 1*, Night-time noise of 47dB$L_{Aeq\text{-}8hour}$, was established.

8.9 Typically, Night-time *NMP 1* maximums of 63dB$L_{Amax,Slow}$ & 60dB$L_{Amax,fast}$ were established. *[ Appendix 3, Charts 5 & 6 ]*

8.10 From the *NMP 2*, Day-time noise of 54dB$L_{Aeq\text{-}16hour}$, was established.

8.11 From the *NMP 2*, Night-time noise of 42dB$L_{Aeq\text{-}8hour}$, was established.

8.12 Typically, Night-time *NMP 2* maximums of 54dB$L_{Amax,Slow}$ & 54dB$L_{Amax,fast}$ were established. *[ Appendix 3, Charts 7 & 8 ]*

8.13 With regard to the *Department of Environment's, Planning Policy Guidance, PPG 24*, noise emissions were taken at the most sensitive points, at the "building-lines" of the proposed dwellings, closest to the road-line of *Mill Hill Road* and the various commercial premises neighbouring the SIte. Therefore, a noise source was chosen as "mixed sources", with the Day and Night-time levels compared against an appropriate *Noise Exposure Category, NEC;* this enabled the Site's residential suitability to be quantified and, further action identified for planning consideration.

8.14 The Site at *NMP 1* was quantified, with regards to *PPG 24*, over both Day & Night Periods as being at the *Noise Exposure Category, "NEC B".*
*[ Appendix 4, PPG 24 NEC Extracts ]*

8.15 The Site at *NMP 2* was quantified, with regards to *PPG 24*, over both Day & Night Periods as being at the *Noise Exposure Category, "NEC A".*

8.16 No individual Night-time events exceeded 82dB$L_{AMax,Slow}$
*[ Appendix 4, PPG 24 NEC Extracts ]*

8.17 For assessing a residential development proposal near a specific source of noise, *PPG 24* states for a Site falling into:

> *"NEC A - Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level".*
>
> *"NEC B - Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise".*

8.18 However, several options of attenuating the noise emissions to at least 30dB, down to an acceptable level for attaining a "good" standard of internal living, as recommended by *BS 8233,* are commercially readily available.
*[ Appendix 4, BS8233 Extract ]*

8.19 Whilst it is advised that no service ducts, chimneys, wall duct or vents should be situated on the road façades to eliminate possible noise "break-ins" to the living areas, attenuated items can be obtained, if required.

8.20 Architecturally, the lowest resistance to noise is normally created by a single glazed window. This provides about 25dB$L_A$. However, it is reasonable to expect and also, a *Building Regulation* requirement, to provide adequate ventilation, especially whilst sleeping. A partially open-window or the installation of a normal window/wall vent would dramatically reduce the effect of the original closed-window level, providing only 10 to 15 dB attenuation.

8.21 Due to construction artefacts currently on the market, the installation of acoustic window vents or acoustic air bricks could provide the ventilation requirements whist the window units slayed closed. Noise reduction typical of these air vents offer a reduction of 48dB. *[ Ref: Appendix 5 ]*

8.22 With such ventilator attenuators fitted to the frontal façade of the building, the lowest protection path of 25dB$L_A$ would be created by the glazing. The use of single glazing would not be appropriate due to a short-fall of 3dB. Double glazing should be therefore specified within the build. Whilst special acoustic units can be obtained to provide attenuation levels of 46dB, typical commercial units would be suitable as they can provide 33dB to 35 dB, as stated by *BS8233,* although only 28dB attenuation is needed. *[ Ref: Appendix 5 ]*

8.23 Likewise, door access points should be specified with acoustic seals and door materials. Whilst fitments offer between 35 to 55 dB, specific attention should be considered to letterbox door furniture.

8.24 Due to no gardens or car-parking provisions at the front of the development, along *Mill Hill Road*, it cannot be perceived that any recreational activities would take place here, although the rear plots close to *NMP 2* are exposed to the Workshop noise of *Ironstyles*.

8.25 The *World Health Organisation, WHO,* recommends that external recreational areas not to exceed 50 dB$L_{Aeq16\text{-}hr}$ so as not to cause "moderate annoyance" over the Day and Evening periods; a level of 54dB$L_{Aeq\text{-}16hour}$, was established covering the garden area. *[Reference: Appendix 4, Assessment Document, WHO ]*

8.26 A barrier, at least 1.8-metre high, should be set on the perimeter boundaries, so that the commercial unit and carpark cannot be seen from the garden area and attenuate possible events by at least 12dB. This would cater for a suitable reduction of the generalised noise that was experienced.

8.27 Although, there are specialised acoustic fencing available on the market that would provided realistic levels up to 30dB, due to the basic requirement of only needing a safeguard reduction of 4dB, a lapped wooden or concrete panel fencing, constructed continuously and, without spaces to a density/mass of at least 10kg/$m^2$ would suffice.

## 9.0 Conclusion

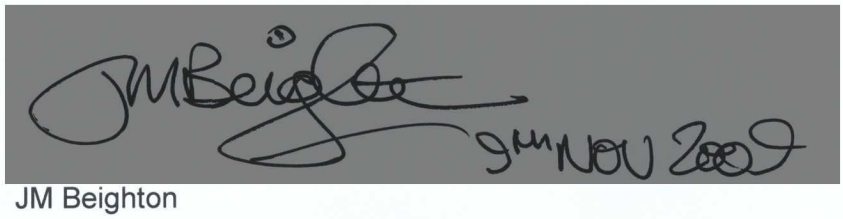
9.1 The proposed *Mill Hill Road* Site for the residential dwellings was identified as potentially being affected by the business operations of neighbouring commercial premises and road traffic events; this was proven not to be significant as initially expected, upheld by our noise survey data.

9.2 From noise measurements taken continuously over both Day & Night-time periods, it was established by assessment, that the proposed Residential Developments with regard to *Planning Policy Guidance 24,* at the worst, fell into the lower end of *Noise Exposure Category, NEC B* over the Day-time and Night-time periods.

9.3 It is our opinion, that with the Development meeting a minimum build standard required of current *Building Regulations* and selective fitment of acoustic articles, such as double glazing, acoustic window vents and/or airbrick for houses facing *Mill Hill Road* and an acoustic fence partitioning the "line-of-sight" view of the Workshops, Offices and carpark, as outlined within our Report, that a "good" standard of internal and outdoor living can be adequately achieved and sustained.

## 10.0 Statement of Truth

I believe that the facts I have stated in this report are true and that the opinions I have expressed are correct.

