

From: William J Hill/HP/NorthLincs
To: Robert Starbuck/NE/NorthLincs@NorthLincs, Planning/PL/NorthLincs@NorthLincs

Date: 06 September, 2010 11:33AM
Subject: Fw: RE: RE: Keigars at brigg.

Rob. 2008/0338

Does this help you to give me your formal comments now?

Bill

-----Forwarded by William J Hill/HP/NorthLincs on 06/09/2010 11:30AM -----

To: "William J Hill" <William.Hill@northlincs.gov.uk>
From: "Dan Drayton" <DD@dns-planning.co.uk>
Date: 01/09/2010 09:11AM
Subject: RE: RE: Keigars at brigg.

Bill,

Thank you for updating me with this. I also attach our revised Noise Assessment following the comments you forwarded me from your Environmental Health Officer.

Thanks

Dan Drayton

Senior Planner

dnsplanning+design



From: William J Hill [mailto:William.Hill@northlincs.gov.uk]
Sent: 26 August 2010 09:40
To: Dan Drayton
Cc: annette.hewitson@environment-agency.gov.uk
Subject: Fw: RE: Keigars at brigg.

Dan.

I pre emptied you next question , here is Annette's reply to me.

Bill

-----Forwarded by William J Hill/HP/NorthLincs on 26/08/2010 09:38AM -----

To: "William J Hill" <William.Hill@northlincs.gov.uk>
From: "Hewitson, Annette" <annette.hewitson@environment-agency.gov.uk>
Date: 24/08/2010 01:08PM
Subject: RE: Keigars at brigg.

Hi Bill,

I'm camping in the Manby Office today and yes it's abit damp here too!

I've sent the Keigar docs onto Greg (engineer) to have a look through but we are both currently chasing a proof of evidence deadline for an Inquiry we are involved with so I don't think we will have a reply for you until that's safely submitted. To be on the safe side I think I will have to request the full 21 days from receipt on this one so that I'm not making any promises that we can't keep. I make that 9th September for our deadline, if this is Ok with you?

Many thanks,
Annette

From: William J Hill [mailto:William.Hill@northlincs.gov.uk]

Sent: 24 August 2010 11:36

To: Hewitson, Annette

Subject: Keigars at brigg.

Click [here](#) to report this email as spam.

Annette

'tis a bit damp here in Scunny bet it is in Lincoln as well.

Did you find the latest docs from Keigar ok?

What I can't understand is why we get a full set of amended plans when all they seem to have changed is a couple of levels.

Any news as Dan Drayton keeps pestering me, if not, how long will you be so I can tell him something. - (even if its a few weeks away I'm not bothered, I go away on 15th Sept for 3 weeks,nearly.)

many Thanks

Bill :-)

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Attachments:

07478 - Brigg Noise assessment Rev B 2010.pdf



Suite B, Floor 3
24 De Montfort Street
Leicester LE1 7GB
T: 0116 204 7766
F: 0116 204 7769
info@bsp-consulting.co.uk
www.bsp-consulting.co.uk

Island Carr Road, Brigg

Environmental Noise Assessment For Keigar Homes



07478

Rev B. 31.08.10



Managing Director: Eur Ing David Sumner BSc(Hons) MSc CEng MICE MIHT
Directors: Martin Breakwell BSc(Hons) CEng MICE Clive Roddick BSc(Hons) CEng MICE Mark Rayers BSc(Hons) MCIT MIHT CMILT
Associate Directors: Jason Devenport BEng(Hons) MIHT Tony Goddard BEng(Hons) CEng MICE Jef Todd EngTech TMICE Carl J Hilton MSc BSc(Hons) CEng MStructE MAPM
Associates: Paul Enoch BEng(Hons) CEng MICE Paul Whittingham BEng(Hons) CEng MStructE Phil Brown BSc MCIQB MIHT

Nottingham Office: 12 Oxford Street, Nottingham NG1 5BG Derby Office: 5 Pride Point Drive, Pride Park, Derby DE24 8BX
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1.0 EXECUTIVE SUMMARY

- 1.1 BSP Consulting has been commissioned by Keigar Homes to undertake an environmental noise assessment for a proposed Residential development. The proposed development is situated off Ancholme Way, Brigg. The location of the site is shown on Figure 1. The first part of the assessment was prepared in order to determine the level of noise emitted from the adjacent road (Ancholme Way) and its potential effect on the proposed development. The second part of the assessment was prepared in order to determine the likelihood of complaints from the proposed residents due to the adjacent industrial estate. The survey was carried out on Friday 19th/Saturday 20th January 2007 with further readings being taken on Friday 12th/Saturday 13th October 2007 and on 27th August 2010.
- 1.2 It can be seen from the calculations in Appendix 2 and also Figure 4 that small section of the site is in NEC B for the daytime period. For the night-time period a small section of the site is also within NEC B, with the remainder of the site in NEC A. Therefore further attenuation methods will be required regarding traffic noise.
- 1.3 With regard to the daytime noise, there is only a small section of outside area that is within NEC B. It is therefore proposed to install a 1.8m high close boarded fence (noise barrier) to attenuate excess noise. The barrier will be install around the boundary of plot 4. It can be seen from the proposed site plan that the proposed building locations will act as a barrier for the remaining site.
- 1.4 The night-time NEC limit of 45dB (A) is based on an internal (bedroom) noise level of 35dB (A), with 10dB (A) being allowed for an open window. Therefore to achieve the acceptable internal NEC A noise level in the bedrooms on the London Road facade, double glazing (typically 10-12-4) could be used together with some form of acoustic ventilation in bedrooms. With this combination a reduction in noise levels of around 29 dB (A) could be expected with the windows closed. This would reduce the internal noise level to $53.8 - 29 = 24.8$ dB (A), which is within the limit intimated by NEC A. This would be sufficient to achieve the acceptable NEC A levels in the bedrooms and habitable rooms along the Ancholme Way. The remainder of the proposed development would be sheltered from the noise by the buildings themselves, and therefore the

specified glazing would also be suitable.

- 1.5 The Calculation sheets in Appendix 2 show the BS4142 assessment for site. The results of the assessment indicate that under the existing noise conditions there is a difference between the distance corrected rating level and the background noise level a monitoring position 2 of -2.8dB(A) in the daytime and at monitoring position 4 of -2.7dB(A), BS4142 states that:

‘A difference of around +10dB or more indicates that complaints are likely.

A difference of around +5dB is of marginal significance

If the rating level is more than 10dB below the measured background noise level then this is a positive indication that complaints are unlikely.’

- 1.4 The assessment discussed above does not take into account any structural boundary conditions proposed for the development, which may further reduce the received noise levels at the development.
- 1.5 The assessment demonstrates that under the current conditions, the proposed site falls into the zone where complaints are unlikely for the daytime period in line with BS4142, and a small part of the site falls into NEC B for both periods in line with PPG24. We therefore consider that provided the above mitigation is applied the site is suitable for residential development when considering environmental noise.

2.0 INTRODUCTION

- 2.1 BSP Consulting has been commissioned by Keigar Homes to undertake an environmental noise assessment for a proposed Residential development. The proposed development is situated off Ancholme Way, Brigg. The location of the site is shown on Figure 1.
- 2.2 The site is bounded by the Old River Ancholme to the north, Ancholme Way (A18) to the east, Bridge Street (A18) to the south, the New River Ancholme and Island Carr Road to the west.
- 2.3 The site is situated adjacent to Ancholme Way, which is a main route into Brigg town centre. The assessment was prepared to determine the existing noise environment of the site, in order to determine what, if any, further attenuation requirements are needed.
- 2.4 In order to ensure that the assessment is representative of the noise climate affecting the site, it was established that a 24-hour noise survey would be required to measure the existing noise environment. The assessment would therefore be carried out in accordance with The Department of the Environments' Planning Policy Guidance: Planning and Noise (PPG 24).
- 2.5 It was also considered that an assessment in accordance with 'BS4142 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' would be required. The assessment determines whether the combined noise levels would be excessive and therefore detrimental to the enjoyment of residents of adjacent properties during the day time and night time period when the industrial unit is operational. Were the assessment to show that noise levels would be an issue, then proposals to help attenuate the received noise levels would be recommended.
- 2.6 For the PPG24 assessment of the site, a single noise-monitoring position adjacent to Ancholme Way would provide a representative view of the existing noise environment for the development. The location of the monitoring positions is shown on Figure 2.
- 2.7 The dominant noise source that affects the whole of the development emanates from the

adjacent road, Ancholme Way. The Department of Environment, Planning Policy Guidance: Planning and Noise (PPG24), suggests a number of noise exposure categories based on the free-field L_{Aeq} measured or predicted noise levels, at the noise sensitive properties. These noise exposure categories are used by planning authorities to assess the impact of transportation noise on residential developments. For noise not to be a determining factor in the granting of planning permission the development will need to be in noise exposure Category A. The noise levels for this category have to be at/or below 55 dB(A) in the daytime (07.00 to 23.00 hours) and 45 dB(A) for the night-time (23.00 to 07.00 hours). If the site falls into noise Category B or above, then noise control measures will be required to reduce the noise level to Category A standard.

- 2.8 The BS4142 assessment has been carried out to assess the noise emanating from the adjacent industrial unit. To ensure that the assessment was based on the worst case in terms of noise, an assessment of the existing environment was carried out during a typical day time period for the site. We consider that one noise monitoring position would provide a representative assessment of the noise source affecting the site and therefore the residents of the proposed dwellings. No monitoring took place for the night-time period at this monitoring position, as it was witnessed on site that the motor repair shop adjacent to the site and the builders merchant were closed during the night time period. As these would have been the two industrial units affecting the site during this period, then it was decided no monitoring was required.

3.0 INSTRUMENTATION

3.1 Free-field noise levels were measured at a height of 1.5 metres above the ground using the following Norsonic integrating sound level metre and microphone:

<u>Description</u>	<u>Model Type</u>	<u>Serial Number</u>
Norsonic Sound Level Meter	Nor-118	31497
Acoustic Calibrator	Nor-1251	29215

3.2 The equipment was operated according to the manufacturers instructions and calibrated before and after use, using the above portable acoustic calibrator, with no significant drifting occurring (not more than 0.5 dB). Calibration certificates are included in Appendix 3.

