

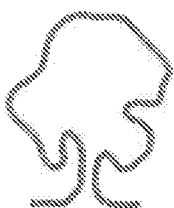
HANBURY PROPERTIES (WALBERTON) LTD

**THE HOLLY TREE, THE STREET, WALBERTON,
ARUNDEL, WEST SUSSEX, BN18 0PH**



Kitchen Ventilation Noise and Odour Impact Assessment

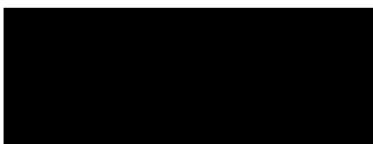
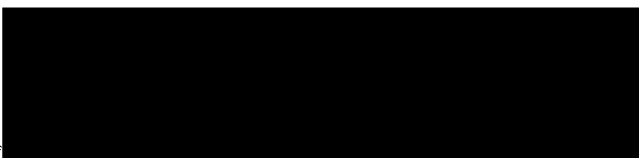
March 2011
(Revised January 2013)



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Environmental Assessment Services Ltd

REPORT DATA SHEET

Requirement	Data
Report Reference	Hanbury/Walberton/N&O
Date	March 2011
Client	Hanbury Properties (Walberton) Ltd
Report type	Kitchen Ventilation Noise Impact and Odour Assessment
Purpose	Submission to planning
Revisions	July 2011, December 2012 & January 2013
Prepared by	Clare Silver BSc (Hons)  Signed.....
Approved by	Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MIEAust, MCIWEM, MIEnvSc  Signed...

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Kitchen Ventilation Noise Impact and Odour Assessment

**March 2011
(Revised January 2013)**

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1. THE SITE AND BACKGROUND

- 1.1 The site comprises the Holly Tree public house, associated car parking and beer garden, and large grassed area to the rear. The site has a plan area of approximately 0.63 hectares and is located on the north side of The Street in the village of Walberton, near Arundel in West Sussex. The OS map reference for the site is SU 9722 0607. See Figure 1 for site location and Figure 2 for existing site layout.
- 1.2 It is proposed to refurbish the Holly Tree public house and to install new extract ventilation within the kitchen. See Figure 3 for proposed development plan.
- 1.3 It is understood that the Holly Tree will serve food to customers in normal public house working hours. This would be from 12:00 – 14:00 hours and 06:30 – 21:00 hours. It would be anticipated that the kitchen will cease preparing hot food by around 21:30 hours, although the kitchen ventilation may be left to run during clearing up thereafter up to, say, 23:00 hours.
- 1.4 A Kitchen Ventilation Noise and Odour Impact Assessment in respect of the likely impact of the proposed kitchen ventilation in the refurbished public house on nearby sensitive receptors, is required to support the planning application for the proposed development. This report addresses the probable odour and noise impacts at the nearest residential receptors from the proposed kitchen ventilation system.
- 1.5 Arun District Council's requirements are that, in accordance with the recommendations of BS 4142:1997, the noise generated by the kitchen exhaust ventilation should not exceed 5 dB_(A) below background (L_{(A)90}) at the nearest sensitive receptor.

2. NEAREST SENSITIVE (RESIDENTIAL) RECEPTORS

- 2.1 The nearest residential receptors appear to be Holly Tree Cottage to the west, Old Hall Cottage to the southeast and the proposed new residences on the site to the north and east of the public house. See Figure 2. The monitoring locations were selected to provide background noise data appropriate for the nearest receptors. See Table 2.1 below.

TABLE 2.1
SUMMARY OF MONITORING LOCATIONS

Monitoring location No.	Description of location
1	Adjacent to boundary with Holly Tree Cottage
2	Close to rear boundary of the site
3	At boundary with Old Hall Cottage
4	At proposed houses at the eastern site boundary

- 2.2 The surrounding land use is mostly residential with a primary school adjacent to the northern boundary of the site, the Village Centre to the east and various commercial premises elsewhere within the village.

3. NOISE ASSESSMENT

3.1 Assessment Method

- 3.1.1 The assessment was carried out with reference to the National Planning Policy Framework 2012.

- 3.1.2 The first part of the assessment comprised the measurement of background noise levels at the site to establish the lowest background noise level likely to coincide with the period when the kitchen ventilation would be operating.

- 3.1.3 The lowest background noise level would be at night, when residents were most likely to be trying to sleep. However, the proposed kitchen ventilation system will not be operating after 23:00 hours. The background noise levels in the vicinity of the site were deemed most likely to be at their lowest during a weekday evening. The Holly Tree public house is closed on Mondays and a Tuesday was selected as being the probable quietest evening.

- 3.1.4 Noise measurements were carried out around the site and as close as practicable to the nearest residential receptors during a relatively quiet time of the day and between 21:00 and 23:00 hours on a Tuesday night. The duration of the measurements taken were between 15 and 40 minutes. The durations chosen were partly dictated by the need to take measurements at different locations over a short period of time.

- 3.1.5 The second part of the assessment was to establish the likely noise output from the proposed new kitchen ventilation system. The noise from the proposed ventilation system at the nearest residential receptor was superimposed on the lowest background noise level for the location and the probable impact was assessed.

3.2 Background Noise Monitoring Results

- 3.2.1 The monitoring was carried out using a CEL (Cassella) Type 490C Precision Sound Level Meter (SLM) annually independently calibrated to national standards. A CEL-110/1 acoustic calibrator was used for site calibration before and after monitoring. See Appendix A.
- 3.2.2 The SLM was mounted 1.5 m above ground level on a tripod during the measurements.
- 3.2.3 The results of the background noise monitoring are summarised in Tables 3.1 and 3.2 below and results of frequency analysis are given in Appendix B:

TABLE 3.1
SUMMARY OF THE RESULTS OF THE DAYTIME/AFTERNOON
BACKGROUND NOISE MONITORING

Location No.	Date	Time (hours)	Duration (mins)	$L_{(A)90}$ (dB _(A))	Noise sources
1	7 March 2011	15:38	15	44.0	Distant traffic, aeroplanes, playing on recreation ground (pub closed)
2		15:55	32	42.5	
3		16:30	36	41.5	
4		17:06	24	37.5	

TABLE 3.2
SUMMARY OF THE RESULTS OF THE EVENING/NIGHT-TIME
BACKGROUND NOISE MONITORING

Location No.	Date	Time (hours)	Duration (mins)	$L_{(A)90}$ (dB _(A))	Noise sources
1	15 March 2011	22:15	15	46.5	Distant traffic, aeroplanes, occasional movement in pub and village hall car parks
2		21:52	20	43.5	
3		22:31	36	43.0	
4		21:12	38	44.5	

- 3.2.4 The weather during the monitoring on 7 March 2011 was cold, dry and cloudy with a light easterly breeze. The weather during the monitoring on 15 March 2011 was dry with some cloud and a gentle southerly breeze. Weather conditions were not a significant influence on the background noise during the monitoring.