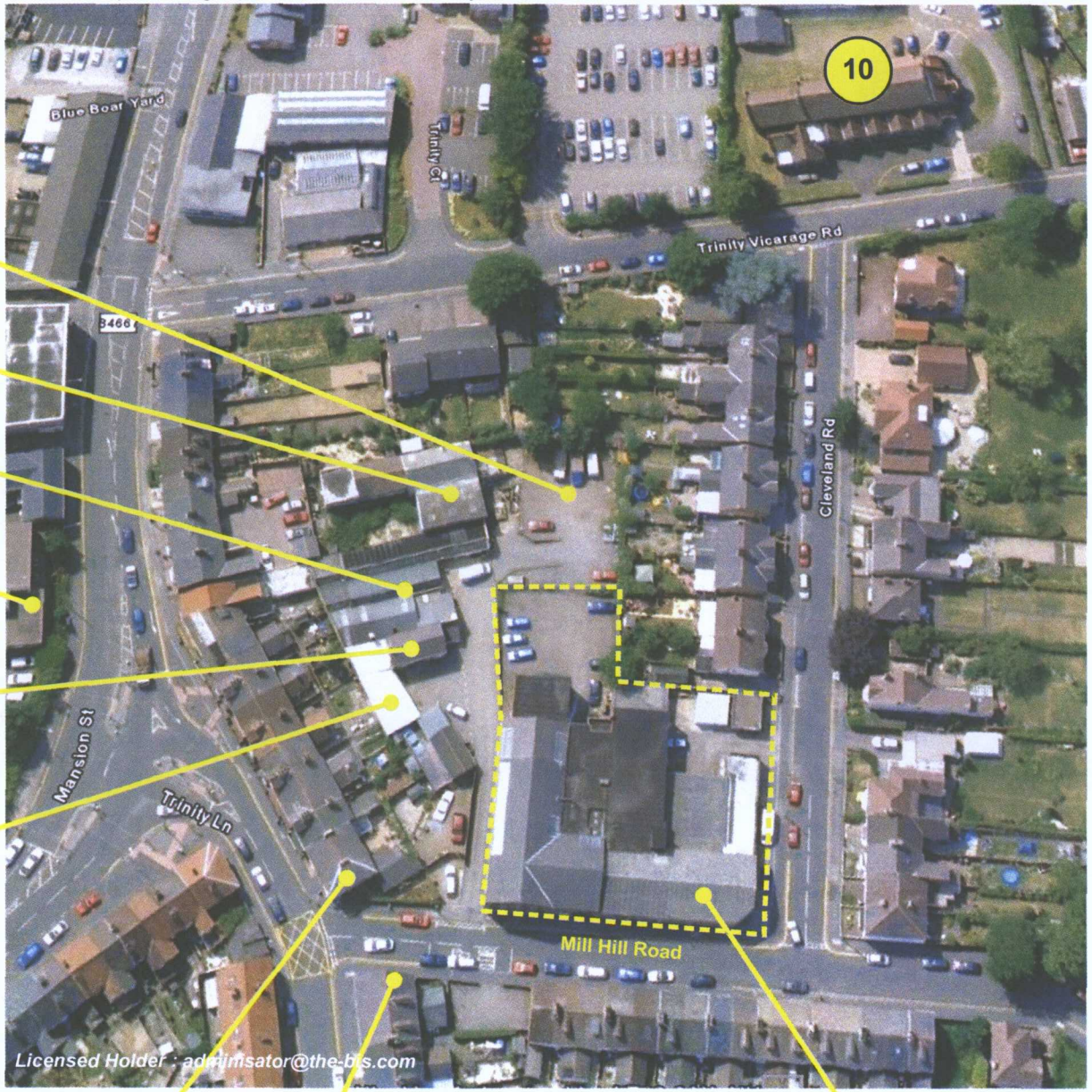


JM Beighton

BSc(Hons) CEng MIMechE MIOA CMIOSH CRSP

# Appendix 1

Note : aerial photo images presented could be up to 2-years old





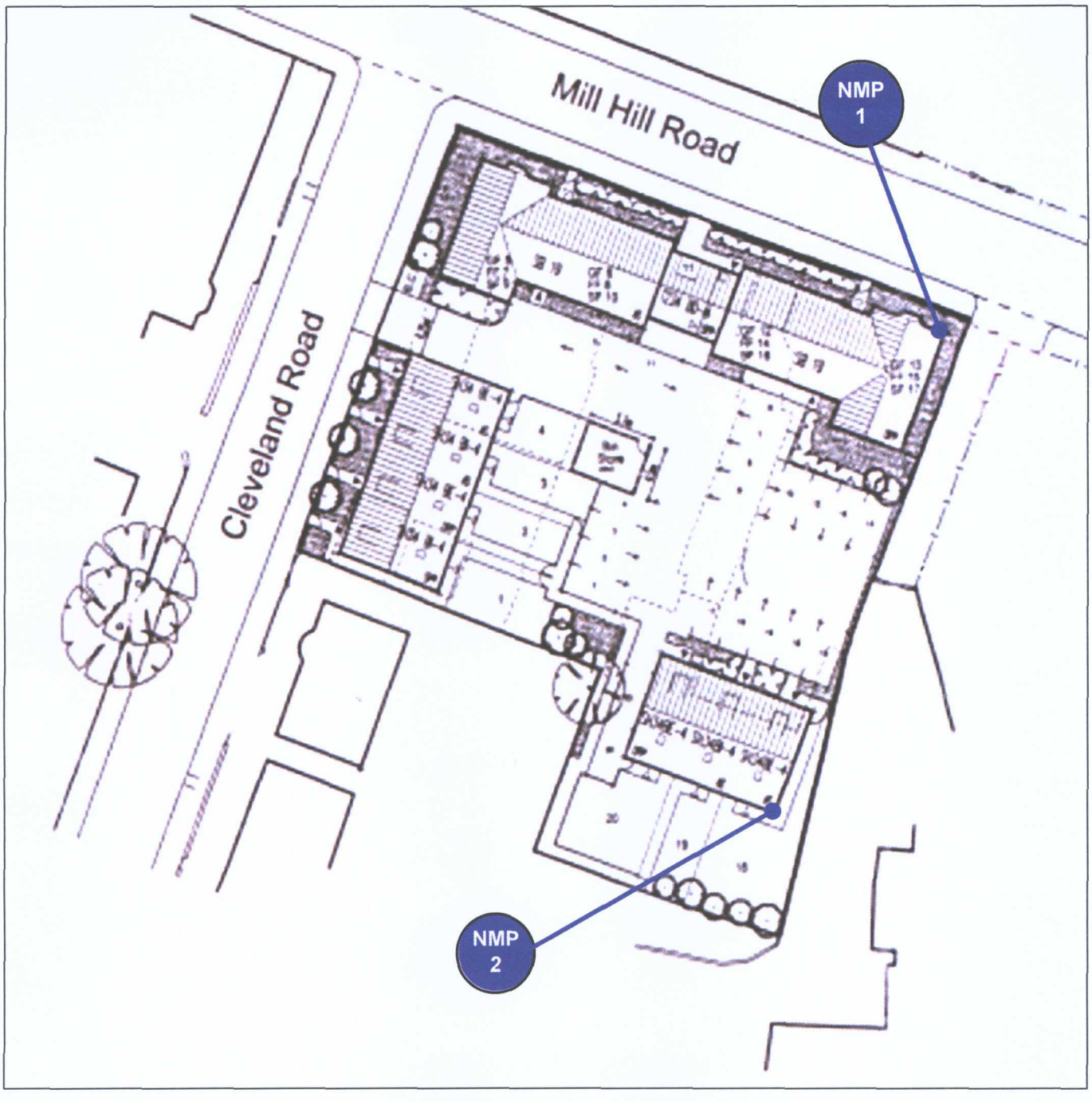

## Key

1. Proposed Residential Development Ste
2. Shadewells Blinds
3. Trinity Lane Off-Linence
4. Garages/store for Kilpatrick Developments
5. Offices of Dream Homes Kilpatrick Developments and 1st Residential Flat
6. BT Telephone Exchange
7. Iron Styles Limited Workshop & Paint Spray Booth
8. Hi-speed DIY Warehouse (very occasional use)
9. Commercial Premises Carpark
10. Trinity Church

# Location Plan showing Environmental Aspects around the Development Site

Ref: BiS C474/151/JMB

BiS




# Location Plan showing Site Layout & Noise Measurement Positions

Ref: BiS C474/151/JMB

# Appendix 2

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, CM6 1HD
www.campbell-associates.co.uk

# Certificate of Calibration

UKAS CALIBRATION 0789

Certificate number: U4380 **CALIBRATION**

**Test object : Sound Level Meter**
**Manufacturer: Norsonic**
**Type : 118**
**Serial no: 31341**

**Customer: BIS Ltd**
**Business Improvement Services**
**Bretby Business Park**
**Burton on Trent, Staffordshire, DE15 0YZ**
**Mr John Beighton**
**Order no.: Verbal**

Method of Calibration
Calibration has been performed as set out in the CA Technical procedures TP01 & 2 as appropriate.

The following items have been tested according to BS 7580, Part 1, 1997

| | Producer: | Type: | Serial No: |
|---|---|---|---|
| Microphone | Norsonic | 1225 | 48100 |
| Calibrator* | Norsonic | 1251 | 30875 |
| Preamplifier | Norsonic | 1206 | 30369 |

Additional items that also have been submitted for verification

| | |
|---|---|
| Wind shield | None |
| Attenuator | None |

| Environmental conditions: | Pressure : | Temperature : | Relative humidity : |
|---|---|---|---|
| Reference conditions: | 101,325 kPa | 23,0 °C | 50 %RH |
| Measurement conditions : | 100.99 kPa | 23.6 °C | 50.4 %RH |

Date received : 12/10/2008
Date of calibration: 13/10/2008
Date of issue: 30/10/2008

Engineer [redacted]
David Egan

Supervisor [redacted]
Ian Campbell MSc MIOA

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificates may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

* The calibrator was complete with any required coupler for the microphone specified

# *Certificate of Calibration*

**Certificate No.: 11801505**

| | |
|---|---|
| **Object** | Real time Analyser Nor-118 |
| **Supplier** | Norsonic AS |
| **Type** | 118 |
| **Serial number** | 32196 |
| **Client** | Business Improvement Services Limited<br>GREAT BRITAIN |

**Calibration complies with the following standard(s)**

IEC 61672-1:2002 class 1
IEC 60651 type 1
IEC 60804 type 1
IEC 61260 class 1
ANSI S1.4-1983 (R2001) with amd. S1.4A-1985 class 1
ANSI S1.43-1997 (R2002) class 1
ANSI S1.11-2004 class 1
DIN 45 657, Applicable parts
Norsonic production standard set for the Nor118

**Instrumentation used for calibration traceable to**

Electrical Parameters: MT, Norway
Acoustical Parameters: PTB, Germany
Environmental Parameters: IKM, Norway. Justervesenet. Norway

**Adjustments** None

**Comments** None

| **Date of calibration** | **Calibration interval recommended** |
|---|---|
| 12.08.2009 | 2 years |

**The environmental parameters applicable to this calibration are kept well within limits ensuring negligible deviation on obtained measurement results.**

**Calibrated by**
Anders Amundsen

Norsonic
P.O. BOX 24, N-3421 LIERSKOGEN, NORWAY

Sign. AA

Norsonic AS, P.B 24, 3421 Lierskogen. Visitor address: Gunnersbråtan 2, Tranby, Norway.
Phone +47 32858900 Fax.: +47 32852208. email: norsonic@online.no

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, CM6 1HD
www.campbell-associates.co.uk
Phone 01371 871030 Facsimile 01371879106

# Certificate of Calibration

**Certificate number:** **U5709** **CALIBRATION** **0789**

| | |
|---|---|
| **Test object :** | **Sound Level Meter** |
| **Manufacturer:** | **Norsonic** |
| **Type :** | **131** |
| **Serial no:** | **1312934** |
| **Customer:** | **BIS Ltd**<br>**Business Improvement Services**<br>**Bretby Business Park, Ashby Road**<br>**Mr John Beighton** |
| **Order no.:** | **007JMB** |

Method of Calibration
Calibration has been performed as set out in the CA Technical procedures TP01 & 2 as appropriate.