4.0 NOISE SURVEY

- 4.1 The noise survey was carried out during a 24 hour period at a single monitoring position in accordance with PPG24, to ensure that the measured noise levels were representative of the worst case scenario in noise terms. The survey was carried out at position 1 (see Figure 2) on Friday 19th/Saturday 20th January 2007. The weather was dry and clear during both days. Conditions were mainly calm throughout the assessment period with a slight breeze in the southerly direction of around 5mph. Temperatures varied from around 4-6 degrees in the daytime periods falling to around 0 - 1 degrees during the night-time. Further readings were taken at monitoring position 3 on Friday 12th/Saturday 13th October 2007. Conditions were calm throughout the assessment period with a slight breeze, temperatures varied from around 10-11 degrees in the daytime periods falling to around 5-6 degrees during the night-time.
- 4.2 The results of the PPG 24 noise survey are shown on data sheets 2 in Appendix 1. The existing worst-case L_{Aeq} noise levels at monitoring position 3 have been calculated from these results as 61.7dB(A) during the daytime, and 53.8dB(A) during the night-time period. These results were then distance corrected to calculate the NEC boundaries, as specified in PPG24, in order for the site to be classified for development in terms of noise.
- 4.3 For the BS4142 assessment, the survey was carried out during the daytime period in accordance with BS4142 (monitoring position 2). A series of readings were taken throughout the period to ensure that the measured noise levels were representative of the worst case scenario in noise terms.
- 4.4 For the assessment, readings were taken on the site during a typical daytime period. Firstly, background noise levels, L_{A90} , were taken adjacent to the existing industrial units. Secondly specific readings were taken adjacent to the existing unit. The results from this assessment were combined and compared as described in BS4142 using both the recorded background $L_{A90, 1hr}$ noise levels and specific noise levels, $L_{Aeq, 1hr}$. The results of the BS4142 noise survey shown on data sheet 3 in Appendix 1.

- 4.5 The results of the BS4142 assessment in Appendix 2, show that under typical week day conditions on the site, the lowest external recorded background noise level for the daytime, $L_{A90,1hr}$, was 53.1dB(A), with the highest corresponding calculated external specific noise level, $L_{Aeq,1hr}$ of 56.6dB(A). These results, together with the BS4142 assessment are discussed in detail in the following sections, with the results of the BS4142 noise survey shown on data sheet 1 in Appendix 1.
- 4.6 Since carrying out the above, additional readings have been taken at monitoring position 4. This was located at the north east corner of the proposed development adjacent to the existing River Ancholme, in order to pick up any noise emanating from the existing industrial units. The readings were carried out on Friday 27th August 2010. The weather was mostly clear during the monitoring period, with temperatures ranging from around 15-16 degrees during the day-time period. It was witnessed on site that monitoring would not be required during the night-time period.
- 4.7 The results of the second BS4142 assessment in Appendix 2, show that under typical week day conditions on the site, the lowest external recorded background noise level for the daytime, $L_{A90,1hr}$, was 52.0dB(A), with the highest corresponding calculated external specific noise level, $L_{Aeq,1hr}$ of 54.9dB(A). These results, together with the BS4142 assessment are discussed in detail in the following sections, with the results of the BS4142 noise survey shown on data sheet 1 in Appendix 1.

5.0 DISCUSSION

- 5.1 Planning policy guidance notes set out the Government's policies on different aspects of planning. PPG24 gives guidance to local authorities on the use of their planning powers to minimise the adverse impacts of noise without imposing unreasonable restrictions on development, or adding unduly to the costs and administrative burdens of business.
- 5.2 PPG24 recommends appropriate levels of noise exposure for residential development and expresses these as noise exposure categories (NEC's) for different noise sources. Four NEC's are specified for new dwellings, these are identified as A to D, which represent an increasing concern regarding the noise climate, as shown in Table 1.

Table 1	
Noise exposure categories	
Category	Description
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.

5.3 For road traffic noise, the noise levels corresponding to the NEC's above are as shown in Table 2 below

Time Period	NEC			
	A	B	C	D
07.00 – 23.00 (Daytime)	< 55	55 – 63	63 – 72	>72
23.00 – 07.00 (Night-Time)	< 45	45 – 57	57 – 66	>66

5.4 The existing average day and night-time L_{Aeq} values resulting from the measured noise levels in Appendix 1, have been used to calculate the noise contour positions of the above NEC boundaries and are superimposed on the proposed site layout plan. These existing noise contours are shown on Figure 4 for the day and night-time conditions.

5.5 It can be seen from the calculations in Appendix 2 and also Figure 4 that small section of the site is in NEC B for the daytime period. For the night-time period a small section of the site is also within NEC B, with the remainder of the site in NEC A. Therefore further attenuation methods will be required regarding traffic noise.

5.6 With regard to the daytime noise, there is only a small section of outside area that is within NEC B. It is therefore proposed to install a 1.8m high close boarded fence (noise barrier) to attenuate excess noise. The barrier will be install around the boundary of plot 4. It can be seen from the proposed site plan that the proposed building locations will act as a barrier for the remaining site.

5.7 The night-time NEC limit of 45dB (A) is based on an internal (bedroom) noise level of 35dB (A), with 10dB (A) being allowed for an open window. Therefore to achieve the acceptable internal NEC A noise level in the bedrooms on the London Road facade, double glazing (typically 10-12-4) could be used together with some form of acoustic ventilation in bedrooms. With this combination a reduction in noise levels of around 29 dB (A) could be expected with the windows closed. This would reduce the internal noise level to $53.8 - 29 = 24.8$ dB (A), which is within the limit intimated by NEC A. This

would be sufficient to achieve the acceptable NEC A levels in the bedrooms and habitable rooms along the Ancholme Way. The remainder of the proposed development would be sheltered from the noise by the buildings themselves, and therefore the specified glazing would also be suitable.

- 5.8 The second part of the assessment was carried out in accordance with BS4142 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas', using a 1 hour reference time interval for the daytime. The BS4142 assessment would determine whether the noise levels emitted from the existing industrial unit are sufficient enough to result in complaints from the proposed residents of the nearest dwellings.
- 5.9 The Calculation sheets in Appendix 2 show the BS4142 assessment for site. The results of the assessment indicate that under the existing noise conditions there is a difference between the distance corrected rating level and the background noise level a monitoring position 2 of -2.8dB(A) in the daytime and at monitoring position 4 of -2.7dB(A), BS4142 states that:
- ‘A difference of around +10dB or more indicates that complaints are likely.
A difference of around +5dB is of marginal significance
If the rating level is more than 10dB below the measured background noise level then this is a positive indication that complaints are unlikely.’
- 5.10 The assessment demonstrates that under the existing road noise conditions, the site falls into NEC B for both the daytime and night-time periods. The levels of noise emitted from the adjacent industrial unit are unlikely to lead to complaints. Therefore we determine that the site is suitable for the proposed development in noise terms providing the above described mitigation methods are implemented.
- 5.11 The assessment discussed above does not take into account any structural boundary conditions proposed for the development, which may further reduce the received noise levels at the site.

CONCLUSIONS

- 6.1 In order to ensure that the assessment is representative of the noise climate affecting the site, it was established that a 24-hour noise survey would be required to measure the existing noise environment for noise emanating from Ancholme Way. The assessment has therefore been carried out in accordance with The Department of the Environment's Planning Policy Guidance: Planning and Noise (PPG 24). It was also determined that due to the proximity of the existing industrial estate, a BS4142 assessment would be required at the closest affected residential property.
- 6.2 The noise survey was carried out during a 24 hour period at a single monitoring position in accordance with PPG24, to ensure that the measured noise levels were representative of the worst case scenario in noise terms. The survey was carried out at position 1 (see figure 2) on Friday 19th/Saturday 20th January 2007. The weather was dry and clear during both days. Conditions were mainly calm throughout the assessment period with a slight breeze in the southerly direction of around 5mph. Temperatures varied from around 4-6 degrees in the daytime periods falling to around 0 - 1 degrees during the night-time. Further readings were taken at monitoring position 3 on Friday 12th/Saturday 13th October 2007. Conditions were calm throughout the assessment period with a slight breeze, temperatures varied from around 10-11 degrees in the daytime periods falling to around 5-6 degrees during the night-time.
- 6.3 Since carrying out the above, additional readings have been taken at monitoring position 4. This was located at the north east corner of the proposed development adjacent to the existing River Ancholme, in order to pick up any noise emanating from the existing industrial units. The readings were carried out on Friday 27th August 2010. The weather was mostly clear during the monitoring period, with temperatures ranging from around 15-16 degrees during the day-time period. It was witnessed on site that monitoring would not be required during the night-time period.
- 6.4 It can be seen from the calculations in Appendix 2 and also Figure 4 that small section of the site is in NEC B for the daytime period. For the night-time period a small section of

the site is also within NEC B, with the remainder of the site in NEC A. Therefore further attenuation methods will be required regarding traffic noise.

- 6.5 With regard to the daytime noise, there is only a small section of outside area that is within NEC B. It is therefore proposed to install a 1.8m high close boarded fence (noise barrier) to attenuate excess noise. The barrier will be install around the boundary of plot 4. It can be seen from the proposed site plan that the proposed building locations will act as a barrier for the remaining site.
- 6.6 The night-time NEC limit of 45dB (A) is based on an internal (bedroom) noise level of 35dB (A), with 10dB (A) being allowed for an open window. Therefore to achieve the acceptable internal NEC A noise level in the bedrooms on the London Road facade, double glazing (typically 10-12-4) could be used together with some form of acoustic ventilation in bedrooms. With this combination a reduction in noise levels of around 29 dB (A) could be expected with the windows closed. This would reduce the internal noise level to $53.8 - 29 = 24.8\text{dB (A)}$, which is within the limit intimated by NEC A. This would be sufficient to achieve the acceptable NEC A levels in the bedrooms and habitable rooms along the Ancholme Way. The remainder of the proposed development would be sheltered from the noise by the buildings themselves, and therefore the specified glazing would also be suitable.
- 6.7 The second part of the assessment was carried out in accordance with BS4142. The Calculation sheets in Appendix 2 show the BS4142 assessment for site. The results of the assessment indicate that under the existing noise conditions there is a difference between the distance corrected rating level and the background noise level at monitoring position 2 of -2.8dB(A) in the daytime and at monitoring position 4 of -2.7dB(A), BS4142 states that:
- ‘A difference of around +10dB or more indicates that complaints are likely.
A difference of around +5dB is of marginal significance
If the rating level is more than 10dB below the measured background noise level then this is a positive indication that complaints are unlikely.’

6.8 The assessment discussed above does not take into account any structural boundary conditions proposed for the development (e.g. close boarded fences, walls etc), which may further reduce the received noise levels at the site.

6.9 This environmental noise assessment has demonstrated that:

- the proposed site falls into NEC category B, however, with suitable attenuation as suggested above, the levels are reduced to those stated within NEC A in accordance with PPG24 regarding traffic noise on Ancholme Way,
- complaints are unlikely to arise from new residents regarding noise generated from the adjacent industrial units, in accordance with BS4142.