3.3 Interpretation of the Results

- 3.3.1 The $L_{(A)90}$ background noise level results were in the range of 37.5 – 46.5 dB_(A). For the purposes of the assessment, the lowest values recorded at each receptor location will be used.

3.3.2 The $L_{(A)eq}$ results were in the range of 43.5 – 49.4 $dB_{(A)}$. This tends to confirm the impression that Walberton Village is generally a quiet location.

3.4 The Proposed Kitchen Ventilation System

3.4.1 The proposed restaurant kitchen extract ventilation system is based on a minimum of 30 air changes per hour as a suitable ventilation rate for a commercial kitchen of the proposed size and type of duty. The total kitchen volume, including cooking and food preparation areas is $84 m^3$. This would require an airflow through the fan of $0.7 m^3/s$.

3.4.2 See Figure 4 for proposed kitchen layout and proposed kitchen extract ventilation arrangement. From the proposed arrangement, it is apparent that the discharge route is relatively short and uncomplicated and the pressure drop across the system should be moderate.

3.4.3 A fan suitable for the required duty would be a five-bladed Woods 45JM Aerofoil cased fan operating at 1090 rpm ($0.7 m^3/s$ @ 80 pa total pressure) within a full diameter (450 mm) duct. The noise rating at 3 m from the open downstream end of the fan casing is given as 42 $dB_{(A)}$. The principal operating frequency would be anticipated to be around 90 Hz. See Appendix C for manufacturer's test data. The acoustic performance is summarised below in Table 3.4:

TABLE 3.4
ACOUSTIC PERFORMANCE OF WOODS 35JM AEROFOIL FAN

Noise rating at 3 m ($dB_{(A)}$)*	Acoustic performance (dB) at octave band (Hz)							
	63	125	250	500	1000	2000	4000	8000
42	62	68	62	61	60	58	54	51

* The fan noise rating is given in the manufacturer's specification at 3 m. The noise rating at 1 m (as required by BS 4142) would be 52 $dB_{(A)}$

3.4.4 A sound power level (theoretical noise at source) for the fan may be calculated from the formula: $SWL = 42 + 20 \log 3 + 8 = 60 dB_{(A)}$.

3.4.5 The noise at the outlet would be the sound power level minus losses in the ducting/due to distance from the fan. Noise impact at the nearest receptor will be reduced where the outlet faces away from the receptor. In this case the breakout noise level (noise transmitted through the ducting walls) should also be considered.

3.4.6 The attenuation provided by the duct wall will be a minimum of 17 $dB_{(A)}$ (see Appendix D) and probably 20 $dB_{(A)}$. Attenuation per metre run of ducting from fan to outlet will be approximately 0.15 $dB_{(A)}$, with 3 $dB_{(A)}$ of additional attenuation for each 90° bend.

- 3.4.7 The outlet from the ducting will be discharged vertically at a level such that there should be no line of sight to within the open end from the nearest receptors.
- 3.4.8 The effective obstruction of any line of sight from a receptor into the open end of the discharge ducting will provide a minimum of 10 dB of attenuation.
- 3.4.9 The effective noise at the outlet will be:

$$\text{Sound power level} - \text{losses in ducting} - \text{loss in single } 90^\circ \text{ bend} - 10 \text{ dB} \\ \text{loss due to outlet obstruction} = 60 - (2.5 \times 0.15) - 3 - 10 = 46.6 \text{ dB}_{(A)}$$

This may be compared with the maximum breakout noise of:

$$60 - 17 = 43 \text{ dB}_{(A)}$$

It is apparent that the noise from the outlet will be dominant in this case. In accordance with the recommendations of BS 4142, an allowance of 5 dB_(A) will be added to the noise impact to allow for tonal qualities (whirr, hum, whine, buzz, etc.).

- 3.4.8 The nearest receptors considered in the impact assessment are listed in Table 3.5 below:

TABLE 3.5
NOISE IMPACTS AT RECEPTORS

Receptor No.	Description	Distance from noise source (m)
i	Old Hall Cottage	15
ii	Holly Tree Cottage	23
iii	Nearest proposed house to the east	32
iv	Nearest proposed house to the north	36

- 3.4.9 The predicted noise impacts at the nearest receptors are given in Table 3.6 below:

TABLE 3.6
NOISE IMPACTS AT RECEPTORS

Receptor No.	Distance from noise source (m)	Noise impact (inc. + 5 dB tonal) (dB _(A))	Background at receptor* (dB _(A))	Difference (dB _(A))
i	15	20.5	43.0	- 22.5
ii	23	16.8	43.0	- 26.2
iii	32	13.9	37.5	- 23.6
iv	36	12.9	40.0	- 27.1

* Extrapolated from the monitoring results

- 3.4.9 Silencer options are available for this extraction system, which can provide up to 6 dB_(A) of additional attenuation. However this would appear to be unnecessary in this case.
- 3.4.10 From the above, it is apparent that the kitchen ventilation system as proposed will not have any significant noise impact at the nearest existing or proposed residential receptors.

4. ODOUR ASSESSMENT

4.1 Sources of Odour

- 4.1.1 The source of odour will principally be the food cooking within the kitchen. The odour will be largely dependant on the cuisine to be provided by the kitchen. Kitchens producing hot, spicy and/or fried foods (typically the most aromatic) will produce the greatest odour and may require the incorporation of specific odour control measures in a location close to residential receptors.
- 4.1.2 In this case, the cuisine will be typical of traditional public house fare, as given in the present Holy Tree menu (see Table 4.1 below).

TABLE 4.1
PRESENT HOLLY TREE PUBLIC HOUSE MENU

Starters	
❖	Soup of the Day
❖	Chicken Pate
❖	Salmon Pate
❖	Thai Spring Rolls
❖	Brie and Cranberry
❖	Whitebait
Main Courses	
❖	Steak and Ale Pie
❖	Sausages and Mash
❖	Shepherds Pie
❖	Cod and Chips
❖	Char-grilled Rib-eye Steak
❖	Lamb Shank
❖	Mushroom and Thyme Risotto
❖	Steamed Fillet of Hake
❖	White Horse Burger (beef burger)
Desserts	
❖	Crème Brûlée
❖	Lemon Posset
❖	Hot Chocolate Fondant & Ice-cream
❖	Sticky Toffee Pudding
❖	Vanilla Panacotta
❖	Banana Pancake
❖	Various Cheeses
❖	Various Ice-creams

- 4.1.3 The proposed kitchen will have a single ventilation point, and this would be the most likely external source of any odour from the kitchen.