The following items have been tested according to IEC 60651

| | Producer: | Type: | Serial No: | Certificate number |
|---|---|---|---|---|
| Microphone | Norsonic | 1228 | 00843 | 5707 |
| Calibrator* | Norsonic | 1251 | 30875 | U5708 |
| Preamplifier | Norsonic | 1207 | 12188 | U5709 |

Additional items that also have been submitted for verification

| | | |
|---|---|---|
| Wind shield | Norsonic | Nor1451 |
| Attenuator | None | |

These items have been taken into account wherever appropriate.

| Environmental conditions: | Pressure : | Temperature : | Relative humidity : |
|---|---|---|---|
| Reference conditions: | 101.325 kPa | 23.0 °C | 50 %RH |
| Measurement conditions : | 100.602 kPa | 23.7 °C | 56 %RH |

Date received : 25/08/2009
Date of calibration: 27/08/2009
Date of issue: 27/08/2009

Engineer

Ian Campbell MSc HonFIOA

Supervisor

David Egan – Laboratory Manager

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

* The calibrator was complete with any required coupler for the microphone specified

**Campbell Associates Ltd**
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, CM6 1HD
www.campbell-associates.co.uk

# Certificate of Calibration

UKAS CALIBRATION 0789

## Certificate No.: U5708

**CALIBRATION**

| | |
|---|---|
| Test object : | Sound Calibrator |
| Manufacturer: | Norsonic |
| Type : | 1251 |
| Serial no: | 30875 |
| Customer: | BIS Ltd<br>Business Improvement Services<br>Bretby Business Park, Ashby Road<br>Burton upon Trent, Staffordshire, DE15 0YZ |
| Order No: | 007JMB |

| Measurement Results: | Level | Level Stability | Frequency | Frequency Stability | Distortion |
|---|---|---|---|---|---|
| 1: | 114.05 dB | 0.06 dB | 999.97 Hz | 0.00 % | 0.56 % |
| 2: | 114.06 dB | 0.06 dB | 999.97 Hz | 0.00 % | 0.55 % |
| 3: | 114.05 dB | 0.06 dB | 999.97 Hz | 0.00 % | 0.58 % |
| **Result (Average):** | **114.05 dB** | **0.06 dB** | **999.97 Hz** | **0.00 %** | **0.56 %** |
| Expanded Uncertainty: | 0.10 dB | 0.02 dB | 1.00 Hz | 0.01 % | 0.10 % |
| Degree of Freedom: | >100 | >100 | >100 | >100 | >100 |
| Coverage Factor: | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |

The stated level is relative to 20µPa.
The stated level is valid at reference conditions. The following correction factors have been applied during the measurement:
Pressure : 0.0005 dB/kPa Temperature : 0.003 dB/°C Relative humidity : 0.000 dB/%RH Load volume : 0.0003 dB/mm3
The reported expanded uncertainty of measurements is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. Where the degrees of freedom are insufficient to maintain this confidence level then the coverage factor is increased to maintain this confidence level. The uncertainty has been calculated in accordance with UKAS requirements.

Records : K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2009\NOR1251_30875_M1.nmf

| Environmental conditions: | Pressure : | Temperature : | Relative humidity : |
|---|---|---|---|
| Reference conditions: | 101,325 kPa | 23,0 °C | 50 %RH |
| Measurement conditions : | 100.589 ± 0.012 kPa | 24.2 ± 1.2 °C | 59.5 ± 4.4 %RH |

Date received : 25/08/2009
Date of calibration: 27/08/2009
Date of issue: 27/08/2009

Engineer

Ian Campbell MSc ~~HonFIOA~~

Supervisor

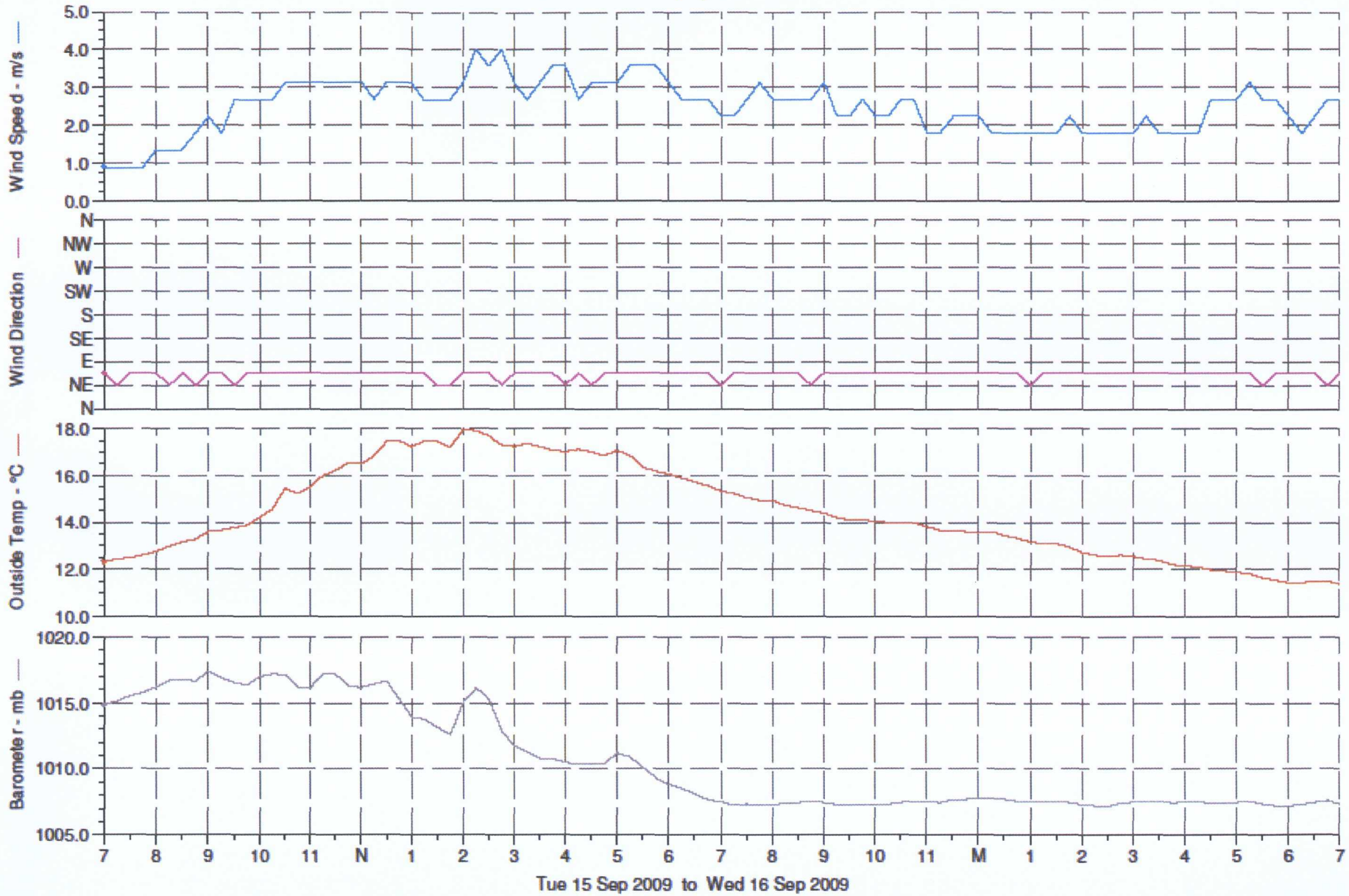
David Egan – Laboratory Manager

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceablity of measurement to recongnised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full without the prior written approval of the issuing laboratory.