We therefore consider that the site is suitable for residential development, in terms of the existing noise climate provided that the above mitigation is implemented.

For and on behalf of BSP Consulting

Fraser Poxon MCIHT
Senior Environmental Noise Technician

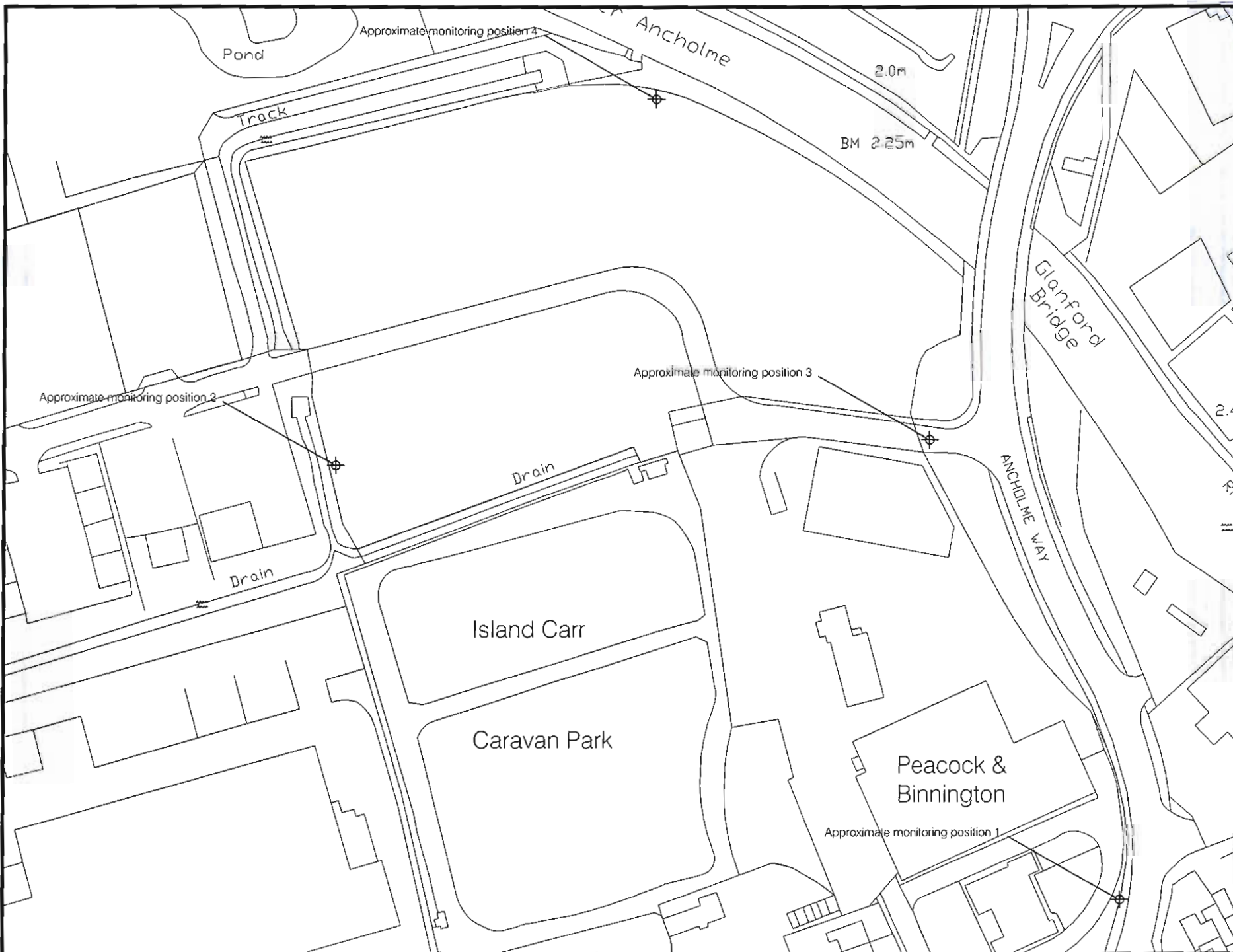
Mark Rayers
Director

FIGURES 1 TO 4



The BSP Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site

<p>12 Oldford Street, Nottingham NG3 6SR Tel: 0115 8402227 - Fax: 0115 8402228 email: info@bsp-consulting.co.uk</p>	FOR INFORMATION		SITE LOCATION PLAN													
	KIEGAR HOME		<table border="1"> <tr> <td>Drawn By:</td> <td>CSA</td> <td>Checked By:</td> <td>NWR</td> <td>Scale:</td> <td>1:1000(2/14)</td> </tr> <tr> <td>Design:</td> <td>WVR</td> <td>Approved By:</td> <td>NWFE</td> <td>Date:</td> <td>FEB 07</td> </tr> </table>		Drawn By:	CSA	Checked By:	NWR	Scale:	1:1000(2/14)	Design:	WVR	Approved By:	NWFE	Date:	FEB 07
	Drawn By:	CSA	Checked By:	NWR	Scale:	1:1000(2/14)										
Design:	WVR	Approved By:	NWFE	Date:	FEB 07											
PROPOSED RESIDENTIAL DEVELOPMENT, ANCHOLME WAY, BRIGG		FIGURE 1														



General Notes

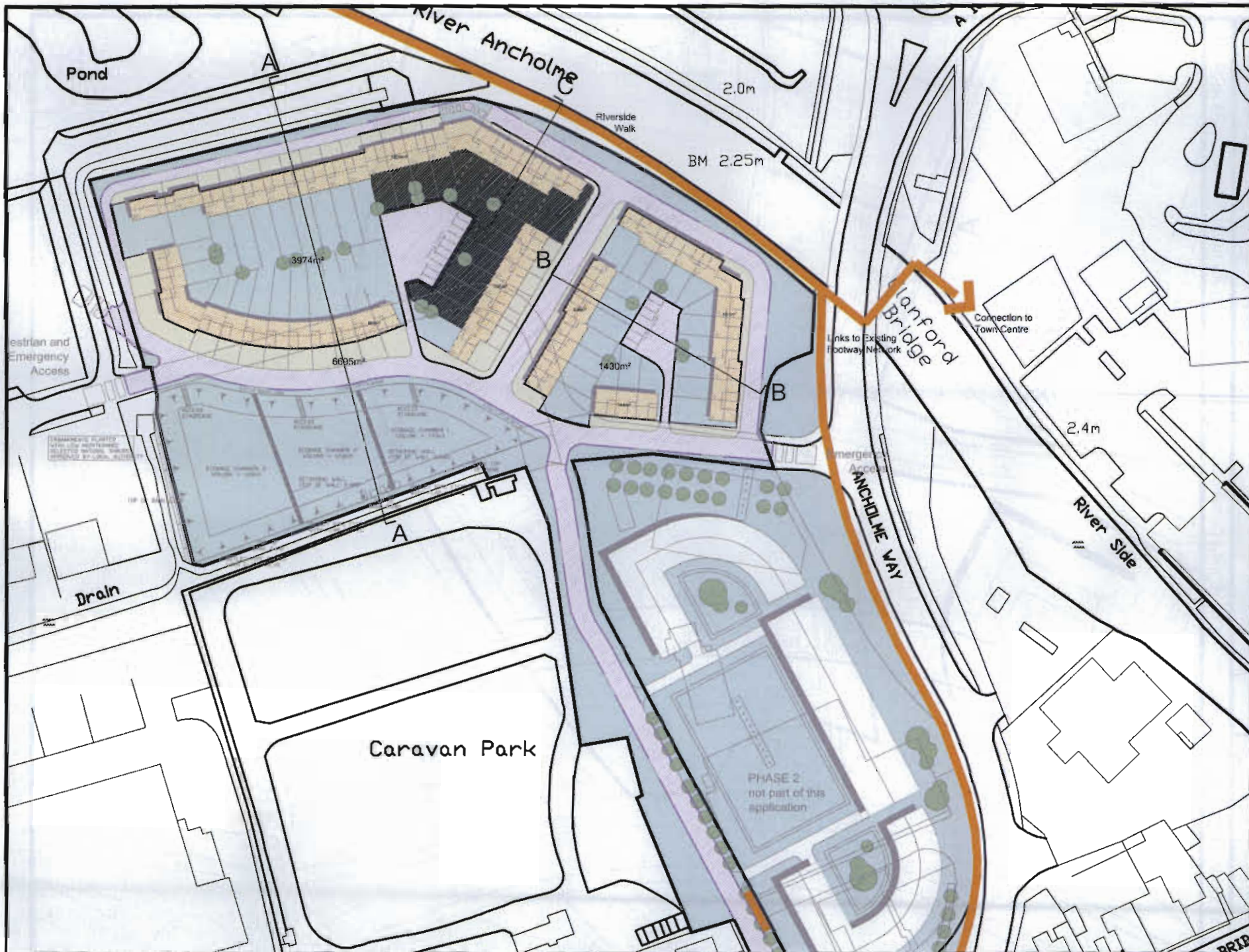
1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings.
3. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer should be informed PRIOR to construction on site.
4. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.
5. All dimensions are in millimetres unless otherwise stated.

bsp consulting

17 Deodar Drive, Scarborough, WA 6015
 Tel: 0815 862227 Fax: 0815 862228
 Email: bsp@bspconsulting.com.au

FOR INFORMATION	
Client	KEIGAR HOMES
Project	Island Carr North Mixed Use Site Eriga, North Queensland
Drawing No.	Existing Site Layout and Noise Monitoring Positions
Scale	1:1000
Author	MWR
Checked	MWR
Date	11/10/10