4.2 Odour Characteristics

- 4.2.1 Table 2.2 of the defra publication '*Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems*' January 2005 (Ref. 1) rates "most pubs" as having *moderate* odour concentration and grease content characteristics.

- 4.2.2 From Table 2.3 of Ref. 1, the existing cooking appliances used at the Holly Tree would be classified as light-medium for grease/smoke loading and moisture content.

- 4.2.2 From observation at the site, the loading on the existing kitchen (in terms of cooking activity) would be considered light to moderate for a commercial kitchen. However, the proposed pub refurbishment will increase the effective restaurant capacity and the odour concentration and grease content classification will increase to moderate.

4.3 Odour Impact Assessment

- 4.3.1 From Annex C of the defra publication '*Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems*' January 2005 (Ref. 1), the Risk Assessment for Odour may be derived based on the following criteria in Table 4.2 below:

TABLE 4.2
ODOUR RISK ASSESSMENT

Criteria	Description	Score	
Dispersion	4 m above ground level at > 5 m/s	Poor	15
Proximity of receptors	Nearest residence within 20 m	Close	10
Size of kitchen	Probably >30 covers on most days	Medium	3
Cooking type	Low-medium odour and grease loading	Medium	4
Impact Risk For Total Score		Medium	32

- 4.3.2 From the results of the Odour Risk Assessment, a high level of odour control will be required and it is recommended that the system inlet should be fitted with a washable grease filter at the point of extraction, fine filtration and carbon filter or UV ozone system upstream of the fan. These filters/odour suppression devices will require regular maintenance to ensure efficient operation. See examples in Appendix E.

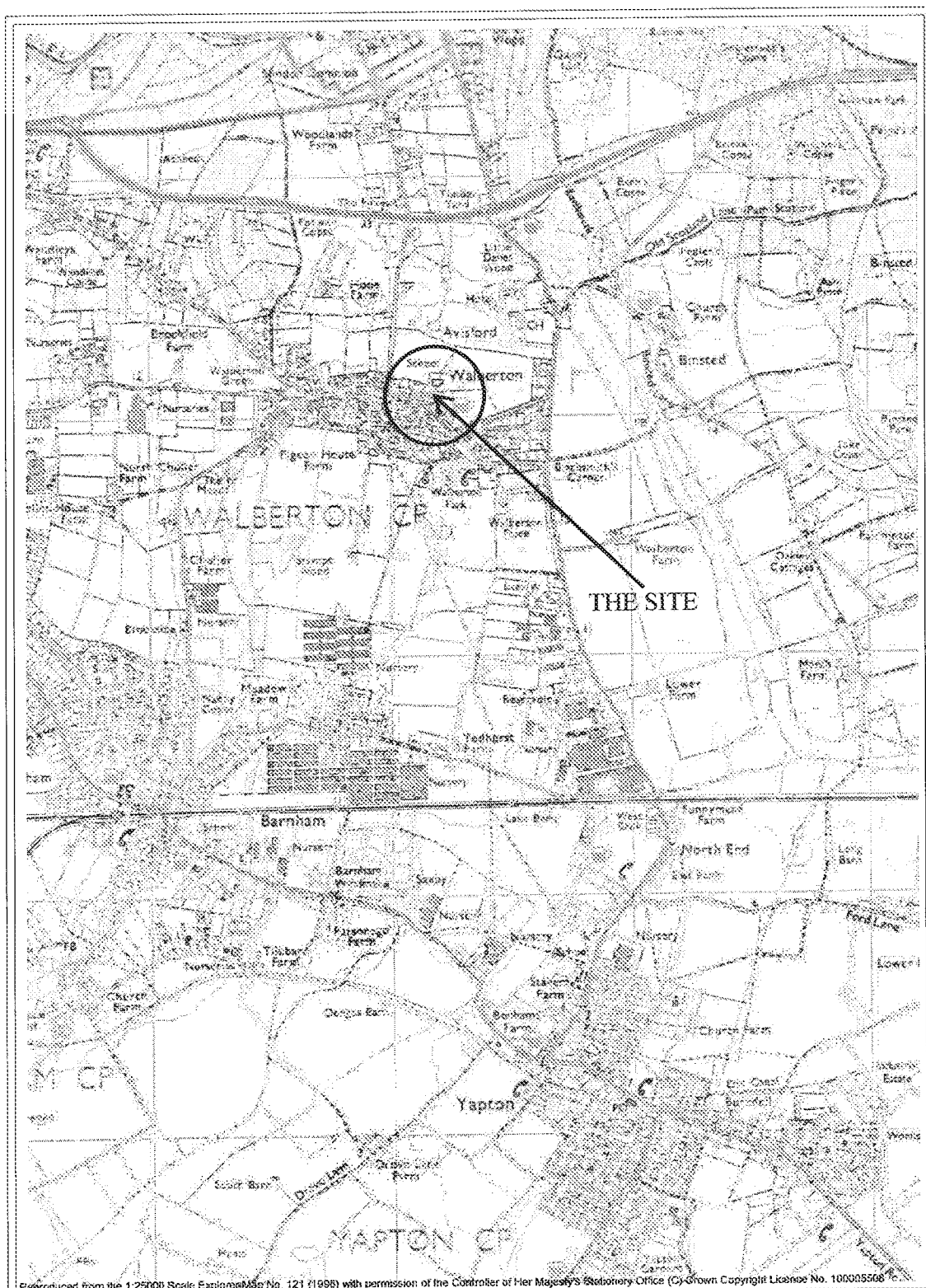
- 4.3.3 It is concluded that, with the proposed ventilation system and proposed high level of odour control, plus the likely menu and the moderate intensity of the kitchen operation, significant adverse odour impacts on nearby residential receptors are unlikely.
- 4.3.4 The level of odour control required could be reduced, if required, by increasing the kitchen ventilation outlet stack height by an additional 4 m to above adjacent roof level.

5. CONCLUSIONS

- 5.1 From the results of the assessment, it is concluded that the noise impact from the proposed kitchen ventilation system at the nearest residential receptors will be $> 5 \text{ dB}_{(\Delta)}$ below background.
- 5.2 The low noise impact will be largely due to the recommended ventilation system fan type plus the proposed location and the arrangement of the kitchen extract ventilation outlet.
- 5.3 It is concluded that the risks of significant odour impact (and hence complaints of odour nuisance) at the nearest residential receptors from the proposed kitchen ventilation system are moderate. This is mainly due to the likely menu, the moderate range of odour risk factors in the kitchen and the limited effective diffusion from the ventilation duct outlet as presently proposed. It is recommended that the ventilation system should incorporate a washable grease filter at the point of extraction, a fine filter and carbon filter/UV ozone system upstream of the fan.
- 5.4 The level of odour control required could be reduced, if required, by increasing the kitchen ventilation outlet stack height by 4 m to above neighbouring roof level.

