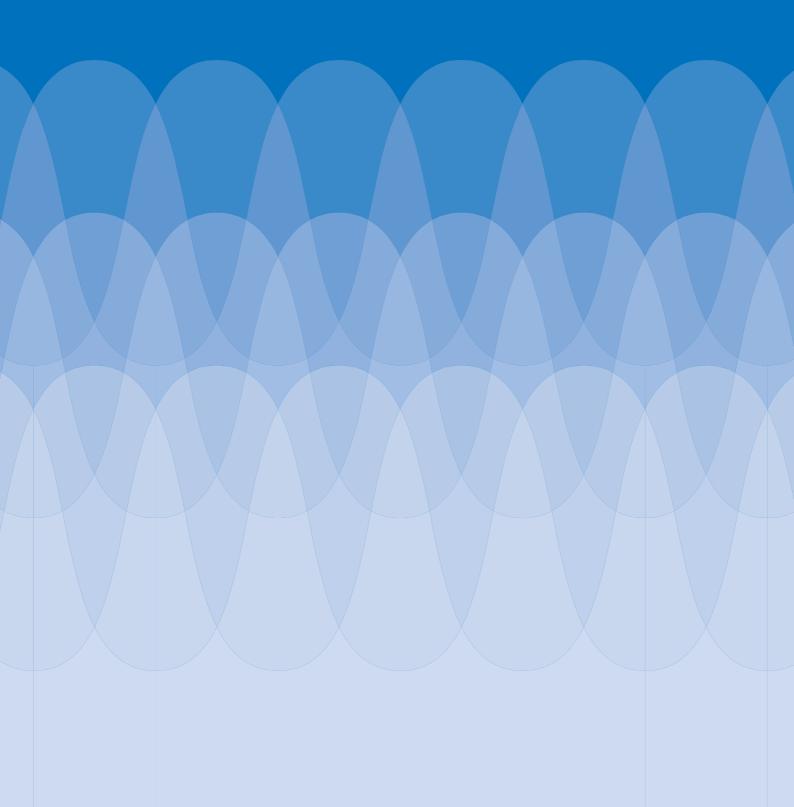


The Pig in The South Downs, Madehurst Plant Noise Assessment

Report 20/0343/R1





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Plant Noise Assessment

Report 20/0343/R1

PSE Associates

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Revision	Description	Date	Prepared	Approved
0	1 st Issue	13 October 2020	Adam Sharpe	Ben Harper

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20/0343/PNS1

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End of Section



1 Introduction

- 1.1 It is proposed to develop a new *The Pig Hotel* in the South Downs area, within the village of Madehurst. As part of these works, mechanical services plant will be installed to serve air conditioning to the venue, in addition to kitchen services units.
- 1.2 Conditional planning permission has been granted for the development. Condition 25 relates specifically to plant noise emissions.
- 1.3 Cole Jarman have been appointed to carry out an external plant noise assessment to discharge the relevant condition.
- 1.4 A noise survey has been conducted at the site in order to quantify the existing background noise levels representative of those at nearby noise sensitive locations.
- 1.5 This report details the methodology and results of the survey and the subsequent assessment of noise emissions from the proposed plant strategy to the nearest noise sensitive locations.

2 Site Description

- 2.1 The site is located within the village of Madehurst at Madehurst Lodge, which sits within the centre of the village.
- 2.2 The site is neighboured by buildings immediately to the northeast of the site's Chicken Shack building, which itself is on the eastern wing of the main lodge building. Beyond this are further neighbouring residences at Parletts Barns, some 45m from the Chicken Shack's eastern extent.
- 2.3 The A29 Fairmile Bottom, which sees regular activity is located to the south of the site, roughly 1km away, while Madehurst's main through road serves as the entry way to the site along its southern boundary.
- 2.4 The site sits within the jurisdiction of South Downs National Park Authority.

3 Background Noise Survey

3.1 Methodology & Instrumentation

- 3.1.1 An unattended noise survey was undertaken at the site commencing at 1145 hours on Tuesday 22nd September, concluding the following day at 1115 hours on Wednesday 23rd September 2020.
- 3.1.2 Measurements of background noise levels were taken from a section of flat roof on the Chicken Shack building. This has been illustrated in attached site plan 20/0343/SP1.