The BSP Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site



General Notes

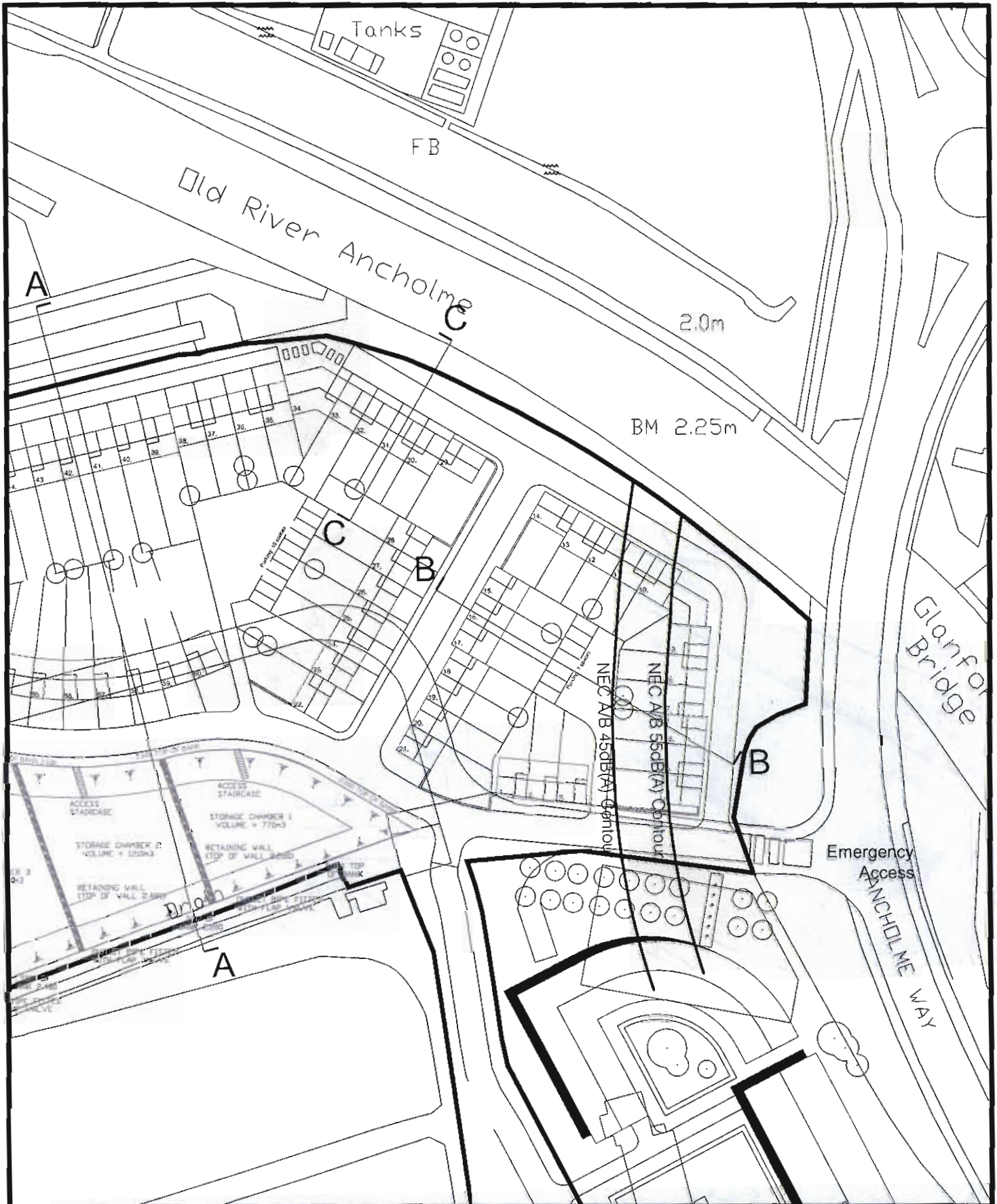
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2. This drawing is to be read in conjunction with all other relevant drawings.
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4. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.
5. All dimensions are in millimetres unless otherwise stated.

bsp consulting

11 Colindale Avenue, London, NW9 1BS
 Tel: 020 729 90227 Fax: 020 729 90228
 Email: info@bsp-consulting.co.uk

FOR INFORMATION
KEIGAR HOMES
Island Carr North Mixed Use Site Brigg, North Lincolnshire
Proposed Site Layout
Figure 3

The BSP Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site



The BSP Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site

<p>bsp consulting</p> <p>60, Trafalgar Street, Birmingham B40 1 5BQ Tel: (0121) 6432227 - Fax: (0121) 6432228 email: info@bsp-consulting.co.uk</p>	<p>FOR INFORMATION</p>		<p>NEC COUNTOUR PLAN</p>		
	<p>Client: KIEGAR HOME</p>		<p>Scale: 1:1000 @ A4</p>		
	<p>Project Title: PROPOSED RESIDENTIAL DEVELOPMENT, ANCHOLME WAY, BRIGG</p>		<p>Drawn by: JDP</p>	<p>Checked by: JMW</p>	<p>Date: FEB 07</p>
	<p>Design: []</p> <p>Cost: []</p> <p>Drawn: []</p> <p>Appr: []</p>		<p>Project Engineer: MWR</p>	<p>Approved By: JMW</p>	<p>Revision: []</p>
		<p>Figure Number: FIGURE 4</p>			

APPENDIX 1
Data Sheets

Ancholme Way, Brigg
North Lincolnshire
Environmental Noise Measurement Results

APPENDIX 1 - DATA SHEET 1
MEASURED NOISE LEVELS IN dB(A)
HOURLY L_{aeq},1hr

Period	Time	Noise Level (dB(A))
		19/20 February
D A Y T I M E	07:00 - 08:00	62.6
	08:00 - 09:00	61.7
	09:00 - 10:00	59.8
	10:00 - 11:00	61.0
	11:00 - 12:00	62.2
	12:00 - 13:00	60.8
	13:00 - 14:00	59.4
	14:00 - 15:00	60.0
	15:00 - 16:00	60.4
	16:00 - 17:00	60.5
	17:00 - 18:00	61.6
	18:00 - 19:00	59.8
	19:00 - 20:00	57.8
	20:00 - 21:00	57.5
	21:00 - 22:00	56.3
	22:00 - 23:00	55.1
Average Daytime L_{aeq}		60.2
N I G H T	23:00 - 24:00	51.4
	24:00 - 01:00	50.8
	01:00 - 02:00	46.6
	02:00 - 03:00	48.5
	03:00 - 04:00	49.4
	04:00 - 05:00	48.5
	05:00 - 06:00	50.1
	06:00 - 07:00	54.7
Average Night-time L_{aeq}		50.7

$$\text{Mean } L_{\text{eq,t}} = 10 \log \left\{ \left(10^{L_1/10} + 10^{L_2/10} + 10^{L_3/10} + \dots \right) / N \right\}$$

$$\text{Night-time } L_{\text{eq},8\text{hr}} = 50.7 \text{ dB(A)}$$

$$\text{Day-time } L_{\text{eq},16\text{hr}} = 60.2 \text{ dB(A)}$$

Ancholme Way, Brigg
North Lincolnshire
Environmental Noise Measurement Results

APPENDIX 1 - DATA SHEET 2
MEASURED NOISE LEVELS IN dB(A)
HOURLY L_{aeq},1hr

Period	Time	Mean L_{aeq},1hr dB(A)
D A Y T I M E	07:00 - 08:00	63.8
	08:00 - 09:00	65.4
	09:00 - 10:00	61.7
	10:00 - 11:00	62.3
	11:00 - 12:00	64.0
	12:00 - 13:00	61.1
	13:00 - 14:00	60.9
	14:00 - 15:00	61.2
	15:00 - 16:00	61.7
	16:00 - 17:00	61.7
	17:00 - 18:00	62.0
	18:00 - 19:00	60.2
	19:00 - 20:00	59.1
	20:00 - 21:00	58.8
21:00 - 22:00	58.3	
22:00 - 23:00	56.7	
Day-time L_{aeq},16hr		61.7
N I G H T	23:00 - 24:00	53.2
	24:00 - 01:00	51.6
	01:00 - 02:00	49.5
	02:00 - 03:00	48.7
	03:00 - 04:00	47.0
	04:00 - 05:00	59.2
	05:00 - 06:00	52.6
06:00 - 07:00	55.4	
Night-time L_{aeq},8hr		53.8

$$\text{Mean } L_{eq,t} = 10 \log \{ (10^{L1/10} + 10^{L2/10} + 10^{L3/10} + \dots) / N \}$$

Night-time L_{eq,8hr} = 53.8dB(A)

Day-time L_{eq,16hr} = 61.7dB(A)

APPENDIX 1 - DATA SHEET 3
MEASURED NOISE LEVELS IN dB(A)

Period	Time	Measured Noise Level		Type of noise recorded	
		LAeq (dB)	LA90 (dB)		
Daytime	09.00-10.00		53.1	Background	
	09.00-10.00	55.2		Residual	
	10.00-11.00	56.6		Specific	
	12.00-13.00		54.0	Background	
	12.00-13.00	55.0		Residual	
	13.00-14.00	56.1		Specific	
	15.00-16.00		53.9	Background	
	15.00-16.00	55.0		Residual	
	16.00-17.00	55.9		Specific	
	16.00-17.00		54.7	Background	
	16.00-17.00	55.1		Residual	
	17.00-18.00	56.0		Specific	

APPENDIX 1 - DATA SHEET 3
MEASURED NOISE LEVELS IN dB(A)

Time	Time	Background	Residual	Specific
Daytime	07.00-08.00		53.1	
	07.00-08.00	53.5		Background
	08.00-09.00	54.4		Residual
				Specific
	10.00-11.00		52.0	
	10.00-11.00	53.5		Background
	11.00-12.00	54.9		Residual
				Specific
	16.00-17.00		52.9	
16.00-17.00	53.0		Background	
17.00-18.00	54.1		Residual	
			Specific	

APPENDIX 2
Calculation Sheets

12 Oxford Street,
Nottingham.
NG1 5BG

Tel: 0115 8402227
Fax: 0115 8402228
e-mail: info@bsp-consulting.co.uk
website: www.bsp-consulting.co.uk



Project:	Ancholme Way, Brigg	
Project No:	07478	
Sheet No:	1	rev
Date:	August 2010	
Part of Structure:	Noise Assessment	

Ref	Calculations	Output
	<p>Distance correction to garden area of closest affected proposed dwelling</p> <p>$\Delta L = 10 \log R1/R2$ R1 = Monitoring position 1</p> <p>$\Delta L = 10 \log 18/46.3 = -4.1\text{dB(A)}$</p> <p>Therefore: Daytime $LA_{\text{eq},16\text{h}} = 61.7 - 4.1 = 57.6\text{dB(A)}$</p> <p>Distance correction to façade of nearest affected proposed dwelling</p> <p>$\Delta L = 10 \log 18/33.5 = -2.7\text{dB(A)}$</p> <p>Therefore: Night Time $LA_{\text{eq},16\text{h}} = 53.8 - 2.7 = 51.1\text{dB(A)}$</p> <p>Daytime - Determine distance to NEC A/B 55dB(A) boundary</p> <p>Distance correction $\Delta L = 20 \log R2/R1$</p> <p>$\Delta L = 6.7\text{dB(A)}, = \Delta L 10 \log R2/R1$</p> <p>$\Delta L = 6.7\text{dB(A)}, = \Delta L 10 \log R2/18$</p> $\frac{6.7}{20} = \log R2/18$ <p style="text-align: center;">$R2 = 38.9\text{m}$</p> <p>Night - time - Determine distance to NEC A/B 45dB(A) boundary</p> <p>Distance correction $\Delta L = 10 \log R2/R1$</p> <p>$\Delta L = 8.8\text{dB(A)}, = \Delta L 10 \log R2/R1$</p> <p>$\Delta L = 8.8\text{dB(A)}, = \Delta L 10 \log R2/18$</p> $\frac{8.8}{20} = \log R2/18$ <p style="text-align: center;">$R2 = 49.6\text{m}$</p>	