☆☆☆☆☆☆

Figures 1 - 4



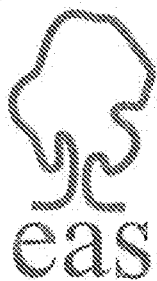
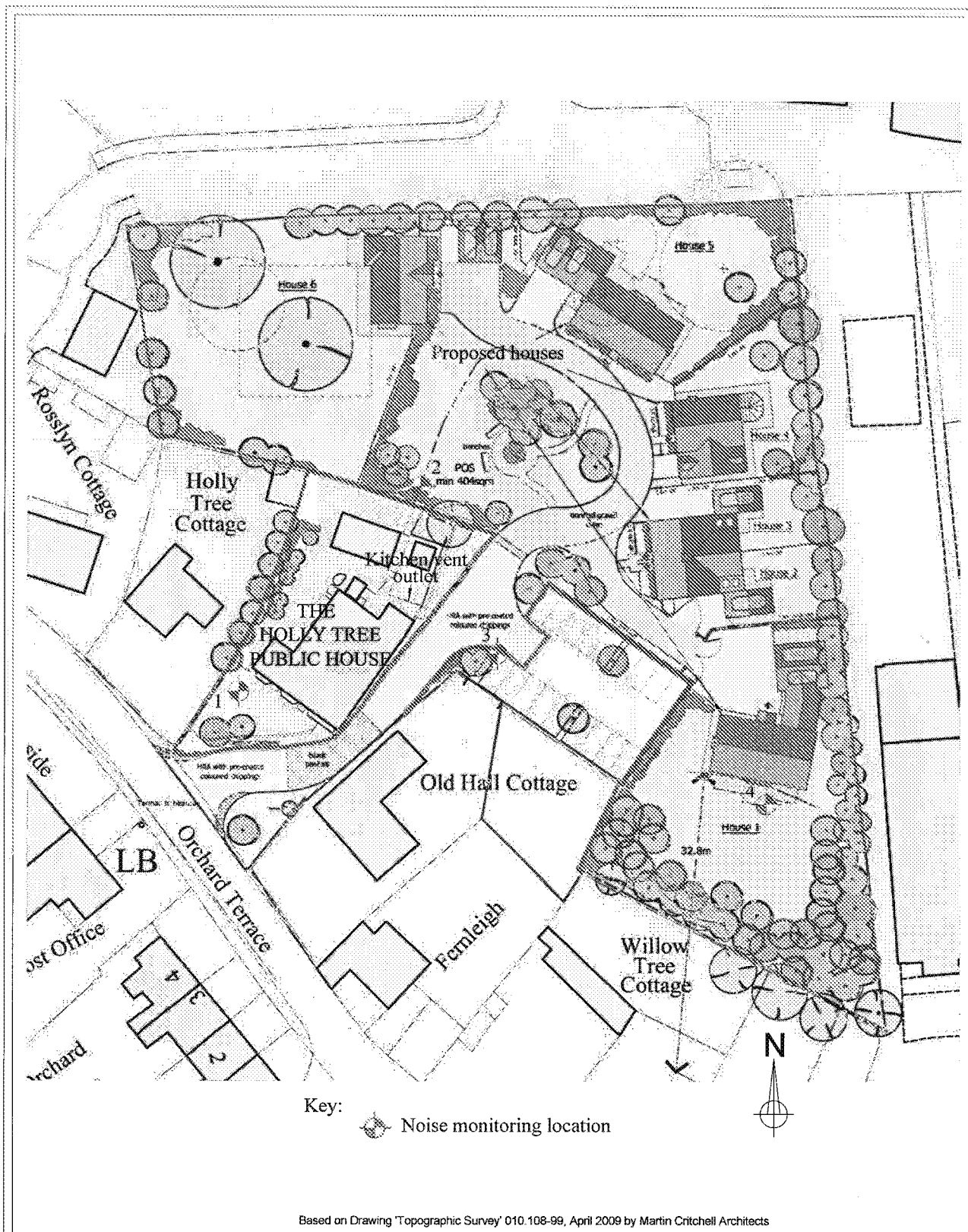
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WEST SUSSEX BN18 0PH

Figure 1: Site Location Plan

March 2011 (Revised January 2013)

Scale 1:25000



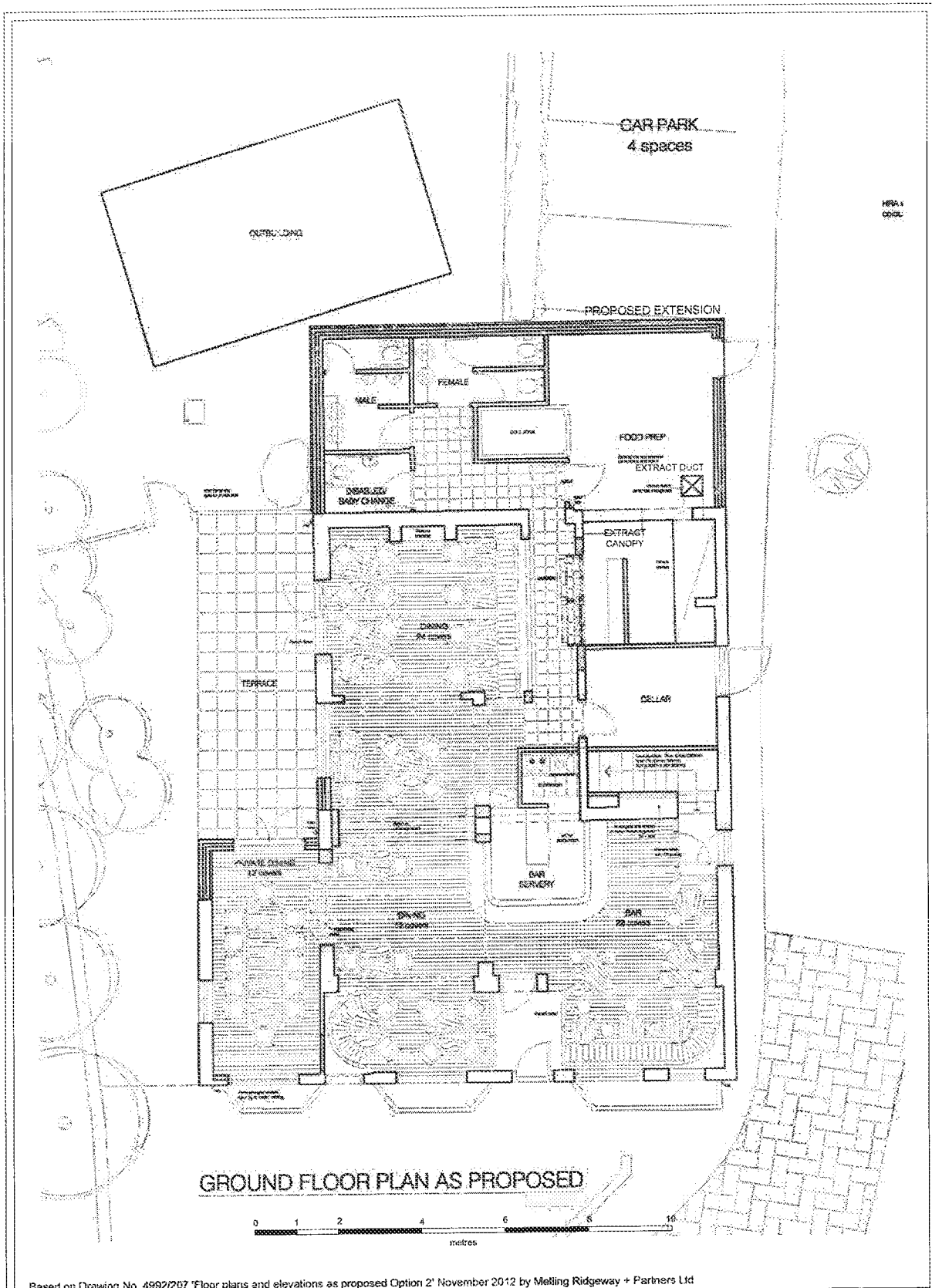
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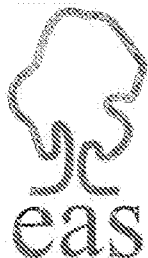
Figure 2: Existing Site Layout and Monitoring Locations