- 3.1.3 This position was selected to quantify background noise levels representative of those at the nearest and surrounding residences to the site.
- 3.1.4 Measurements of the L_{Aeq} , L_{Amax} and L_{A90} indices were recorded over consecutive 15-minute periods for the duration of the survey using the equipment listed within table T1 (see attached Glossary of Acoustic Terms for an explanation of the noise units used).

Item	Manufacturer	Туре
Sound Level Analyser	Rion	NL-52
Acoustic Calibrator	Rion	NC-74
Weatherproof windshield	Rion	WS-15

- T1 Equipment used during unattended noise survey.
- 3.1.5 The microphone was fitted within a weatherproof enclosure, and the sound level meter was calibrated before and after the survey in order to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.
- 3.1.6 The weather conditions when setting up the noise monitoring equipment were cool, still and dry. When collecting the equipment, the weather was cool and damp with some breeze.
- 3.1.7 These conditions are deemed acceptable and are not considered to have affected the measurement results. Publicly available weather data suggest that appropriate conditions (i.e. no precipitation or excessive winds) prevailed for the duration of the survey's night time period, with slight rain noted prior to collection of the equipment.

3.2 Results

- 3.2.1 The results of the noise measurements are presented in attached time history graph 20/0343/TH1.
- 3.2.2 The noise climate perceived onsite was comprised mainly of distant traffic noise from the A29 and A27, and wildlife noise. There was some noise from construction works relating to the Pig site noted, though this is not expected to have had an impact on night time noise levels.
- 3.2.3 The representative background noise levels recorded during the day and night time measurement periods are set out in table T2 below:



	Representative Background Noise Leve LA90 dB						
Location	Daytime (0700-2300 only)	Night time (24-hour)					
MP1: Chicken Shack flat roof	32	24					

T2 Representative background noise levels, L_{A90} .

4 Plant Noise Limits

- 4.1 The site sits within the jurisdiction of South Downs National Park Authority.
- 4.2 Condition 25 of the site's planning permission (ref: SDNP/16/06186/FUL) refers to the assessment of noise emissions from the scheme's proposed mechanical services installation. This has been set out below for ease of reference:

"Notwithstanding the details of associated with Condition 24, prior to the installation of any fixed plant and / or equipment, a scheme for protecting neighbouring residential premises and on site accommodation from noise generated by the plant and / or equipment shall be submitted to and approved in writing by the South Downs National Park Authority. The scheme shall demonstrate that the combined noise level from all such plant (expressed as an LAeq, 5minute) will be 5dBA below the measured background noise levels (expressed as an LAeq, 5minute) representative of the quietest period of a typical week. The assessment shall be made at 1 metre from the façade of the nearest residential premises. The equipment shall then be installed in accordance with the approved details and shall thereafter be retained in that condition unless otherwise agreed in writing with the South Downs National Park Authority."

4.3 Based on the results of our background noise survey set out within table T2 in addition to the guidance set out above, we recommend that the following plant emission limits are to apply at the nearest noise sensitive premises, illustrated in 20/0343/SP1.

	Noise Emission Limit <i>, L_{Ar,Tr} dB</i> (for plant with no distinguishing feature)						
Location	Daytime (0700-2300 only)	Night time (24-hour)					
All Assessment Positions	27	19					

T3 Plant noise emission limits at the nearest residential properties.



4.4 These limits are to apply to all plant items running simultaneously in the representative time periods, when running at design duty, and are to apply at 1m from the outside of nearby residential windows. Any plant with a tonal component or other distinctive feature out of character with the existing environment would be subject to a further penalty.

5 Plant Noise Assessment

5.1 Proposed Installation

5.1.1 The proposed internal and external units ducted to atmosphere are as follows:

• CU1-CU7:	Daikin RZAG35A Mini Sky;
• CU-8:	Daikin Sky Air RGA100NV1;
• CU-9:	Daikin REYQ20U;
• CU-10:	Daikin REYQ16U;
• CU-11:	Daikin REYQ12U;
• CU-12:	Daikin RZASG71MV1;
 Coldroom Condenser: 	J&E Hall JEHS-0200-B2-M-3;
• EF (x12):	<i>S&P</i> TD-160/100N T SILENT;
 Kitchen Supply: 	Systemair MUB630;
Kitchen Extract:	Systemair MUB100.