# Appendix 3

BiS

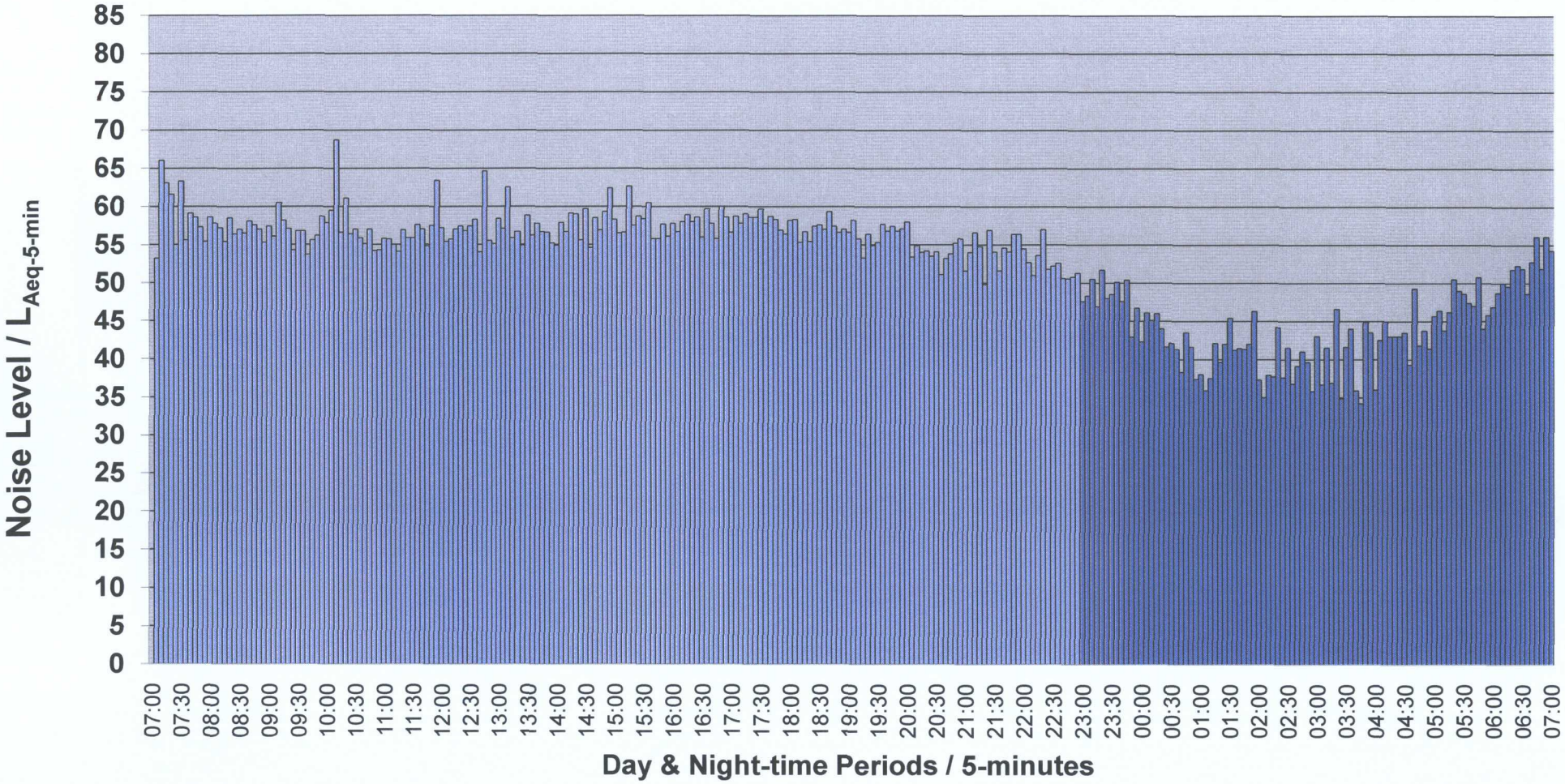
BIS Weather Station 1
Day Span




## Localised Weather during Noise Survey Period on Site

Ref: BiS C472/151/JMB

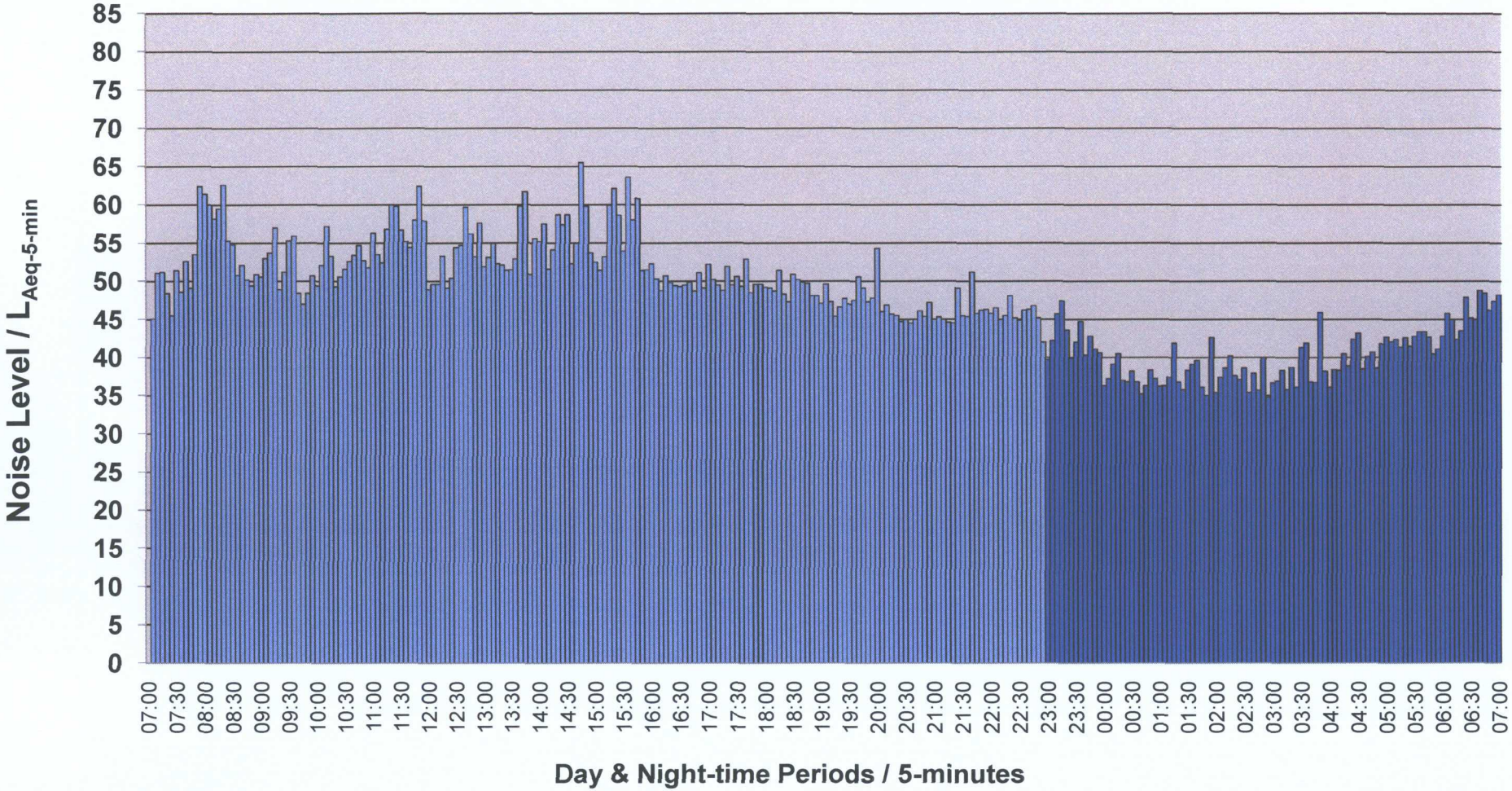
# Chart 1 : NMP 1 - Ambient Noise Level, $L_{Aeq\text{-}5\text{-}min}$ -v- Time




**Summary:**

1. NMP 1 Day-time Level $L_{Aeq\ 16\text{-}hour}$ = 58 dB
2. NMP 1 Night-time Level $L_{Aeq\ 8\text{-}hour}$ = 47 dB

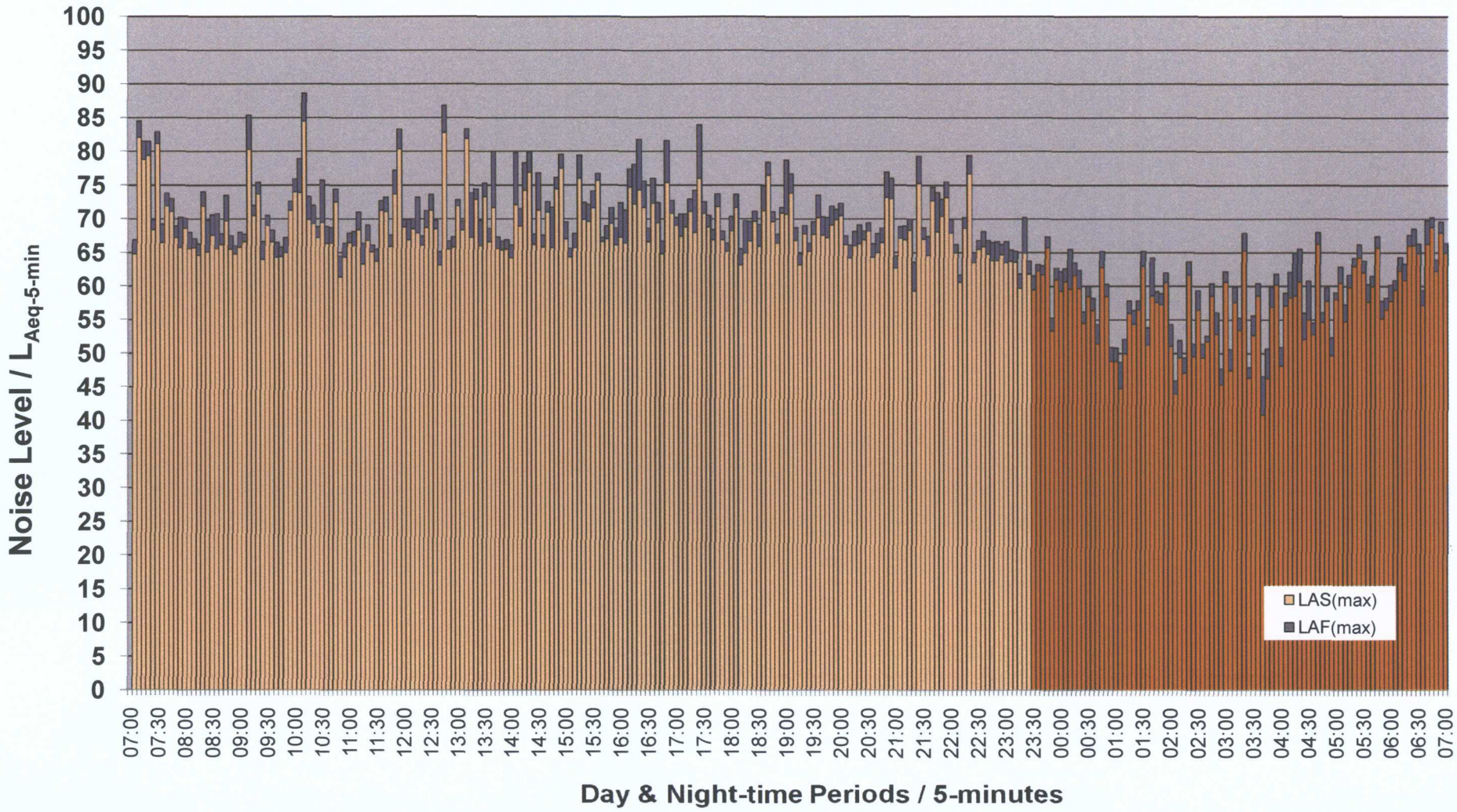
## Chart 2 : NMP 2 - Ambient Noise Level, $L_{Aeq\text{-}5\text{-}min}$ -v- Time