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Scale 1:700



Based on Drawing No. 4992/207 'Floor plans and elevations as proposed Option 2' November 2012 by Metling Ridgeway + Partners Ltd



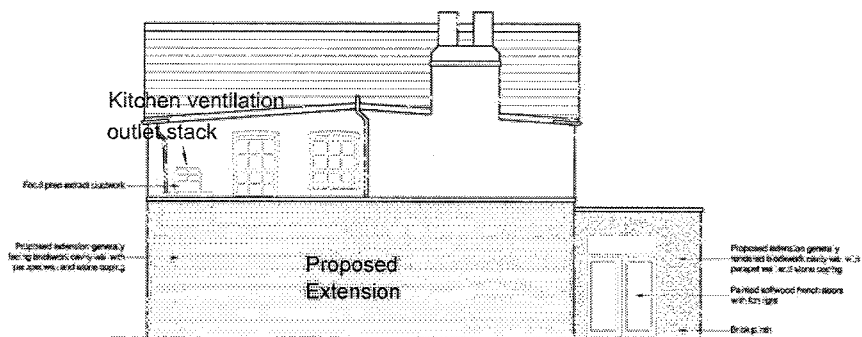
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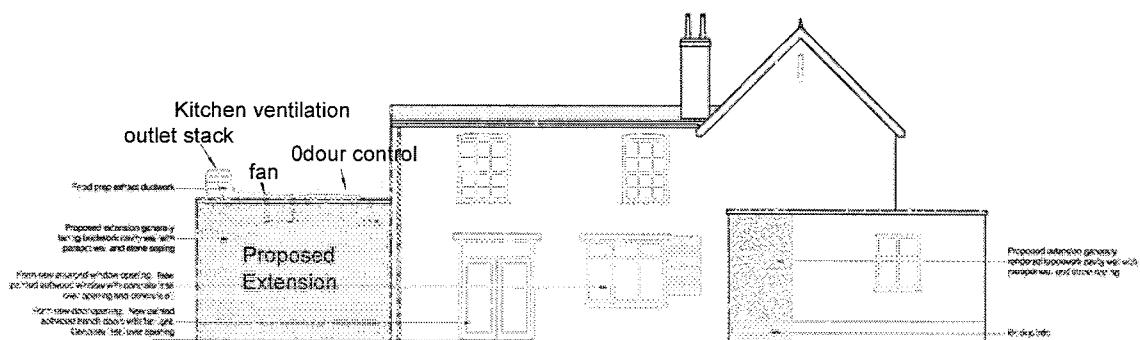
Figure 3: Proposed Development Plan

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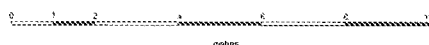
Not to Scale



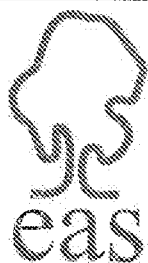
NORTH EAST ELEVATION AS PROPOSED



NORTH WEST ELEVATION AS PROPOSED



Based on Drawing No. 4992/207 'Floor plans and elevations as proposed Option 2' November 2012 by Melling Ridgeway + Partners Ltd



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THE HOLLY TREE, THE STREET, WALBERTON, ARUNDEL,
WEST SUSSEX BN18 0PH

Figure 4: Proposed Kitchen Extract Ventilation Arrangement

March 2011 (Revised January 2013)

Not to Scale



APPENDIX A Calibration Certificates

Acoustic Calibration Services Limited,
Unit 6F, Diamond Industrial Centre,
Works Road, Letchworth Garden City,
Hertfordshire SG6 1LW

ACSL
Acoustic Calibration Services Limited

web: www.acousticcalibration.co.uk

CERTIFICATE OF CALIBRATION

Model: CEL-490.C1

Serial No: 129580

Organisation: Environmental Assessment Services Ltd., London Road,
Hickstead, Haywards Heath, West Sussex RH17 5LZ

Job Number: 1843

Customer Order Reference: EAS/CAL/1

The Sound Level Meter was assessed for conformance with International Standards *IEC60651* and *IEC60804* using test procedures described in *BS 7580* Part 1. The meter claims Type 1 accuracy conformance and it was against these requirements that all the results were evaluated.

The sound level meter was connected to a CEL-495 preamplifier Serial No. 000758 and a CEL-251 measurement microphone Serial No. 0748. The microphone has a nominal capacitance of 18 pF and the device used to apply electrical signals to the preamplifier was of the same nominal capacitance.

CEL-110/1 Acoustic Calibrator Serial No: 119427 was utilised in establishing the initial acoustic calibration setting.

The sound level meter passed all applied tests with no deviations from Type 1 specification, in accordance with *IEC 60651* and *IEC 60804*. Accordingly, the meter meets the requirements of *BS 7580* Part 1.

The sound level meter should be set to read 114.0dB when used with the associated acoustic calibrator, microphone and preamplifier as detailed above at reference atmospheric pressure.