12 Oxford Street,
Nottingham.
NG1 5BG

Tel: 0115 8402227
Fax: 0115 8402228
e-mail: info@bsp-consulting.co.uk
website: www.bsp-consulting.co.uk



Project: Anchoime Way

Project No: 05178

Sheet No: 2 rev

Date: Feb-07

Part of Structure: Noise Assessment

Ref	Calculations	Output
	<p><u>BS4142 Assessment - Daytime (Monitoring Position 1)</u></p> <p>Lowest Recorded Daytime Background Noise Level, $L_{A90, 1hr} = 53.1\text{dB(A)}$</p> <p>Residual Noise Level, $L_{Aeq, 1hr} = 55.2\text{dB(A)}$</p> <p>Specific Noise Level, $L_{Aeq, 1hr} = 56.6\text{ dB(A)}$</p> <p>Correction from table 1, BS4142 is:-</p> <p style="padding-left: 40px;">$(56.6 - 55.2) = 1.4$ which equates to</p> <p style="padding-left: 80px;">$-3\text{dB(A)} = 53.6\text{dB(A)}$</p> <p>Distance Correction - Centre of nearest affected dwelling</p> <p>Noise Level Correction to centre of nearest garden area at proposed dwelling at a distance of approx 65m from the existing industrial unit</p> <p>$\Delta L = 20 \log R_2 / R_1 \quad R_1 = 65\text{m (Monitoring Position 2 - Proposed dwelling)}$</p> <p>$\Delta L = 20 \log 25 / 65 = -8.3\text{dB(A)}$</p> <p style="padding-left: 40px;">Therefore $53.6 - 8.3 = 45.3\text{dB(A)}$</p> <p>Corrected Measured Noise Level = 45.3dB(A)</p> <p>Specific Noise Level, $L_{Aeq, 1hr} = 45.3\text{dB(A)}$</p> <p>Acoustic Feature Correction = $+5\text{dB(A)}$</p> <p>Rating Level = $(45.3 + 5) = 50.3\text{dB(A)}$</p> <p>Background Level = 53.1dB(A)</p> <p>Excess of Rating over background level</p> <p style="padding-left: 40px;">$= (50.3 - 53.1) = -2.8\text{dB(A)}$</p> <p>Therefore the Assessment indicates that as the noise level is below the existing background level then this is a positive indication that complaints are unlikely.</p>	

12 Oxford Street,
Nottingham.
NG1 5BG

Tel: 0115 8402227
Fax: 0115 8402228
e-mail: info@bsp-consulting.co.uk
website: www.bsp-consulting.co.uk



Project:	Ancholme Way	
Project No:	07478	
Sheet No:	3	rev
Date:	Aug-10	
Part of Structure:	Noise Assessment	

Ref	Calculations	Output
	<p><u>BS4142 Assessment - Daytime (Monitoring Position 4)</u></p> <p>Lowest Recorded Daytime Background Noise Level, $L_{A90, 1hr} = 52.0\text{dB(A)}$</p> <p>Residual Noise Level, $L_{Aeq, 1hr} = 53.5\text{dB(A)}$</p> <p>Specific Noise Level, $L_{Aeq, 1hr} = 54.9 \text{ dB(A)}$</p> <p>Correction from table 1, BS4142 is:-</p> <p>BS4142 states that if the difference is below 3dB(A) then an alternative method should be used. Therefore: $10\log(10^{5.49} - 10^{5.35}) = 49.3 \text{ dB(A)}$</p> <p>Corrected Measured Noise Level = 49.3dB(A)</p> <p>Specific Noise Level, $L_{Aeq, 1hr} = 49.3\text{dB(A)}$</p> <p>Acoustic Feature Correction = +0dB(A)</p> <p>Rating Level = (49.3+ 0) = 49.3dB(A)</p> <p>Background Level = 52.0dB(A)</p> <p>Excess of Rating over background level</p> <p>$= (49.3 - 52.0) = -2.7\text{dB(A)}$</p> <p>Therefore the Assessment indicates that as the noise level is below the existing background level then this is a positive indication that complaints are unlikely.</p>	

APPENDIX 3
Calibration Certificate

Calibration Report

Certificate No.:3437

Manufacturer: Norsonic
Type : 1251
Serial no: 29215

Customer: Breakwell Sumner Partnership
Department:
Place: 12 Oxford Street
City: Nottingham NG1 5BG
Order No: BSP/357
Contact Person: Fraser Poxon
Phone/Mail: 0115 840 2227

Measurement Results:

	Level : (dB)	P. Stab : (dB)	Frequency : (Hz)	F. Stab : (%)	Distortion: (% TD)
1:	114.04	0.06	1000.02	0.00	0.02
2:	114.03	0.06	1000.01	0.00	0.02
3:	114.04	0.06	1000.02	0.00	0.02
Result (Average):	114.04	0.06	1000.02	0.00	0.02
Expanded Uncertainty:	0.07	0.02	1.00	0.01	0.01
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 20 μ Pa.

The following correction factors have been applied during the measurement:

Pressure : None Temperature : None Relative humidity : None
Reference microphone: WSM2 - GRAS40AG-28653. Volume correction: 0.000 dB

Records :K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2007\NOR1251_29215_M1.nmf

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Environmental conditions:

Pressure : 101.581 \pm 0.006 kPa
Temperature : 24.0 \pm 1.1 $^{\circ}$ C
Relative humidity : 42.4 \pm 3.3 %RH

Date of calibration:30/10/07

Date of issue:30/10/07

Supervisor : Ian Campbell MSc MIOA
Engineer :


Darren Batten Tech IOA


Campbell Associates

www.campbell-associates.co.uk

Calibration Report

Certificate No.:3435

Manufacturer: Norsonic
Type : 1225
Serial no: 52229

Customer: Breakwell Sumner Partnership
Place: 12 Oxford Street
City: Nottingham NG1 5BG
Order No: BSP/357
Contact Person: Fraser Poxon
Phone/Mail: 0115 840 2227

Measurement Results:

	Sensitivity : (dB re 1V/Pa)	Capacitance : (pF)
1:	-25.65	23.6
2:	-25.65	23.6
3:	-25.65	23.5
Result (Average):	-25.65	23.5
Expanded Uncertainty:	0.10	1.00
Degree of Freedom:	>100	>100
Coverage Factor:	2.00	2.00

The following correction factors have been applied during the measurement:
Pressure :-0.010 dB/kPa Temperature :-0.007 dB/°C Relative humidity :0.000 dB/%RH

Reference Calibrator: WSC1 - Nor1253-24269. Volume correction: 0.000 dB

Records :K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\2007\NOR1225_52229_M1.nmf

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Comment: Calibration Certificate Number 3435

Environmental conditions:

Pressure : 101.479 ± 0.008 kPa
Temperature : 23.3 ± 1.1 °C
Relative humidity : 42.3 ± 2.3 %RH

Date of calibration:30/10/07

Date of issue:30/10/07

Supervisor : Ian Campbell MSc MIOA
Engineer :


Darren Batten TechIOA


Campbell Associates

www.campbell-associates.co.uk

Microphone Calibration Certificate

Norsonic
Type : 1225

Serial no : 52229

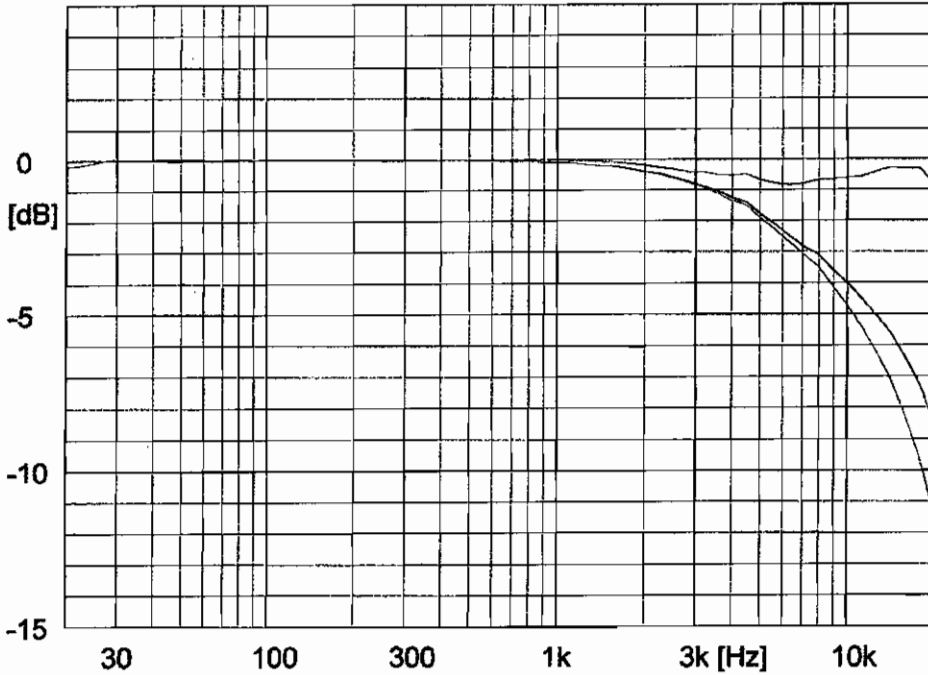
Sensitivity : 52.17 mV/Pa
-25.65 ±0.10 dB re. 1 V/Pa
Capacitance : 23.5 ±1.0 pF
Date : 30/10/07

Signature : 

Measurement conditions :
Polarisation voltage : 200.0 V
Pressure : 101.48 ±0.01 kPa
Temperature : 23.3 ±1.1 °C
Relative humidity : 42.3 ±2.3 %RH
Results are normalised to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