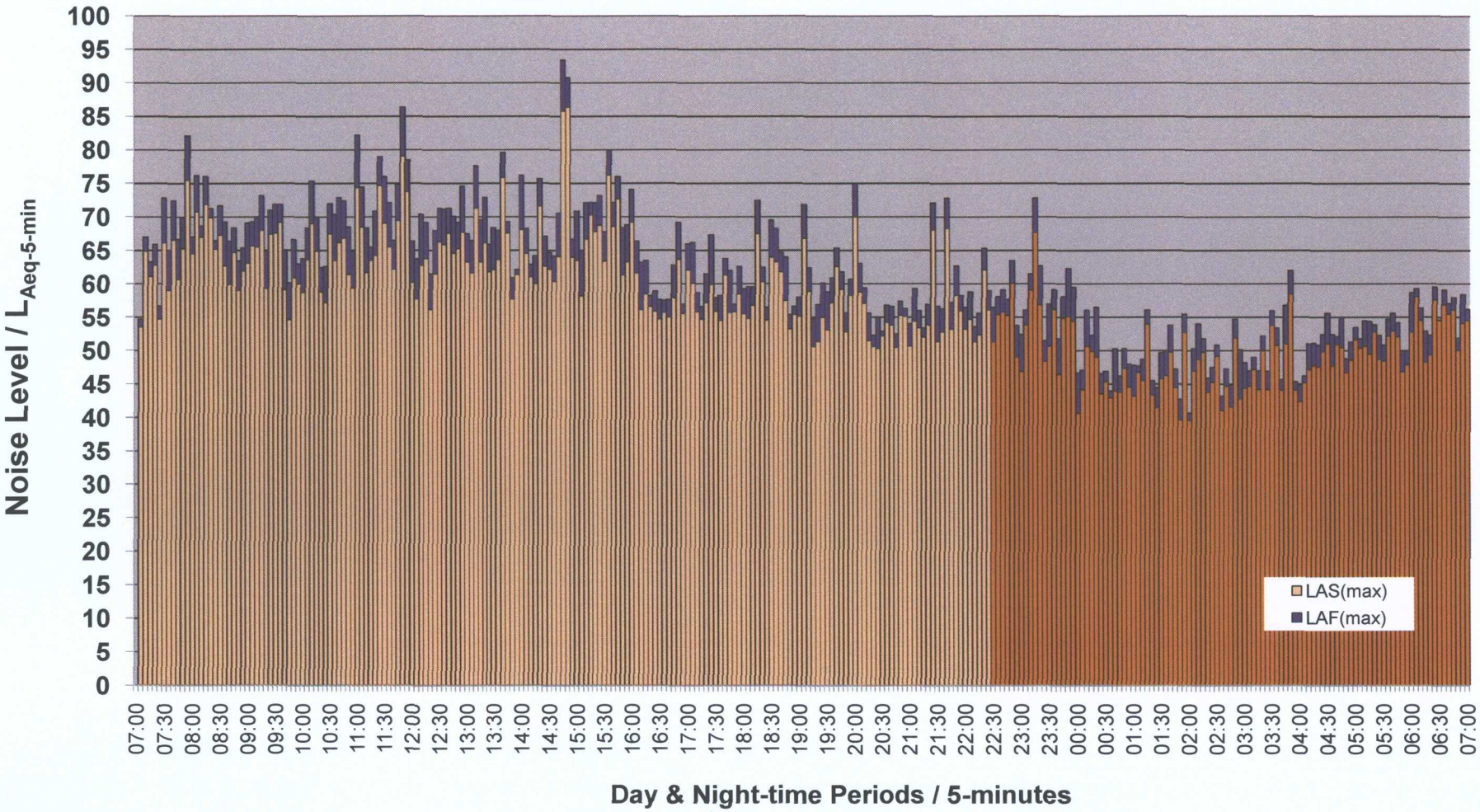

**Summary:**

**1. NMP 2 Day-time Level $L_{Aeq\ 16\text{-}hour}$ = 54 dB 2. NMP 2 Night-time Level $L_{Aeq\ 8\text{-}hour}$ = 42 dB**

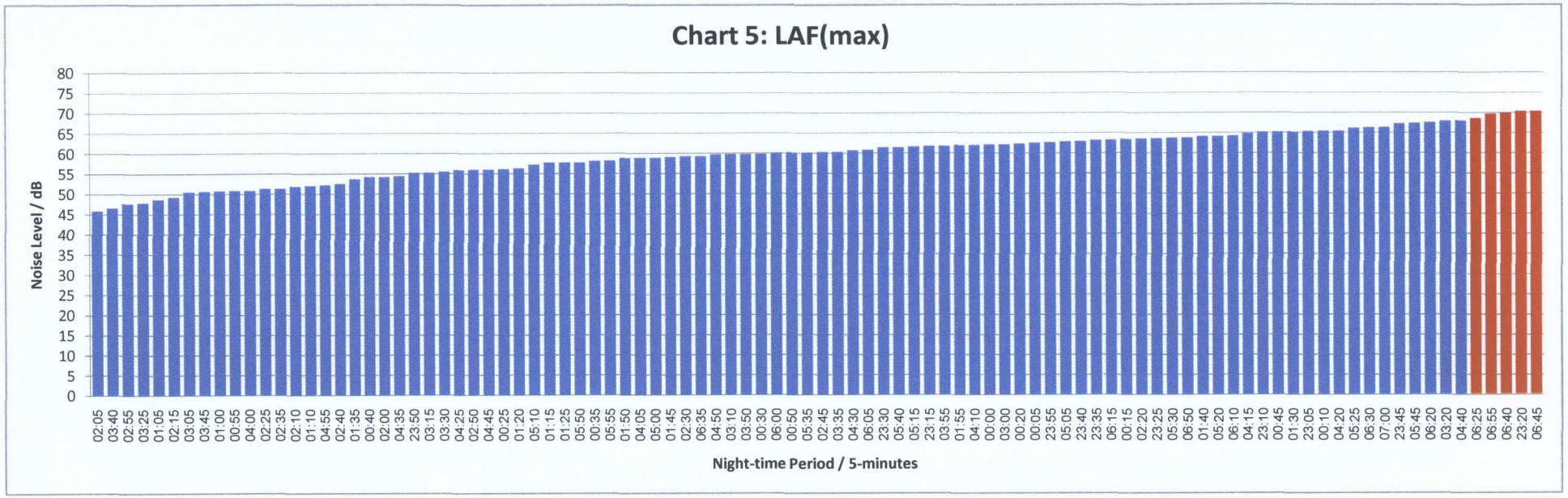
# Chart 3 : NMP 1 - Ambient Noise Level, $L_{AMax\ (fast\ \&\ slow)}$ -v- Time

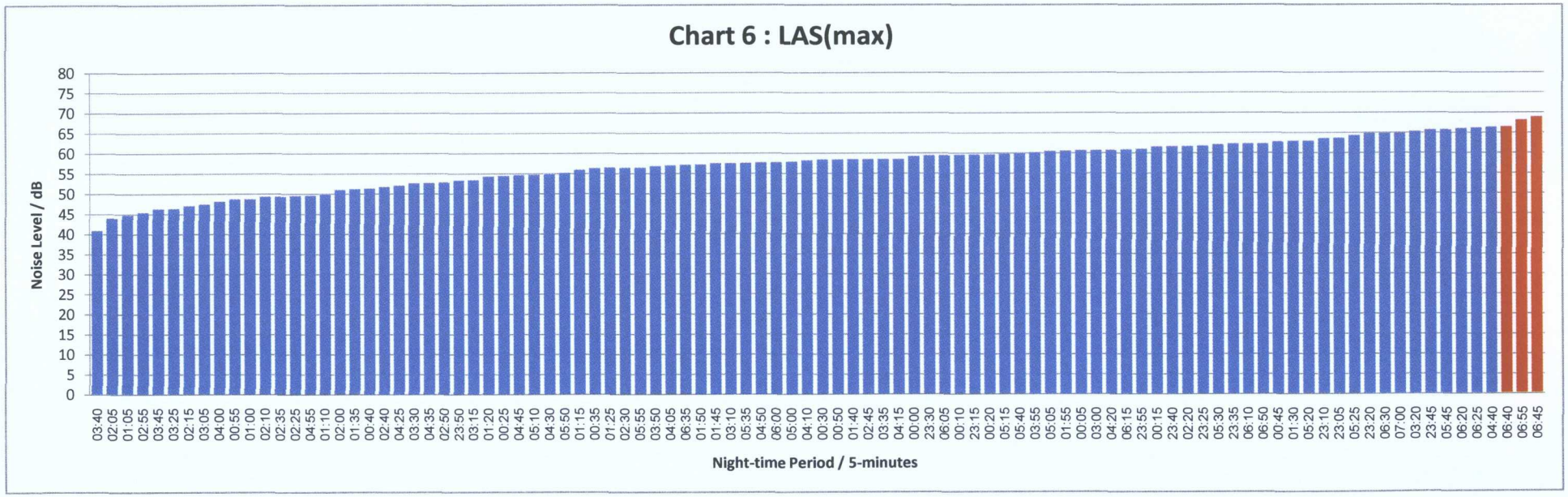


# Chart 4 : NMP 2 - Ambient Noise Level, $L_{AMax\ (fast\ \&\ slow)}$ -v- Time



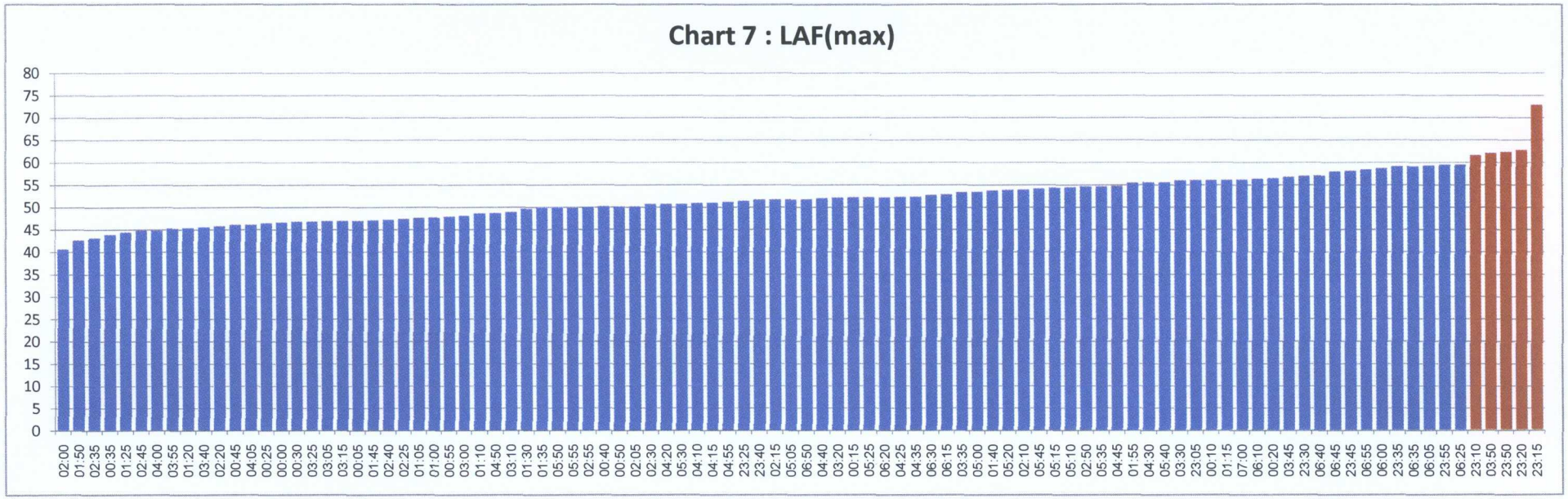
## Chart 5 & 6 : Distribution of Night-time $L_{AMax}$ Levels at NMP1