All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

Certificate No: 13461
Date of Issue: 23rd July, 2010

Signature: 
Print Name: Trevor Lewis

Registered Office: HW Associates, Portmill House, Portmill Lane, Hitchin, Hertfordshire SG5 1DJ
Registered No: 4143457 VAT No: GB 770505441
Directors: Trevor J Lewis, Owen R Clingan MIOA

Acoustic Calibration Services Limited,
Unit 6F, Diamond Industrial Centre,
Works Road, Letchworth Garden City,
Hertfordshire SG6 1LW

ACSL
Acoustic Calibration Services Limited

web: www.acousticcalibration.co.uk

CERTIFICATE OF CALIBRATION

Model: CEL-110/1

Serial Number: 119427

Organisation: Environmental Assessment Services Ltd., London Road
Hickstead, Haywards Heath, West Sussex RH17 5LZ

Job Number: 1843

Customer Order Reference: EAS/CAL/1

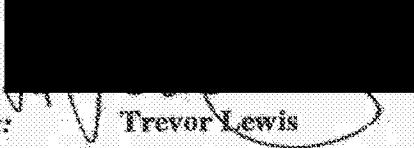
The acoustic calibrator was run for a period of time until a stable level was measured. The output level was compared to the certified level of the laboratory measurement references. The measurements were repeated 5 times and the average value calculated.

The ambient temperature during calibration was $27 \pm 1^{\circ}\text{C}$.
The barometric pressure was 101.2 to 101.3 kPa.

The output of the acoustic calibrator when applied to the *CEL 251* is *114.0dB* or *94.1dB*.
The output frequency signal of the acoustic calibrator is *1000Hz*.

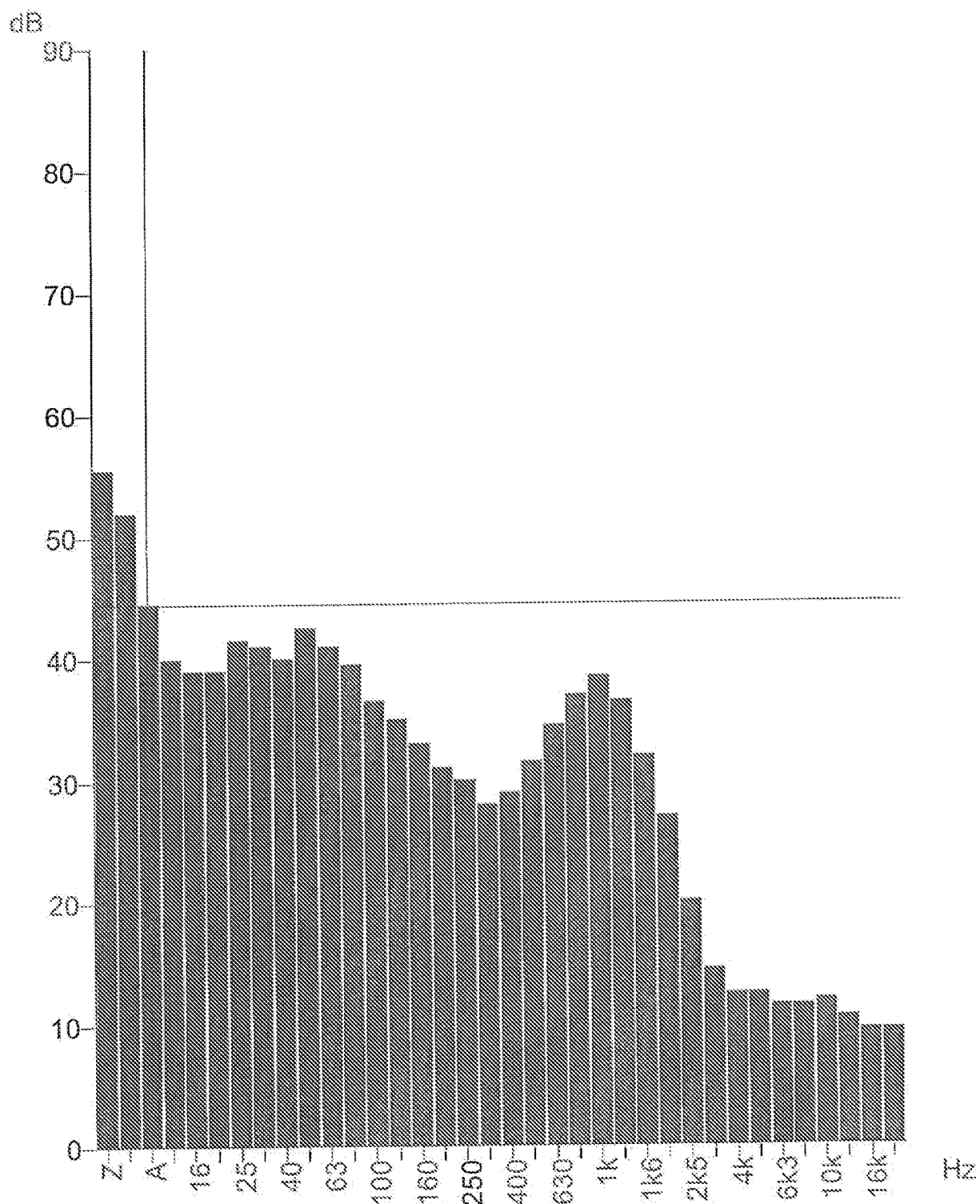
All ACSL's calibration instrumentation is fully traceable to National Standards. The acoustic references are calibrated by laboratories which are UKAS accredited for the purpose.

Certificate No: 13460
Date of Issue: 23rd July, 2010

Signature: 
Print Name: Trevor Lewis

Registered Office: HW Associates, Portmill Lane, Hitchin, Hertfordshire SG5 1DJ Registered No: 4143457 VAT No: GB 770505441
Directors: Trevor J Lewis, Owen R Clingan MICA

APPENDIX B
Noise Monitoring Results Example



c:\documents and settings\all users\windows\documents\shared documents\hanbury
 holly tree 4.dta
 Function = L2F90.0 dB