Campbell Associates
www.campbell-associates.co.uk



Microphone Calibration Certificate

Norsonic
Type : 1225

Serial no : 52229

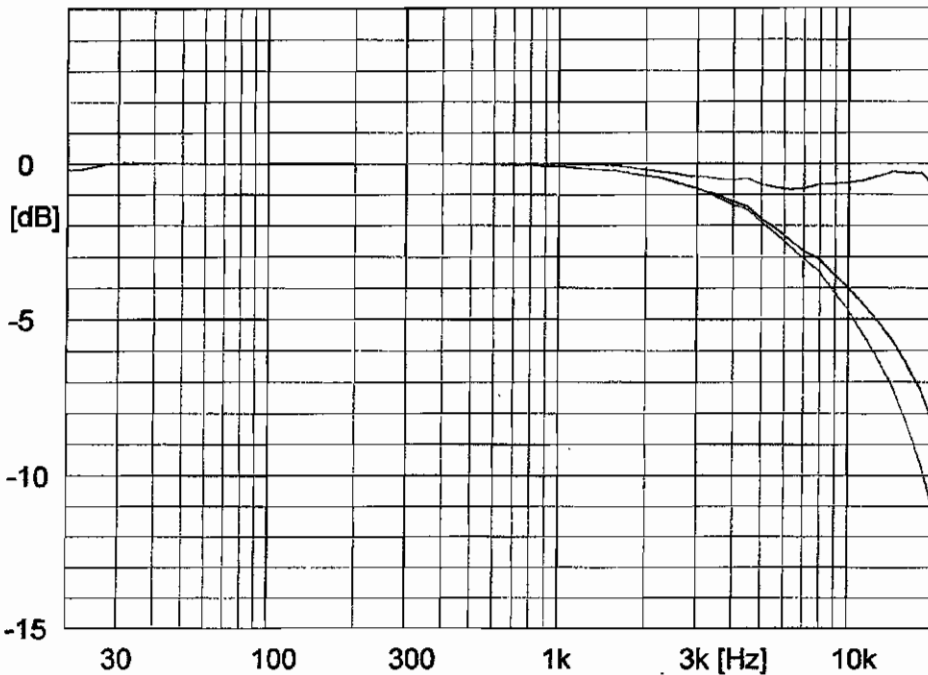
Sensitivity : 52.17 mV/Pa
-25.65 ±0.10 dB re. 1 V/Pa
Capacitance : 23.5 ±1.0 pF
Date : 30/10/07

Signature : 

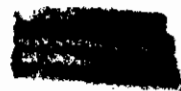
Measurement conditions :
Polarisation voltage : 200.0 V
Pressure : 101.48 ±0.01 kPa
Temperature : 23.3 ±1.1 °C
Relative humidity : 42.3 ±2.3 %RH
Results are normalised to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

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Comment : Calibration Certificate Number 3435



Calibration Report

Certificate No.:3434

Norsonic Type : 118 Serial no : 31497

Customer: Breakwell Sumner Partnership Ltd
Department:
Place: 12 Oxford Street
City: Nottingham NG1 5BG
Order No: BSP/357
Company: Fraser Poxon
Phone: 0115 840 2227

Microphone :	Norsonic	Type : 1225	Serial no : 52229	Sens:-25.65dB
Pre amplifier	Norsonic	Type : 1206	Serial no : 30543	
Calibrator :	Norsonic	Type : 1251	Serial no : 29215	Level:114.04dB

Measured with Pre Amplifier

Measurement Results:

Noise Test - IEC 60651 #9.4.1 & 9.4.3	Passed
Level Linearity Test - IEC 60651, #7.9 & 7.10	Passed
Weighting Network Test : A Network - IEC60651 #9.2.2	Passed
Weighting Network Test : C Network - IEC 60651 #9.2.2	Passed
Weighting Network Test : Linear Network - IEC 60651 #9.2.2	Passed
Overload Detector Test : A-Network - IEC 60651 #9.3.1	Passed
Overload Detector Test : Square wave - IEC 60651 #9.3.1	Passed
F/S//Peak Test : Steady State Response - IEC 60651 #7.4	Passed
Fast-Slow Test : Overshoot test - IEC 60651 #9.4.1	Passed
Fast-Slow Test: Single Sine Wave Burst - IEC 60651 #9.4.1 & 9.4.3	Passed
Impulse Test : Continuous Sine Wave Burst - IEC 60651 #9.4.3	Passed
Impulse Test : Single Sine Wave Burst - IEC 60651 #9.4.1 & 9.4.3	Passed
Impulse Decay Time Test - IEC 60651 #7.3	Passed
Peak Detector Test, single square wave burst - IEC 60651 #9.4.4	Passed
RMS Detector Test : Crest Factor Test - IEC 60651 #9.4.2	Passed
RMS Detector Test : Continuous Sine Wave Burst - IEC 60651 #9.4.2	Passed
Time Averaging Test: Pulse Range - IEC 60804 #9.3.4	Passed
Time Averaging Test : Averaging Functions - IEC 60804 #9.3.2	Passed
Linearity Test - IEC 804 #9.3.3	Passed

Environmental conditions:

Pressure : 101.358 kPa
Temperature : 22.2 °C
Relative humidity : 43 %RH

Date of calibration: 29/10/07

Date of issue: 30/10/07

Supervisor: Ian Campbell MSc MIOA
Engineer

Darren Batten TechIOA

Campbell Associates

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Certificate of Conformance

Campbell Associates

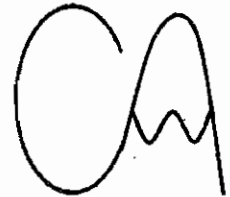
Certificate Number 7149
Date of verification June 28, 2010

Sonitus House,
5b Chelmsford Road Industrial Estate
Great Dunmow, Essex CM6 1HD

Weather protected measurement microphone

Manufacturer Gras
Type 41AL
Variant S
Serial number 44955

Telephone 01371 871035
Facsimile 01371 879106
E-mail :info@campbell-associates.co.uk



Issued to

BSP Consulting
Suite B, Floor 3,
24 De Montfort Street,
Leicester.
LE1 7GB

These weather protected measurement microphones comprise a microphone capsule and an associated preamplifier, the types and serial numbers fitted to this unit are noted below. Each of these elements have been tested separately and then the overall acoustic performance of the system verified.

Calibration Report & Certificate Number 7148 for the microphone are attached and form part of this certificate.

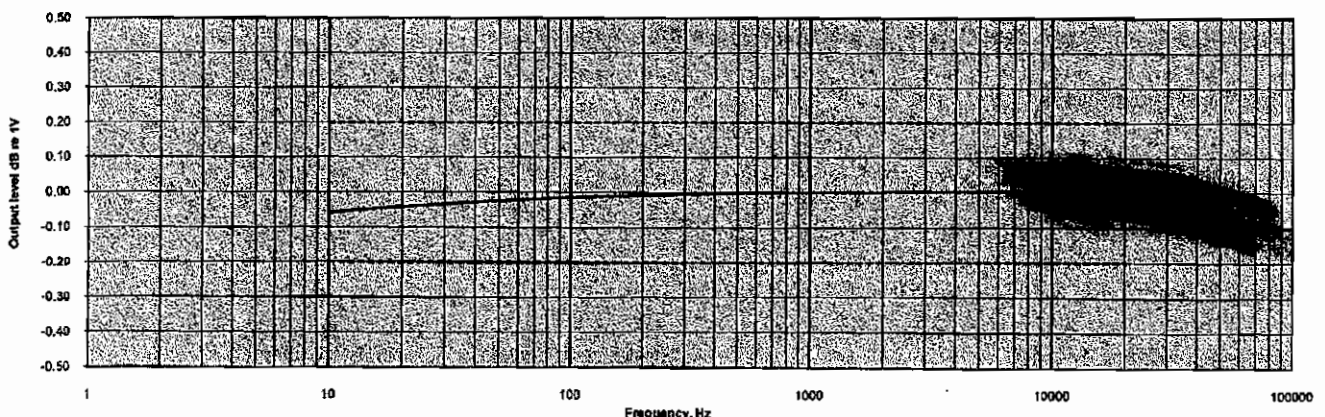
Microphone type	Gras-40AS	Serial number	50687	Sensitivity	-28.54 dB
Preamplifier type	Gras-26AK	Serial number	50931		

Comments: Electrical self noise and acoustic tests carried out using Nor-118.31708.
None

Preamplifier conformance

Relative gain test. An input signal was connected via a 18pF line input adaptor. The signal source was a Stanford Research SD360 Signal Synthesizer serial number 61987 and the output levels were read on an Agilent (HP) 34401A Precision Digital Voltmeter serial number MY45015835. Power supplies for the preamplifier were supplied by a Norsonic Nor-483B SMS unit serial number 25758. Valid traceable calibration certificates are held for all this equipment. Verification was performed to the procedure CA-4100 issue 1B. The relative gain with frequency of the preamplifier is given in the graph below with the absolute gain at 1kHz given in the table.

Relative gain at 1V Input



Continued overleaf

Absolute gain at 1k Hz

Absolute gain test		
Frequency	Gain	Result
Hz	dB	
1k	-0.27	Pass

Electrical self noise tests

Self noise in dB, at -26dB re 1V/Pa with 18pF load		Result
dB(A)	9.4	Pass
dB(C)	11.3	Pass

Acoustic tests

The weather protected measurement microphone was coupled to the Reference Calibrator Nor-1253 serial number 24269 using a laboratory coupler RA0010 serial number 972 as no coupler was supplied by the client, and the correct SPL was set on the laboratory analyser. The acoustic cover was then placed over the microphone and the acoustic noise floor checked and the level expressed in dB(A).

Acoustic tests	Reference	Measured	Result
	dB	dB	
Acoustic calibration @ 250 Hz	124.05	123.7	Pass

Acoustic noise floor	Lab ambient	Measured	Result
	dB	dB	
A weighting	42.6	16.3	Pass

The correct reference angle for this measurement microphone is 90 degrees, when mounted vertically it is correct for measurement of sources co-planar to the horizon.

Environmental conditions at time of tests

Temperature 21.9 °C Humidity 41.2 % RH Pressure 101.469 mBar

These test indicate that the subject device complies with the requirements of the manufacturer's specification at the time of its manufacture. Repeat verification is recommended within 24 months

Verification performed by



Michael Tickner

Certificate Number: 7149

Date of verification: June 28, 2010

Calibration Report

Certificate No.:7148

Manufacturer: GRAS
Type : 40AS
Serial no: 50687

Address: [REDACTED]
Order No: [REDACTED]
Contact Person: [REDACTED]

BSP Consulting
Suite B, Floor 3, 24 De Montfort Street,
Leicester. LE1 7GB.
L152
Fraser Poxon

Measurement Results:

	Sensitivity : (dB re 1V/Pa)	Capacitance : (pF)
1:	-28.54	14.7
2:	-28.54	14.7
3:	-28.55	14.6
Result (Average):	-28.54	14.7
Expanded Uncertainty:	0.10	2.00
Degree of Freedom:	>100	>100
Coverage Factor:	2.00	2.00

The following correction factors have been applied during the measurement:
Pressure :0.000 dB/kPa Temperature :0.000 dB/°C Relative humidity :0.000 dB/%RH

Reference Calibrator: WSC2 - GRAS42AA-18277 Volume correction: 0.000 dB
Records :K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\2010\GRAS40AS_50687_M1.nmf

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Comment: Grac GR0014 half inch grid fitted for calibration.