- 5.1.2 Condenser units CU1-7 & CU12 and the Coldroom Condenser are to be located against the southern elevation of Grooms House, CU9, CU10 and CU11 are to be located within an area on the eastern elevation of the proposed Woofruff Garage Boiler House & Plant Room. The Kitchen Supply and Extract are to be located within the rear of the Madehurst Lodge Main Building, terminating on its southeastern elevation and through its roof respectively. There are to be a total of 16 extract fans (EF) located throughout the Madehurst Lodge Main Building, terminating at roof level.
- 5.1.3 It is proposed that condensing units CU-1 to CU-12 are to be installed within acoustic enclosures, manufactured by *Environ*. These have been factored in to our assessment accordingly. Should this strategy be revised, it will be essential to inform Cole Jarman, as this will have a significant impact on the resultant noise levels from the scheme.
- 5.1.4 Due to its function in serving guest areas, it is expected that the majority of the plant is to operate on an ad-hoc basis, and as such has been assessed against the night time noise limit. The Kitchen Extract and Supply fans have also been assessed to this limit as it is expected to run between the hours of 0600 hours to 2300 hours daily. Only the condenser CU-10 is expected not to run during the night time hours, and as a result has been assessed against the daytime limits only.



5.2 Methodology

- 5.2.1 Our assessment has used manufacturer's noise data for each plant item as shown in the attached schedule 20/0343/PNS1. The noise data suggests that no tonality correction need be applied. It is also not expected that any other feature corrections would be necessary.
- 5.2.2 The nearest noise sensitive receivers to the proposed plant installation are described below and illustrated on the attached site plan 20/0343/SP1.
 - AP1: South-eastern-facing first floor window of property immediately neighbouring the Chicken Shack to the east;
 - AP2: South-western-facing first floor window of 6 Parletts Barns.
- 5.2.3 The noise levels generated by all mechanical services elements have been calculated by correcting the plant noise levels for distance and radiation losses, façade reflections and screening where appropriate.
- 5.2.4 Summary sheets showing each unit's individual contribution to the noise climate at each assessment position are set out on attached sheets 20/0343/CS1-CS4. Full calculation sheets are available upon request.

5.3 Mitigation

5.3.1 The results of our assessment indicate that mitigation of noise emissions from all units will be required in order to meet the Local Authority noise emission limits as imposed by Condition 25.

Fans

5.3.2 It will be necessary to install in-duct silencers within the kitchen supply, kitchen extract and all EF fan atmospheric duct routes. The minimum insertion loss requirement for these silencers can be found in table T4 below.

			Inc	ortion I	oss (dB	e) at			
Silencer	Insertion Loss (dB) at Octave Band Centre Frequency (Hz)								
	63	125	250	500	1k	2k	4k	8k	
AS-1 Kitchen Supply	4	7	13	19	23	23	16	13	
AS-2 Kitchen Extract	5	8	14	15	15	8	6	4	
AS-3 All EF fans	1	2	4	10	13	10	10	9	

T4 Required silencer insertion losses.



5.3.3 The silencers should be located within the demise of the building, close to the fans so that noise breakout from the duct is also reduced. The kitchen extract fan silencer should be Melinex-faced to allow for cleaning. We would expect the insertion losses required for each of the silencers set out above to be achieved with the following configurations:

AS-1 Kitchen Supply:	900mm length, 40% free area;
• AS-2 Kitchen Extract:	900mm length, 47% free area (Melinex-faced);

- AS-3 All EF fans: 280mm diameter, 560mm long unpodded.
- 5.3.4 All fans should be mounted on anti-vibration mounts and have flexible ductwork connections to control structure-borne sound transmission. The air discharge louvres should be sized at a face velocity of not more than 2 m/s.
- 5.3.5 The ductwork on the extract and fresh air fans must be appropriately sized so that the pressure loss across the silencer does not exceed 40 Pa. This is to avoid regenerative noise from air turbulence.