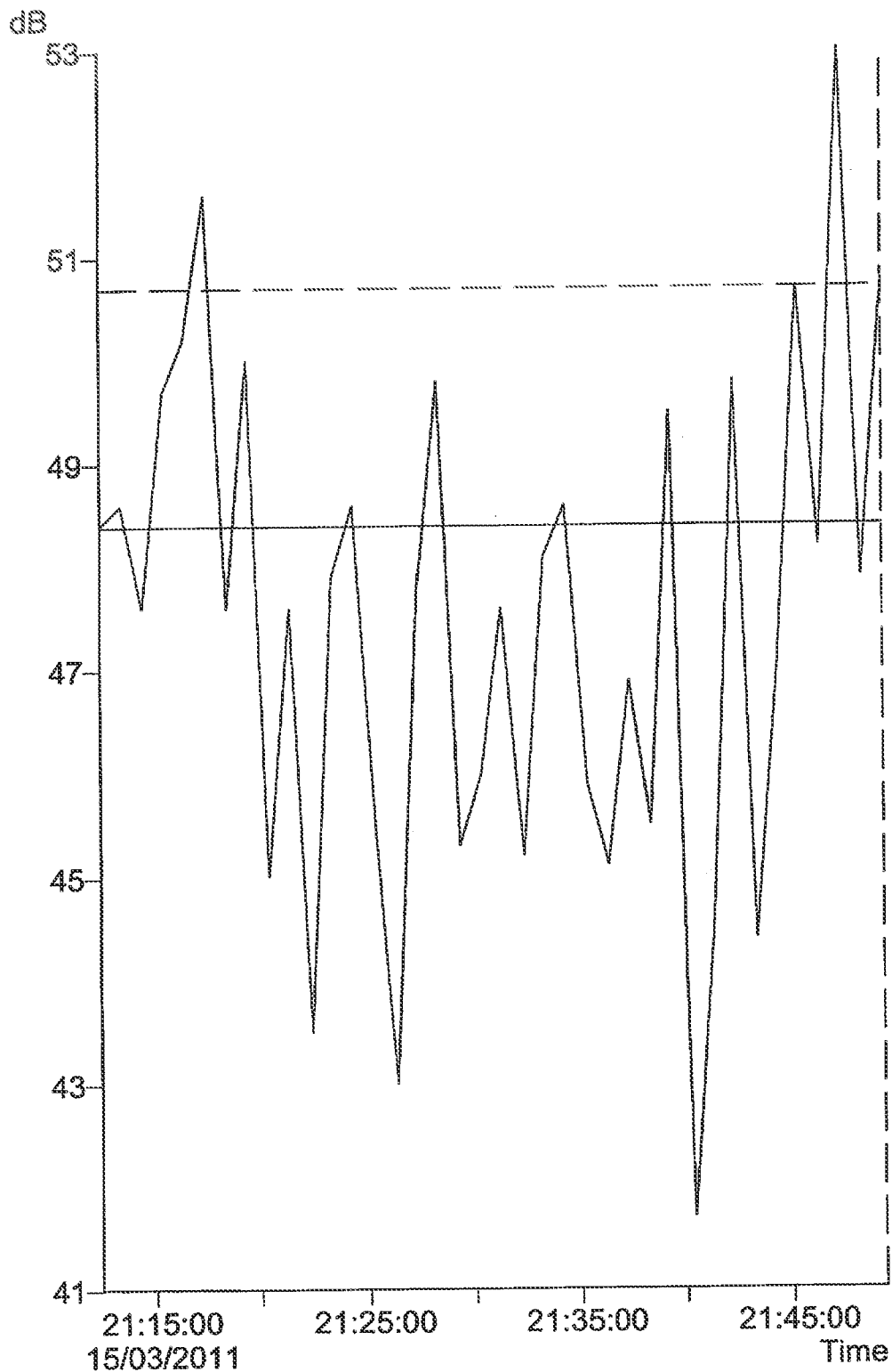
Cursor: 15/03/2011 21:12:23, Band = Broadband, Level = 44.5 dB, Flags: -----

c:\documents and settings\all users\windows\documents\shared documents\hanbury holly tree 4.dta

- Cumulative period results -

Number of records 38
 Start of run 15/03/2011 21:12:23
 Duration of run 00:38:20.06
 Overload occurred No
 Under-range occurred No
 Low battery occurred No
 Pause was used No