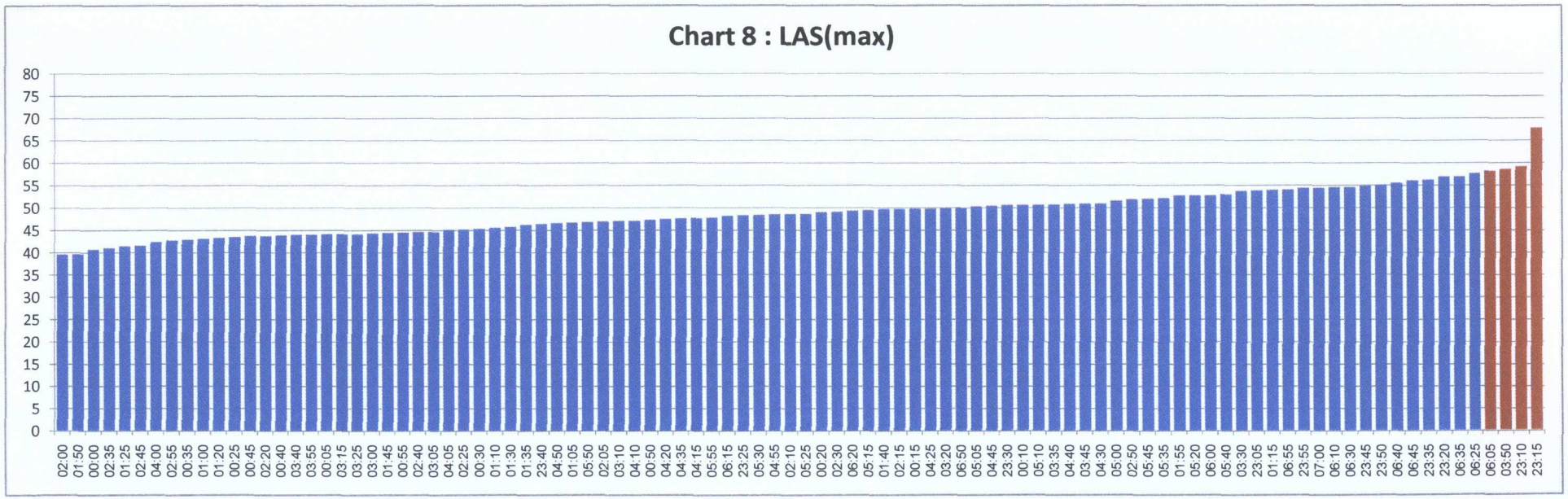



***Note: Red Bars indicate infrequent events not indicative of general conditions***

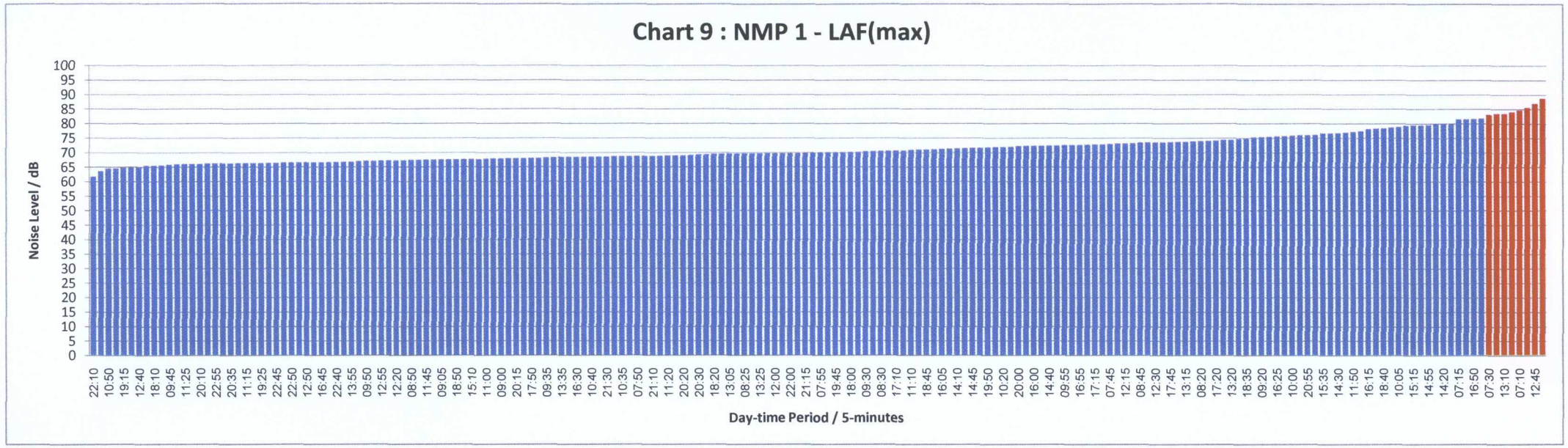
## Chart 7 & 8 : Distribution of Night-time $L_{AMax}$ Levels at NMP 2

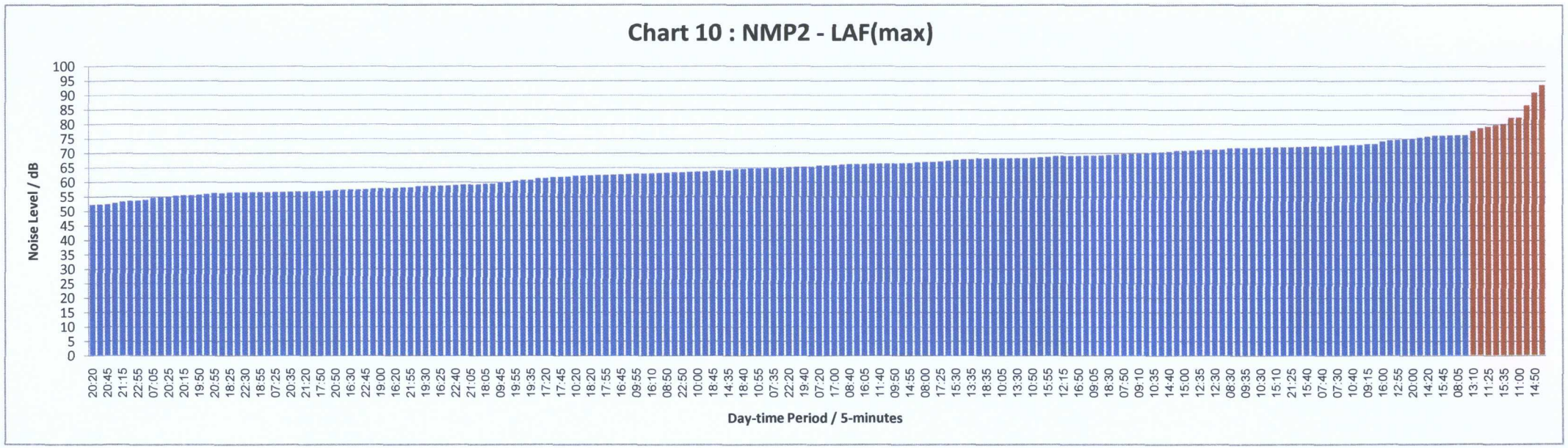



***Note: Red Bars indicate infrequent events not indicative of general conditions***

## Chart 9 & 10 : Distribution of Night-time $L_{AMax}$ Levels at NMP1 & NMP 2




*Note: Red Bars indicate infrequent events not indicative of general conditions*

# Appendix 4

**PPG 24 : Noise Exposure Categories For Dwellings**

**1.** When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC, as below:

| NEC | |
|---|---|
| A | Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level. |
| B | Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise. |
| C | Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise. |
| D | Planning permission should normally be refused. |

**2.** A recommended range of noise levels is given below for each of the NECs for dwellings exposed to noise from road, rail, air, and "mixed sources". Annex 2 provides a detailed explanation of how the boundaries of each of the NECs have been derived. Paragraph 9 of the main text explains that in some cases local planning authorities may be able to justify a range of NECs of up to 3 dB(A) above or below those recommended.

**3.** The NEC noise levels should not be used for assessing the impact of industrial noise on proposed residential development because the nature of this type of noise, and local circumstances, may necessitate individual assessment and because there is insufficient information on people's response to industrial noise to allow detailed guidance to be given. However, at a mixed noise site where industrial noise is present but not dominant, its contribution should be included in the noise level used to establish the appropriate NEC.

**4.** The NEC procedure is only applicable where consideration is being given to introducing residential development into an area with an existing noise source, rather than the reverse situation where new noise sources are to be introduced into an existing residential area. This is because the planning system can be used to impose conditions to protect incoming residential development from an existing noise source but, in general, developers are under no statutory obligation to offer noise protection measures to existing dwellings which will be affected by a proposed new noise source. Moreover, there would be no obligation on individuals with an interest in each dwelling affected to take up such an offer, and therefore no guarantee that all necessary noise protection measures would be put in place.