Condensing Units

- 5.3.6 The results of our assessment indicate that the specified *Environ* acoustic enclosures for condensing units CU-1 to CU-12 will be sufficient in limiting noise emissions from these units to the nearest noise sensitive receptors.
- 5.3.7 However, it will be necessary to install the Coldroom Condenser in a similar acoustic enclosure.
- 5.3.8 Due to the high performance necessary, the required enclosure should take the form of a manufactured enclosure. Examples of companies which produce high performance enclosures include Environ Technologies Ltd¹ and Sound Planning Ltd². The minimum insertion loss requirements for the enclosure can be found in table T5 below. The enclosure must be sized to allow sufficient airflow to the condenser unit.

¹ http://www.Environ.co.uk

² http://www.soundplanning.co.uk/



Enclosure	Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
ENC-1 Condenser Enclosure	12	13	20	29	35	35	35	25

T5 Required enclosure insertion losses.

5.3.9 The rating noise levels calculated with the mitigation measures specified above are shown in table T6.

	Rating Noise Lev	/el, L _{Ar,Tr} dB (Limit)
Assessment Position	Daytime (0700-2300)	Night Time (2300-0700)
AP1: South-eastern 1F window to property neighbouring the Chicken Shack	19 (27)	18 (19)
AP2: South-western 1F window to 6 Parletts Barns	19 (27)	18 (19)

T6 Plant noise emission levels at assessment positions.

6 Conclusions

- 6.1 It is proposed to develop a new *The Pig Hotel* in the South Downs area, within the village of Madehurst. As part of these works, mechanical services plant will be installed to serve air conditioning to the venue, in addition to kitchen services units.
- 6.2 An environmental noise survey has been conducted at the site, and appropriate mechanical services noise limits derived based on its results.
- 6.3 Noise mitigation measures have been recommended on the basis of a subsequent assessment of the proposed units and it has been shown that the limits would be met at all times.

End of Section



Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq} .

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

LA10 & LA90:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

 L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n .