Environmental conditions:


Pressure : 101.127 ± 0.005 kPa
Temperature : 22.9 ± 1.6 °C
Relative humidity : 60.5 ± 4.0 %RH

Date of calibration: 25/06/2010

Date of issue: 25/06/2010

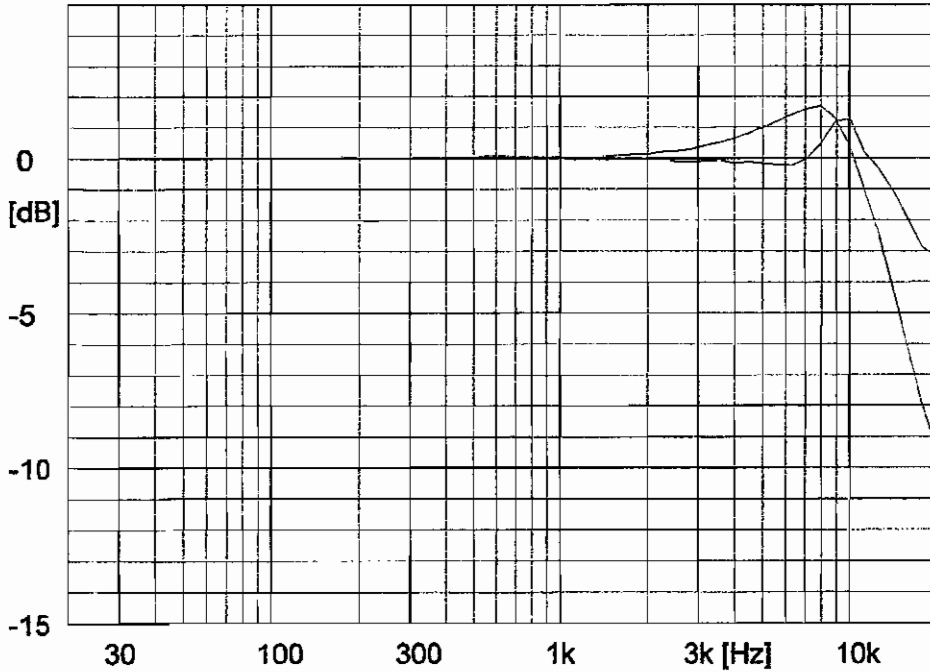
Supervisor : David Egan - Laboratory Manager
Engineer : [REDACTED]

[REDACTED]
Michael Tickner
Software version: 5.1


Campbell Associates

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Microphone Calibration Certificate



GRAS
Type : 40AS

Serial no : 50687

Sensitivity : 37.39 mV/Pa
-28.54 ±0.10 dB re. 1 V/Pa
Capacitance : 14.7 ±2.0 pF
Date : 25/06/2010

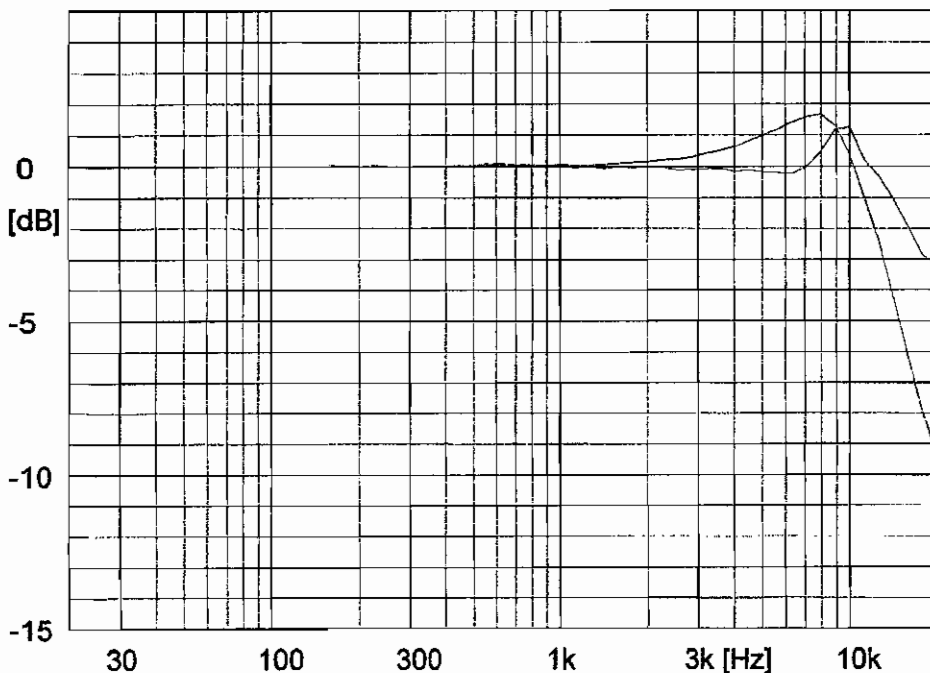
Signature :

Measurement conditions :
Polarisation voltage : 200.0 V
Pressure : 101.13 ±0.01 kPa
Temperature : 22.9 ±1.6 °C
Relative humidity : 60.5 ±4.0 %RH
Results are normalised to the reference conditions.

Free field response
Pressure (Actuator) response

Campbell Associates
www.campbell-associates.co.uk

Microphone Calibration Certificate



GRAS
Type : 40AS

Serial no : 50687

Sensitivity : 37.39 mV/Pa
-28.54 ±0.10 dB re. 1 V/Pa
Capacitance : 14.7 ±2.0 pF
Date : 25/06/2010

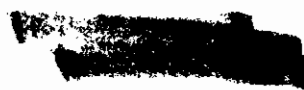
Signature :

Measurement conditions :
Polarisation voltage : 200.0 V
Pressure : 101.13 ±0.01 kPa
Temperature : 22.9 ±1.6 °C
Relative humidity : 60.5 ±4.0 %RH
Results are normalised to the reference conditions.

Free field response
Pressure (Actuator) response

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Comment : Gras GR0014 half inch grid fitted for calibration.



CA

Certificate number: U7145

The equipment was preconditioned for more than 4 hours in the specified calibration environment.

Measurements

The calibrator has been tested as described in the following annexes to BS EN IEC60942:2003 Sound Calibrators; B3.4 for sound pressure level, B3.5 for frequency, B3.6 for total distortion and A4.4 for short term stability of the pressure level.

Method

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

Instruments and program

A complete list of equipment, hardware and software that has been used in this calibration is available from the calibration laboratory on request.

Traceability

The measured values are traceable to the following laboratories:

Sound Pressure Level: National Physical Laboratory, United Kingdom

Voltage: National Physical Laboratory, United Kingdom

Frequency: National Physical Laboratory, United Kingdom

Ambient Pressure: National Physical Laboratory, United Kingdom

Temperature & Relative Humidity: National Physical Laboratory, United Kingdom

Comment

Calibrated as received, no adjustments made.

Notes:

The sound pressure level generated by the calibrator in its ½ inch configuration was measured five times and [redacted] P working standard microphone as specified in the International Standard BS EN 61094-4. The results of three replications and the mean of the measurements obtained are given in the measurement results table of this certificate. The frequency and distortion were measured in a similar manner. The figures in **BOLD** are the final results; a small correction factor may need to be added to the sound pressure level quoted here if the device is used to calibrate a sound level meter that is fitted with a free field response microphone. See manufacturer's handbooks for full details of this and other corrections that may be applicable.

Measurements performed by

 **Campbell
Associates**

Sonitus House, 5b Chelmsford Road Industrial Estate, Great Dunmow, GB-CM6 1HD

Tel (+44) 01371 871030 Fax (+47) 01371 879106
email calibration@campbell-associates.co.uk

Page 2 of 2

Microphone Calibration Certificate

Norsonic
Type : 1225

Serial no : 52229

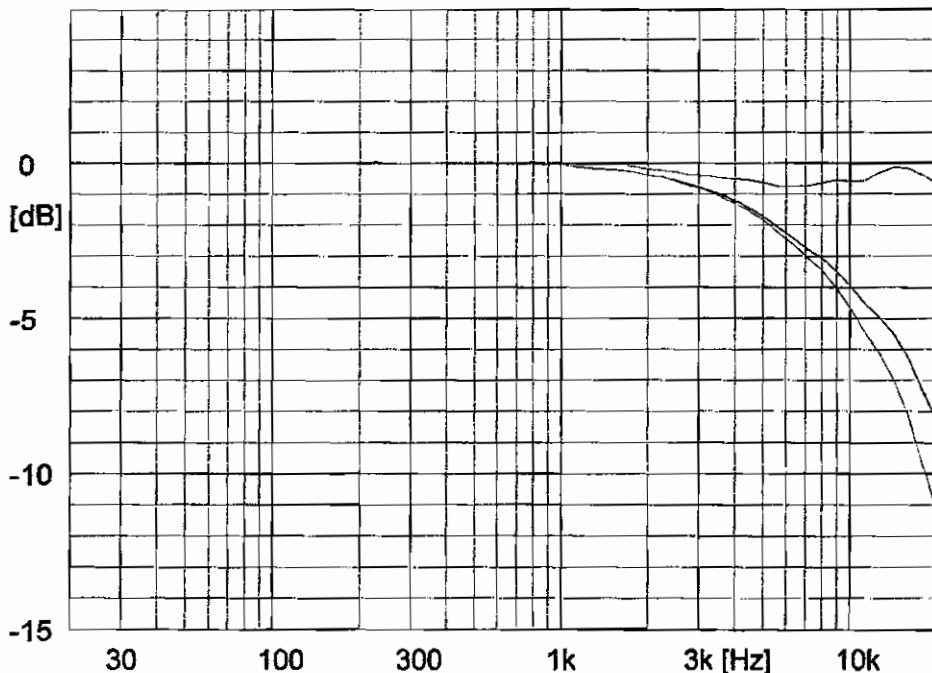
Sensitivity : 51.59 mV/Pa
-25.75 ±0.10 dB re. 1 V/Pa
Capacitance : 22.5 ±2.0 pF
Date : 25/06/2010

Signature : 

Measurement conditions :
Polarisation voltage : 200.0 V
Pressure : 101.18 ±0.00 kPa
Temperature : 23.2 ±1.5 °C
Relative humidity : 57.3 ±4.5 %RH
Results are normalised to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