**Recommended Noise Exposure Categories for Dwellings Near Existing Noise Sources**

| Noise Levels[0] Corresponding To The Noise Exposure Categories For New Dwellings $L_{Aeq,T}$ dB | | | | |
|---|---|---|---|---|
| | Noise Exposure Category | | | |
| **Noise Source** | **A** | **B** | **C** | **D** |
| **road traffic** | | | | |
| 07.00 - 23.00 | <55 | 55 - 63 | 63 - 72 | >72 |
| 23.00 - 07.00[1] | <45 | 45 - 57 | 57 - 66 | >66 |
| **rail traffic** | | | | |
| 07.00 - 23.00 | <55 | 55 - 66 | 66 - 74 | >74 |
| 23.00 - 07.00[1] | <45 | 45 - 59 | 59 - 66 | >66 |
| air traffic[2] | | | | |
| 07.00 - 23.00 | <57 | 57 - 66 | 66 - 72 | >72 |
| 23.00 - 07.00[1] | <48 | 48 - 57 | 57 - 66 | >66 |
| **mixed sources[3]** | | | | |
| 07.00 - 23.00 | <55 | 55 - 63 | 63 - 72 | >72 |
| 23.00 - 07.00[1] | <45 | 45 - 57 | 57 - 66 | >66 |

**Notes**

[0]**Noise levels:** the noise level(s) ($L_{Aeq,T}$)used when deciding the NEC of a site should be representative of typical conditions.

[1]**Night-time noise levels (23.00 - 07.00):** sites where individual noise events regularly exceed 82 dB $L_{Amax}$ (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8h}$ (except where the $L_{Aeq,8h}$ already puts the site in NEC D).

[2]**Aircraft noise:** daytime values accord with the contour values adopted by the Department for Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects.

[3]**Mixed sources:** this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant.

To check if any individual noise source is dominant (for the purposes of this assessment) the noise level from the individual sources should be determined and then combined by decibel addition (remembering first to subtract 2 dB (A) from any aircraft noise contour values). If the level of any one source then lies within 2 dB(A) of the calculated combined value, that source should be taken as the dominant one and the site assessed against the appropriate NEC for that source, rather than using the "mixed source" NECs. If the dominant source is industrial noise see paragraph 19 of Annex 3.

If the contribution of the individual noise sources to the overall noise level cannot be determined by measurement and/or calculation, then the overall measured level should be used and the site assessed against the NECs for "mixed sources".

**Table 5 — Indoor ambient noise levels in spaces when they are unoccupied**

| Criterion | Typical situations | Design range $L_{Aeq,T}$ dB | |
|---|---|---|---|
| | | Good | Reasonable |
| Reasonable industrial working conditions | Heavy engineering | 70 | 80 |
| | Light engineering | 65 | 75 |
| | Garages, warehouses | 65 | 75 |
| Reasonable speech or telephone communications | Department store | 50 | 55 |
| | Cafeteria, canteen, kitchen | 50 | 55 |
| | Wash-room, toilet | 45 | 55 |
| | Corridor | 45 | 55 |
| Reasonable conditions for study and work requiring concentration | Library, cellular office, museum | 40 | 50 |
| | Staff room | 35 | 45 |
| | Meeting room, executive office | 35 | 40 |
| Reasonable listening conditions | Classroom | 35 | 40 |
| | Church, lecture theatre, cinema | 30 | 35 |
| | Concert hall, theatre | 25 | 30 |
| | Recording studio | 20 | 25 |
| Reasonable resting/sleeping conditions | Living rooms | 30 | 40 |
| | Bedrooms[a] | 30 | 35 |

[a] For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB $L_{Amax}$

**Table 6 — Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important**

| Criterion | Typical situations | Design range $L_{Aeq,T}$ dB |
|---|---|---|
| Reasonable acoustic privacy in shared spaces | Restaurant | 40–55 |
| | Open plan office | 45–50 |
| | Night club, public house | 40–45 |
| | Ball room, banquet hall | 35–40 |
| | Reception room | 35–40 |

**7.6.1.4** *Other precautions*

It is recommended that any partition separating a WC from a noise sensitive room should have a weighted standardized level difference ($D_{nT,w}$) of at least 38 dB.

In flats, sound absorbent materials should be applied to the ceiling surfaces of internal corridors and stairwells to reduce propagation of noise through the building.

NOTE Carpets can also provide useful absorption.

Resilient floor coverings, such as carpet with underlay, can be used to minimize noise from footsteps on stair treads, corridors and landings. Noise will be reduced at the same floor level and to rooms below the floor or stair. The quietest types of sanitary, heating and plumbing equipment (e.g. WCs, ball valves, refuse chutes etc.) should be used; however their location is more important than their detailed design.

It is good practice to isolate vibration in the heating pipework from the building structure, at least near the pump. This may be achieved by using resilient fixings on pipe runs. Where pipes penetrate walls and floors, air gaps should be sealed to reduce airborne noise transmission in such a way that structure-borne noise is not transmitted: this may be achieved by packing the gap with mineral wool, and sealing the faces with non-hardening mastic. Building Regulations guidance for fire safety should be taken into account [24], [25], [26]. Ventilation fans and similar equipment should have resilient mountings where structure-borne noise could be a problem.

Care should be taken to position lifts to minimize noise disturbance from the operation of the control gear. Lift doors should operate quietly, and acoustic signals to herald lift arrival should not be audible within dwellings.

NOTE For additional guidance see [10].

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## Table 4.1: WHO Guideline values for community noise in specific environments.

| Specific environment | Critical health effect(s) | LAeq [dB] | Time base [hours] | LAmax, [dB] |
|---|---|---|---|---|
| Outdoor living area | Serious annoyance, daytime and evening | 55 | 16 | - |
| | Moderate annoyance, daytime and evening | 50 | 16 | - |
| Dwelling, indoors | Speech intelligibility and moderate annoyance, daytime and evening | 35 | 16 | |
| Inside bedrooms | Sleep disturbance, night-time | 30 | 8 | 45 |
| Outside bedrooms | Sleep disturbance, window open (outdoor values) | 45 | 8 | 60 |
| School class rooms and pre-schools, indoors | Speech intelligibility, disturbance of information extraction, message communication | 35 | during class | - |
| Pre-school bedrooms, indoors | Sleep disturbance | 30 | sleeping-time | 45 |
| School, playground outdoor | Annoyance (external source) | 55 | during play | - |
| Hospital, ward rooms, indoors | Sleep disturbance, night-time | 30 | 8 | 40 |
| | Sleep disturbance, daytime and evenings | 30 | 16 | - |
| Hospitals, treatment rooms, indoors | Interference with rest and recovery | #1 | | |
| Industrial, commercial shopping and traffic areas, indoors and outdoors | Hearing impairment | 70 | 24 | 110 |
| Ceremonies, festivals and entertainment events | Hearing impairment (patrons:<5 times/year) | 100 | 4 | 110 |
| Public addresses, indoors and outdoors | Hearing impairment | 85 | 1 | 110 |
| Music through headphones/ earphones | Hearing impairment (free-field value) | 85 #4 | 1 | 110 |
| Impulse sounds from toys, fireworks and firearms | Hearing impairment (adults) | - | - | 140 #2 |
| | Hearing impairment (children) | - | - | 120 #2 |
| Outdoors in parkland and conservation areas | Disruption of tranquillity | #3 | | |

#1: as low as possible; #2: peak sound pressure (not LAmax), measured 100 mm from the ear;
#3: existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low; #4: under headphones, adapted to free-field values

# Appendix 5

### 8.4.7 *Windows*

#### 8.4.7.1 *General*

Table 10 gives guide values for the sound insulation of windows, as measured in the field.

NOTE Further information is given in BS 6262 and [31].

The nomogram in annex A can be used to estimate the insulation of a wall containing a window.

The full insulation value of any window cannot be realized if there are air gaps. These commonly occur around frames due to insecure fixing, shrinkage of wood and poor maintenance, and between frames and opening lights.

Glass often shows a pronounced dip in insulation at its critical frequency (see annex E). For 6 mm glass this is around 2 000 Hz. Laminated glass performs better because the increased damping reduces the effect.

When adjoining rooms have their windows open the sound reduction from one to the other will be limited to about 30 dB if there are other buildings close to the windows to reflect the sound back. When the window is closed in one of the rooms, a reduction of over 50 dB between the rooms should be obtainable, and with both windows closed, this flanking path should not limit the insulation provided by normal separating elements.

#### 8.4.7.2 *Double glazed thermal insulating glass units*

An insulating unit is unlikely to perform better than a single pane of mass equivalent to the thicker pane of the sealed unit and should be used in a frame with good seals to realize its full potential.

#### 8.4.7.3 *Secondary windows*

In addition to the need for good sealing, the following recommendations apply for double windows.

a) The air space should be at least 100 mm, although for good performance over the main frequency range of interest a cavity of about 300 mm is desirable.

b) The sides and top of the reveal should be lined with sound absorbent (the bottom should be left clear to avoid staining due to condensation).

c) The best results are obtained if both windows are sealed, but this has obvious difficulties for cleaning (and means of escape where appropriate). When opening lights are used some loss of insulation will occur, but this can be minimized by good quality fittings and weather stripping.

d) The outer pane can be an insulating glass unit to improve performance and reduce condensation.

**Table 10 — Sound insulation of typical windows**

| Description | Weighted sound reduction index $R_w$ dB |
|---|---|
| Any type of window in a façade when partially open | 10–15 |
| Single glazed windows (4 mm glass) | 22–30 |
| Thermal insulating units (6-12-6) | 33–35 |
| Secondary glazed windows (6-100-6) | 35–40 |
| Secondary glazed windows (4-200-4) | 40–45 |

#### 8.4.7.4 *Ventilation*

The Building Regulations on ventilation [32], [33], [34] recommend that habitable rooms in dwellings have background ventilation. Trickle ventilators can provide this, and sound attenuating types are available. Where sound insulation requirements preclude opening windows for rapid ventilation and cooling, acoustic ventilation units incorporating fans are available for insertion in external walls; these can provide sound reduction comparable with domestic secondary glazing. However, ducted systems with intakes on the quiet side of the building may be required in very noisy situations, or where appearance rules out through-the-wall fans.