$L_{\rm AX}, L_{\rm AE} \text{ or SEL}$

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

End of Section

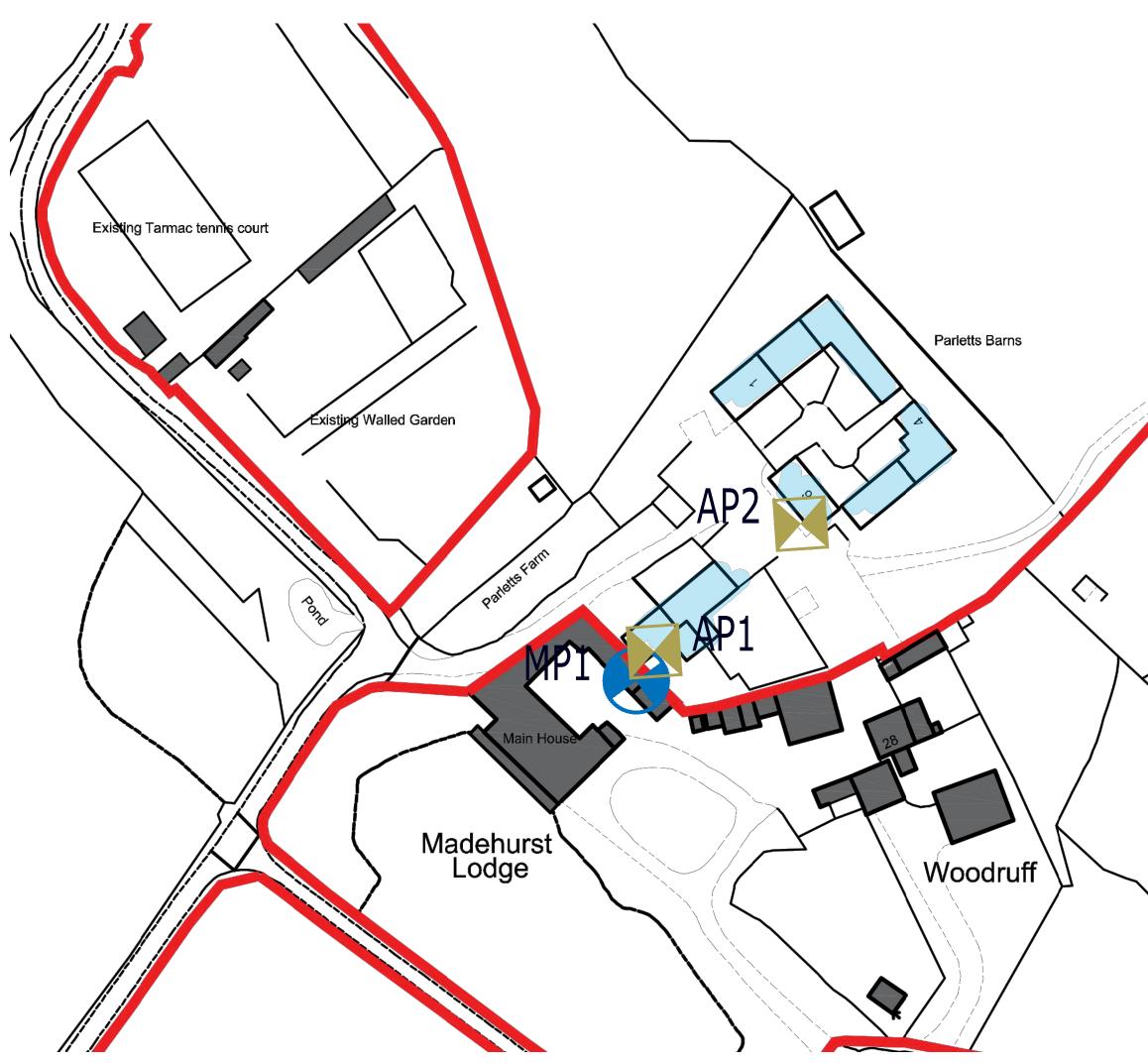




Figure 20/0343/SP1

Title:

Site plan illustrating unattended measurement and assessment positions





Measurement Position



Assessment Position



Project:

The Pig in the South Downs, Madehurst

Date:

Revision:

October 2020

_

Scale:

Not to scale

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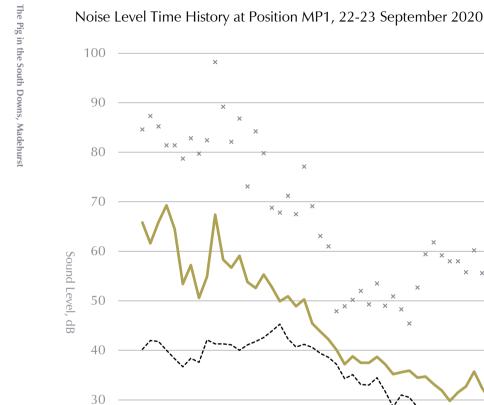