Campbell Associates
www.campbell-associates.co.uk



Microphone Calibration Certificate

Norsonic
Type : 1225

Serial no : 52229

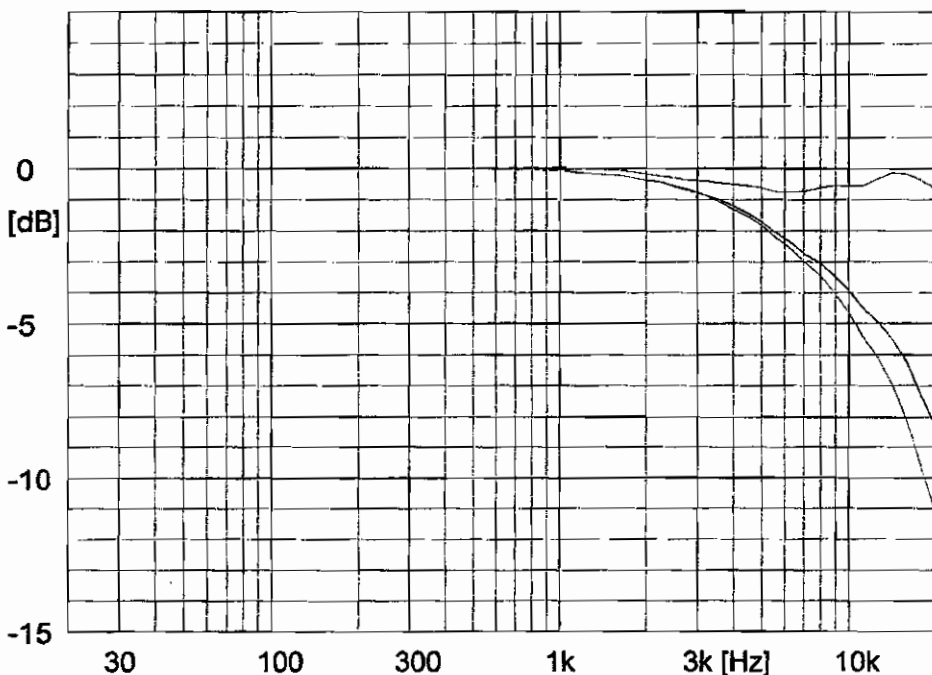
Sensitivity : 51.59 mV/Pa
-25.75 ±0.10 dB re. 1 V/Pa
Capacitance : 22.5 ±2.0 pF
Date : 25/06/2010

Signature : 

Measurement conditions :
Polarisation voltage : 200.0 V
Pressure : 101.18 ±0.00 kPa
Temperature : 23.2 ±1.5 °C
Relative humidity : 57.3 ±4.5 %RH
Results are normalised to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

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Comment :

Calibration Certificate

UKAS Laboratory Number 0789

Certificate No.: U7147

Method

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN 60651 and or BS EN 60804. The reference range, reference sound pressure level, primary indicator range, secondary indicator range, pulse range, linearity range and display range as specified by the manufacturer were used for the verification. The sound level meter was set to A weighting and adjusted to read correctly in response to the associated sound calibrator the reading was derived from the calibrator calibration certificate and manufacturer's instruction manuals. A measurement of the self noise of the sound level meter was then made using a dummy microphone having a capacitance of $\pm 20\%$ of the associated microphones self capacitance. The sound level meter was then tested, and its overall sensitivity adjusted, in accordance with Section 5 of BS 7580:Part 1:1997. The acoustic calibration at 1 kHz specified in sub-clause 5.6.1 of the standard was performed by application of a reference sound calibrator, whilst the tests at 125 Hz and 8k Hz (sub-clause 5.6.2) were performed by the electrostatic actuator method. At the end of the test, the associated sound calibrator was reapplied to the sound level meter and the meter reading was recorded and is noted below in the statements section.

Traceability

The measured values are traceable to the following laboratories:

Sound Pressure Level: National Physical Laboratory, United Kingdom

Voltage: National Physical Laboratory, United Kingdom

Frequency: National Physical Laboratory, United Kingdom

Ambient Pressure: National Physical Laboratory, United Kingdom

Temperature & Relative Humidity: National Physical Laboratory, United Kingdom

Measurement Results:

Calibration of sound level meter - BS7580 #5.4	Passed
Noise test - BS 7580 #5.5.2	Passed
Level Linearity Test - BS 7580, #5.5.3	Passed
Frequency weightings: A Network - BS 7580 #5.5.4	Passed
Frequency weightings: C Network - BS 7580 #5.5.4	Passed
Frequency weightings: Z Network - BS 7580 #5.5.4	Passed
Time weightings F and S - BS7580 #5.5.5	Passed
Peak response - BS7580 #5.5.6	Passed
RMS accuracy - BS7580 #5.5.7	Passed
Time weighting I - BS7580 #5.5.8	Passed
Integrating Test : Time averaging - BS7580 #5.5.9	Passed
Integrating Test : Pulse range - BS7580 #5.5.10	Passed
Integrating Test : Sound exposure level - BS7580 #5.5.11	Passed
Overload SPL Test - BS 7580 #5.5.12	Passed
Overload Leq Test - BS 7580 #5.5.12	Passed
Acoustic tests - BS 7580 #5.4 and 5.6	Passed
Summation of acoustic tests - BS 7580 #5.5.4	Passed

Statements

The sound level meter in the configuration tested conforms to the requirements of BS 7580 Part 1.

The self-generated noise recorded in the test specified in § 5.5.2 was: (Below MSD) 9.9dB(A), (Below MSD) 9.9dB(C) and (Below MSD) 18.5dB(Z).

The following response was finally obtained using the associated calibrator.(§5.6.3): 113.8dB(A)

This reading should be used henceforth to set up the sound level meter for field use.

A stricter test than that specified in paragraphs 5.6.1 and 5.6.2 can be used by verifying that the 10 ms reference pulse is also correct. The level uncertainty of the Laboratory's 1 kHz sound calibrator used during this verification is ± 0.1 dB.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The sound level meter in the configuration tested was found to comply with BS 7580:1997 part 1 for a type 1 device. The associated calibrator has been corrected for barometric pressure at the time of calibration in accordance with the relevant manufacturer's instructions

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: U7147 **CALIBRATION** **0789**

Test object : Sound Level Meter
Manufacturer: Norsonic
Type : 118
Serial no: 31497

Customer: BSP Consulting
Address: Suite B, Floor 3, 24 De Montfort Street,
 Leicester. LE1 7GB.
Contact Person: Fraser Poxon.
Order No: L152

Method

Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. The following items have been calibrated as set out in BS 7580 Part 1:1997

	Producer:	Type:	Serial No:	Certificate number
Microphone	Norsonic	1225	52229	7146
Calibrator*	Norsonic	1251	29215	U7145
Preamplifier	Norsonic	1206	30543	Included

Additional items that also have been submitted for verification

Wind shield	Norsonic	Nor1451
Attenuator	None	
Microphone cable	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 :	101.174 kPa	23.7 °C	54.8 %RH

Date received : 18/06/2010
 Date of calibration: 25/06/2010
 Date of issue: 25/06/2010

Engineer

Michael Tickner

Supervisor

Darren Batten Tech IOA

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

Calibration Report

Certificate No.:7146

Manufacturer: Norsonic
Type : 1225
Serial no: 52229

Customer: BSP Consulting
Address: Suite B, Floor 3, 24 De Montfort Street,
Leicester. LE1 7GB.
Order No: L152
Contact Person: Fraser Poxon

Measurement Results:

	Sensitivity :	Capacitance :
	(dB re 1V/Pa)	(pF)
1:	-25.75	22.6
2:	-25.75	22.5
3:	-25.75	22.5
Result (Average) :	-25.75	22.5
Expanded Uncertainty:	0.10	2.00
Degree of Freedom:	>100	>100
Coverage Factor:	2.00	2.00

The following correction factors have been applied during the measurement:
Pressure :-0.010 dB/kPa Temperature :-0.007 dB/°C Relative humidity :0.000 dB/%RH

Reference Calibrator: WSC2 - GRAS42AA-18277 Volume correction: 0.000 dB
Records :K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\2010\NOR1225_52229_M1.nmf

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Comment:

Environmental conditions:


Pressure : 101.176 ± 0.003 kPa Temperature : 23.2 ± 1.5 °C Relative humidity : 57.3 ± 4.5 %RH

Date of calibration: 25/06/2010

Date of issue: 25/06/2010

Supervisor : David Egan - Laboratory Manager
Engineer :


Michael Tickner
Software version: 5.1


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 GREAT DUNMOW, Essex, CM6 1HD
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Certificate of Calibration

Certificate No.: U7145

CALIBRATION

0789

Test object : Sound Calibrator
Manufacturer: Norsonic
Type : 1251
Serial no: 29215

Customer: BSP Consulting
Address: Suite B, Floor 3, 24 De Montfort Street,
 Leicester. LE1 7GB.

Contact Person: Fraser Poxon.
Order No: L152


Measurement Results:	Level	Level Stability	Frequency	Frequency Stability	Distortion
1:	113.99 dB	0.06 dB	999.90 Hz	0.00 %	0.34 %
2:	113.97 dB	0.06 dB	999.91 Hz	0.00 %	0.33 %
3:	113.97 dB	0.06 dB	999.91 Hz	0.00 %	0.33 %
Result (Average):	113.98 dB	0.06 dB	999.91 Hz	0.00 %	0.33 %
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 level is traceable to National Standards.
 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 the 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, the coverage factor is increased to maintain this confidence level. The uncertainty has been determined in accordance with UKAS requirements.
 Records : K:\C A\Calibration\Nor-1504\Nor-1018 CalCal\2010\NOR1251_29215_M1.nmf

Environmental conditions:	Pressure :	Temperature :	Relative humidity :
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions :	101.192 kPa	22.5 °C	53.5 %RH

Date received for calibration : 18/06/2010
 Date of calibration: 25/06/2010
 Date of issue: 25/06/2010
 Engineer

Supervisor


 Michael Tickner


 Darren Batten TechnOA

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GLOSSARY

1. The human ear responds to sound in an approximately logarithmic manner and the logarithmic decibel (dB) scale is used to measure and assess sound. The human ear does not respond equally to sounds at different frequencies. It is more sensitive at the mid-frequency range than it is at the lower and higher frequencies. Therefore, when measuring sound a weighting network, known as >A-weighting= is applied to the frequency spectrum to take account of this differing sensitivity. This unit is termed dB(A).
2. The L_{Aeq} equivalent continuous sound level, is the sound level of a steady sound having the same energy as a fluctuating sound over a specified measuring period. This may be as short as 1 second or as long as 24 hours when used to assess the noise level at a specified location.