### 8.4.8 *Floors and ceilings*

#### 8.4.8.1 *General*

As far as sound insulation is concerned, ground floors are of marginal interest except where they may contribute to flanking transmission by passing through a separating wall. Intermediate floors are the main concern and these are available with a variety of structural components and finishes.

Intermediate separating floors suitable for use in dwellings, which are described in the technical documents that support the Building Regulations [21], [22], [23], fall into the following three broad categories for new buildings:

— a concrete base with a soft covering;

— a concrete base with a floating layer; and

— a timber base with a floating layer.

Guidance on upgrading existing floors is also provided. The technical documents contain details of points to watch and should be consulted for work in dwellings. As the gaps between pre-cast units in beam and block floors are difficult to seal well, a bonded screed is strongly recommended.

Dwellings that adjoin other buildings with activities that generate noise levels greater than normal domestic activities may require constructions offering better performance than those described in the documents that support the Building Regulations.

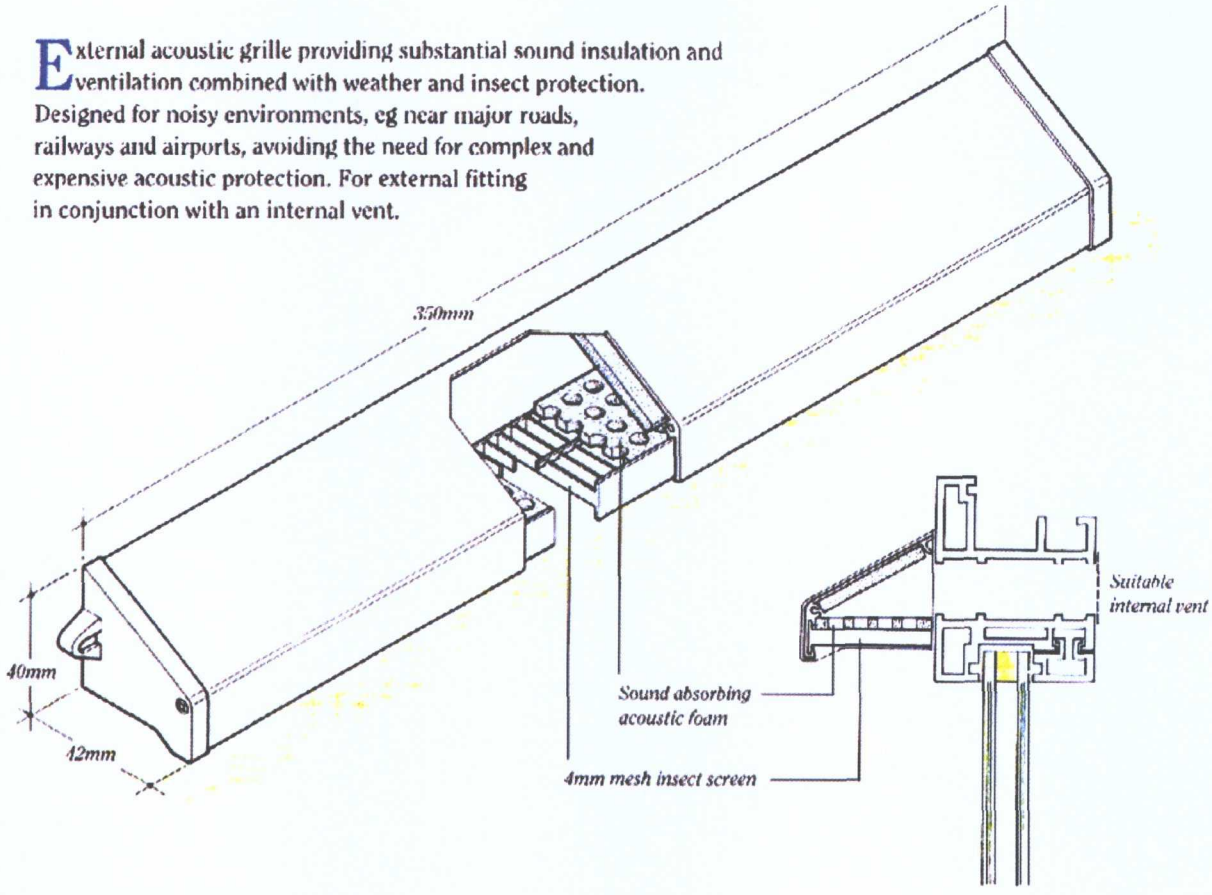
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Ref; BiS/479/217/JMB

# ACOUSTIC GRILLE

External acoustic grille providing substantial sound insulation and ventilation combined with weather and insect protection. Designed for noisy environments, eg near major roads, railways and airports, avoiding the need for complex and expensive acoustic protection. For external fitting in conjunction with an internal vent.




## FEATURES AND BENEFITS

- Provides substantial sound reduction. Ideal for noisy environments.
- Very robust construction. Ideal for high abuse areas.
- 4mm rigid mesh injection-moulded plastic insect screen. Protects against insect ingress; prolonged life, will not rot or corrode.
- Integral mastic sealant groove. Provides additional protection against water penetration.

**Dimensions**

| Type Code | Ventilation area | Overall length |
|---|---|---|
| TVAG4 | 4000mm² | 370mm* |

*including end lugs.

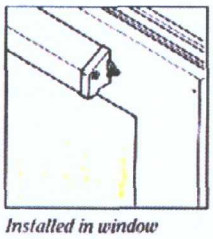
*Material:* aluminium with polyester paint finish to BS 6496. Injection-moulded plastic end caps and insect screen. Closed-cell expanded polyethylene acoustic foam lining.

*Colours:* white or brown. Colour co-ordinated end caps. Other colours to special order subject to minimum quantity.

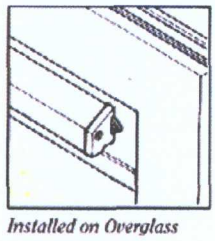
*Fixing:* by screws through end lugs.

**Sound reduction and slot size** (when used with internal vents)

| Internal vent code | | Slot size | Sound reduction |
|---|---|---|---|
| Delta Vent | TVDV4 | 308 x 15mm | 48dB |
| Frame Vent | TVFV4 | 308 x 15mm | 48dB |
| Ultra Vent | TVUV4 | 315 x 15mm | 48dB |



*Installed in window*



*Installed on Overglass*

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**Manufacturers of UPVC, hardwood, aluminium and glass products for the domestic and commercial market**

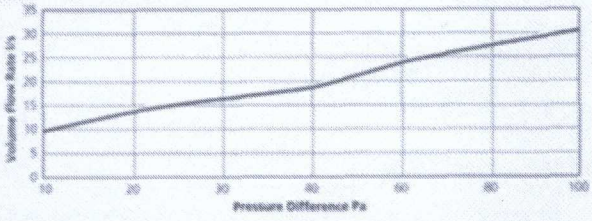

Ref: BiS467/862/JMB

# AAB-4000
## Acoustic Airbrick

GREENWOOD AIRVAC
Environmental

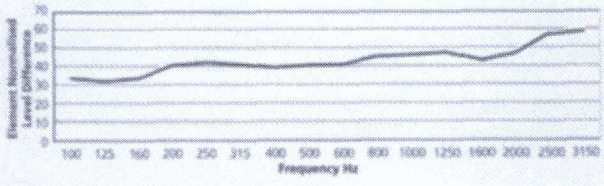
### Product Performance

**BS EN 1314-1 Airflow Performance (l/s)**
**Open Position**




### Acoustic Performance

**BS EN ISO 717-1: 1997 Airborne Sound Insulation (dB)**
**Closed Position**




**Dn,e,w (C;Ctr)** = 46(0;-2) dB
**Dn,e,w (C)** = 46dB
**Dn,e,w (Ctr)** = 44dB

**Dn,e,w:** Average weighted performance across frequency range
**C:** Pink Noise
**Ctr:** Road Noise

**Full specification detail and test reports are available on request.**

### How to order

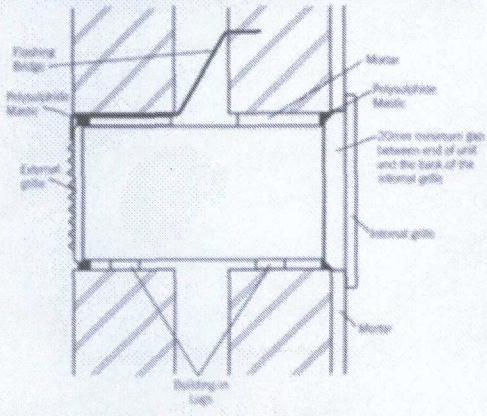
Please state:

1 **Model** – AAB
2 **Grille** – AAB-**C**
4 **Quantity** – 10.

AAB x 10
AAB-C x 10

**To order please contact Greenwood Customer Services on 01903 777130**

### Installation Instructions




1 Cut an opening 240mm x 165mm through the wall.
2 Place ventilator in opening, ensuring external louvre is flush with face of wall. Building-in lugs should act as feet and should be seated firmly in cement.
3 Make good prior to pointing with Polysulphide Mastic.
4 Fix cavity flashing:
For existing building – cut opening 100mm long on each side at top of prepared opening. Position 440mm wide lead flashing, allowing flashing to bridge cavity and turn up at least 75mm.
For new building – build into inner leaf of cavity at least one course above ventilator. Lead flash to extend 100mm beyond ventilator on each side.





5 Dress down flashing 25mm, covering edge of external grille.
6 Fit exposed site baffle if required. Punch out 4 corner holes and fit to acoustic airbrick with self-tapping screws.
7 Minimum 20mm space must be left between the end of the unit and back of the internal grille. If wall does not permit 20mm space, use timber surround.
8 Fit internal grille.

### Maintenance

Greenwood recommends that any dust be simply removed from the internal mechanism without dismantling.

**For further information, please contact Greenwood Technical Services on: 01903 777137**

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