Figure 20/0343/TH01

× LAmax

LAeq

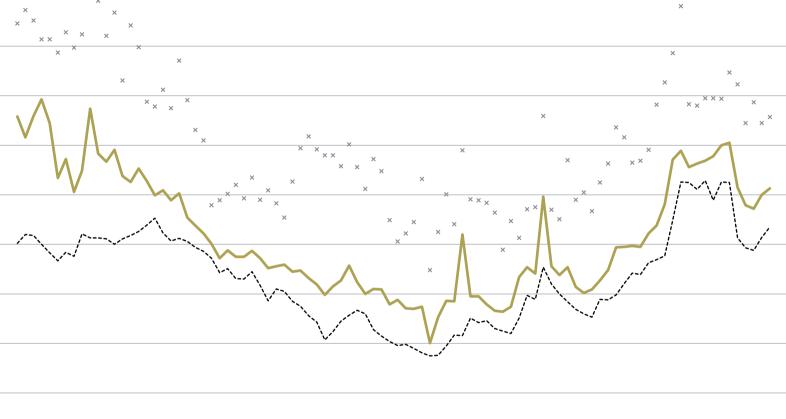
----- LA90



20

10

0



11:00 12:00 13:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 14:00

Measurement Time



Schedule of Plant and Air Handling Equipment Sound Levels, dB

Reference	Description	Data SourceNoise Level Type		Noise Levels (dB)								
Kelerence	Description		endise level Type	63	125	250	500	1k	2k	4k	8k	
CU1-7	7x Condensing units along Grooms House rear	Man	Sound Power, Lw	65.0	65.0	62.0	62.0	57.0	50.0	45.0	39.0	
CU8	Condensing unit to rear of Woodruff Garage plant room	Man	Sound Power, Lw	48.0	56.0	49.0	47.0	44.0	36.0	34.0	27.0	
CU9	Condensing unit to rear of Woodruff Garage plant room	Man	Sound Power, Lw	97.0	87.0	87.0	88.0	81.0	76.0	74.0	70.0	
CU10	Condensing unit to rear of Woodruff Garage plant room	Man	Sound Power, Lw	94.0	90.0	85.0	85.0	77.0	75.0	73.0	71.0	
CU11	Condensing unit to rear of Woodruff Garage plant room	Man	Sound Power, Lw	90.0	85.0	83.0	81.0	76.0	74.0	75.0	67.0	
CU12	Condensing unit along Grooms House rear	r Man	Sound Power, Lw	74.0	73.0	65.0	64.0	59.0	52.0	55.0	45.0	
Coldroom Condenser	Condensing unit along Grooms House real	r Man	Sound Pressure, Lp @ 1m	56.0	56.0	54.0	51.0	48.0	42.0	34.0	29.0	
EF	Fans located throughout Lodge Main Building	Man	Sound Power, Lw	30.0	34.0	37.0	48.0	51.0	47.0	41.0	31.0	
Kitchen Supply	Fan terminating through louvre of Lodge Main Building southeastern elevation	Man	Sound Power, Lw	73.0	75.0	79.0	81.0	80.0	77.0	72.0	72.0	
Kitchen Extract	Fan terminating at roof level of Lodge Main Building roof	Man	Sound Power, Lw	56.0	74.0	75.0	79.0	80.0	78.0	73.0	66.0	

20/0343/PNS1



Notes

Page 2 of 2

1 - Man refers to data supplied by the equipment manufacturer or supplier, Emp refers to data calculated using empirical formulae, and Meas refers to data measured by Cole Jarman



20/0343/CS1

4k 8k

Project Name	The Pig in the South Downs, Madehurst			То	Total Noise Levels						
Project Reference	20/0343										
Receiver Reference		30									
	AP1 Day AP1 Day Neighbour's SE-facing 1F window	20)—	_							
Description	_	1()—	-	-						
Noise Limit	27	(63	125	250	500	1k	2k			
dBA	18.8				Fre	equen	cy (H	z)			

Reference	Noise Levels (dB)									
	63	125	250	500	1k	2k	4k	8k		
CU1-7	8.3	4.5	-7.5	-16.5	-28.5	-36.5	-43.5	-49.5		
CU9	34.9	21.4	11.6	1.0	-13.0	-19.0	-23.0	-27.0		
CU10	31.9	24.4	9.6	-2.0	-17.0	-20.0	-24.0	-26.0		
CU11	27.9	19.4	7.6	-6.0	-18.0	-21.0	-22.0	-30.0		
CU12	11.9	7.4	-10.4	-23.0	-35.0	-43.0	-42.0	-52.0		
CU8	-14.1	-9.6	-26.4	-40.0	-50.0	-59.0	-63.0	-70.0		
Kitchen Extract	-18.6	-1.5	-1.8	3.4	2.7	3.8	0.6	-3.9		
Kitchen Supply	18.0	19.8	17.1	10.3	3.1	-0.6	1.4	4.5		
EF	-15.7	-8.6	-3.4	5.5	8.3	6.3	0.3	-8.7		
Coldroom Condenser	3.4	-0.4	-11.4	-23.4	-33.4	-40.4	-50.4	-55.4		



20/0343/CS2

4k 8k

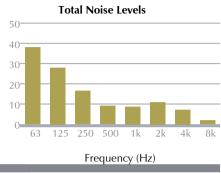
Project Name	The Pig in the South Downs, Madehurst		50-		То	tal No	oise Lo	evels	
Project Reference	20/0343	(dB)	40-						
Receiver Reference	AP1 Night	Levels	30-						
Description	Neighbour's SE-facing 1F window	Noise L	20- 10-						
Noise Limit	19	Ż	0=						
dBA	18.1			63	125	250 Fre	500 equen	1k cy (H	2k z)