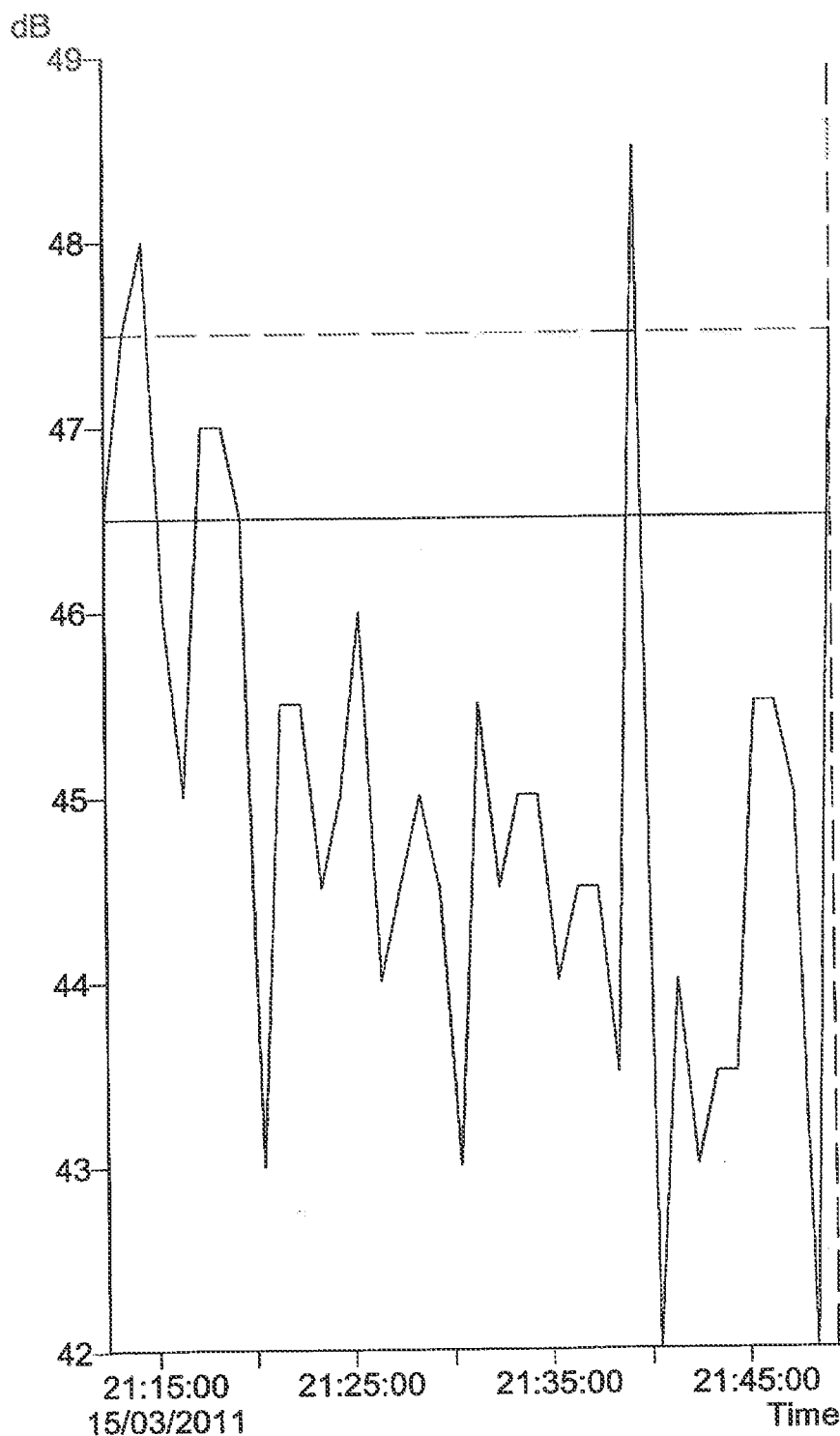
Hz		Flags	dB	dB	dB	dB	dB	dB
Band	Fw	OBPZ	LFmx	LFmn	Leq	LF10.0	LF50.0	LF90.0
Broadband	Z	----	89.8	51.5	63.4	65.5	59.5	55.5
Broadband	C	----	75.9	49.0	57.0	60.0	55.0	52.0
Broadband	A	----	68.0	40.1	48.2	50.5	47.0	44.5
12	Z	----	77.7	28.1	51.8	53.5	46.0	40.0
16	Z	----	75.3	28.2	50.6	53.0	45.5	39.0
20	Z	-----	71.4	28.3	49.3	52.0	44.5	39.0
25	Z	----	69.9	29.0	49.7	52.5	46.5	41.5
32	Z	----	68.8	30.1	49.5	53.0	46.0	41.0
40	Z	-----	63.9	31.6	47.8	51.5	44.5	40.0
50	Z	-----	63.7	33.3	49.3	52.5	47.0	42.5
63	Z	----	63.5	33.0	47.8	51.0	45.0	41.0
80	Z	----	65.4	32.8	45.7	48.5	43.0	39.5
100	Z	-----	61.3	28.9	43.3	45.5	40.0	36.5
125	Z	----	63.8	29.0	43.8	44.0	38.0	35.0
160	Z	----	63.3	28.1	44.0	43.0	36.5	33.0
200	Z	-----	61.2	25.7	41.7	41.0	34.5	31.0
250	Z	-----	57.8	25.0	39.0	40.0	33.5	30.0
315	Z	----	60.9	23.5	40.1	38.5	31.5	28.0
400	Z	-----	58.3	24.8	38.0	38.0	32.0	29.0
500	Z	-----	57.7	26.9	38.5	39.5	34.5	31.5
630	Z	----	54.5	29.5	39.0	41.5	37.5	34.5
800	Z	-----	53.0	31.7	41.0	43.5	40.0	37.0
1k	Z	-----	65.8	32.9	42.4	45.0	41.5	38.5
1k25	Z	----	58.4	29.0	39.9	42.5	39.0	36.5
1k6	Z	-----	54.1	25.0	35.3	37.5	34.5	32.0
2k	Z	----	56.9	20.0	31.1	32.5	29.5	27.0
2k5	Z	----	54.4	14.7	26.7	28.0	23.5	20.0
3k15	Z	-----	53.1	10.9	23.7	25.0	18.5	14.5
4k	Z	----	48.2	9.1	22.4	24.5	16.5	12.5
5k	Z	-----	52.4	9.8	22.6	25.0	17.0	12.5
6k3	Z	----	49.1	9.5	21.7	23.5	15.5	11.5
8k	Z	-----	48.1	10.4	19.5	20.5	14.0	11.5
10k	Z	----	46.1	11.1	18.5	20.0	14.0	12.0
12k5	Z	-----	45.0	9.9	16.0	16.5	11.5	10.5
16k	Z	-----	43.8	9.1	13.5	13.0	10.0	9.5
20k	Z	-----	39.5	8.9	10.8	10.5	9.5	9.5



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 HOLLY TREE 4.DTA
 Band = Broadband
 Overall profile duration = 00:38:20 (38 samples)
 Function order = LZF dB
 Cursor 1: Time = 15/03/2011 21:12:23, Level = 48.4 dB, Flags: -----
 Cursor 2: Time = 15/03/2011 21:49:23, Level = 50.7 dB, Flags: -----
 Duration on / between the cursors = 00:38:20, Flags: , Scale: 1:1

~ LZF ~

Minimum LZF = 41.7 dB, On / between the cursors. Time of minimum = 15/03/2011
21:40:23
Maximum LZF = 53.0 dB, On / between the cursors. Time of maximum = 15/03/2011
21:47:23



/ LF90.0

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 HOLLY TREE 4.DTA
 Band = Broadband
 Overall profile duration = 00:38:20 (38 samples)
 Function order = LZ90.0 dB
 Cursor 1: Time = 15/03/2011 21:12:23, Level = 46.5 dB, Flags: -----
 Cursor 2: Time = 15/03/2011 21:49:23, Level = 47.5 dB, Flags: -----
 Duration on / between the cursors = 00:38:20, Flags: , Scale: 1:1
 - LZ90.0 -

Minimum LZF90.0 = 42.0 dB, On / between the cursors. Time of minimum = 15/03/2011
21:40:23
Maximum LZF90.0 = 48.5 dB, On / between the cursors. Time of maximum = 15/03/2011
21:39:23

Calculated average LZF90.0 = 45.0 dB, On / between the cursors



APPENDIX C
Manufacturer's Fan Test Data

JIN Aerofoil fan

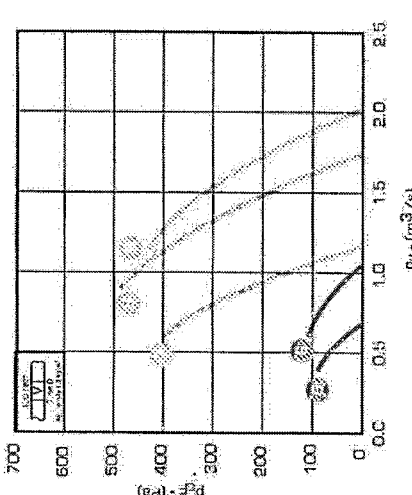
THE

Parage

Fans that include BT or CT motors can be continuously operated at temperatures up to 70°C. When these fans are operating in excess of 50°C they should be run at full speed only.

For Short cased fans please omit the prefix from the product number and state S-type on enquiries/orders. Product numbers shown are for Long cased fans.

Bold text denotes Super Express Product, next day delivery available if ordered by 4pm.



220-240V/50Hz/1~

[illegible]

The fan noise levels shown are for the specified operating point. When an electronic controller is incorporated, a magnetic not-e (enhanced motor noise) can occur - particularly if the fan is operating at speeds well below maximum. For noise sensitive applications FWL recommend using an auto transformer speed controller. Fans are supplied at catalogue stated angle. Should you wish for the pitch angle to be adjusted, we would be happy to offer a quotation.