Reference		Noise Levels (dB)									
	63	125	250	500	1k	2k	4k	8k			
CU12	11.9	7.4	-10.4	-23.0	-35.0	-43.0	-42.0	-52.0			
CU11	27.9	19.4	7.6	-6.0	-18.0	-21.0	-22.0	-30.0			
CU9	34.9	21.4	11.6	1.0	-13.0	-19.0	-23.0	-27.0			
CU8	-14.1	-9.6	-26.4	-40.0	-50.0	-59.0	-63.0	-70.0			
CU1-7	8.3	4.5	-7.5	-16.5	-28.5	-36.5	-43.5	-49.5			
EF	-15.7	-8.6	-3.4	5.5	8.3	6.3	0.3	-8.7			
Coldroom Condenser	3.4	-0.4	-11.4	-23.4	-33.4	-40.4	-50.4	-55.4			
Kitchen Supply	18.0	19.8	17.1	10.3	3.1	-0.6	1.4	4.5			
Kitchen Extract	-18.6	-1.5	-1.8	3.4	2.7	3.8	0.6	-3.9			



20/0343/CS3

Project Name	The Pig in the South Downs, Madehurst	
Project Reference		s (dB)
Receiver Reference	AP2 Day	Levels
Description	SW-facing 1F window of 6 Parletts Barns	loise
Noise Limit	27	Ζ
dBA	18.6	

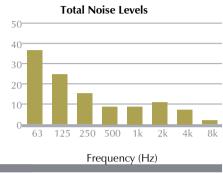


Reference		Noise Levels (dB)									
	63	125	250	500	1k	2k	4k	8k			
CU1-7	11.3	7.5	-5.1	-14.1	-26.1	-34.1	-41.1	-47.1			
CU9	35.7	22.2	12.4	1.6	-12.4	-18.4	-22.4	-26.4			
CU10	32.7	25.2	10.4	-1.4	-16.4	-19.4	-23.4	-25.4			
CU11	28.7	20.2	8.4	-5.4	-17.4	-20.4	-21.4	-29.4			
CU12	12.7	8.2	-9.6	-22.4	-34.4	-42.4	-41.4	-51.4			
Kitchen Extract	-23.6	-4.7	-2.9	4.8	6.6	10.3	6.8	1.4			
Kitchen Supply	9.5	11.2	8.8	1.4	-7.2	-13.6	-11.6	-8.5			
CU8	-13.3	-8.8	-25.6	-39.4	-49.4	-58.4	-62.4	-69.4			
EF	-20.1	-13.0	-7.7	1.1	3.9	1.9	-4.1	-13.1			
Coldroom Condenser	6.3	2.6	-9.1	-21.1	-31.1	-38.1	-48.1	-53.1			



20/0343/CS4

Project Name	The Pig in the South Downs, Madehurst	5
Project Reference	20/0343 ^(fig)	4
Receiver Reference	AP2 Night	3
Description	SW-facing 1F window of 6 Parletts Barns	2
Noise Limit	19	
dBA	17.6	



Reference	Noise Levels (dB)									
	63	125	250	500	1k	2k	4k	8k		
CU12	12.7	8.2	-9.6	-22.4	-34.4	-42.4	-41.4	-51.4		
CU11	28.7	20.2	8.4	-5.4	-17.4	-20.4	-21.4	-29.4		
CU9	35.7	22.2	12.4	1.6	-12.4	-18.4	-22.4	-26.4		
CU8	-13.3	-8.8	-25.6	-39.4	-49.4	-58.4	-62.4	-69.4		
CU1-7	11.3	7.5	-5.1	-14.1	-26.1	-34.1	-41.1	-47.1		
EF	-20.1	-13.0	-7.7	1.1	3.9	1.9	-4.1	-13.1		
Coldroom Condenser	6.3	2.6	-9.1	-21.1	-31.1	-38.1	-48.1	-53.1		
Kitchen Supply	9.5	11.2	8.8	1.4	-7.2	-13.6	-11.6	-8.5		
Kitchen Extract	-23.6	-4.7	-2.9	4.8	6.6	10.3	6.8	1.4		

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